AN INVESTIGATION OF THE DETERMINANTS OF INTRA-INDUSTRY TRADE BETWEEN ZAMBIA AND ITS TRADING PARTNERS IN THE SOUTHERN AFRICAN DEVELOPMENT COMMUNITY (SADC)

MASTER OF ARTS (ECONOMICS) THESIS

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UNIVERSITY OF MALAWI
CHANCELLOR COLLEGE

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Master of Arts (ECONOMICS) Thesis

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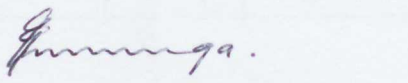
DECLARATION

I the undersigned, hereby declare that this dissertation is substantially my original work and that, to the best of my knowledge, has never been submitted for similar purposes to this or any other University or Institution of higher learning. Where work of others has been used, acknowledgements have been duly given.

Mulenga Chonzi Mulenga



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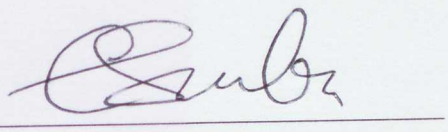

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DEDICATION

This thesis is dedicated to my parents Mark and Agness - you will always be with me.

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ABSTRACT

It has been hypothesised that the degree of specialization in Intra Industry Trade (IIT) is highly correlated with the level of a country's development. Therefore, since specialization mostly characterizes manufacturing goods and not primary commodity exports of which countries in the Southern African Development Community (SADC) are mainly dependent on, IIT has generally been perceived to be a feature of the industrialized countries. The past few years have seen a rapid increase in Zambia's trade with its trading partners in the SADC. Trade statistics show that substantial part of the intra-SADC trade is in fact IIT. This study therefore tries to establish the extent of the existence of IIT between Zambia and its trading partners in the SADC region and to identify the determinants of IIT between Zambia and its trading partners in SADC.

Using a modified gravity model in a panel data framework for the years 1998 to 2006, the estimation results from the Feasible Generalized Least Squares in the random effects model evaluates the existence of IIT between Zambia and its trading partners in the SADC. The empirical results reveal that gross domestic product (GDP), dissimilarities in per capita income (DPCI), transportation costs (distance and common border) and colonial ties (common language) are significant factors in explaining IIT between Zambia and its trading partners in the SADC. The results also reveal that IIT between Zambia and its trading partners in the SADC is positively determined by GDP, distance, and dummies for common border and common language while dissimilarities in per capita income (DPCI) depresses it.

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LIST OF ACRONYMS AND ABBREVIATIONS

AGOA:	African Growth Opportunity Act
ASEAN:	Association of Eastern Asian Nations
CEMAC:	Central African Economic and Monetary Community
COMESA:	Common Market for Eastern and Southern Africa
CTIP:	Commercial Trade and Industrial Policy
DIST:	Distance
DPCI:	Dissimilarity in Per-Capita Income
DRC:	Democratic Republic of Congo
EAC:	East African Community
EBA:	Everything But Arms
ECOWAS:	Economic Community of West African States
EPA:	Economic Partnership Agreement
EPZs:	Export Processing Zones
ESA:	East and Southern Africa
EU:	European Union
FGLS:	Feasible Generalized Least Squares
FNDP:	Fifth National Development Plan
FTA:	Free Trade Area
GDP:	Gross Domestic Product
G-L:	Grubel Lloyd
GLS:	Generalised Least Squares
GNP:	Gross National Product
HIIT:	Horizontal Intra-Industry Trade

H-O:	Heckscher-Ohlin
HS:	Harmonised System
IIT:	Intra-Industry Trade
IMF:	International Monetary Fund
LDCs:	Least Developed Countries
LSDV:	Least Squares Dummy Variable
MFEZ:	Multi-Facility Economic Zone
MFN:	Most Favoured Nation
NAFTA:	North American Free Trade Area
NTBs:	Non-Tariff Barriers
NTT:	New Trade Theories
OAU:	Organization of African Unity
OLS:	Ordinary Least Squares
PCI:	Per-Capita Income
PTA:	Preferential Trade Area
RSA:	Republic of South Africa
SACU:	Southern African Customs Union
SADC:	Southern African Development Community
SADCC:	Southern African Development Coordination Conference
SNDP:	Sixth National Development Plan
TDCA:	Trade Development and Co-operation Agreement
TI:	Trade Intensity
UDEAC:	Customs and Economic Union of Central Africa
UNCTAD:	United Nations Conference on Trade and Development
UNECA:	United Nations Economic Commission for Africa

VIIT:	Vertical Intra-Industry Trade
WAEMU:	West African Economic and Monetary Union
WB:	World Bank
WTO:	World Trade Organization
ZDA:	Zambia Development Agency

CHAPTER ONE

INTRODUCTION

1.1. Motivation of the Study

International trade involves the exchange of various commodities between countries. Countries the world over have over the years been involved in various exchanges of goods and services in what is commonly known as trade. There are two types of trade: Intra-Industry Trade and Inter-Industry Trade. Intra-Industry Trade (IIT) is the simultaneous import and export of products belonging to the same group, such as the two-way exchange of differentiated textiles or vehicles. Inter-Industry Trade refers to trade in products that belong to different industrial groups, for instance the import of textiles and the export of maize.

Comparative advantage models in trade have implicitly assumed that countries mostly trade in goods that are homogenous and that a country will therefore either only export goods within the same industry or only import these goods, but not simultaneously import and export goods within the same industry. However, a large portion of modern trade is in differentiated rather than homogenous products of the same industry; that is, IIT as opposed to Inter-Industry Trade in completely different products (Kocyigit and Sen, 2007).

Intra-Industry Trade arises from the fact that countries try to take advantage of economies of scale in production and because of this it has generally been regarded as a way in which countries involved in trade stand to benefit. This can be achieved through increasing trade among them, and it is in this vein that many countries in the Southern African Development Community (SADC) have realized the potential benefits and have therefore advocated for its expansion.

While many studies[1] on developing country IIT have been undertaken in international trade, previously, most studies placed greater emphasis on a country's comparative advantage as the basis of trade. This tendency however, ignored the IIT theories which are important in understanding and analysing trade patterns between countries which are relatively similar and produce relatively similar products.

Since the early 1980s, numerous studies have attempted to identify the determinants of IIT. These studies can be divided into two groups: country-specific studies and industry-specific studies. The country-specific studies explain IIT through the macroeconomic variables in each country, such as per capita income, country size, distance, and trade orientation (DeRosa and Roningen, 2003). Industry-specific studies explain an industry's IIT as a function of industry-specific variables, such as scale variables, advertising/sales ratio and firm concentration ratio (DeRosa and Roningen, 2003). Some studies have attempted to combine both country and industry variables to identify determinants of IIT. This study, however, employs the country variables using the gravity model of trade which explores the trade partner composition as well as the trade commodity composition. Despite the theoretical relevance and successful empirical performance of the gravity model, very few studies have focussed on Zambia's IIT, and on Zambia and the SADC region in particular using the model although there is strong evidence for increasing IIT among developing countries. As IIT is considered to have potential benefits in terms of improving a country's economic prospects, the study attempts to establish the extent of the existence of IIT between Zambia and its trading partners in the SADC and therefore establish the determinants of this trade which in essence will provide guidelines to trade theory and knowledge. This study therefore tries to make a

[1] Studies on developing country IIT include Aquino (1978), Balassa (1979), Havrylyshyn and Civan (1983), Manrique (1987), Lee and Lee (1993), Stone and Lee (1995), Gonzalez and Velez (1995), Havrylyshyn and Kuznel (1997), Hu and Ma (1999), and Nilsson (1999).

modest contribution to knowledge and to the relatively small stoke of research on Zambia's IIT.

1.2. Background

International trade has played a significant role in integrating developing countries into the global world economy. Over the past five decades, Africa has been experimenting with economic integration and this led to the emergence of SADC in 1992 which evolved from the Southern African Development Coordination Conference (SADCC) formed in 1980. Regional trade integration is generally seen as a means of fostering economic growth and development through increased intra-regional trade and cross border investment (Chauvin and Gaulier, 2002). One of the main features of SADC is to coordinate sector or industry programs among member countries. Theoretical and empirical researchers have been keenly interested in the trade occurring among SADC member countries. This trade has been commonly referred to as IIT as countries in SADC are perceived to have similar economic structures. Formally, the concept of IIT refers to trade in differentiated products produced by the same industry or linked to a broad category of products. A measure of IIT is the Grubel-Lloyd (G-L) index. The G-L index measures IIT as a percentage of a country's total trade and it takes on values from zero (0) to one (1) as the extent of IIT increases. Thus, the closer the G-L index is to 1, the more the IIT. The closer the G-L index is to 0 the more the Inter-Industry Trade.

Greenaway, *et al.* (1995) state that there are two classifications of IIT; Firstly, Horizontal Intra Industry Trade (HIIT), which involves the simultaneous import and export of different varieties of a given product, such as cars of a similar class and price range. Secondly, Vertical Intra-Industry Trade (VIIT), which involves trade in products distinguished by quality and price, for instance export of high quality clothing and imports of lower quality clothing.

Zambia undertakes trade with other countries in the SADC and most of this trade involves the exchange of differentiated products that belong to the same industry. SADC is an organization of 14 African states comprising; Zambia, Angola, Botswana, Democratic Republic of Congo (DRC), Lesotho, Malawi, Mauritius, Mozambique, Namibia, Republic of South Africa (RSA), Seychelles, Swaziland, Tanzania and Zimbabwe.

The rationale behind economic integration especially in the area of trade has been the opportunity that such preferential trading arrangements offer for trade expansion among developing countries through opening up of markets (Ndhlovu, 1998). In line with opening up markets, by 1998, nine out of the 14 SADC members (Botswana, DRC, Lesotho, Malawi, Namibia, RSA, Swaziland, Mozambique and Zambia) had moderately opened or fully opened their trade regimes (Damiyano, 2008). Establishment of SADC led to trade liberalization and deregulation which resulted to the change in the composition and direction of Zambia's trade. Prior to liberalization, Zambia conducted more trade with high income countries especially Europe and Asia as compared to other countries in SADC which absorbed and supplied a very small proportion of its exports and imports. Evidence from trade statistics suggest that intra-SADC trade has been on the rise over the past two decades (TIPS, 2007). This study therefore evaluates the existence of this trade and more precisely, the determinants of IIT.

1.3. Statement of the Problem

Over the years, it has been assumed that the degree of specialization in IIT is highly correlated with the level of a country's development. Therefore, since specialization mostly characterizes manufacturing goods and not primary commodity exports on which countries in the SADC are mainly dependent for their economic survival, IIT has generally been perceived to be a feature of the industrialized countries. However, trade statistics show that substantial part of the intra-SADC trade is in fact IIT. For instance in

2004, the G-L index as calculated at a four digit Harmonised System (HS) code level, revealed that Zambia's top 15 categories of products had a G-L index above 0.6 in its trade with other countries in the SADC region except South Africa (TIPS[2], 2007).[3] See Appendix 1.

This study in its own right tries to establish the extent of the existence of IIT between Zambia and its trading partners in the SADC region and to identify the determinants of IIT between Zambia and its trading partners in SADC. A number of studies[4] have been done to address similar issues in Africa but there is no published study on the determinants of Zambia's IIT with SADC countries.

1.4. Research Questions

The paper will attempt to answer the following questions:

1. What is the extent of the existence of IIT between Zambia and its trading partners in SADC?
2. What are the main factors that influence the levels of IIT between Zambia and its trading partners in the SADC?

1.5. Objectives of the Study

General Objectives

The overall objectives of the study are:

1. To establish the extent of the existence of IIT between Zambia and its trading partners in the SADC region.

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[2] Trade and Industrial Policy Strategies
[3] A G-L index value of 0.6 means that the proportion of IIT is high
[4] Studies include Musonda (1997), Chidoko *et al.* (2006), Simwaka (2006).

2. To identify the determinants of IIT between Zambia and its trading partners in SADC.

Specific Objectives

Within the overall objectives, the specific objectives are:

1. To evaluate the existence of IIT between Zambia and its trading partners in SADC.
2. To identify the significant factors influencing the levels of IIT between Zambia and its trading partners in the SADC.

1.6. Research Hypothesis

This study seeks to tests the following hypotheses:

1. There is no IIT between Zambia and its trading partners in SADC.
2. Intra-Industry Trade does not necessarily take place among countries with larger economic size or same levels of development.

1.7. Scope of the study

The study uses a panel data approach composed of 11 of Zambia's major trading partners in SADC for the period 1998-2006. This period captures the transition in Zambia's bilateral trade partner composition given the rapidly growing Zambian bilateral trade with other countries in SADC. The trade partners included in this study include; RSA, Zimbabwe, Malawi, Botswana, DRC, Tanzania, Namibia, Angola, Mozambique, Mauritius and Swaziland. The choice of countries was made mainly on the availability of data on the variables used in the model as well as whether the commodities exhibit IIT.

1.8. Significance of the Study

Many studies on IIT state that IIT is prevalent among countries with almost similar economic structures. One thing to note from theoretical and empirical studies involving the determinants of IIT among developing countries is that bilateral trade depends primarily on three variables – the size of an economy, the level of development and the geographical distance between economic centres (Verdoorn, [1960], Kimura and Lee [2004]). Most studies have paid insufficient attention to the role of other country-specific factors such as adjacency, historical ties, trade intensity and exchange rate.

This study is significant in the following aspects; by evaluating the existence of IIT, the study determines whether trade in actual fact takes place among countries with similar economic structures and therefore provides policy guidelines within SADC. Furthermore, by outlining the determinants of IIT between Zambia and its trading partners in SADC, this study sheds more light on how IIT is determined by various economic factors other than the size of an economy, level of development and the geographical distance between economic centres. Therefore, this study is expected to equip trade policy makers with important insight to design strategies for improvement of overall trade in the region, and more precisely Zambia's trade balance.

1.9. Organization of the Study

This study is structured into six chapters. The remainder of this study is as follows: Chapter Two provides an overview of SADC and Zambia's trade during the past two decades. Chapter Three comprises of the theoretical and empirical review of international trade theory to support the analytical methods used in this study. Chapter Four discusses the methodological approach, data and variables used for the analysis employed. Chapter Five discusses the estimated results from the specified model used for this study. Chapter Six summarizes the results of the study and discuses these results with respect to the study's contribution to the literature of IIT.

CHAPTER TWO

AN OVERVIEW OF SADC AND ZAMBIA'S TRADE

2.0. Introduction

The Organization of African Unity (OAU) and the United Nations Economic Commission for Africa (UNECA) had actively encouraged the formation of regional bodies to pave way for the establishment of an African Common Market (Musonda, 1995). The rationale behind the formation of these regional trading blocs was to advocate for trade liberalization and deregulation which would therefore allow the free flow of commodities across borders of trading partners. This in essence led to the establishment of a number of regional groupings such as the Economic Community of West African States (ECOWAS), the Central African Economic and Monetary Community (CEMAC) which succeeded the Customs and Economic Union of Central Africa (UDEAC) in 1999, the Preferential Trade Area for Eastern and Southern Africa (PTA) which later transformed into Common Market for Eastern and Southern Africa (COMESA) in 1994, the East African Community (EAC) and SADC. This chapter gives a brief discussion of Zambia's economic structure, trade policy, and the relative importance of SADC in Zambia's trade.

2.1. Economic Structure of SADC Countries

The economic structures of the SADC countries though similar reflect some heterogeneity. Historically, SADC countries had been overwhelmingly dependent on a single sector (either mining or agriculture), thereby being vulnerable to economic shocks. For instance, an economy dominated by agriculture is susceptible to adverse weather conditions. At the same time, a country that depends too much on the mining sector is susceptible to international price fluctuations, as was the case for Zambia in the 1970s

(TIPS, 2007). However, recent developments in SADC reveal that many countries have relatively diversified their economies.

Table 2.1: SADC Sectoral Contribution to GDP in 2000 and 2005.

Country	Services (%)		Agriculture (%)		Manufacturing(%)		Mining (%)	
	2000	2005	2000	2005	2000	2005	2000	2005
Angola	22.20	18.70	5.70	6.90	3.00	3.00	69.00	71.00
Botswana	36.10	35.10	4.10	3.20	2.00	2.00	58.00	60.00
DRC	29.40	31.20	49.40	41.10	5.00	5.00	16.00	23.00
Lesotho	36.60	37.60	16.80	14.10	15.00	16.00	31.00	33.00
Malawi	38.40	39.50	35.70	29.90	12.00	11.00	14.00	20.00
Mauritius	54.40	59.30	20.50	17.50	5.00	5.00	20.00	18.00
Mozambique	42.70	42.00	23.50	22.40	12.00	16.00	22.00	19.00
Namibia	54.70	54.40	10.00	10.80	10.00	8.00	25.00	27.00
RSA	59.00	60.90	3.00	2.60	17.00	16.00	21.00	20.00
Swaziland	27.60	28.70	10.80	9.50	25.00	24.00	37.00	38.00
Tanzania	36.20	34.80	41.60	38.40	7.00	7.00	15.00	20.00
Zambia	46.70	45.20	19.90	16.40	10.00	10.00	23.00	28.00
Zimbabwe	48.50	40.40	15.90	13.60	14.00	10.00	22.00	36.00

Source: World Development Indicators (2007).

Table 2.1 shows the contribution of various sectors to a country's GDP in the years 2000 and 2005. Traditionally, the economies of DRC, Malawi, Mozambique and Tanzania were driven by the agricultural sector. While the agricultural sector continued to be dominant in DRC and Tanzania with a contribution of 41 percent and 38 percent to GDP respectively in 2005, this was no longer the case for Malawi and Mozambique as diversification in these economies had taken place and the economies were now being driven by the services sector (TIPS, 2007). The Mauritian economy was also for a long time driven by the agricultural sector until the introduction of the adjustment programs in the 1980's. Since then economic development has been fostered through export led industrialization, agricultural diversification and the expansion of the tourism sector

(Chauvin and Gaulier, 2002). In Seychelles, the services sector is the dominant sector and it results from the importance of the tourism sector (Chauvin and Gaulier, 2002).

The economies of Angola, Botswana, Lesotho, Swaziland, RSA and Zimbabwe were previously driven by the mining sector. The mining sector continued to be dominant in Angola, Botswana and Swaziland with a contribution of 71 percent, 60 percent and 38 percent respectively to GDP in 2005, while the economies of Lesotho, RSA and Zimbabwe have in recent years transformed to service-driven economies (TIPS, 2007). For a very long time the Zambian economy was dominated by the mining sector however, statistics show that in 2005, the service sector contributed 45 percent to GDP as compared to the mining sector which contributed 28 percent (TIPS, 2007). The role of the mining sector-especially that copper prices have been surging upwards since 2004 as well as that of the agriculture sector to the country's economic prospects however, cannot be ignored.

Although historically, the economies of most countries in the SADC were characterised by the domination of either the mining or agriculture sectors, the statistics in Table 2.1 reveal that most of the countries have in actual fact diversified their economies. Most countries have transformed into being service-driven economies but also continue to participate in their historical sectors (mining or agriculture). For instance, as of 2005, the Zambian economy had transformed to being a service-driven economy but the mining sector also contributed significantly to the country's GDP (28 percent) (TIPS, 2007).

2.2. SADC and Zambia's Trade Policy

Historically, Southern African countries led interventionist and protectionist trade regimes. On the import side, there were extensive uses of restrictive licensing systems, high tariffs with escalated and cascading structures, varying degrees of import prohibitions and tight foreign exchange controls were implemented. While on the export

side, there were substantial implicit and explicit export taxes and prohibition of certain items of exports (Kalenga, 1999). The trade policy advocated by countries in the SADC was liberalization of intra-regional trade using both tariff and non tariff instruments. Tariff instruments involved participation to regional arrangements; this resulted in lower tariff rates and less dispersion in tariff regimes in individual countries. On the other hand, trade policy related to non-tariff barriers (NTBs) involved reduction on; quantitative restrictions on certain imports such as agricultural imports (maize, wheat and dairy products), customs documentation and related procedures, border related controls and transportation of goods and persons, foreign exchange bottlenecks which tend to discourage trade transactions, delays in payments, clearance and settlement systems.

Since the late 1980's, Zambia has been undergoing a reform programme with the support of the International Monetary Fund (IMF), the World Bank (WB) and bilateral donors. The reform programme was aimed at bringing about macroeconomic stability so as to induce real growth in the economy, which had been declining since the 1970's (UNCTAD, 2006). The reforms involved the liberalization of the domestic markets in goods and services through the reduction of tariffs and the removal of quantitative restrictions on exports and imports. The liberalization of financial markets through the removal of exchange controls on the capital account and the privatization of a dominant sector of state-owned companies (UNCTAD, 2006). Other reforms included: The Duty Drawback System which involved the reimbursement of exporters for the customs duties and other taxes that they had paid on imported inputs. This strategy was meant to give producers access to inputs at world prices (TIPS, 2007). Another strategy initiated was the Export Processing Zone (EPZ) programme implemented under the Multi-Facility Economic Zones (MFEZ) which offered fiscal and non-fiscal incentives that included tax holidays for the first 10 years and relief on import duties of all imported raw materials and intermediate and capital goods. However, only firms with an initial investment of over US$ 500 000 were eligible to benefit (TIPS, 2007).

Zambia's trade policy as outlined in several policy framework papers aims at pursuing an outward-oriented, export-led trade strategy based on open markets and international competition (UNCTAD, 2006). Openness to trade has become essential for developing countries to keep up with the global trend and progress so as to compete effectively in an increasingly integrated world economy. The policy seeks to achieve this objective by directing resources to the most productive areas necessary for export production using the tariff policy as its main instrument. This can be achieved by designing a simple and rational tariff structure that promotes development and takes account of revenue implications and adjustment costs to industry, thus safeguarding policy space that is important to development, employment generation and poverty reduction (UNCTAD, 2006).

2.3. SADC and Zambia's Trade Structure and Performance

The SADC trade structure remains unchanged since the formation of SADC in 1992. The majority of SADC countries specialise in the export of raw materials for example mineral fuels, oil and precious metals while importing technologically advanced goods such as machinery and other value-added products used in the manufacturing production process from advanced economies. The regions dependency on the exportation of primary goods reflects the deep-rooted supply side constraints which exist and in particular the persistence of the shortages of skills that would normally play a pivotal role in adding value to these exports (TIPS, 2007).

Although the SADC region is usually regarded as one of the richest regions in Africa in terms of raw materials, its trade performance remains nevertheless low as compared to other regional blocs (TIPS, 2007). Trade statistics show that the European Union (EU) contributed the greatest share of exports in world exports from 2000 to 2006 (38 percent in 2000 and 39 percent in 2006) accounting for two fifths of world exports (Kalaba and

Tsedu, 2008). It was followed by North American Free Trade Area (NAFTA)[5] bloc, then the Association of Eastern Asian Nations (ASEAN)[6]. The SADC bloc was the least, with contributions of 0.8 percent in 2000 and 1.0 percent in 2006 accounting for an average of only 0.9 percent of world exports (Kalaba and Tsedu, 2008). However, SADC has recorded some growth in its total trade volumes. Trade statistics show that in the period 2000-2005, SADC's total trade with the rest of the world almost doubled, increasing from US$ 71.3 billion to US$ 138.2 billion. The value of exports also rose from US$ 50 billion in 2000 to over US$ 113 billion in 2006 representing a more than 100 percent growth per annum. During this period the EU was the region's major trading partner as it absorbed most of its exports and supplied most of its imports. It was followed by NAFTA bloc, then ASEAN (Kalaba and Tsedu, 2008). Other regions such as ECOWAS and CEMAC also experienced a rise in total exports. For ECOWAS, the value of total exports rose from US$ 35.4 billion in 2000 to US$ 76.7 billion in 2006 while for CEMAC the value of total exports rose from US$ 8.3 billion to US$ 26.4 billion for the years 2000 and 2006 respectively (UNCTAD, 2009).

2.3.1. Intra-SADC Trade Performance

Historically, there has been very little intra-SADC trade. However on a general level, SADC countries have been increasing their trade with each other since the 1980's. One of the main aspects of the Southern Africa sub-region is that it is dominated by the economic performance of the RSA, the largest economy of the region as almost all countries in SADC depend on its exports. The only other significant exports within the region that did not involve RSA were those of Mozambique to Zimbabwe which had export shares of 17.7 percent in 2000 but later declined to 2.9 percent in 2006 (Kalaba and Tsedu, 2008). The reason for the decline could be attributed to the economic and

[5] Comprises Canada, Mexico and The United States of America.
[6] Comprises Brunei Darussalam, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand and Vietnam.

social-political challenges that Zimbabwe was facing within the same period. According to Kalaba and Tsedu (2008), RSA dominated trade within SADC by supplying 70 percent of total intra-SADC export shares in the years 2000 and 2006. Swaziland had the highest shares of exports intended for SADC in 2000 and 2006. Other countries which already had high shares at the implementation of the SADC trade protocol in 2000 were Mozambique (35.8 percent), Malawi (34 percent), Namibia (33.5 percent) and Zambia (29.1 percent) (Kalaba and Tsedu, 2008). However, only Zambia managed to increase its share in 2006 to 35.4 percent, while the other 3 countries experienced reductions in their shares of exports to SADC. Countries that had the lowest export shares to SADC were Tanzania and Mauritius with values of 5.3 percent and 6.5 percent respectively, however both countries experienced increased export shares in 2006. They recorded 18.9 percent and 7.4 percent respectively in 2006 (Kalaba and Tsedu, 2008).

On the import side, RSA, Mauritius, Tanzania and Seychelles are the least dependent on SADC imports. For Mauritius and Tanzania, this might be explained by the closer and older historical relationship with members of the EAC. On the other side Malawi, Mozambique (since 1995), Zambia and Zimbabwe rely heavily on SADC imports with more than 50 percent of their imports originating from SADC (Chauvin and Gaulier, 2002).

2.3.2. Bilateral Trade Relations within SADC

In 1996, countries in the SADC signed a Trade Protocol with the purpose of establishing a Free Trade Area early in the next decade. In this regard, various works have been done relating to the determination of tariff reduction schedules, rules on the origin of goods and services, the elimination of non-tariff barriers, as well as harmonization of customs and trade documentation and dispute settlement mechanisms (Chauvin and Gaulier, 2002). On 7 August 2000, SADC Free Trade Area, a product of the SADC protocol was signed by 11 of the 14 SADC countries but the tariff phase down process only came into

effect in September 2000.[7] According to the agreement, a free trade area (FTA) was to be reached in 2008 where up to 85 percent (non-sensitive products) of trade flows within SADC would be duty free (SADC Secretariat, 2003). The remaining 15 percent consisting of sensitive products will be liberalised by 2012. As part of the agreement Mozambique, Tanzania, Malawi and Zambia–the four poorest SADC members, would be given special trade preferences on clothing and textiles for the first five years of the protocol (Chauvin and Gaulier, 2002). Trade liberalization within SADC is expected to enhance market access within the region however, it should also be noted that bilateral agreements within the region are also important tools for the development process. There are many bilateral trade agreements within SADC. Most of these trade agreements however involve RSA. They include; the non-reciprocal bilateral trade agreement between South Africa and Malawi in which Malawi enjoys duty free access to South Africa under the Most Favoured Nation (MFN) treatment, the reciprocal bilateral trade agreement between Malawi and Zimbabwe. Others are the bilateral relationships between South Africa and Zimbabwe, South Africa and Mozambique in which special trade preferences are given to clothing, textiles and other industries.

Zambia is a signatory to many bilateral trade agreements within SADC. It has signed bilateral agreements with Malawi, Namibia, Tanzania and Zimbabwe with objectives to facilitate free bilateral trade. These agreements advocate for no restrictions on trade commodities and they are already in force although with Namibia the two countries are yet to agree on the schedule of commodities. Zambia has also trade agreements with South Africa which have strengthened trade links between the two countries. Zambia is also a participant in the Mozambique-Malawi-Zambia trade triangle. In addition to these trade agreements, Zambia is currently negotiating yet more bilateral agreements with DRC and Nigeria in order to enhance its exports (TIPS, 2007). The need for bilateral

[7] With the exception of Angola, DRC and Seychelles.

trade agreements arises, in part, from the fact that some countries, such as the DRC, which have not implemented regional trade agreements, have consequently, made it difficult for Zambia to export to these destinations (TIPS, 2007).

As part of the intent to maximise their own market opportunities, many African countries have subscribed to more than one regional grouping. Zambia for instance is a signatory to three key regional arrangements. These are the COMESA Free Trade Area, the SADC Preferential Trade Area and the Cotonou Agreement under the EU (UNCTAD, 2006). Nine out of the fourteen countries in SADC also belong to the COMESA Free Trade Area. In West Africa, eight countries in ECOWAS also belong to the West African Economic and Monetary Union (WAEMU) (Zannou, 2010). However, overlapping membership of regional bodies and trade arrangements is a pervasive trend as this has created a challenge to policy makers in terms of compliance and effective implementation of the different agreements. Overlapping membership tends to be costly and can generate complex structures that result in conflicting and confusing commitments. At times, that can retard development. Zambia is also incurring membership fees and administrative costs for both SADC and COMESA (TIPS, 2006).

2.3.3. Trends in Zambia's Trade

In 1991, Zambia autonomously liberalised trade. As a policy measure to promote exports, the Zambian government liberalised the capital and current accounts and restructured its tariff structure. These policies had a mixed impact on the overall trends of Zambian trade. Despite the negative effects that have been associated with liberalisation, such as the collapse of the manufacturing industries, the country's trade has more than doubled over the period (TIPS, 2007). Since trade liberalization, Zambia's direction and composition of trade has changed significantly. In terms of commodity composition, although the mining sector has continued to be the major source of exports, there has been an increase in the contribution of non-traditional exports especially in agriculture to total exports.

The total volume of trade increased slightly from US$ 2.0 billion in 1995 to US$ 2.6 billion in 2003 representing a 30 percent increase over a period of 9 years (UNCTAD, 2006). Although Zambia's total trade remains basically the same as it were in the early 1990's, the share of imports to GDP has increased over time. In 1995, imports contributed 23 percent to GDP and this increased to 36 percent in 2003. On the export side, the share of exports in GDP has declined over the period 1995 to 2003. In 1995, the share of exports in GDP was 36 percent which later declined to 25 percent in 2003 (UNCTAD, 2006).

In terms of direction of merchandise trade, prior to liberalization, high income countries especially Europe and Asia absorbed more than 66 percent of Zambia's exports and were the source of over 60 percent of its imports. In that period SADC absorbed only 4 percent of Zambia's exports and supplied 8 percent of its imports. Between 1995 and 2004 the situation changed as trade with the SADC region became so dominant that it outgrew its trade with the rest of the world (TIPS, 2008).

Table 2.2: Zambia's Export and Import Destination by Region: 1995-2004.

Region	Exports (%)			Imports (%)		
	1995-1997	2000-2002	2004	1995-1997	2000-2002	2004
COMESA	8.50	15.20	13.40	13.40	4.70	6.00
SADC	12.00	36.80	48.10	48.00	75.10	58.90
EU	19.70	16.60	26.20	22.90	10.50	14.00
USA	4.50	1.80	2.80	4.90	2.20	2.00
ASIA	50.60	28.70	7.90	9.20	5.80	15.40
OTHERS	4.70	0.90	1.60	1.60	1.70	3.70

Source: (DTIS)[8], (CSO)[9]

[8] Ministry of Commerce Trade and Industry (2005). Zambia: Diagnostic Trade Integration Study.
[9] Central Satistical Office-Department of External Trade.

Table 2.2 shows Zambia's import and exports to various regions between 1995 and 2004. The table shows that by 2004 the SADC region supplied 59 percent of Zambia's imports and absorbed about 48 percent of its exports (UNCTAD, 2006). The SADC region has over the past few years experienced increased volumes of trade with Zambia and has increasingly become important to Zambia as a market for both its non-traditional and traditional exports.

Historically, the EU was the largest export market for Zambian commodities, however evidence from Table 2.2 shows that this is no longer the case as Zambia exported 26 percent of its exports to the EU and in turn secured 14 percent of its imports from that region in 2004 (UNCTAD, 2006). This reduction in trade with the rest of the world (ROW) and the increase in trade with SADC give evidence of the occurrence of IIT as countries in the SADC are assumed to have similar economic structures as well as the same levels of development. The growth in trade between Zambia and SADC is largely as a result of the increased trade activity between Zambia and RSA. Prior to the formation of SADC, Zambia belonged to a group of countries called the Frontline States which included Angola, Botswana, Lesotho, Mozambique, Swaziland, Tanzania and Zimbabwe. Their objective was to co-ordinate their responses to apartheid and to formulate a uniform policy toward the apartheid government in RSA by imposing sanctions. This meant that there was very little trade between RSA and the Frontline States. However, the end of apartheid and the subsequent joining of RSA in SADC in 1994 greatly increased the volumes of trade between Zambia and RSA as both countries have been taking advantage of existing bilateral agreements to foster relations. This is also an important phenomenon in trade policy in the sense that preferential markets dominate Zambia's major export market.

Table 2.3: Zambia's Trade with SADC: 1998-2006 (Percentage and Total Volume)

Zambia Exports	1998	2003	2006	Zambia Imports	1998	2003	2006
Angola	0.27	0.27	0.06	Angola	0.01	0.00	0.00
Botswana	2.19	0.81	0.87	Botswana	0.79	0.41	1.05
DRC	18.65	8.71	18.77	DRC	0.01	1.18	1.74
Lesotho	0.00	0.04	0.66	Lesotho	0.00	0.43	0.00
Malawi	18.09	4.80	8.41	Malawi	0.32	0.93	0.74
Mauritius	0.02	0.88	0.10	Mauritius	0.32	0.21	0.14
Mozambique	0.35	0.14	0.19	Mozambique	0.08	0.93	0.94
Namibia	1.61	0.20	2.58	Namibia	0.23	0.35	0.47
RSA	36.44	48.57	58.60	RSA	75.10	73.55	81.72
Seychelles	0.00	0.00	0.00	Seychelles	0.13	0.00	0.01
Swaziland	0.02	0.06	0.13	Swaziland	1.17	0.00	0.30
Tanzania	14.26	31.17	2.02	Tanzania	2.03	2.31	3.09
Zimbabwe	8.10	4.35	7.56	Zimbabwe	19.80	19.48	9.80
SADC (US$m)	257.2	421.1	684.3	SADC (US$m)	571.5	1081.0	1750.0
ROW (US$m)	1025.8	980.8	3694.3	ROW (US$m)	1092.8	1518.9	2916.9
SADC in Total Trade (%)	25.07	42.93	18.52	SADC in Total Trade (%)	52.30	71.21	60.02

Source: CSO, SADC Trade Database

Table 2.3 shows the trends in Zambia's trade with its trading partners in SADC in the period 1998 to 2006. Zambia's trade with SADC continues to increase substantially as can be seen in Table 2.3. The total value of Zambia's exports rose from US$ 257.22 million in 1998 to US$ 421.31 million in 2003. In 2006, the exports rose even further to US$ 684.30 million, the share of Zambian exports to SADC as a proportion of total exports rose from 25 percent in 1998 to 43 percent in 2003 but later fell to 19 percent in 2006. This could be attributed to the impact of the global economic recession on trade. On the import side, the total value of its imports rose for US$ 571.51 million in 1998 to US$ 1 081 million in 2003 and then further rose to US$ 1 750 million in 2006. In terms of import shares to SADC as a proportion of total imports, they rose from 52 percent to

71 percent in 1998 and 2003, respectively before falling to 60 percent in 2006. Most of Zambia's imports from SADC came from three countries (RSA, Tanzania and Zimbabwe) of which RSA is the largest, representing 82 percent in 2006. Generally this was attributed to RSA's competitive advantage in production, its capacity to export a wide range of products and the increased investment undertaken by RSA companies into the Zambian economy of total imports since 2003 (TIPS, 2007). Major products imported include iron, steel, vehicles, paper and paper products, industrial equipment, petroleum products, foodstuffs and beverages (UNCTAD, 2006). Zambia's export destination within the region as of 2006 was dominated by three SADC countries, RSA (59 percent), DRC (19 percent) and Zimbabwe (8 percent). The volume of trade sent from Zambia to RSA could be explained by high industrial activity in RSA, the short distance between the two countries and the preferential market access which, via the SADC Trade Protocol, allowed Zambia to export a wide range of products on a duty and quota free basis to that partner country (TIPS, 2007). South Africa remains the country's major trade partner within the region. Other important SADC trading partners are DRC, Tanzania, Zimbabwe, Malawi, Botswana and Namibia. Zambia's major export products to SADC are cotton, stock feeds, fresh vegetables, sugar and processed foodstuffs. Other major exports are; copper, scrap metal, wood and electricity (UNCTAD, 2006). Although Zambia's trade with SADC countries outside RSA is relatively small, recent developments reveal positive trends.

Zambia has witnessed an improvement in its economic growth over the past few years and this coincides with the substantial and increasing trade taking place with its trading partners in the SADC. This has resulted in an improvement in the economic performance of Southern Africa since the mid nineties. This improved economic performance of Southern Africa results also in part from better economic policies and structural reforms that led to an improvement of macro-economic indicators (reduced inflation rates, budget

deficits). Progressive trade liberalization was also an important component of the opening up of the economies and of the strengthening of export performance.

2.3.3.1. Zambia's Trade Structure by Product Groups

For the 2000-2005 period, Zambia's exports grew rapidly in the metal products sector while its import growth was concentrated in the machinery sector (TIPS, 2007). This was attributed to the high copper prices which led to a substantial investment of imported heavy industrial equipment in the mining industry.

Table 2.4: Zambia's Top 5 Import and Export Sectors and their Shares: 2005

Exports			Imports		
Section	Exports (US$m)	% Share	Section	Imports (US$m)	% Share
Metal Products	1193.8	64.9	Machinery	579.7	22.6
Prepared Foodstuffs, Beverages and Tobacco	159.5	8.7	Chemical products	380.7	14.8
Mineral Products	152.7	8.3	Mineral Products	327.4	12.8
Vegetable Products	89.6	4.9	Paper Products	303.7	11.8
Textile Products	84.2	4.6	Vehicles, Aircrafts and Vessels	229.9	9.0

Source: SADC Trade Database

Table 2.4 presents Zambia's top 5 import and export sectors and their trade shares in total trade in 2005. The top 5 exports accounted for over 91 percent of Zambia's total exports in 2005. Although Zambia exports a wide range of products, the traditional exports of copper and other metals contributed 65 percent to her total exports in 2005. The metal products are usually exported to developed countries in their raw form as industrial inputs. Non-traditional exports have also gained prominence over the years. Zambia exports non-traditional products mainly to countries in the SADC. The major non-traditional export products include; cotton, sugar, textiles and semi-precious stones.

On the import side, Zambia's imports are mainly high-valued consumption, intermediate and capital goods. The top 5 imports accounted for about 71 percent of Zambia's total imports in 2005 with the machinery section contributing the highest share of 23 percent. Zambia mainly imports machinery, chemical products, vehicles and aircrafts from developed countries, particularly the EU, Japan and RSA. From the SADC region Zambia mostly imports foodstuffs and non food products such as chemicals used in its industries.

2.4. Market Access

The World Trade Organisation (WTO) has advocated for trade liberalization as a way of gaining access to foreign markets. Market access according to the WTO will provide opportunities for poor countries to exploit export markets and enable them achieve higher growth rates and essentially reduce poverty.

The SADC regional bloc enjoys access to EU, NAFTA and the Middle East markets as these are the region's major trading partners. In fact, the EU is by far the major consumer of SADC's exports. Countries that have signed the Economic Partnership Agreements (EPA's) include; Botswana, Lesotho, Madagascar, Mauritius, Mozambique, Namibia, Swaziland and Tanzania. These are required to provide reciprocal market access. Four countries had by 2007 not signed but continued to access the EU market on a duty-free basis under the Everything But Arms (EBA) facility because they are classified as least developed countries (LDC's). They are Angola, the DRC, Malawi and Zambia. South Africa also has not signed the interim EPA but has a separate agreement with the EU under the Trade Development and Co-operation Agreement (TDCA). In terms of NAFTA, there is a pending agreement between the US and Southern African Customs Union (SACU) members, which has the potential to be upgraded to include all of the member countries of both NAFTA and SADC (TIPS, 2007).

In the case of Zambia, Market access is not a constraint to export expansion and diversification (UNCTAD, 2006). Most of its exports are destined to preferential markets in SADC, EU and COMESA countries. Zambia's major exports such as copper and raw materials enjoy duty-free access to the United States and EU markets under the African Growth and Opportunity Act (AGOA) and the EBA initiative, respectively (World Bank, 2008). It also has reciprocal duty free access to the regional markets of COMESA and SADC. In April 2008, Zambia signed the interim EPA that replaced the trade portion of the Cotonou Agreement as a member of the East and Southern Africa (ESA) group, but has not submitted a market access schedule and continues to trade under EBA rules (World Bank, 2008).

However although the country enjoys duty-free non-reciprocal access in its export markets the country experiences many setbacks in its export earnings. These are attributed to limited value addition in its export products, lack of export competitiveness because of high costs in the domestic economy as well as high transport costs.

2.5. Summary of the Chapter

The economic structure of SADC had for a long time been dependent on either mining or agriculture; however, recent developments in SADC reveal that many countries have relatively diversified their economies. SADC trade continues to be dominated by RSA. South Africa's relatively developed economy and dominance creates considerable risks in that economic activities tend to gravitate to and polarise in locations within its market. Although the SADC region is usually regarded as one of the richest regions in Africa in terms of raw materials, its trade performance remains nevertheless low as compared to other regional blocs. In the case of Zambia, although the trade between Zambia and SADC is quite low, Zambia continues to trade more with SADC countries as compared to COMESA countries (Table 2.2) and this can be attributed to strong historical ties and lower transaction costs as these countries are geographically closer to Zambia.

As a way of promoting intra-SADC trade, countries in the SADC implemented the SADC Trade Protocol whose main objective is to liberalise trade in goods and services on the basis of fair, mutual beneficial trade arrangements. The Trade Protocol envisages free trade occurring among the SADC member states in the future; however, freeing trade presents, for some member states a risk of significantly depleting their governmental revenues in the short run while it offers welfare improvements in the long run.

CHAPTER THREE

LITERATURE REVIEW

3.0. Introduction

This chapter gives a theoretical and empirical review of the literature on IIT and the trade patterns using the gravity model. This is the basis of the methodology this study has used in evaluating the extent of the existence and the determinants of IIT between Zambia and its trading partners in the SADC.

Section 3.1 presents the theoretical literature which focuses on the theories explaining trade. Section 3.2 presents the empirical literature which reviews the various studies that have been done on IIT using the Gravity model, while Section 3.3 wraps up the chapter by giving an overview of the literature reviewed.

3.1. Theoretical Review of Literature

International trade involves the exchange of both homogenous and differentiated products. In the trade literature, expanding trade is acknowledged as one of the ways of promoting development via foreign trade multipliers (Sodersten, 1980). In recent years IIT (trade in differentiated products) has been gaining ground thus attracting a lot of interest from economists, but in order to understand this phenomenon, it is necessary to look at what the different competing trade theories say about the basis of trade.

3.1.1. Theories Explaining Trade

In the trade literature, there are many theories that give an explanation of the basis of trade. The traditional trade theories which assume perfect competition give an explanation of the basis of trade based on comparative advantage and differences in relative factor endowments thereby explaining Inter-Industry Trade. The IIT theories on

the other hand give an explanation of trade based on imperfectly competitive market models. Intra-Industry Trade theories include; the neo-Heckscher-Ohlin theory, the Linder hypothesis and the New Trade Theory (NTT). Therefore, since Zambia conducts both inter-industry trade and IIT, it is justified to look at both theories. This Section will give an explanation of trade based on the traditional trade theories and then on the IIT theories but the main focus is on the IIT theories.

3.1.1.1. Traditional Trade Theories

The classical economists were among the first to explain the basis of trade. The classical theories of trade were developed in response to the criticisms of the Mercantilist orthodoxy. According to the Mercantilists, wealth of a nation was measured by the accumulation of precious metals (gold and silver) but in order to do this a country had to expand exports whilst discouraging imports. The classical economists challenged this on the basis that since economic activity is a Zero-Sum game, it would not be possible to achieve mutually beneficial trade between trading partners as exporting countries would stand to gain by accumulating wealth at the expense of the importing country as there were fixed amounts of precious metals at a particular point in time.

The absolute advantage theory of trade by Adam Smith is considered as the first classical theory for explaining the basis of trade. Smith (1776) compared nations to households and stated that since every household finds it worthwhile to produce only some of its needs and to buy others with products it can sell, the same should apply to nations. He argued that countries should specialize in the production of goods according to their absolute advantage, then trade with others and in the end they would all stand to gain in international trade (Markusen, *et al.* 1995). This argument however, fails to explain the basis for trade for a country that does not have absolute advantage in any commodity.

David Ricardo (1817) on the other hand built upon the shortcomings of the absolute advantage theory. He argued that there will be gains from foreign trade even if a country had advantages over another in the production of nothing or of everything; that is, even though a country had absolute advantage in both commodities. According to Ricardo (1817), comparative advantage is defined to exist where the relative cost of producing different items differs between countries. Taking the simplest case of two countries and two commodities, comparative advantage would exist if the marginal opportunity cost of producing one good in terms of the other differed between the two countries. In this case each country would have a comparative advantage in one of the two goods and would gain by specializing in the production of that good and trading some of its output for the other good. From this argument, it is clear that comparative advantage is the basis for trade, however, the Ricardian model is deficient in many ways: Firstly, the model assumes an extreme degree of specialization which is rather unrealistic because Zambia for instance, imports and exports maize simultaneously. Secondly, it predicts that every country gains from trade because it does not take the effect of international trade on income distribution within countries. Thirdly, it ignores differences in resource endowments among countries, the role of economies of scale, and IIT (Do, 2006).

Due to the many defects of the classical theory, the Hecksher-Ohlin (H-O) theory by Heckscher (1919) and Ohlin (1933) was developed in order to extend and develop an influential theory of trade. It is a modification of the Ricardian model as it includes capital as an additional factor of production. The H-O theorem implies that trade should occur primarily between pairs of countries with different relative factor endowments and factor intensities of traded commodities. The model assumes that mutually beneficial trade occurs if countries export commodities that intensively use their relative abundant and cheap factors of production and import commodities that intensively use their scarce and expensive factors of production (Markusen, 1988).

There is some level of practicality in the H-O theorem as it has been successful in explaining trade between industrialized and developing countries; whereby the developing countries export labour and tropical land-intensive products to industrialized economies and import capital and temperate climate land-intensive goods from them (Mudenda, 2007). The H-O theorem is however less successful in explaining trade among developing countries, because these trade flows are not based on differences in factor endowment. Another shortfall of the H-O theorem is that it makes the assumption that there are no price distortions in the economy. This is not the case in many economies as they have tariff and tax structures and other non-tariff barriers.

Failure of the H-O model to give an explanation of the effect of changes in the prices of goods, caused for example by changes in tariffs, on the prices of factors of production led to the development of the Stolper-Samuelson theorem of international trade. The Stolper-Samuelson theorem which was first presented by Stolper and Samuelson (1941) dealt with a very special framework with many restrictive neo-classical assumptions, most notably that the economy consists of only two broad sectors, and that production uses only two factors (capital and labour) shows that changes in commodity prices cause a change in real factor rewards (Neary, 2004). Assuming constant returns to scale and no complete specialisation, the Stolper-Samuelson theorem postulates that an increase in the relative price of the export good will lead to an increase in the real reward of the factor used intensively in producing that good and a decrease in the real reward of the factor used intensively in the production of the import-substitute good. The implication of the Stolper-Samuelson theorem is that for a labour abundant economy, trade will cause an increase in the demand for labour in export production thus raising the real reward to labour, while reducing the demand for capital used in the domestic production of import substitute goods thus lowering its real reward. Therefore, the relatively abundant factor benefits real income while the scarce factor loses real income. The major problem with the Stolper-Samuelson theorem is that it always holds for small nations. However, for

larger nations the analysis is more complicated due to the effect of their trade on world prices, hence it is very unlikely to hold. In addition, the theorem also fails to explain IIT.

The specific factors model tried to explain trade by relaxing the H-O assumption of perfect factor mobility. According to the model, protection tends to raise the real return of one factor, the one specific to the import-competing sector, and to lower the real return of the other factor, that's specific to the export sector. However, its effect on the real return of the mobile factor is now ambiguous. Although the specific-factors model which depicts a short-run equilibrium seems intuitively more appealing than the Stolper-Samuelson theorem, over time, the specific factors lose their distinctiveness and become inter-sectorally mobile, so the Stolper-Samuelson predictions are restored (Neary, 2004).

The comparative advantage models postulate that economies tend to trade based on comparative advantage to exploit their production side differences while the factor endowment theories predict that trade will be based on differences in relative factor endowments. Therefore according to these theories minimum trade between nations with similar factor endowments is expected. Traditional trade theories imply that countries which are less similar tend to trade more. In this view, traditional trade theories are therefore unable to explain the huge volumes of trade taking place between countries with similar factor endowments and increasing IIT currently being experienced among developing countries.

3.1.1.2. Intra-Industry Trade Theories

Although the factor endowment theories or any other comparative advantage theory predicted that trade involves the exchange of different products and should be greater the more the countries differed in their relative production possibilities, most of the enormous growth in trade in recent years came in relatively similar goods between relatively similar countries (Neary, 2009).

Failure of the traditional trade theories to explain IIT has seen the emergence of other theories of trade. The neo-Heckscher-Ohlin theories give an explanation of IIT based on factor endowments by linking product specifications to different combinations of basic factors, such as capital and labour (Sodersten and Reed, 1994). One such model is the model developed by Falvey (1981) in which he assumed two countries, two homogenous factors of production (labour and capital) and two industries. Labour is mobile between the two industries while capital is industry specific. He further assumed that one industry in each country produces a homogenous product while the other produces a differentiated product in terms of quality (high and low). The model states that provided there is a demand for both high quality goods and low quality goods, there will be IIT in the differentiated good between the two countries, with the relatively capital-rich country exporting the higher quality varieties of the capital-intensive good while the labour-rich country will export both the labour-intensive good and the lower quality varieties of the capital-intensive good. An example of such trade may be found in some parts of the clothing industry, where labour-rich economies have tended to export lower quality products while importing higher quality versions from the capital-rich country (Sodersten and Reed, 1994).

Another theory giving an explanation of IIT is that formulated by Linder (1961). The Linder hypothesis (1961) argues that countries with similar levels of per capita incomes have similar preferences and in turn trade more with each other in similar but differentiated productions (Montenegro and Soto, 1996). In his argument, Linder (1961) also looked at production quality as well as tastes as the main determinants for the basis and direction of trade with the proposition that a country will produce first for home consumption and the surplus for export to countries with similar preferences. The high income countries will have low income earners and low income countries will have high income earners. Thus, the low income country will produce low quality goods and export to the markets of the rich countries for low income earners and high income countries

will produce high quality goods and export them to low income countries for high income earners. This proposition cannot be dismissed as it is evident in the increasing bilateral trade patterns in the SADC.

Krugman (1979) developed a model that was consistent with the empirical evidence on IIT. This marked the birth of the New Trade Theories (NTT). The NTT explain world trade based on economies of scale, imperfect competition and product differentiation which relax the strict assumptions of Traditional Trade Theories of constant returns to scale, perfect competition and homogenous goods (Do, 2006). Under these new assumptions countries can specialize in producing a narrower range of products at larger scale with higher productivity and lower cost. Then it can also increase the variety of goods available to the consumer through trade. In short trade is likely to occur even when countries do not differ in their factor endowments or technology.

Just as in Ricardo's comparative advantage theory, the NTT also had aspects of mutually beneficial trade, however the major difference was that the countries were identical so there was no role for comparative advantage. In his model, Krugman (1979) made two simplifying assumptions: that consumers prefer a diverse choice of brands and that production favours economies of scale. He stated that the existence of differentiated products say different versions of a car can be explained by consumer's preference for diversity but because of economies of scale, it is not profitable to spread the production of one version all over the world. Therefore production will be concentrated in a few factories and therefore in a few countries (or maybe just one). This logic gave an explanation of how each country specialised in producing a few brands of any given type of product and in essence IIT. This came to be known as the home market effect. The home market effect argues that, ceteris paribus, if there are increasing returns, countries will tend to be net exporters of those kinds of products for which they have relatively large domestic demand.

Krugman also explored the case where transport costs cause international differences in goods prices. Krugman (1991) attempted to explain the determinants of regional concentration of economic activity under the assumption of increasing returns to scale, economies of scale and trade costs in his Economic Geography model. This led to a new prediction: the possibility that manufacturing activity may agglomerate even when countries are ex ante identical (Neary, 2009). The agglomeration prediction argues that increasing returns to scale coupled with factor mobility lead to centrifugal pressures, which may render unstable an initial symmetric equilibrium (Neary, 2009). This implies that instead of production spreading out evenly around the world, it will tend to concentrate in a few countries, regions or cities which will become more densely populated but also have higher levels of income because of increased production. There are two main results of the Krugman model; Firstly, each industry has an incentive to locate in the country with the bigger market for its product. Secondly, if transport costs are not too low and scale economies not too pervasive, incomplete specialization and the resulting IIT flows are the equilibrium outcomes (Brulhart, 1995).

The NTT assume increasing returns which give rise to imperfectly competitive markets. Imperfectly competitive markets, in turn give a theoretical explanation of IIT. Following the pioneering work of Grubel and Lloyd (1975) revealing the existence of IIT, Caetano and Galego (2007) posit that IIT has attracted a lot of theoretical and empirical literature evaluating the phenomenon and its foundations. They further state that theoretical models suggest that IIT is determined by both country-specific factors (income levels, economic dimension and endowments) and industry specific factors (market structure, product differentiation, economies of scale). Empirical studies have yet found stronger support for country-specific determinants (Greenaway, *et al.* 1995). Therefore, in analysing the determinants of IIT trade between Zambia and its trading partners in the SADC, this study will incorporate country specific factors and not industry specific factors in formulating the gravity equation. The major reason is that, it would be difficult to obtain

data on variables which are reasonable proxies for the variables which economic theory tells us are probable explanatory variables in studies involving industry specific factors (Sodersten and Reed, 1994).

3.1.1.3. The Gravity Model

The gravity model which has been used intensively in analyzing patterns and performances of international trade in recent years, can be applied to quantify the trade flows empirically (Do, 2006). The model has been very successful in many empirical studies in explaining bilateral trade patterns. The gravity model of international economics typically examines the direction and patterns of trade. The basic theoretical model for trade between two countries (i and j) takes the form of:

$$F_{ij} = g \frac{M_i M_j}{D_{ij}} \qquad (3.1)$$

where;

F_{ij} is the total trade flow from country i to country j

M_{ij} are the economic masses of country i and j

D_{ij} is the distance between country i and j

g is a constant.

Gravity models have been estimated for a wide range of countries and have shown that different variables are necessary in explaining trade patterns in different countries. It should also be stated that gravity models share common features: Firstly, in explaining

bilateral trade, a trade variable is always used as the dependent variable in this case the IIT index is the explanatory variable. Secondly, GDP, GNP[10], or GNP per capita[11], GNP per capita measure the economic mass of the exporting and importing country implying that countries with higher income tend to trade more and those with low income trade less. Lastly, distance which is the geographical distance between the countries economic centres is a commonly used variable (Do, 2006). The general gravity model takes the following form;

$$F_{ij} = gM_i^{\beta_1} M_j^{\beta_2} D_{ij}^{-\beta_3} \varepsilon_{ij} \qquad (3.2)$$

where;

F_{ij} represents bilateral trade flows from country *i* to country *j*.

M_i represent the economic mass proxied by GDP for countries *i*.

M_j represents the economic mass proxied by GDP for country *j*.

D_{ij} denotes the distance between the countries *i* and *j*.

ε_{ij} is an error term with $E(\varepsilon_{ij}) = 1$ meaning that the mean value of the error term is 1.

β_1 represents the impact of country i's GDP on the bilateral trade flows from country i to country j.

β_2 represents the impact of country j's GDP on the bilateral trade flows from country i to country j.

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[10] Gross National Product (GNP) is defined as the market value of all goods and services produced in one year by labour and property supplied by the residents of a country.

[11] Gross National Product (GNP) Per Capita is defined as the market value of all goods and services produced per person in one year by labour and property supplied by the residents of a country.

β_3 represents the impact of Distance between country i and country j on the bilateral trade flows between the two countries.

The traditional approach to estimating this equation consists of taking logs on both sides, leading to a log-linear model of the form (note: constant G becomes part of β_0 which is the intercept term).

$$\ln(F_{ij}) = \beta_0 + \beta_1 \ln(M_i) + \beta_2 \ln(M_j) - \beta_3 \ln(D_{ij}) + (\varepsilon_{ij}) \quad (3.3)$$

Despite being successful in explaining bilateral trade patterns in many empirical studies, the gravity model has also been criticised on a number of issues: Firstly, the gravity model of international trade has been criticised for being ad hoc and lacking theoretical foundation. However, much progress has been made in trying to find a theoretical framework explaining the model and this led to the emergence of models by Anderson (1979) and Bergstrand (1985) and now the gravity model rests on a solid theoretical foundation (Kimura and Lee, 2006). Secondly, the gravity model has been criticized for relying too much on the Increasing Returns-to-Scale based theories of trade. This is because such theories focus mainly on the proportionality of the volume of trade to the trading countries incomes and not on its relationship to trade resistance or the role of the demand side (Porojan, 2000). Thirdly, the model takes no account of comparative advantage (Ciuriak and Kinjo, 2006). This critique is particularly important when the gravity model is considered for policy applications such as identifying priority markets for trade promotion programs. For example, the potential for trade expansion might be greater with countries with complementary patterns of comparative advantage than those with similar patterns (Ciuriak and Kinjo, 2006). Lastly, it has also been criticized on the measurement of distance by stating that there is need for a more differentiated measure of distance as the current measurement is biased (downward for away countries and upward for close-by-countries) (Porojan, 2000).

The gravity model explains both IIT and inter-industry trade, and despite its criticisms, the model has remained popular in empirical analysis as it has outperformed more sophisticated models when forecasting on the composition of trade flows (Montenegro and Soto, 1996). Matyas and Harris (1998) observed that the gravity model has performed particularly much better than other trade models in analysing trade flows between countries and therefore has been deemed appropriate for policy analysis by most economists.

3.2. Empirical Review of Literature

The Classical, Heckscher-Ohlin, neo-Heckscher-Ohlin and the NTT have given explanations of the basis and direction of trade in both homogenous and differentiated products. However, these theories achieved less success in explaining the trade patterns or the size of the trade flows between countries. This section therefore shows empirically the successes of the gravity model in explaining trade flows as well as the various factors used in the model to determine IIT.

Historically, empirical analysis of IIT trade had been confined to a static indicator known as the G-L index. By developing the G-L index which is also called the IIT index, Grubel and Lloyd (1975) were able to prove that a significant amount of international trade was within industry classifications; however, these findings were inconsistent with the traditional theories of trade. They also observed that goods that are homogenous with respect to production and consumption may still be differentiated by either location or by time. Trade in such goods is measured as IIT even though does not really contradict the endowment-based theory (Leamer and Levinsohn, 1994).

Ekanayake (2001) measured the extent of Mexico's IIT patterns so as to identify the determinants of IIT between Mexico and her major trading partners. He used the non-linear least squares of the logit function to estimate the model and found that the signs

and significance of the explanatory variables were in conformity with his expectations. The results showed that the extent of IIT is positively correlated with per capita income, average country size, trade intensity, trade orientation existence of common border, common language and participation in a regional integration scheme. While IIT is negatively correlated with income differences, differences in country size, distance and trade imbalance. He also observed that controlling for trade imbalance, the coefficients increased notably: the t-statistics for the coefficients of per capita income, country size, differences in country size, trade intensity, trade orientation, dummies for common border, language and regional integration scheme increased while the t-statistics for the coefficients for income differences and distance decreased.

Do (2006) using a panel data framework for the years 1993-2004 examined the bilateral trade between Vietnam and twenty three European countries. Using GDP, population, real exchange rate as a proxy for price, distance and history as explanatory variables, he estimated the model using the fixed effects, random effects and the pooled estimation methods, however, his analytical efforts focussed on the fixed effects estimation method as it gave more consistent estimates. He found that the determinants of bilateral trade between Vietnam and the twenty three European countries were economic size, market size, and the real exchange rate volatility. Distance and history however seemed to have no effect on bilateral trade between Vietnam and the twenty three European countries as their coefficients were statistically insignificant. Using the results of the gravity model to calculate the trade potential between Vietnam and the twenty three European countries, he found that there was considerable room for growth.

Musonda (1997) examined IIT between members of the PTA/COMESA regional trading arrangements using the gravity model. Her sample included Tanzania, Zambia, Kenya, Zimbabwe, Malawi, Ethiopia and Sudan. Using average per capita income, average country size, distance, dissimilarity in per capita income, trade barriers and dummy

variables for common language, special relations and common border, she found that all variables had the expected signs however only distance was significant at 1 percent level of significance. She further observed that countries belonging to this sub-region do engage in IIT especially with their immediate neighbours and those that are relatively more advanced in terms of their manufacturing sector.

Using COMESA as a case study, Geda and Kebret (2007) tested the determinants for trade using the standard gravity model. They used Gross National Product (GNP), GNP per capita, distance, infrastructure, macroeconomic policy, political instability and culture, and geography as explanatory variables. They found that bilateral trade flows among the regional groupings could be explained by standard variables (GNP and GNP per capita) as demonstrated by the results of the conventional gravity model (except for distance). They also found that good macroeconomic policies as well as infrastructural development are positively related to intra-COMESA trade. Proxies used to measure political instability (except war) had the expected signs although they were found not to be statistically significant. The results show that regional groupings had an insignificant effect on the flow of bilateral trade as intra-COMESA trade was found not to be significantly different from its trade with other non-member countries. The review of the issues indicates that the performance of regional blocs is mainly constrained by problems of variation in initial condition, compensation issues, real political commitment, overlapping membership, policy harmonisation, lack of diversification and poor private sector participation. These problems seem to have made building successful economic groupings in Africa a daunting task, despite its perceived importance in the increasingly globalised world.

Ndhlovu (1998) estimated the impact of preferential trade arrangements as well as the impact of trade barriers on trade flows using bilateral trade data between SADC countries. He concluded that country size, state of development as well as special trade

ties have a significant impact on intra-SADC trade while distance and tariffs have a negative effect on this trade.

Using an econometric gravity model to examine Malawi's trade with her major trading partners, Simwaka (2006) found that Malawi's bilateral trade is a linear function of economic size of the country, geographical distance, and exchange rate volatility, among other factors. Favouring the fixed effects model over the random effects gravity model, he found that Malawi's bilateral trade is positively determined by the size of the economies (GDP of the importing country) and similar membership to a regional integration agreement. He further established that transportation costs proxied by distance have a negative influence on Malawi's trade and that the exchange rate volatility depresses Malawi's bilateral trade, whereas regional economic groupings have had insignificant effects on the flow of bilateral trade. He also observed that the flow of trade in regional blocks is constrained by problems of compensation issues, overlapping membership, policy harmonization and poor private sector participation.

Zannou (2010) examined the determinants of intra-ECOWAS trade flows. He used the gravity to identify the factors affecting the importance of ECOWAS intra-community trade flows. Using a panel data set for the period 1980 to 2000, he first estimated the model using the pooled OLS and then the fixed effects estimation method. He used the following variables; real domestic product per capita, population size, distance, common language, contingency, landlockedness, trade openness for both importing and exporting country, exchange rates for importing and exporting country, dummy for participation in Mano River Union (An organization for countries which have planned and/or implemented policies aimed at economic integration), dummy variable for the impact of WAEMU on the flows of goods within the ECOWAS region. Using the pooled OLS estimation method the results revealed that remoteness (participation in Mano River Union) and enclosure (landlockedness) reduce the volume of intra-community trade,

while proximity (geographical, linguistic or monetary) increases it. The results also revealed that economic and demographic dynamics are sources of more increased trade within ECOWAS. This also applied to exchange rate stability and openness of national economies. However, using the fixed effects estimation method so as to control for heterogeneity in the cross-sectional elements, the results revealed that only population, depreciation of the exchange rates and openness of economies determine the volumes of intra-ECOWAS trade flows.

Finally, Chidoko, *et al.* (2006) also using the gravity model investigated the determinants of IIT between Zimbabwe and its trading partners in the SADC. Using annual secondary data for the panel 1997-2002, he found that trade intensity, distance, exchange rate and GDP have an impact on Zimbabwe's trade patterns. He further established that Zimbabwe has been trading more with other SADC countries in more or less the same goods and this was revealed by the trade intensity variable.

3.3. Overview of Literature

The reviewed literature is of relevance to the study. The theoretical literature outlined in this chapter has given an explanation of the basis and direction of trade in both homogenous and differentiated products. Moving from the comparative advantage theory in which economies trade based on comparative advantage to the factor endowment theories in which trade is based on differences in relative factor endowments, the Traditional Trade Theories have been unable to explain the huge volumes of trade taking place between countries with similar factor endowments and the increasing trade currently being experienced among developing countries. In order to give an explanation of this growing phenomenon, focus has shifted to other theories of trade. These theories have come to be known as the IIT theories and they include; the neo-Heckscher-Ohlin theories, Linder hypothesis and the NTT. The NTT was developed by Krugman (1979). It

assumes increasing returns to scale which give rise to imperfectly competitive markets, thereby giving a theoretical explanation of IIT.

The empirical literature has highlighted that using the gravity model, the determinants of IIT differ among countries. Thus, by the inclusion of various explanatory variables for different countries, the gravity model has proven to be successful in analyzing the determinants of IIT as it has been able to quantify trade flows in various studies.

Most studies use common variables such as economic mass proxied by GDP, levels of development proxied by GDP per capita, market size proxied by population and distance between economic centers of trading partners. These variables have been shown to be strong factors in explaining IIT among countries; however, the major problem with these variables is that, apart from the distance variable they tend to be correlated with each other. This study therefore tries to correct this problem by augmenting the basic gravity equation with new variables.

CHAPTER FOUR

RESEARCH METHODOLOGY

4.0. Introduction

In analyzing the determinants of IIT between Zambia and its trading partners in the SADC, the Gravity model is used. Conceptually, the model draws on Isaac Newton's Law of Gravity in the sense that bilateral trade resembles the gravitational interaction between two objects. Tinbergen (1962) was the first economist to apply the gravity model in international trade flows. Other researchers that followed included; Poyhonen (1963) and Linnemann (1966). This chapter outlines the methodology used in the study.

Section 4.1 presents the specific gravity model to be estimated in the study, while Section 4.2 gives a detailed description of all variables employed in the model. Section 4.3 considers the estimation technique, diagnostic tests and the estimation methods employed in panel data analysis. Lastly, Section 4.4 presents the data type and sources.

4.1. The Specific Gravity Model to be estimated

The Gravity model applied in this study is a variation of the standard gravity model used by Chidoko, *et al.* (2006) augmented by adding an extra dummy variable for common language. In estimating the standard gravity model the dependent variable is always a trade variable which in this study is the proportion of IIT in total trade.

In terms of the explanatory variables, although theory posits that there are several variables that affect IIT; in this study only eight (8) explanatory variables will be used. These include; Real Exchange Rate (EXRT), GDP, Per Capita Income (PCI), Dissimilarity in Per Capita Income (DPCI), Distance between capital cities of trading countries (DIST), Trade Intensity (TI) and dummy variables for Common Borders (D_1)

and Common Language (D_2). The model to be estimated and the expected signs of the explanatory variables are presented below.

$$IIT_{ijk} = f(GDP_k, PCI_k, DPCI_{jk}, TI_{jk}, EXRT_{jk}, DIST_{jk}, D_1, D_2) \quad (4.1)$$
$$(+) \quad (+) \quad (-) \quad (+) \quad (-) \quad (-) \quad (+) \quad (+)$$

where;

i represents the industry.

j is the trading country, which in this study is Zambia.

k is the partner country.

the dummy variable D_1 takes the value of one (1) if Zambia and the trading partner share a common border and zero (0) otherwise, while D_2 takes the value of one (1) if the trading partner's official language is English and zero (0) otherwise.

In estimating the determinants of IIT, a log-linear function is employed so as to make the estimates less sensitive to extreme observations as well as to enable interpretation of the coefficient terms as elasticities. The logarithmic transformation of the estimated model is as follows;

$$LogIIT_{ijk} = \beta_0 + \beta_1 LogGDP_k + \beta_2 LogPCI_k + \beta_3 LogDPCI_{jk} + \beta_4 LogTI_{jk} + \beta_5 LogEXRT_{jk} + \beta_6 LogDIST_{jk} + \beta_7 D_1 + \beta_8 D_2 + \varepsilon_{jk} \quad (4.2)$$

where;

LogIIT – Logarithm of intra-industry trade index.

LogGDP – Logarithm of gross domestic product.

LogPCI – Logarithm of per capita income.

LogDPCI – Logarithm of the Dissimilarities in per capita income or the Linder term.

LogTI – Logarithm of trade intensity.

LogEXRT – Logarithm of exchange rate.

LogDIST – Logarithm of the distance between capital cities.

D_1 – Dummy for common border.

D_2 – Dummy for common language.

The dummies are in linear form because they assume the values of zero or one, and if for instance, they assume a value of zero, the log transformation would be undefined.

β_0 stands for the country effects.

4.2. Definition and Measurement of Variables in the Model

4.2.1. Dependent Variable

In this study the dependent variable is the IIT Index as defined by Grubel and Lloyd (1975). The IIT index measures the proportion of IIT in an industry and it is given as follows;

$$IIT_{ijk} = \left[1 - \frac{|X_{ijk} - M_{ijk}|}{(X_{ijk} + M_{ijk})}\right] \quad (4.3)$$

where;

IIT_{ijk} is the intra-industry trade index in industry i between Zambia and country k.

X_{ijk} are Zambia's exports of industry i to country k.

M_{ijk} are Zambia's imports of industry *i* from country *k*.

the index of IIT takes values from 0 to 1. If all trade in industry *i* is IIT; that is, if $X_{ijk} = M_{ijk}$, then $IIT_{ijk} = 1$. Similarly, if all trade in industry *i* is Inter-Industry trade, that is, either $X_{ijk} = 0$ or $M_{ijk} = 0$, then $IIT_{ijk} = 0$.

In this study the IIT index in Equation 4.3 is modified to measure the proportion of IIT in total trade between Zambia and country *k* as a measure of the IIT_{ijk} and can be written as;

$$IIT_{ijk} = \left[1 - \frac{\Sigma|X_{ijk} - M_{ijk}|}{\Sigma(X_{ijk} + M_{ijk})}\right] * 100 \qquad (4.4)$$

where; the dependent variable lies within the range of (0, 100), depending on the importance of IIT (Musonda, 1997).

4.2.2. Explanatory Variables

Real Gross Domestic Product (GDP)

GDP is a basic measure of a country's economic performance and is defined as the market value of all final goods and services produced within the borders of a country in a given period of time, usually a year. It is a proxy for economic size. It is hypothesised that the greater the economic size, the higher the IIT. Therefore GDP determines the level of international trade. In agreement with this, Filippini (2003) states that just as any other economic activity, trade will generally increase with an increase in the size of the

economy. In this study GDP is measured in United States Dollars (USD$) and is expected to have a positive sign.

Per Capita Income (PCI)

Per Capita Income is the ratio of the total value of goods and services produced and property supplied by the residents of a country and the population in a given time period, usually a year. It is simply the GNP per capita. It is calculated by dividing the total income of a country by its population. PCI measures the level of a country's economic development and is used in comparing levels of economic development between countries. It is believed that IIT with any given trading partner may tend to be higher as PCI of the partner country is higher since IIT is a phenomenon of countries with similar economic levels of development. In this study PCI is measured in United States Dollars (US$) and is expected to be positively related to IIT.

Dissimilarity in Per Capita Income (DPCI)

Dissimilarity in per capita income also known as the Linder term is simply the absolute difference between the PCI of the trading countries. It is defined as follows;

$$DPCI_{jk} = \left|PCI_j - PCI_k\right| \tag{4.5}$$

where;

$DPCI_{jk}$ is dissimilarity in per capita income between Zambia and partner country k.

PCI_j is the PCI for Zambia.

PCI_k is the PCI of the partner country.

Linder (1961) and other researchers use dissimilarities in per capita income as proxies for consumer tastes and preferences. It has been argued that countries with similar levels of PCI will have similar tastes and will produce similar but differentiated products and therefore will tend to trade more among themselves. Theory indicates that countries with similar PCI have overlapping demands which will increase IIT. Hence the share of IIT rises as the difference in PCI declines.

Distance (DIST)

Distance is the geographical distance between the economic centres of trading partners; it is a proxy for transport costs. The distance used in this study is the actual road distance between capital cities of trading countries measured in kilometres. The distance between capital cities of trading countries is likely to affect the search and transaction costs. This will in turn affect the bilateral trade as larger distances tend to be associated with greater costs. Therefore, the longer the distance, the lower the IIT between countries expected. Therefore, a negative sign is expected for the distance variable.

Trade Intensity (TI)

Trade intensity measures the degree of trade between the two partner countries. It is hypothesised that the higher the trade intensity between trading partners, the greater the IIT. Therefore, as two countries engage in more and more trade, the level of IIT is believed to increase. It is given as follows;

$$\mathrm{TI}_{jk} = \frac{X_{jk} + M_{jk}}{GDP_j} \tag{4.6}$$

where;

TI_{jk} = Trade intensity between Zambia and partner country k.

X_{jk} = Zambia's exports to partner country k.

M_{jk} = Zambia's imports from partner country k.

GDP_j = Zambia's gross domestic product.

Real Exchange Rate (EXRT)

An exchange rate is defined as the price of a currency in terms of another currency. This study makes use of cross-exchange rates to calculate the nominal exchange rate expressed in the price quotation system, which is then used to calculate the real exchange rate. The cross-exchange rate is defined as the exchange rate between two currencies; say the Zambian Kwacha (ZMK) and the Malawian Kwacha (MK) calculated with reference to the United States Dollar (US$).

suppose

$$\$1 = ZMK\,4700$$

and

$$\$1 = MK152$$

then

$$E_{jk} = \frac{4700}{152} = ZMK\,30.921053 / MK$$

where;

E_{jk} = is the norminal exchange rate between Zambia and trading partner k.

To determine the real exchange rate between trading partners the nominal exchange rate is then multiplied by the GDP deflator for the trading partner and divided by Zambia's GDP deflator. The real exchange rate can be calculated as follows;

$$RER_{jk} = E_{jk} \times \frac{P_k}{P_j} \tag{4.7}$$

where;

RER_{jk} = Real exchange rate between Zambia and trading partner k.

E_{jk} = is the norminal exchange rate between Zambia and trading partner k.

P_j = Zambia's GDP deflator.

P_k = GDP deflator for the trading partner.

The real exchange rate is used because it gives a measure of an economy's competitiveness in terms of exports and imports and it also takes into account the real as well as the nominal price changes. Empirically, it has been shown that the exchange rate in gravity type studies has been significant in explaining trade variations among countries involved in trade. The effect of the real exchange rate in this study is expected to be negatively related to IIT because an appreciation of the Zambian kwacha makes exports to be more expensive while imports become cheaper thereby discouraging IIT.

Common Border (D1)

The dummy variable for common borders represents SADC countries with a common border with Zambia. The existence of common borders represents the possibilities of IIT in response to locational advantages (Balassa and Bauwens, 1987). Therefore, Cēterīs

paribus, trade between countries which share a common border is likely to be higher than between countries which do not share a border.

$$D_1 = \begin{cases} 1 & \text{if countries share a common border} \\ 0 & \text{otherwise} \end{cases}$$

Common Language (D2)

The existence of a common language in both trading countries is likely to enhance a flexible flow of information and lower transaction costs, therefore increase trade between the countries. Common language is measured as a dummy variable which is defined as follows:

$$D_2 = \begin{cases} 1 & \text{if countries use a common language} \\ 0 & \text{otherwise} \end{cases}$$

4.3. Estimation Techniques

The study estimates the determinants of IIT between Zambia and 11 of its major trading partners in the SADC for the years 1998-2006. The data is limited to 21 major sectors of commodities in which Zambia trades with its partners in the SADC.

The model is estimated using a panel data framework in Stata in which a strongly balanced panel is used. Panel data is a special type of pooled data in which the same cross sectional unit is surveyed over time (Gujarati, 2003). The main problem with panel data econometrics is the latent individual heterogeneity (Nerlove, 2002). Other demerits associated with panel data include extra time needed and extra cost incurred for data collection and analysis. However, the use of panel data methodology in this study can be justified based on its advantages as highlighted by Damiyano (2008) and Do (2006).

The advantages are that;

1. Panel data analysis allows control of heterogeneity of cross-sectional units. It is expected that each cross-sectional unit has some intrinsic and immeasurable characteristics distinguishing it from others.
2. The combination of cross-sectional and time elements in panel data generates more variability, more degrees of freedom and at the same time reduces multicollinearity problems thereby improving the efficiency of the econometric estimates.
3. Panel data analysis can be used to identify the effect of time-varying variables (e.g. technology) and cross-sectional variables (e.g. economies of scale) simultaneously.
4. Panel data allows better analysis of dynamic adjustments through observing the repeated cross section of observations (e.g. unemployment levels). Knowledge of individual dynamic adjustments may be critical in understanding economic phenomenon
5. With panel data it is possible to control for some types of omitted variables by observing changes in the dependent variable overtime.
6. Panel data is also able to solve the endogeneity problem using its various estimation methods (Random or Fixed effects methods).

There has been growing emphasis over the recent years for the use of panel data in gravity models because cross-sectional or time series data are often affected by problems of misspecification and therefore yield biased estimates of volumes of trade due their failure to control for heterogeneity. It should also be noted that panel data may lead to inconsistent estimates because it may be affected by problems of non-stationary time series, however, these problems are usually of concern when the time series is lengthy. This study uses a short time series of 9 years, therefore, panel data unit root tests and panel data cointegration tests will not be carried out.

4.3.1. Diagnostic Tests

Diagnostic tests ensure that the model framework satisfies the various econometric assumptions in order to derive reliable coefficient estimates.

Multicollinearity

The term Multicollinearity in a strict sense refers to the existence of a perfect or exact linear relationship among some or all the explanatory variables in a multiple linear regression. However, Multicollinearity is also said to exist when variables are highly collinear in a multiple linear regression model even though not perfectly. In panel data, the combination of cross-sectional and time elements reduces Multicollinearity problems thereby improving the efficiency of the econometric estimates. The correlation matrix is used to detect the collinear variables. According to theory, variables are considered highly collinear or linear combination of other independent variables if they have a value of over 0.80.

Heteroskedasticity

One of the basic classical assumptions of regression analysis is that the variance of each disturbance term conditional on the chosen values of the explanatory variables in the regression function exhibits Homoskedasticity (Gujarati, 2003). This means that the variance of the disturbance term is constant across observations. The presence of Heteroskedasticity in a model produces estimates that are consistent but not efficient. The likelihood ratio test for Heteroskedasticity was used. It is a nested approach and is superior to the general approach for testing for Heteroskedasticity because the test is based on the behaviour of the residuals (Greene, 2003).

Autocorrelation

Serial correlation refers to correlation between the errors in different time periods. An explanation of serial correlation in the errors of panel data models is that the error in each

time period contains a time-constant omitted factor (Woodridge, 2002). In most cases serial correlation is considered as a serious problem because it usually has a larger impact on standard errors and the efficiency of the estimators than does Heteroskedasticity. The Wooldridge Test for Autocorrelation in panel data is used to detect the presence of Autocorrelation. It tests the null hypothesis of no first-order Autocorrelation. A significant test statistic indicates the presence of Autocorrelation.

4.3.2. Estimation Methods

There is a distinction in the literature between static and dynamic panel data models. Static panel data models include the fixed effects and the random effects methods, while dynamic panel data models are those that include a lagged dependent variable as an explanatory variable. This study, however, considers the static panel data models as opposed to the dynamic panel data models because in the dynamic panel data models, the lagged dependent variable is correlated with the error component which complicates estimation and therefore yields biased and inconsistent estimates.

Static panel data regression models can be estimated using pooled estimation, fixed effects and random effects (Asteriou, 2006). In view of the different model specifications that can be employed in static panel data analysis, all the three methods are considered and estimated in this study, however, the model to be specified is based on the estimation method that produces consistent and efficient estimates.

Pooled Estimation

Pooled estimation is the simplest approach and assumes there is one single set of slope coefficients and one overall intercept in other words it assumes there are no country and time effects. The pooled estimation function uses the usual OLS regression method and can be written as follows;

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + ... + \beta_9 X_{9it} + \varepsilon_{it} \quad (4.8)$$

where;

i stands for the country $(i = 1, 2, 3....., 11)$.

t stands for the time period $(t = 1, 2, 3....., 9)$.

$\varepsilon_{it} \sim N(0, \sigma^2)$ is the error term which captures the difference across countries and over time. It is normally distributed with zero mean and constant variance.

For OLS to be properly applied, the errors have to be independent and homoskedastic. Those conditions are so rare that it is often unrealistic to expect that OLS will provide efficient and unbiased estimates (Davidson and Mackinnon, 1993).

Fixed Effects Estimation

The fixed effects approach takes into account the individual and time effects by letting the intercept vary by introducing different intercept dummies for each country and time period but the slope coefficients are constant (time invariant). The fixed effects model is also known as the Least Squares Dummy Variable (LSDV) estimator because in order to allow for different intercept dummies for each country, it includes a dummy variable for each country. The FEM approach assumes the country effects in the disturbance term ε_i are correlated with the regressors. It takes the following form;

$$Y_{it} = \beta_{1i} + \beta_2 X_{2it} + \beta_3 X_{3it} + ... + \beta_9 X_{9it} + \varepsilon_{it} \quad (4.9)$$

where;

$\varepsilon_{it} \sim iid(0, \sigma^2)$ means that the error term is independently and identically distributed across countries and over time with zero mean and constant variance.

$E(X_{it}, \varepsilon_{it}) = 0$ means that all explanatory variables are independent of all error terms across countries and over time.

The fixed effects model however, has many drawbacks; for instance the use of a dummy for each cross-sectional unit creates losses in degrees of freedom. Introduction of too many variables in the model may lead to Multicollinearity, and finally the model may not be able to identify the impact of time invariant variables such as distance and language and therefore they will be excluded from the model (Gujarati, 2003).

Random Effects Estimation

To overcome the problems of the fixed effects model, the random effects estimation has been used in many researches. The random effects approach treats the intercept as a random variable. The random effects model makes the assumption that the unobserved country effects ε_i are randomly distributed in the sense that the unobserved country effects are not correlated with each of the regressors. It takes the following form;

$$Y_{it} = \beta_1 + \beta_2 X_{2it} + \beta_3 X_{3it} + ... + \beta_9 X_{9it} + w_{it} \qquad (4.10)$$

where:

$w_{it} = \varepsilon_i + \mu_{it}$

ε_i denotes the unobservable and time invariant country specific effects that are not included in the regression.

μ_{it} denotes idiosyncratic errors, these are errors which change across countries and over time.

$\varepsilon_i \sim N(0, \sigma_\varepsilon^2)$ means that the unobservable and time invariant country specific effects are normally distributed with zero mean and constant variance.

$\mu_{it} \sim N(0, \sigma_\mu^2)$ means that the errors which change across countries and over time are normally distributed with zero mean and constant variance.

$E(\varepsilon_i, \mu_{it}) = 0,\ E(\varepsilon_i, \varepsilon_j) = 0\ (i \neq j)$ means that the unobservable and time invariant country specific effects are independent of each other and of the errors which change across countries and over time.

$E(\mu_{it}, \mu_{is}) = E(\mu_{it}, \mu_{jt}) = E(\mu_{it}, \mu_{js}) = 0 (i \neq j, t \neq s)$ means that the errors which change across countries and over time are independent of each other across countries and time.

The major problem with the random effects model is that, if the unobserved and time invariant country effects are correlated with the explanatory variables, then the estimates will be biased and inconsistent.

4.4. Data Type and Sources

This study makes use of secondary data which contain annual trade flows, GDP, population, trade intensity, exchange rate, distance, dummies for common border and common language and differences in per capita income between Zambia and its trading partners in the SADC. The study covers 21 sectors of commodities which Zambia trades with its partners in SADC. The sample contains 11 countries in SADC that portrayed IIT with Zambia. The data on trade was obtained from the Department of External Trade, the Zambian Central Statistical Office (CSO). Data on GDP was taken from World Development Indicators via the Nation Master website: www.nationmaster.com. The data on population and exchange rates were obtained from the Penn World website:

www.pennworld.com. Additional information on the exchange rates was taken from the International Monetary Fund, World Economic outlook database. Distance data were obtained from the Jon Havemans website: www.havemaninternational/capitals.htm, while data on other relevant variables were obtained from the SADC trade database and the World Bank-World Trade Indicators (2008).

CHAPTER FIVE

RESULTS AND DISCUSSIONS

5.0. Introduction

This chapter presents the panel econometric estimation results and discussion. Section 5.1 presents the diagnostic tests results, while Section 5.2 presents the estimation model used in the study. Section 5.3 reports the hypothesis test results and gives an interpretation of the regression results.

5.1. Diagnostic Test Results

Test results for Multicollinearity using the Correlation Matrix are presented in Appendix 2. The results show that PCI and DPCI were highly collinear (0.88) thus the need to correct for Multicollinearity by dropping one of the collinear variables. In order to do so, the model was run with PCI while DPCI was dropped and vice versa (results are shown in Tables 5.1 and 5.2).

Results from the likelihood ratio test for Heteroscedasticity shown in Appendix 3 indicate the presence of Heteroskedasticity across panels. Since the presence of Heteroskedasticity across panels may lead to estimates that are consistent but not efficient, it is taken into account by the estimation method to be used.

The study tested for Autocorrelation using the Wooldridge test for Autocorrelation in panel data and the results are presented in Appendix 4. The null hypothesis of no first order Autocorrelation was rejected at all levels of significance in favor of the alternative hypothesis of first order Autocorrelation. Since Autocorrelation is regarded as a very big problem it has to be corrected, in this study autocorrelation is corrected by the estimation method used.

5.2. Model Specification

The results obtained after running the pooled, fixed effects and random effects estimation methods are presented in Appendices 5, 6 and 8. This study, however, uses the random effects model as opposed to pooled and the fixed effects estimation methods. The reasons for this model choice are the following: Firstly, the pooled estimation method has a tendency of giving biased results due to ignoring country effects. Secondly, the fixed effects estimation method does not take time invariant variables such as distance, common border and common language into account therefore rendering the Hausman Specification test inappropriate to this study. Thirdly, the use of a dummy for each cross-sectional unit in the fixed effects model creates losses in degrees of freedom. Lastly, since the results of the random effects model in appendix 8 are closer to the results of the pooled ordinary least squares model in appendix 5, this suggests that the unobserved effects (unobserved heterogeneity) are unimportant (relative to the variance of the error term) therefore giving justification of the use of the random effects model as opposed to pooled and the fixed effects estimation models.

Given the results of Appendices 3 and 4, which show that the disturbance variance of the country-specific effects varies across countries (Heteroskedastic) and the errors are serially correlated over time, it is important to control for both Heteroskedasticity and Autocorrelation. Therefore, in order to obtain consistent and efficient estimators the model is estimated by Feasible Generalized Least Squares (FGLS) in the random effects model. The assumption behind FGLS is that all aspects of the model are completely specified, here that includes that the disturbances have different variances for each panel and are constant within panel. The advantage of FGLS estimation in the random effects model is that it is able to handle both Heteroskedasticity and serial correlation.

5.3. Regression Results and Interpretation

The empirical results from the regression using Feasible Generalized Least Squares (FGLS) in the random effects model are reported in Tables 5.1 and 5.2.

Table 5.1: FGLS Regression Results Table with PCI

Variable	Coefficient	Standard Error	Prob. > |z|
LogGDP	1.085751	0.2531342	0.000***
LogPCI	-0.81405	0.3327507	0.041**
LogEXRT	-0.0612411	0.1069455	0.567
LogDIST	1.34297	0.6703676	0.045**
LogTI	0.0757918	0.1168582	0.517
D1	3.778347	0.5578789	0.000***
D2	4.402816	1.007483	0.000***
Constant	-32.0155	8.489702	0.000***

*denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%.

Number of observations = 99

Number of groups = 11

Time periods = 9

When the model was run with PCI, the results show that although significant, the coefficient of PCI had a negative sign which is not in conformity with a priori expectation (results presented in Table 5.1). This result shows that the higher the PCI, the lower the IIT, therefore the higher the Inter-Industry trade suggesting that PCI explains trade based on comparative advantage as opposed to IIT.

Table 5.2: FGLS Regression Results Table with DPCI

Variable	Coefficient	Standard Error	Prob. > |z|
LogGDP	0.9176383	0.2270798	0.000***
LogDPCI	-0.6029963	0.3083821	0.051*
LogEXRT	-0.0971468	0.1054887	0.387
LogDIST	1.165163	0.7008871	0.096*
LogTI	0.1633474	0.1033916	0.114
D1	3.938728	0.5812316	0.000***
D2	3.969157	1.002791	0.000***
Constant	-28.06041	8.244858	0.001***

*denotes significance at 10%, ** denotes significance at 5%, *** denotes significance at 1%.

Number of observations = 99

Number of groups = 11

Time periods = 9

When the model was run with DPCI, the coefficient of DPCI was found to be significant and had the expected negative sign (results presented in Table 5.2). Although both models obtain similar results for all the other variables, the model with PCI is dropped in order to control for Multicollinearity as the coefficient of PCI gives a perverse outcome.

Using a single equation model as specified in equation 4.2, the results show that with the exception of LogEXRT and LogTI, after dropping LogPCI, all the variables are significant. However, both LogEXRT and LogTI have the expected signs. The empirical result of LogEXRT suggests that fluctuation of the Zambian Kwacha has not supported IIT. Since exchange rate liberalization, the Zambian Kwacha as compared to other currencies has been unstable; this implies that the effect of the change in the exchange

rate on imports and exports have been cancelling each other, thereby having no effect on IIT. The reason for LogTI to be insignificant can be due to the fact that Zambia's trade volumes with other countries in SADC apart from RSA have not been significantly changing. Therefore, this result could be highly influenced by Zambia's trade with RSA.

The study establishes the extent of the existence of IIT between Zambia and its trading partners in SADC and the estimation results reveal that economic size (GDP), dissimilarities in per capita income (DPCI), transportation costs (distance and common border) and colonial ties (language) are significant factors in explaining IIT between Zambia and its trading partners in the SADC. The findings of this paper are consistent with other empirical studies[12] in explaining IIT using the gravity model.

GDP is found to be statistically significant at 1 percent and positively related to IIT, which suggests that the larger the size of the economy the larger the IIT to be conducted. The results show that an increase by 1 percent of Zambia's trading partner's GDP will increase the proportion of IIT between that trading partner and Zambia by 0.91 percent. The intuition behind is that, the larger the size of the economy, the larger the opportunities for production of differentiated goods under conditions of economies of scale and therefore the greater the demand for foreign differentiated goods in these economies. This leads to larger opportunities for trade in these goods. As shown in chapter two, Zambia has shifted its trade from the EU and ASEAN to countries in the SADC as these countries have similar economic structures and therefore produce and trade in similar but differentiated goods. This has lead to increased production and trade in the economies for instance the increased volumes of trade between Zambia and RSA that have been recorded in recent years. Since RSA is a large economy, the opportunity to produce differentiated goods under economies of scale is large and therefore its demand

[12] Balassa (1986), Clark and Stanely (1999), Ekanayake (2001), Chidoko, *et al.* (2006) and many others.

for foreign differentiated goods from Zambia has been high leading to increased IIT between the two countries. This finding is in line with the findings of Balassa (1986) and, Clark and Stanely (1999).

The Linder hypothesis states that countries with similar levels of PCI will have similar demand structures and will produce similar but differentiated products and therefore trade more among themselves. The Linder term in this study which is represented by Dissimilarities in Per Capita Incomes between Zambia and its trading partners is found to be consistent with the Linder theory. DPCI is found to be weakly significant and negatively related to IIT, which generally suggests that as countries become similar in their income levels, IIT becomes more pronounced. The results show that a 1 percent increase in the DPCI of trading partners will reduce the proportion of IIT by 0.60 percent. This result shows that the wider the gap in the resource endowments or demand structures of trading partners the lower the IIT. Therefore economies which share a lot in common economically will conduct more IIT as compared to those that have little or nothing in common. A study by Ekanayake (2001) shows that if PCI is interpreted as an indicator of demand structure, a greater difference in PCI implies that demand structures have become more dissimilar which indicates that the potential for IIT decreases. The explanation to this is that, for trade to exist between two countries there must in each country be a demand for high quality products produced by the other country. Therefore, when the gap between the PCIs of the two trading partners widens, the scope of IIT tends to lessen. This finding conforms to the findings of Balassa (1986).

The estimated coefficient for DIST is found to be weakly significant and positively related to IIT. The positive sign indicates that Zambia's IIT is more pronounced with countries that are geographically further from it. This result is not in conformity with the earlier expectation that long distance discourages IIT and is in contrast to Balassa (1986) who argued that IIT will tend to be greater when trading countries are geographically

close to each other. The major explanation to this could be attributed to the fact that despite the large geographical distance between Zambia and RSA, Zambia tends to conduct more trade with RSA which is further away as compared to other countries which are geographically closer. Being a landlocked country, Zambia's cheapest mode of conducting trade is through overland transportation, in particular road transport. Therefore this result could be influenced by the large trade volumes between Zambia and RSA which could be as a result of the good road infrastructure between the two countries.

In line with the findings of Grubel and Lloyd (1975) who suggested that in sharing a common border, IIT may take place in products that are functionally homogenous but differentiated by location. This study reveals that the estimated coefficient for common border is strongly significant and has the anticipated positive sign. The result shows that countries that share a common border tend to trade more than those that do not because the geographical distance between the two countries sharing a border will be relatively shorter. This in essence means that transport cost will be reduced significantly if Zambia conducts more trade with countries geographically close to her as compared to countries geographically further from her. However, for this result to have intuitive appeal there should be economic complementarity between the two trading partners involved in trade. Countries in SADC usually lack complementarity and this could be attributed to the dominance of one or two commodities in the export baskets of partner SADC countries. This finding however, shows that there exists economic complementarity between Zambia and its trading partners in SADC.

The language dummy is found to be strongly significant and has the expected positive sign. The language dummy represents the 11 SADC members used in this study with colonial ties to Zambia. The language dummy essentially indicates how colonial ties influence the magnitude of IIT. The result suggests that the seven (7) countries used in this study that have English as their official language conduct more IIT as compared to

the four (4) non-English speaking countries in this study. The explanation to this could be that the existence of common language will contribute to freer information flows (Balassa and Bauwens [1987], Stone and Lee [1995]) and therefore is expected to enhance IIT. This finding is consistent with the findings of Ekanayake (2001). However, this result is more relevant to north versus south trade-where Anglophone countries in Africa are likely to trade more with the United Kingdom (UK) than France and where Francophone countries in Africa are likely to trade more with France than the UK.

5.4. Summary of the chapter

This chapter has presented and discussed the econometric results from the random effects model (REM). The empirical results establish the extent of the existence of IIT between Zambia and its trading partners in SADC. The results suggest that after dropping PCI because of collinearity, the significant factors in explaining IIT between Zambia and its trading partners in SADC are; GDP, DPCI, DIST and, dummies for Common Border and Common Language. Although EXRT and TI are statistically insignificant, they have the anticipated signs. The results further show that IIT is positively determined by GDP, DIST and dummies for Common Border and Common Language, while DPCI depresses it. Apart from the positive sign for distance, the results are consistent with other empirical studies by Balassa (1986), Clark and Stanely (1999), Ekanayake (2001), Chidoko, *et al.* (2006) and many others. The results give policy makers insights to design strategies for improving overall trade in the region.

CHAPTER SIX

CONCLUSION

6.0. Introduction

This chapter wraps up the study on the determinants of IIT between Zambia and its trading partners in the SADC region. It gives a summary of the regression results obtained from estimation model used in the study and discuses these results with respect to the study's contribution to the literature of IIT.

6.1. Summary of Results

The main objective of the study was to establish the extent of the existence of IIT between Zambia and its trading partners in the SADC region and to identify the determinants of IIT between Zambia and its trading partners in the SADC. In a panel data framework the study used the Feasible Generalized Least Squares in the random effects model to estimate the gravity equation covering a period of 9 years from 1998 to 2006. Although the gravity model has been criticised for being ad hoc and lacking theoretical foundation, this study reveals that it is an important empirical tool in explaining trade flows as it has been able to evaluate the existence of IIT between Zambia and its trading partners in SADC as well as to establish the determinants of this trade.

The empirical results establish the extent of the existence of IIT between Zambia and her trading partners in the SADC and reveal that apart from the common gravity equation variables (GDP, PCI and DIST), IIT between Zambia and her trading partners in SADC is also determined by other variables such as DPCI, common border and common language. The results further reveal that GDP, DIST, Common Border and Common Language have a positive impact on IIT, while DPCI depresses it. EXRT and TI, however, seem to have no effect on IIT between Zambia and its trading partners in the

SADC as they are found to be statistically insignificant although with the anticipated signs.

6.2. Contributions of the Study

Global trends reveal that IIT has gained ground in world trade and in this regard Zambia has not been an exception. The findings from this study reveal that Zambia has actually been taking part in IIT and this is shown by the fact that Zambia has shifted from markets in the EU, which have significant structural differences to SADC countries which have relatively similar economic structures. Over the years, Zambia's trade with other countries in the SADC has been on the rise especially with countries like DRC, Tanzania, Malawi and Zimbabwe. This is surprising considering that countries in the SADC region have similar economic and productive structures (except RSA) therefore tend to produce and trade in similar but differentiated goods within the same industry.

The contributions of this study can be stated as follows; Firstly, the results suggest that IIT between Zambia and its trading partners increases, the larger the economic size (GDP) of a country. This means that economic growth will strongly affect trade relationships, that is to say IIT between Zambia and its trading partners in SADC is likely to expand as the economies become larger. Secondly, the results show that similarities in per capita income is a very important aspect in increasing IIT between Zambia and its trading partners in the SADC. Therefore, if Zambia is to increase IIT and maximize her gains from this kind of trade, she has to engage more in trade with countries with similar per capita incomes. Thirdly, in order to expand IIT, Zambia has to trade more with her neighbours and this is evident from the large and significantly positive effect of the coefficient of the common border variable. Fourthly, historical ties have been found to have a very important role to play in expanding IIT between Zambia and its trading partners in SADC. Although the results suggest that Zambia should engage more in trade with other former British colonies because of the easy information flows. Doing so,

however, would limit Zambia's trade within the region and thereby affect IIT considering the fact that there has been increased trade activity in countries like; Angola, DRC, Tanzania and Mozambique which are not former British colonies.

While many studies[13] on developing countries have found the exchange rate to be a significant factor in explaining IIT, this study however finds that in the case of Zambia, the exchange rate though having the anticipated sign is insignificant. This suggests that the exchange rate has not supported IIT. This finding can be explained by the fact that the Zambian Kwacha has constantly been appreciating and depreciating ever since it was liberalized. Currency appreciation causes exports to be more expensive and imports to be cheaper while currency depreciation causes imports to be more expensive while exports become cheaper. Therefore, exchange rate instability does not support IIT because the effects of the change in the exchange rate on imports and exports tend to cancel each other out. In this regard the real exchange rate cannot be used as a determinant of IIT in a country with an unstable exchange rate.

In addition, the study finds distance to be a significant factor in explaining IIT. This means that the distance between trading centres is a very important factor in explaining trade. In regard to this finding, RSA has over the years been relocating its manufacturing production base to advantageous locations so as to enable it compete favorably in terms of trade. South Africa has shifted most of its manufacturing units to Johannesburg which is closer to most SADC countries that rely on its manufacturing products. This has seen its trade expand considerably over the years.

Furthermore, in identif ying the determinants of IIT between Zambia and its trading partners in SADC this study finds that PCI gives a perverse outcome. PCI seems to

[13] Chidoko, *et al.* (2006), Do (2006), Simwaka (2006)

explain trade based on comparative advantage as opposed to IIT, therefore suggesting that countries in SADC may have not reached levels of development high enough to conduct IIT among themselves.

Lastly, for a very long time IIT has been perceived to be a feature of developed countries however, this study shows that IIT is a feature of both the industrialized countries as well as developing countries; this finding is confirmed by the significance of the dissimilarities in per capita income (DPCI) variable.

6.3. Policy Recommendations

Trade is considered as a very important aspect in the economic performance of a country. It is for this reason that it is important to investigate IIT, for this may be an area where substantial benefits could be reaped if properly nurtured. Therefore, there is need for policy to be aimed at expanding it in order to improve a country's economic prospects. The results reveal that IIT does in actual fact exists, therefore since this trade is beneficial to the country, there is need to direct efforts to expand this form of trade. This can be achieved through paying particular attention to the determinants of IIT as established by the gravity model in this study. Firstly, economic size (GDP) has been found to be one aspect that can increase IIT. Therefore policy must be aimed at encouraging economic growth and this can be achieved through expanding the production sectors of the economy. Expansion of the productive sectors entails an expansion in the production of goods and services and therefore leads to an increase in income (Gross Domestic Product and Per Capita Income). In order to achieve this, this paper recommends that policy makers put in place stabilization policies and an attractive business environment which will attract Foreign Direct Investment and will therefore contribute to bringing a high growth rate in the economy. This study also recommends that Zambia maintains good relations with its neighbors as well as countries with which it has historical ties with. This has potential benefits in terms of reducing transaction costs because of closeness. The

other recommendation is that Zambia enters into bilateral trade agreements with her neighbors as this would result in the elimination of trade barriers and therefore enable reciprocal non-trade barrier trade between her and her neighbors. Distance is also an important determinant of IIT between Zambia and its trading partners in the SADC. As many countries in the SADC are landlocked; one of the most important features of trade in the SADC is that it is dominated by road transport. Road transport is Zambia's main link to other countries in the SADC, therefore improvement in the road infrastructure as well as reduction in the delays at border posts would be necessary steps to the expansion of IIT within the region. Improvement of the road network is particularly beneficial to the country in terms of increased export earnings to countries like DRC, Angola and Zimbabwe which have in recent years experienced growing demand for consumer goods.

A key objective of the Government is to reposition the economy with a view to take advantage of the rebound in global economic activity and trade. The promotion of trade is integral to Zambia in its efforts to find additional regional and international markets for its products. Zambia has continued to maintain a liberal trade policy regime aimed at enhancing productivity and competitiveness of Zambian products in both the domestic and international markets. The main objective of Zambia's trade policy is to contribute to economic growth and national development through the creation of viable and competitive export sectors in the economy: this led to the formation of the Zambia Development Agency (ZDA). This objective has been enshrined in key national policy documents such as the Commercial Trade and Industrial Policy (CTIP), the Fifth National Development Plan (FNDP) and the Vision 2030, which articulate the country's long term development objectives (Katotoka, 2010). The policy seeks to achieve this objective by directing resources to the most productive areas for export production, therefore, this study can act as a guide to policy makers as they formulate the Sixth National Development Plan (SNDP) in terms of ways of fostering economic growth and development in Zambia through the promotion of IIT with its trading partners in SADC.

6.4. Limitations and Areas for further Research

The major limitation that was faced in this study was the non-availability of data as a large part of the trade in SADC is informal and therefore goes unrecorded. Therefore the sample used in this study only included those countries that portrayed IIT and those for which information was readily available; the lack of appropriate data has limited this study to 11 countries and only 21 commodities with a lower level of industry aggregation. Therefore, future research on this subject may include a higher level of industry aggregation.

Musonda (1997) has likened the lack of data in some African countries to mining a very hard rock, such that even after mining there is no assurance that one will end up with the kind of mineral one was searching for. In undertaking this study the lack of appropriate data has also led to failure to classify IIT into its two classifications of VIIT and HIIT and therefore looking at the determinants of each classification separately. Therefore, further research would be to consider the determinants of VIIT and HIIT separately by estimating different regressions for the two classifications and analyzing whether there are differences between the two types of IIT.

The other limitation was that there is a tendency to have discrepancies between reporter and exporter country data arising from erroneous reporting. However, this study overcame this handicap by making use of databases which had originally reported statistics on Zambia as a reporting country, as opposed to individual country statistics. This study only limited itself to country specific determinants, however IIT has both country specific determinants (income levels, economic dimension and endowments) as well as industry specific determinants (market structure, product differentiation, economies of scale) as outlined in the new trade theories. Therefore future research can also incorporate both the country specific determinants as well as the industry specific determinants of IIT.

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APPENDICES

Appendix 1: Intra-Industry Trade with RoSADC: Top 15 Commodities in 2004.

Commodity	Grubel-Lloyd index
H2710: Oils petroleum, bituminous, distillates, except crude	0.97
H1202: Ground-nuts, not roasted or otherwise cooked	0.97
H5201: Cotton, not carded or combed	0.96
H3401: Soaps	0.91
H6405: Footwear n.e.s., sole not leather, rubber or plastic	0.91
H9404: Mattress supports, mattresses, bedding	0.88
H2523: Cement (portland, aluminous, slag or hydraulic)	0.86
H4901:Printed reading books, brochures, leaflets, etcetera	0.84
H6401: Waterproof footwear, rubber, plastic (Wellingtons etcetera)	0.82
H5209: Woven cotton n.e.s., >85% cotton, >200g/m2	0.80
H8474: Machinery to sort, screen, wash, etcetera mineral products	0.74
H4407: Wood sawn, chipped lengthwise, sliced or peeled	0.74
H8429: Self-propelled earth moving, road making, etcetera machines	0.74
H3808: Insecticides, fungicides, herbicides etcetera (retail)	0.73
H2201: Unsweetened beverage waters, ice and snow	0.71

Source: TIPS (2006)

Appendix 2: Correlation Matrices

Appendix 2A: Correlation Matrix with LogPCI

(obs=99)

	LogIIT	LogGDP	LogPCI	LogDPCI	LogEXRT	LogDIST	LogTI	d1	d2
LogIIT	1.0000								
LogGDP	0.2071	1.0000							
LogPCI	0.0737	0.3806	1.0000						
LogDPCI	-0.0353	0.3372	0.8836	1.0000					
LogEXRT	0.0229	0.0896	0.4185	0.3502	1.0000				
LogDIST	-0.3477	0.0846	0.2515	0.2894	-0.3377	1.0000			
LogTI	0.2658	0.3671	0.0862	0.1580	-0.0737	-0.0531	1.0000		
d1	0.3183	-0.2346	0.5493	-0.5338	-0.1208	-0.332	-0.4139	1.0000	
d2	.1755	0.0697	.5712	0.5841	0.4506	-0.3624	0.3568	-0.4629	1.0000

Appendix 2B: Correlation Matrix after droping LogPCI

(obs=99)

	LogIIT	LogGDP	LogDPCI	LogEXRT	LogDIST	LogTI	d1	d2
LogIIT	1.0000							
LogGDP	0.2071	1.0000						
LogDPCI	-0.0353	0.3372	1.0000					
LogEXRT	0.0229	0.0896	0.3502	1.0000				
LogDIST	-0.3477	0.0846	0.2894	-0.3377	1.0000			
LogTI	0.2658	0.3671	0.1580	-0.0737	-0.0531	1.0000		
d1	0.3183	-0.2346	-0.5338	-0.1208	-0.3321	-0.4139	1.0000	

d2	.1755	-0.0697	0.5841	0.4506	-0.3624	0.3568	-0.4629	1.0000

Appendix 3: Likelihood Ratio Test for Heteroscedasticity

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares
Panels: heteroskedastic
Correlation: no autocorrelation

Estimated covariances	= 11	Number of obs	= 99
Estimated autocorrelations	= 0	Number of groups	= 11
Estimated coefficients	= 8	Time periods	= 9
Wald chi2(7)	= 87.79		
Prob > chi2	= 0.0000		

LogIIT	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LogGDP	1.00137	.1674127	5.98	0.000	.673247	1.329493
LogDPCI	-.5015895	.1545782	-3.24	0.001	-.8045572	-.1986219
LogEXRT	-.0707713	.0477486	-1.48	0.138	-.1643568	.0228143
LogDIST	1.152163	.3801933	3.03	0.002	.4069975	1.897328
LogTI	-.0029988	.1091277	-0.03	0.978	-.2168852	.2108876
d1	3.367093	.4506935	7.47	0.000	2.48375	4.250436
d2	3.737611	.5863582	6.37	0.000	2.58837	4.886852
_cons	-29.98961	4.666829	-6.43	0.000	-39.13643	-20.8428

Appendix 4: Wooldridge Test for Autocorrelation in Panel Data

Wooldridge test for autocorrelation in panel data

H0: no first-order autocorrelation

F(1, 10) = 34.691

Prob > F = 0.0002

Appendix 5: Regression Results from the Pooled Estimation Method

Source	SS	df	MS
Model	227.886072	7	32.5551532
Residual	259.434005	91	2.85092314
Total	487.320078	98	4.97265385

Number of obs = 99

F(7, 91) = 11.42

Prob > F = 0.0000

R-squared = 0.4676

Adj R-squared = 0.4267

Root MSE = 1.6885

LogIIT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LogGDP	.9176383	.236851	3.87	0.000	.4471627	1.388114
LogDPCI	-.6029963	.3216519	-1.87	0.064	-1.241918	.0359256
LogEXRT	-.0971468	.1100279	-0.88	0.380	-.3157036	.12141
LogDIST	1.165163	.7310465	1.59	0.114	-.2869709	2.617297
LogTI	.1633474	.1078405	1.51	0.133	-.0508646	.3775594
d1	3.938728	.6062422	6.50	0.000	2.734502	5.142953
d2	3.969157	1.045942	3.79	0.000	1.891522	6.046792
_cons	-28.06041	8.599636	-3.26	0.002	-45.14253	-10.97829

Appendix 6: Regression Results from the Fixed Estimation Method

Fixed-effects (within) regression — Number of obs = 99

Group variable: country — Number of groups = 11

R-sq: within = 0.0386 — Obs per group: min = 9

between = 0.2063 — avg = 9.0

overall = 0.0813 — max = 9

F(4,8 = 0.84

corr(u_i, Xb) = -0.7403 — Prob > F = 0.5017

LogIIT	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LogGDP	-.4556605	.8109355	-0.56	0.576	-2.068295	1.156974
LogDPCI	-.0322422	.5223794	-0.06	0.951	-1.071051	1.006567
LogEXRT	-.0210213	.1671879	-0.13	0.900	-.3534927	.3114501
LogDIST	(dropped)					
LogTI	-.3127732	.2174939	-1.44	0.154	-.7452837	.1197373
d1	(dropped)					
d2	(dropped)					
_cons	12.35956	15.53189	0.80	0.428	-18.52731	43.24642

sigma_u	2.3996572	
sigma_e	1.5941307	
rho	.69381049	(fraction of variance due to u_i)

F test that all u_i=0: F(10, 84) = 1.81 Prob > F = 0.0713

Appendix 7: Regression Results from the Random Estimation Method with PCI

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares
Panels: homoskedastic
Correlation: no autocorrelation

Estimated covariances	= 1	Number of obs	= 99
Estimated autocorrelations	= 0	Number of groups	= 11
Estimated coefficients	= 8	Time periods	= 9
Wald chi2(7)	= 90.87		
Prob > chi2	= 0.0000		

LogIIT	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LogGDP	1.085715	.2531342	4.29	0.000	.589581	1.581849
LogPCI	-.81405	.3327507	-2.45	0.014	-1.466229	-.1618706
LogEXRT	-.0612411	.1069455	-0.57	0.567	-.2708504	.1483683
LogDIST	1.34297	.6703676	2.00	0.045	.0290735	2.656866
LogTI	.0757918	.1168582	0.65	0.517	-.1532461	.3048297
d1	3.778347	.5578789	6.77	0.000	2.684924	4.87177
d2	4.402816	1.007483	4.37	0.000	2.428185	6.377447
_cons	-32.0155	8.489702	-3.77	0.000	-48.65501	-15.37599

Appendix 8: Regression Results from the Random Estimation Method with DPCI

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares
Panels: homoskedastic
Correlation: no autocorrelation

Estimated covariances	= 1	Number of obs	= 99
Estimated autocorrelations	= 0	Number of groups	= 11
Estimated coefficients	= 8	Time periods	= 9
Wald chi2(7)	= 86.96		
Prob > chi2	= 0.0000		

LogIIT	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LogGDP	.9176383	.2270798	4.04	0.000	.4725701	1.362706
LogDPCI	-.6029963	.3083821	-1.96	0.051	-1.207414	.0014215
LogEXRT	-.0971468	.1054887	-0.92	0.357	-.3039008	.1096071
LogDIST	1.165163	.7008871	1.66	0.096	-.2085504	2.538877
LogTI	.1633474	.1033916	1.58	0.114	-.0392963	.3659912
D1	3.938728	.5812316	6.78	0.000	2.799535	5.077921
D2	3.969157	1.002791	3.96	0.000	2.003722	5.934592
_cons	-28.06041	8.244858	-3.40	0.001	-44.22004	-11.90079

Appendix 10: Log Transformation

COUNTRY	YEAR	LogIIT	LogGDP	LogPCI	LogDPCI	LogEXRT	LogDIST	LogTI	D1	D2
1	1998	3.93	22.37	8.08	7.97	6.46	6.97	-1.16	1	1
1	1999	3.19	22.45	8.14	8.04	6.51	6.97	-1.54	1	1
1	2000	3.86	22.54	8.21	8.12	6.41	6.97	-1.29	1	1
1	2001	3.69	22.52	8.17	8.06	6.38	6.97	-1.47	1	1
1	2002	3.81	22.50	8.13	8.02	6.32	6.97	-1.67	1	1
1	2003	3.57	22.84	8.45	8.36	6.43	6.97	-1.46	1	1
1	2004	3.15	23.01	8.60	8.50	6.42	6.97	-1.48	1	1
1	2005	2.66	23.07	8.64	8.52	6.18	6.97	-0.33	1	1
1	2006	3.51	23.06	8.61	8.42	5.88	6.97	-1.50	1	1
2	1998	2.01	22.08	5.42	4.67	5.36	7.13	-3.19	1	0
2	1999	3.07	22.11	5.42	4.49	5.38	7.13	-2.62	1	0
2	2000	0.16	22.05	5.34	4.69	5.32	7.13	-1.24	1	0
2	2001	-3.35	22.03	5.29	5.01	5.08	7.13	-2.00	1	0
2	2002	0.57	22.13	5.37	4.88	5.04	7.13	-2.31	1	0
2	2003	1.56	22.29	5.51	5.03	4.97	7.13	-1.30	1	0
2	2004	3.32	22.50	5.70	5.28	4.92	7.13	-2.66	1	0
2	2005	1.86	22.64	5.82	5.75	4.74	7.13	-1.87	1	0
2	2006	2.04	22.75	5.92	6.39	4.39	7.13	-1.82	1	0
3	1998	1.78	21.28	5.07	5.15	3.95	6.41	0.40	1	1
3	1999	2.94	21.30	5.06	5.05	3.98	6.41	-0.69	1	1
3	2000	2.61	21.28	5.02	5.11	3.96	6.41	-0.55	1	1
3	2001	3.20	21.26	4.98	5.31	3.91	6.41	-1.02	1	1
3	2002	3.16	21.38	5.07	5.24	4.35	6.41	-0.66	1	1
3	2003	3.36	21.29	4.96	5.55	4.10	6.41	-0.25	1	1
3	2004	2.92	21.37	5.01	5.84	3.95	6.41	0.03	1	1
3	2005	2.86	21.45	5.07	6.20	3.72	6.41	0.15	1	1
3	2006	2.43	21.53	5.12	6.68	3.45	6.41	-0.44	1	1
4	1998	3.06	21.95	7.54	7.35	5.97	7.26	-1.78	1	1
4	1999	4.27	21.94	7.51	7.33	6.00	7.26	-2.39	1	1
4	2000	3.78	21.95	7.50	7.30	6.11	7.26	-2.19	1	1
4	2001	3.44	21.89	7.42	7.18	5.93	7.26	-2.48	1	1
4	2002	3.56	21.86	7.37	7.13	5.84	7.26	-2.13	1	1
4	2003	3.59	22.22	7.72	7.53	6.08	7.26	-2.19	1	1
4	2004	3.29	22.47	7.95	7.76	6.08	7.26	-1.69	1	1
4	2005	3.02	22.55	8.02	7.78	5.91	7.26	-1.57	1	1

4	2006	3.05	22.58	8.04	7.67	5.59	7.26	-1.44	1	1
5	1998	3.31	22.53	6.26	5.25	11.65	6.08	1.42	1	1
5	1999	3.30	22.51	6.23	5.27	11.17	6.08	1.07	1	1
5	2000	3.66	22.72	6.44	5.73	11.16	6.08	0.96	1	1
5	2001	3.13	23.05	6.76	6.25	10.40	6.08	1.13	1	1
5	2002	3.07	23.81	7.52	7.31	8.28	6.08	1.10	1	1
5	2003	2.82	22.72	6.44	5.42	5.97	6.08	1.63	1	1
5	2004	3.43	22.27	6.00	4.53	5.86	6.08	1.37	1	1
5	2005	3.38	21.95	5.68	5.89	4.17	6.08	0.94	1	1
5	2006	3.50	22.33	6.07	6.28	1.86	6.08	0.72	1	1
6	1998	2.15	22.85	5.57	4.24	1.30	7.34	0.40	1	0
6	1999	2.59	22.88	5.57	3.93	1.35	7.34	0.24	1	0
6	2000	3.56	22.93	5.60	3.87	1.36	7.34	-0.79	1	0
6	2001	3.44	22.97	5.61	4.32	1.25	7.34	-1.20	1	0
6	2002	2.33	23.00	5.62	4.27	1.24	7.34	0.57	1	0
6	2003	1.44	23.05	5.65	4.76	1.14	7.34	1.22	1	0
6	2004	1.77	23.15	5.73	5.24	0.98	7.34	1.02	1	0
6	2005	2.17	23.26	5.81	5.77	0.77	7.34	0.10	1	0
6	2006	2.12	23.27	5.80	6.45	0.38	7.34	-0.47	1	0
7	1998	-1.20	22.55	4.85	5.32	4.01	7.54	0.39	1	0
7	1999	0.80	22.27	4.54	5.40	4.84	7.54	0.15	1	0
7	2000	3.22	22.18	4.42	5.46	4.96	7.54	0.43	1	0
7	2001	1.17	22.27	4.47	5.56	4.23	7.54	-0.09	1	0
7	2002	2.27	22.44	4.61	5.51	4.00	7.54	0.09	1	0
7	2003	3.33	22.46	4.60	5.71	3.86	7.54	0.22	1	0
7	2004	3.09	22.61	4.72	5.95	3.77	7.54	0.80	1	0
7	2005	3.39	22.68	4.77	6.29	3.55	7.54	0.54	1	0
7	2006	3.44	22.87	4.92	6.72	3.34	7.54	0.38	1	0
8	1998	3.44	25.62	8.02	7.91	6.12	7.05	2.78	0	1
8	1999	3.64	25.62	8.00	7.89	6.15	7.05	2.61	0	1
8	2000	3.20	25.61	7.99	7.88	6.11	7.05	3.00	0	1
8	2001	3.25	25.50	7.86	7.72	5.90	7.05	3.12	0	1
8	2002	3.16	25.43	7.79	7.63	5.81	7.05	3.10	0	1
8	2003	3.21	25.84	8.18	8.06	6.08	7.05	3.12	0	1
8	2004	3.40	26.10	8.43	8.32	6.11	7.05	3.24	0	1
8	2005	3.27	26.21	8.54	8.40	5.94	7.05	2.98	0	1
8	2006	3.38	26.26	8.58	8.38	5.61	7.05	2.82	0	1
9	1998	1.53	22.15	8.18	8.08	4.72	8.05	-2.84	0	1

9	1999	-7.15	22.17	8.20	8.11	4.78	8.05	2.61	0	1
9	2000	0.35	22.22	8.23	8.15	4.78	8.05	3.00	0	1
9	2001	0.02	22.24	8.24	8.14	4.64	8.05	3.12	0	1
9	2002	1.02	22.24	8.23	8.14	4.70	8.05	3.10	0	1
9	2003	2.49	22.38	8.37	8.27	4.71	8.05	3.12	0	1
9	2004	2.35	22.53	8.50	8.40	4.62	8.05	3.24	0	1
9	2005	2.53	22.56	8.53	8.39	4.35	8.05	2.98	0	1
9	2006	-0.18	22.59	8.55	8.34	3.98	8.05	2.82	0	1
10	1998	-0.17	21.02	7.13	6.82	6.15	7.13	-1.57	0	1
10	1999	0.18	21.04	7.14	6.85	6.16	7.13	-2.04	0	1
10	2000	0.72	21.05	7.13	6.84	6.12	7.13	-2.09	0	1
10	2001	-1.30	20.95	7.02	6.65	5.91	7.13	-2.45	0	1
10	2002	-1.63	20.90	6.96	6.56	5.80	7.13	-2.59	0	1
10	2003	-2.11	21.37	7.43	7.15	6.08	7.13	-2.25	0	1
10	2004	-3.12	21.59	7.65	7.38	6.11	7.13	-2.23	0	1
10	2005	-5.39	21.68	7.74	7.40	5.95	7.13	-2.76	0	1
10	2006	-0.54	21.70	7.75	7.22	5.64	7.13	-2.89	0	1
11	1998	2.53	22.59	6.46	5.74	5.40	7.49	-3.76	1	0
11	1999	1.01	22.54	6.40	5.66	5.37	7.49	-5.11	1	0
11	2000	-0.39	22.93	6.78	6.33	5.74	7.49	-4.45	1	0
11	2001	2.99	22.91	6.74	6.21	5.61	7.49	-6.94	1	0
11	2002	-5.12	23.16	6.97	6.57	5.74	7.49	-4.41	1	0
11	2003	-3.12	23.36	7.14	6.76	5.80	7.49	-3.65	1	0
11	2004	1.52	23.71	7.46	7.12	5.87	7.49	-4.67	1	0
11	2005	-0.22	24.21	7.94	7.67	5.88	7.49	-4.78	1	0
11	2006	-2.44	24.51	8.21	7.90	5.75	7.49	-5.57	1	0

1-Botswana 2-Mozambique 3-Malawi 4-Namibia 5-Zimbabwe 6-Tanzania 7-Democratic Republic of Congo 8-Republic of South Africa 9-Mauritius 10-Swaziland 11- Angola