

An Investigation of the Determinants of Intra-Industry Trade Between Zambia and its Trading Partners in the Southern African Development Community (SADC)

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Abstract

Intra-Industry trade (henceforth IIT) has generally been perceived to be a feature of the industrialized countries. As the past few years have seen a rapid increase in Zambia's trade with its trading partners in the SADC, trade statistics reveal that a substantial part of such intra-SADC trade is in fact of the IIT form. This study seeks to establish the extent of IIT between Zambia and its trading partners in the SADC region and to identify the determinants of IIT at this level.

Using a modified gravity model in a panel data framework for the 1998-2006 period, 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, dissimilarities in per capita income, transportation costs (distance and common border) and colonial ties (common language) are significant factors 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.

Table of Contents

Table of Contents	3
List of Tables.....	5
1 Introduction.....	6
2 Background.....	7
3 Statement of the Problem	7
4 OBJECTIVES OF THE STUDY	9
4.1 General and Specific Objectives	9
4.2 Research Hypothesis	9
4.3 Scope of the study.....	9
4.4 Significance of the Study.....	9
5 Methodology	11
6 Definition and Measurement of Variables in the Model	11
6.1 Dependent Variable	11
6.2 Explanatory Variables	12
6.2.1 Real Gross Domestic Product (GDP).....	12
6.2.2 Per Capita Income (PCI).....	13
6.2.3 Dissimilarity in Per Capita Income (DPCI).....	13
6.2.4 Distance (DIST)	13
6.2.5 Trade Intensity (TI).....	14
6.2.6 Real Exchange Rate (EXRT)	14
6.2.7 Common Border (D1)	15
6.2.8 Common Language (D2)	16
7 Estimation Technique.....	16
7.1 Estimation Models	16
7.2 Results and Discussions	17
7.2.1 Diagnostic Test Results	17
7.2.2 Model Specification	17
7.2.3 Regression Results and Interpretation.....	18
8 SUMMARY AND CONCLUSIONS.....	21
8.1 Summary of Results	21
8.2 Contributions of the Study	22
8.3 Policy Recommendations	23
9 REFERENCES	25
10 APPENDICES	28
10.1 Appendix 1: Likelihood Ratio Test for Heteroscedasticity	28
10.2 Appendix 2: Wooldridge Test for Autocorrelation in Panel Data	28

10.3 Appendix 3: Correlation Matrix with LogPCI..... 29

10.4 Appendix 4: Correlation Matrix after dropping LogPCI..... 29

10.5 Appendix 5: Regression Results from the Random Estimation Method with PCI..... 29

10.6 Appendix 6: Regression Results from the Random Estimation Method with DPCI 31

List of Tables

Table 1: FGLS Regression Results Table with PCI.....	18
Table 2: FGLS Regression Results Table with DPCI.....	18

1 Introduction

International trade involves the exchange of various commodities between countries. There are two types of trade: intra-industry 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 (Kocycigit and Sen, 2007).

Intra-Industry Trade arises from the fact that countries try to take advantage of economies of scale in production and it is in this vein that many countries in the Africa have realized the potential benefits and have therefore advocated of its expansion.¹

While there are a number of studies² on developing countries' IIT, previously most trade studies placed greater emphasis on a country's comparative advantage as the basis of trade rather than on economies of scale. 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.

Studies that have attempted to identify the determinants of IIT 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 Roninggen, 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 (*Ibid*). 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 would provide

¹ Studies by Chidoko, *et al.*, (2006), Musonda (1997).

² Studies on developing countries' 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).

some guidelines to policy makers. This study therefore tries to make a modest contribution to knowledge and to the relatively small stoke of research on Zambia's IIT.

2 Background

Africa has for a very long time been experimenting with economic integration and this led to the emergence of SADC in 1992. 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. For a very long time theoretical and empirical researchers have been keenly interested in the trade occurring among SADC member countries.³

Zambia trades with other countries in the SADC and most of this trade involves the exchange of differentiated products that belong to the same industry. The establishment of SADC led to trade liberalization and deregulation which resulted to changes 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. 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). This study therefore analyses the existence of this trade and more precisely, the determinants of IIT.

3 Statement of the Problem

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 index⁴ above 0.6 in its trade with other countries in the SADC region except South Africa (TIPS⁵, 2007).⁶

³ 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.

⁴ The G-L index estimates the proportion of trade accounted for by IIT for an industry or sector.

⁵ Trade and Industrial Policy Strategy

⁶ A G-L index value of 0.6 means that the proportion of IIT is high.

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 studies⁷ 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.

⁷ Studies include Musonda (1997), Chidoko *et al.* (2006), Simwaka (2006).

4 OBJECTIVES OF THE STUDY

4.1 General and Specific 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.
2. To identify the determinants of IIT between Zambia and its trading partners in SADC.
3. To evaluate the existence of IIT between Zambia and its trading partners in SADC.
4. To identify the significant factors influencing the levels of IIT between Zambia and its trading partners in the SADC.

4.2 Research Hypothesis

This study seeks to test 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.

4.3 Scope of the study

The study uses a panel data⁸ 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 influenced by the availability of data for the variables used in the model as well as whether the commodities exhibit IIT.

4.4 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

⁸ Panel data are repeated measures of one or more person or simply put panel data are repeated cross-section time series. The use of panel data is justified because multiple countries (11 countries) are observed over a period of time (9 years)

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 some insights to design strategies for improvement of overall trade in the region, and more precisely Zambia's trade balance.

5 Methodology

This study applies the Gravity model which is a variation of the standard gravity model used by Chidoko, *et al.*, (2006) augmented by adding an extra dummy variable for common language. The dependent variable is the IIT index which is multiplied by 100 to get the proportion of IIT. 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 are: 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.

$$\text{IIT}_{ijk} = f(\text{GDP}_k, \text{PCI}_k, \text{DPCI}_{jk}, \text{TI}_{jk}, \text{EXRT}_{jk}, \text{DIST}_{jk}, D_1, D_2) \quad (1.1)$$

(+) (+) (-) (+) (-) (-) (+) (+)

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 if Zambia and the trading partner share a common border and zero otherwise, while D_2 takes the value of one 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;

$$\text{LogIIT}_{ijk} = \beta_0 + \beta_1 \text{LogGDP}_k + \beta_2 \text{LogPCI}_k + \beta_3 \text{LogDPCI}_{jk} + \beta_4 \text{LogTI}_{jk} \quad (1.2)$$

$$+ \beta_5 \text{LogEXRT}_{jk} + \beta_6 \text{LogDIST}_{jk} + \beta_7 D_1 + \beta_8 D_2 + \varepsilon_{jk}$$

The dummies are in linear form because they assume the values of zero or one.

β_0 stands for the country effects.

6 Definition and Measurement of Variables in the Model

6.1 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;

$$\text{IIT}_{ijk} = \left[1 - \frac{|X_{ijk} - M_{ijk}|}{(X_{ijk} + M_{ijk})} \right] \quad (1.3)$$

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 $\text{IIT}_{ijk} = 1$.

Similarly, if all trade in industry i is Inter-Industry trade, that is, either $X_{ijk} = 0$ or $M_{ijk} = 0$, then $\text{IIT}_{ijk} = 0$.

In this study the IIT index in Equation 1.3 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;

$$\text{IIT}_{ijk} = \left[1 - \frac{\sum |X_{ijk} - M_{ijk}|}{\sum (X_{ijk} + M_{ijk})} \right] * 100 \quad (1.4)$$

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

6.2 Explanatory Variables

6.2.1 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. 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 constant base year prices denominated in United States Dollars (USD\$) to incorporate price changes. Real GDP is expected to have a positive sign.

6.2.2 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 constant base year prices denominated in United States Dollars (US\$) and is expected to be positively related to IIT.

6.2.3 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;

$$DPCI_{jk} = |PCI_j - PCI_k| \quad (1.5)$$

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.

6.2.4 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.

6.2.5 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;

$$TI_{jk} = \frac{X_{jk} + M_{jk}}{GDP_j} \quad (1.6)$$

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.

6.2.6 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

$$\$1 = MK 152$$

then

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

where;

E_{jk} = is the nominal 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;

$$RER_{jk} = E_{jk} \times \frac{P_k}{P_j} \quad (1.7)$$

where;

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

E_{jk} = is the nominal 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 because 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 more expensive while imports become cheaper thereby discouraging IIT.

6.2.7 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, *Ceteris paribus*, IIT between countries which share a common border is likely to be higher than between countries which do not share a border.

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

6.2.8 Common Language (D2)⁹

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 IIT between the countries. Common language is measured as a dummy variable which is defined as follows:

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

The link between common language and trade is a positive one and since IIT is a form of trade given that the relationship between IIT and common language will be the same unless the results show otherwise. This is because when countries share a common language then they have close economic ties hence they will tend to trade more.

7 Estimation Technique

Using 11 of Zambia's major trading partners in the SADC for the years 1998-2006, the model is estimated using a panel data framework in Stata. The use of panel data methodology in this study can be justified based on its advantages;

- Panel data analysis allows control of heterogeneity of cross-sectional units.
- Generates more variability, more degrees of freedom and at the same time reduces multicollinearity problems thereby improving the efficiency of the econometric estimates.

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.

7.1 Estimation Models

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

⁹ 7 out of the 11 countries share common language with Zambia. The other languages are Portuguese, French and Swahili.

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.

7.2 Results and Discussions

7.2.1 Diagnostic Test Results

Testing for Multicollinearity using the Correlation Matrix, 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 1 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 has used the Feasible Generalized Least Squares (FGLS) in the random effects model which corrects for Heteroscedasticity.

The study tested for Autocorrelation using the Wooldridge test for Autocorrelation in panel data and the results are presented in Appendix 2. 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 (Wooldridge, 2002), in this study autocorrelation is corrected by the estimation method used.

7.2.2 Model Specification

This study 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 by 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. Lastly, the use of a dummy for each cross-sectional unit in the fixed effects model creates losses in degrees of freedom.

Given the results of Appendices 1 and 2, 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.

7.2.3 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 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 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 1.2, the results show that all the variables are significant with the exception of LogEXRT and LogTI, after dropping LogPCI. LogEXRT and LogTI have the expected signs. The empirical result of LogEXRT suggests that highly volatile fluctuations of the Zambian Kwacha have not supported IIT. Since exchange rate liberalization, the Zambian Kwacha as compared to other currencies has been unstable; this could have caused the effect of the change in the exchange rate on imports and exports 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 flows 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 studies¹⁰ 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 this pattern 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. 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 (TIPS, 2008). This has led to increased production and trade in the economies for instance the increased trade flows 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 for foreign differentiated goods from Zambia has been high leading to increased IIT between the two countries. The reason for an adverse IIT result could be attributed to the fact that Zambia's trade flows with other countries in SADC apart from RSA have not been significantly changing. This finding is in line with the findings of Balassa (1986) and those of Clark and Stanely (1999).

¹⁰ Balassa (1986), Clark and Stanely (1999), Ekanayake (2001), Chidoko, et al., (2006) and many others.

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. This result shows 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 be in each country a demand for differentiated 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 costs 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).

8 SUMMARY AND CONCLUSIONS

This paper 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.

8.1 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.

8.2 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. Over the years, Zambia's trade with other countries in the SADC has been on the rise, 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, 2007). 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. These include all SADC countries except for South Africa. 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 studies¹¹ on developing countries have found the exchange rate to be a significant factor in explaining IIT, this study finds for Zambia that while, the exchange rate variable has the anticipated sign, it 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.

¹¹ E.g. Chidoko, *et al.* (2006), Do (2006), Simwaka (2006)

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

8.3 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 exist, 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 a higher 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:¹² this led to the formation of the Zambia Development Agency (ZDA). 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.

¹² 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)

9 REFERENCES

- Aquino, A. (1978), "Intra-Industry Trade and Inter-Industry Specialization as Concurrent Sources of International Trade in Manufactures," *Weltwirtschaftliches Archiv*, Vol. 114, No. 2, pp. 275–296.
- Asteriou, D. (2006), *Applied Econometrics: A Modern Approach Using EViews and Microfit*, Palgrave Macmillan: Hampshire and New York.
- Balassa, B. (1979), *Intra-Industry Trade and the Integration of Developing Countries in the World Economy*, in H. Giersch (ed.), *On the Economics of Intra-Industry Trade*, pp. 245-270: Tubingen.
- Balassa, B. (1986), "The Determinants of Intra-Industry Specialization in United States Trade," *Oxford Economic Papers*, Paper No. 38, pp. 220-223.
- Balassa, B. and Bauwens, L. (1987), "Intra-Industry Specialization in a Multi-Country and Multi-Industry Framework," *The Economic Journal*, Vol. 97, No. 388, pp. 923–939.
- Chauvin, S. and Gaulier, G. (2002), "Prospects for Increasing Trade among SADC Countries Annual Report," *Trade and Industrial Policy Strategies: Muldersdrft*.
- Chidoko, C., Zivanomoyo, J. and Sunde, T. (2006), "Determinants of Intra-Industry Trade between Zimbabwe and its Trading Partners in the Southern African Development Community Region (1990-2006)," *Journal of Sciences*, Vol. 5, No. 1, pp. 16-21.
- Clark, D. P. And Stanley, D. L. (1999), "Determinants of Intra-Industry Trade between Developing Countries and the United States," *Journal of Economic Development*, Vol. 24, No. 2, pp. 79-92.
- DeRosa, D.A. and Roningen, V.O. (2003), *Zambia in Regional and Extra-Regional Free Trade Agreements: Estimates of the Trade and Welfare Impacts*, VORSIM/ Potomac Associates: Virginia.
- Do, T. T. (2006), "A Gravity Model for Trade between Vietnam and Twenty-Three European Countries," *Unpublished Thesis*, Department of Economics and Society: Hanoi.
- Ekanayake, E. M. (2001), "Determinants of Intra-Industry Trade. The case of Mexico," *The International Trade Journal*, Vol. 15, No. 1, pp. 89-112.

- Filippini, C. (2003), *The Determinants of East Asian Trade Flows: A Gravity Equation Approach*, Bocconi University: Milan.
- Gonzalez, J. G. and Velez, A. (1995), "Intra-Industry Trade between the United States and the Major Latin American Countries: Measurement and Implications for Free Trade in the Americas," *The International Trade Journal*, Vol. 9, No. 4, pp. 519–536.
- Grubel, H. and Lloyd, P. (1975), *Intra-Industry Trade: The Theory and Measurement of International Trade in Differentiated Product*, McMillan Publishers: London.
- Havrylyshyn, O. and Civan, E. (1983), *Intra-Industry Trade and the Stage of Development*, in P.K.M. Thakaran (ed.), *On Intra-Industry Trade: Empirical and Methodological Aspects*, pp. 111–140, Elsevier: Amsterdam.
- Havrylyshyn, O. and Kuznel, P. (1997), "Intra-Industry Trade of Arab Countries: An Indicator of Potential Competitiveness," *IMF Working Paper No. 97/ 47*.
- Hu, X. and Ma, Y. (1999), "International Intra-Industry Trade of China," *Weltwirtschaftliches Archiv*, Vol. 135, No. 1, pp. 82–101.
- Katotoka, H. (2010), "Reflections on Evidence Based Trade Policy Formulation in Zambia," *Paper Presented at the SADRN Workshop for Policy Makers*: Pretoria.
- Kimura, F. and Lee, H. (2004), "The Gravity Equation in International Trade in Services," *Review of World Economics Journal*, Vol. 142, No. 1, pp. 92-121.
- Kocyigit, A. and Sen, A. (2007), "The Extent of Intra-Industry Trade between Turkey and the European Union: The Impact of Customs Union," *Journal of Economics and Social Research*, Vol. 9, No. 2, pp. 61-64.
- Lee, H. and Lee, Y. (1993), "Intra-Industry Trade in Manufactures: The case of Korea," *Weltwirtschaftliches Archiv*, Vol. 129, No. 1, pp. 159–169.
- Linder, B. S. (1961), *An Essay on Trade and Transformation*, Almqvist & Wiksell: Stockholm.
- Manrique, G. (1987), "Intra-Industry Trade between Developed and Developing Countries: The United States and the NICs," *Journal of Developing Areas*, Vol. 21, No. 4, pp. 481–493.

Musonda, F. M. (1997), "Intra-Industry Trade between Members of the PTA/COMESA Regional Trading Arrangements," *AERC Research Paper* No. 64, pp. 10-17.

Nilsson, L. (1999), "Two-Way Trade between Unequal Partners: The EU and the Developing Countries," *Weltwirtschaftliches Archiv*, Vol. 135, No. 1, pp. 102–127.

Simwaka, K. (2006), "Dynamics of Malawi's Trade Flows: A Gravity Model Approach," *Munich Personal RePEc Archive*, MPRA Paper No. 1122.

Stone, J. A. and Lee, H. (1995), Determinants of Intra-Industry Trade: A longitudinal and Cross-Country Analysis, *Weltwirtschaftliches Archiv*, Vol. 131, No. 1, pp. 67–83.

Trade and Industrial Policy Strategies (2006), *Zambia: Intra–SADC-Trade Performance Review; 1999-2003*: Lusaka.

Trade and Industrial Policy Strategies (2007), *Zambia: Intra–SADC-Trade Performance Review; 2000-2005*: Lusaka.

Trade and Industrial Policy Strategies (2008), *Zambia: Intra–SADC-Trade Performance Review; 2006-2008*: Lusaka.

Verdoon, P. (1960), The Intra-Bloc Trade of Benelux, In E. Robinson (ed.), *Economic Consequences of the Size of Nations*, Macmillan: London.

Woodridge, J. M. (2002), *Econometric Analysis of Cross Section and Panel Data*, MIT Press: London.

10 APPENDICES

10.1 Appendix 1: 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

10.2 Appendix 2: 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

10.3 Appendix 3: 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

10.4 Appendix 4: Correlation Matrix after dropping 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

10.5 Appendix 5: 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

10.6 Appendix 6: 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