Determinants of Intra-Industry Trade between Zimbabwe and its Trading Partners in the Southern African Development Community Region (1990-2006)

[1]Tafirenyika Sunde, [2]C. Chidoko and [2]J. Zivanomoyo
[1]Department of Economics, Polytechnic of Namibia,
School of Business and Management, Private Bag 13388, Windhoek, Namibia
[2]Great Zimbabwe University, Zimbabwe

Abstract: Problem statement: The main objective of this study was to establish the determinants of intra industry trade between Zimbabwe and its trading partners in the Southern African Development Community (SADC) region. The study was mainly motivated by the need to establish the type of goods that Zimbabwe trades with its trading partners. **Approach:** The study also wanted to prove the hypothesis that similarity in per capita income is not the main determinant of intra-industry trade between Zimbabwe its SADC trading partners; and also that intra industry trade does not necessarily take place among countries with similar economic structures and level of development. The study used the Modified Standard Gravity Equation which has Intra-Industry Trade Index as its dependant variable. The model was regressed using Ordinary Least Squares in excel. **Results:** The results of the study show that per capita income, trade intensity, distance, exchange rate and gross domestic product explain Intra-Industry Trade (IIT) between Zimbabwe and its SADC trading partners. The study also established that most countries in SADC trade in more or less the same goods and this can be explained by the type of development that these countries were subjected to during the colonial era which resulted in the establishment of similar economic structures and per capita incomes that were more or less the same. As result, these countries produce and trade similar products. Both hypotheses above were proved wrong. **Conclusion:** We therefore concluded that Zimbabwe needs to get into more bilateral trade agreements with its trading partners in order to enhance trade between itself and its trading partners. We also concluded that Zimbabwe has to give incentives to its producers and also mend its relationship with the Breton Woods Institutions (International Monetary Fund and the World Bank) if it wants to reach its full trade potential.

Key words: Gravity model, per capita incomes, trade intensity

INTRODUCTION

According to[1,5] intra-industry trade involves trade in differentiated products, that is, trade in goods that belong to the same industry. A great deal of international trade involves the exchange of differentiated products of the same industry or broad product group. There is vertical integration where products are ranked according to the levels of all characteristics being augmented or lowered for some others, for example, cars of different series. Horizontal integration between two products involves ranking products according to levels of characteristics being augmented while it is lowered for others, for example different versions of a car. Inter-industry trade involves trade in commodities that are completely different; and belong to different industries, such as textiles and motor industries. Since the Southern African Development Community (SADC) region is composed of countries of almost the same economic structure, trade among these countries is mainly intra-industry trade.

International trade has become essential for developing countries to keep up with the global trend and progress, to compete effectively in an increasingly integrated world economy. Trade expansion generally improves allocation of resources, enhances economic efficiency and therefore economic growth. A great deal of international trade is Intra-Industry Trade (IIT) as opposed to inter-industry trade. Intra-industry trade arises in order to take advantage of important economies of scale in production. It benefits consumers because of the wider range of choices, that is, the

Corresponding Author: Tafirenyika Sunde, Polytechnic of Namibia, School of Business and Management, Department of Economics, Private Bag 26925, Windhoek, Namibia Tel: 00264612072406 Mobile: 00264813711879

greater variety of differentiated products. Zimbabwe can benefit more if it increases its trade with Southern Africa Development Community (SADC) countries in differentiated products because this will enhance the welfare of its population due to wider choice of products.

Intra-Industry Trade (IIT) is increasingly becoming significant in developing countries and as a result, most governments are keen to find the trading sector well catered for, by allocating resources and offering technical support to enhance its expansion.

The significance of intra-industry trade arises from its basic character that it needs not be based on comparative advantage. To a large extent, intra-industry trade arises from the fact that products are differentiated and the production of any particular product requires some fixed costs. Thus, the more sport utility vehicles Ford makes, the lower the unit cost; the more Mercedes-Benz convertibles produced, the lower the unit cost. To the extent that comparative advantage is not involved, the pattern of trade is indeterminate. When economies of scale are involved, who exports what can be determined by the accident of history.

One of the great benefits of intra-industry trade is that international trade needs not cause dislocations associated with inter-industry trade. The Stolper-Samuelson theorem suggests that international trade can cause a redistribution of income from scarce factors to abundant factors. But if most international trade is intra-industry, the impact on internal income distribution should be relatively minor. If trade is not based on scarce and abundant factors of production it does not result in reduced demand for the scarce factors and increased demand for the abundant factors; thus, trade expansion need not result in large changes in the distribution of income[9].

Intra-industry trade reduces the demands for protection because in any industry there are both exports and imports, making it difficult to achieve unanimity among those demanding protection[3,8]. Intra-industry trade needs not give rise to a justification for a strategic trade policy, which is, giving export subsidies to correct for departures from perfect competition. It is true that much intra-industry trade takes place under imperfect competition, but monopolistic competition is for all practical purposes efficient.

Statement of the problem: The degree of specialization in IIT is assumed to be correlated with the level of development of the country. It is therefore perceived that IIT is mostly a feature of the industrialized countries. However, there are indications that much of the trade in the SADC region is intra-industry trade. The SADC region is composed of fourteen Southern African states, namely Zimbabwe, Botswana, Zambia, Tanzania, Angola, Mozambique, Swaziland, Namibia, RSA, Malawi, Lesotho, Seychelles, Mauritius and DRC. Generally, SADC countries are poor and cannot influence world terms of trade. The region is mainly dependent on primary commodity exports and highly dependant on the western countries for their industrial machinery and equipment and economic survival. Why then has IIT been predominant between Zimbabwe and its trading partners within the SADC region?

There is very little published work on the determinants of the factors that influence Zimbabwe's IIT with the SADC region. This was the main motivation for undertaking this research. In this study we explored the factors that determine IIT between Zimbabwe and its trading partners within SADC region. However, the study concentrated on seven main trading partners of Zimbabwe, that is, Botswana, RSA, Zambia, Mauritius, Malawi, DRC and Namibia. In addition, twenty categories of products that form the bulk of the trade among these countries were considered.

Hypothesis to be tested: The study sought to test the hypothesis that similarity in per capita income is not the main determinant of intra-industry trade between Zimbabwe and the other SADC countries. The study also wanted to test the hypothesis that intra-industry trade does not necessarily take place among countries with similar economic structures and level of development.

MATERIALS AND METHODS

Now we outlines the methodology used to analyse the determinants of intra-industry trade between Zimbabwe and its trading partners in the SADC region. The Modified Standard Gravity Model was used to come up with the Intra-Industry Trade Index.

The Model: To estimate the Standard Gravity equation, we used the Intra-Industry Trade (IIT) index, as the dependent variable[2,4,6].

We used a time series data set on the Modified Standard Gravity Model which included the per capita income, dissimilarity in per capita income, trade intensity, distance between capitals, exchange rate, gross domestic product and dummy for common borders as its explanatory variables. The function takes the following form:

IIT = f (PCI, DPCI, TI, DIS, ER, GDP, D1)

Thus, the modified gravity equation takes the form:

$$IIT_{jk} = \beta_0 + \beta_1 PCI_k + \beta_2 DPCI_{jk} + \beta_3 TI_{jk} + \beta_4 DIS_{jk} \\ + \beta_5 ER_{jk} + \beta_6 GDP_k + \beta_7 D_1 + E_{jk} \qquad (1)$$

where, the βs are elasticities and $\beta_0, \beta_1, \beta_3, \beta_4, \beta_6, \beta_7 > 0$, $\beta_2 < 0, \beta_5 < 0, \beta_5 > 0$

Where:
ITT_{JK} = intra-industry trade index
PCI   = per capita income
DPCI = dissimilarity in per capita income
TI   = trade intensity
DIS   = the distance between capitals of trading countries
ER   = the exchange rate
GDP   = gross domestic product
D_1 = the dummy for common borders
E_{jk} = error term and βs are elasticises

A logarithmic transformation of the linear model given above yields the following expression:

$$LogIIT_{jk} = \beta_0 + \beta_1 logPCI_k + \beta_2 logDPCI_{jk} + \beta_3 logTI_{jk} \\ + \beta_4 logDIS_{jk} + \beta_5 logER_{jk} + \beta_6 logGDP_k + \beta_7 D_1 + E_{jk} \qquad (2)$$

Where:
logIIT   = The logarithm of Intra-Industry Trade (IIT)
logPCI   = The logarithm of per capita income
logDPCI = The logarithm of dissimilarity in per capita income
logTI   = The logarithm of trade intensity
logDIS   = The logarithm of distance
logER   = The logarithm of exchange rate
logGDP   = The logarithm for gross domestic product
D_1 = The dummy for common borders.

The dummy is in linear form. The dummy assumes values of zero and one, so the natural log of zero is undefined.

Variables in the model: Intra-industry trade (which is the simultaneous import and export of commodities), is the dependent variable. It is measured by the following formula Eq. 3.

For a good j with exports X_j and imports M_j, the level of IIT, B_j is:

$$B_j = \left[1 - \frac{|X_j - M_j|}{X_j + M_j} \right] \times 100 \qquad (3)$$

B_j is a percentage from 0-100. When $B_j = 0$, it is all inter-industry trade and when $B_j = 100$, it is all intra-industry trade.

Per capita income: Per capita income is the mean income computed for every man, woman and child in a geographic area. It is derived by dividing the total income of a country's population. This measure is rounded to the nearest dollar. Similarity in economic structure enhances trade between countries, so the per capita income is expected to be directly related to IIT.

Dissimilarity in per capita income: This measure is derived by finding the differences between the per capita incomes of trading partners. The measure is expected to be inversely related to IIT, since the dissimilarity in per capita income depicts different levels of development.

Trade intensity: This factor measures how intense trade is, between countries. The assumption is that the more trade is between countries, the higher the IIT. As a result trade intensity is expected to be positively or directly related to IIT. We have measured the factor using the following formula:

$$T_I = \frac{X_j + M_j}{GDP} \qquad (4)$$

Where:
T_I = Trade intensity
X_j = Exports of country j to partner country
M_j = Matching imports from the partner country.
GDP = The economic mass of the trading country.

Distance: The proximity of trading partners is likely to lower search and transaction costs and hence boost bilateral trade. Hence, this measure is positively related to IIT.

Exchange rate: Exchange rate instability affects prices and volumes of goods and services in international trade. Exchange rate levels can either promote exports or discourage imports or vice-versa. Cross-rates have been used to determine exchange rates between trading SADC countries. This is calculated as ratio of A to the dollar divided by ratio of B to the dollar say;

Say Z\$6000 = US\$1
SA Rand 15 = US\$1

Then cross exchange rate = $\dfrac{6000}{15}$ = Z\$400/Rand

Gross domestic product: Gross Domestic Product (GDP) is the value of total output produced in the whole economy over some period, usually a year. The higher the GDP of a country, the more it can trade with other countries. In this case, GDP is positively related to intra-industry trade, since the more countries trade, the higher is the intra-intra-industry trade[2,4,6].

Adjacency: This is represented by a dummy for common borders. Countries that share common borders are likely to trade more than countries which do not share borders. This is expected to be positively related to IIT.

Data type and sources: The study utilizes annual secondary data for the period 1990-2006 for seven countries sampled from the SADC region. The study is also limited to twenty sampled product categories. These form the bulk of the traded goods between Zimbabwe and its main trading partners in the SADC region. The problem of data availability has limited the researchers to these specified countries and product categories. The data was sourced from International Financial Statistics (IFS) (2006), Central Statistical Office (Zimbabwe), Trades Centre (Zimbabwe) and the RBZ Monthly and Quarterly Reviews.

RESULTS

LogIIT is the logarithm of intra-industry trade, logPCI is the logarithm of per capita income, logDPCI is the logarithm of dissimilarity in per capita income, logTI is the logarithm of trade intensity, logDIS is the logarithm of distance, logER is the logarithm of exchange rate, logGDP is the logarithm for gross domestic product and D_1 is the dummy for adjacency.

A regression was run on all variables as regressors and the logarithm of intra-industry trade as the regressand. Several regressions were experimented with and this led to the dropping of logDPCI and D_1 from the model. These two variables were suspected of causing serial correlations in the model.

LogPCI and logDPCI are closely related, that is dissimilarity in per capita income is calculated from the per capita income variable. This close link between the two variables implies that they have the same effect in the model. Also logDIS and D_1 may have similar influence in the model. A common border implies short distance between the two trading countries and therefore less transaction costs when importing or exporting.

After dropping logDPCI and D_1, from the model, all variables become significant. LogPCI and logTI become significant at 10%. logER becomes significant at 5%, while logDIS and logGDP are significant at 1%. The coefficients of logPCI, logER and logGDP are compatible with theory, while those of logTI and logDIS are not. The overall R^2 is 0.702, meaning that the variation in the dependant variable is 70.2% explained by variations in the explanatory variables that were included in the model. The results also show that the model is free from autocorrelation. The results are shown in Table 1.

Table 1: Regression results

Variable	Coefficient	Std error	Prob > |z|
LogPCI	0.0605879	0.0310436	0.051
LogTI	-0.0534928	0.0278426	0.055
LogDIS	-0.04099523	0.01037007	0.000
LogER	-0.07355	0.0320865	0.022
logGDP	0.049221	0.0182464	0.007
Const	2.530525	0.289347	0.000

Number of Countries	=	7
R^2	=	0.702
DW	=	1.894

DISCUSSION

The results show that the following variables are significant in explaining intra industry trade between Zimbabwe and its trading partners: per capita income, trade intensity, distance, exchange rate and gross domestic product. SADC countries were by virtue of their historical background, subjected to almost similar developmental strategies. This led to virtually similar economic structures and hence similarities in per capita income. As such, they produce and trade in almost similar goods, or goods that belong to the same industries.

The results reveal that Zimbabwe has been trading more with other SADC countries. This is revealed by the trade intensity variable. LogDIS is highly significant. Considering the proximity of RSA, Botswana, Zambia, Malawi and Namibia with Zimbabwe, we would expect more trade between Zimbabwe and its neighbouring trading partners. Road transport is the main link among countries in the SADC region. Most of the trade between Zimbabwe and its trading partners is conducted by using road links. Most of the trade between Zimbabwe and its trading partners is by land. Hence, distance plays a major role in enhancing foreign trade in the SADC region.

The bulk of Zimbabwe's trade is with RSA. Since they share a common border, implying short distance between the two countries, transaction costs of ferrying goods across the border are minimized. Exchange rates also have an impact on the volume of trade between countries. If currency is highly valued it may be difficult to conduct trade with the respective country because of its expensive exports and cheaper imports. Between the years 1990 and 2006 the favourable exchange rate regime enabled Zimbabwe to trade favourably with other countries in the region.

Gross domestic product shows us the value of total output of a country per given period, usually a year. This measures the economic mass of a country. This gives the capacity of a country to import or export. SADC countries were able to trade with Zimbabwe because of the production strengths of their economies; although Zimbabwe's production has been on a downward trend.

According to[7] cited in[10] countries that have almost similar economic structures produce almost the same commodities and they trade in those goods. This is because, according to theory; there is a representative demand structure in each respective economy.

Another study by[9] on Canada and USA also shows strong trade between the two countries. These countries are both technologically advanced and their economies exhibit almost similar structures. Research work done on USA, Canada, South Africa, Korea, Ghana and various other countries have proved that intra-industry trade is stronger between countries that have much in common economically.

Our results of intra-industry trade between Zimbabwe and its trading partners are statistically significant. When the per capita income increases within trading economies we expect the intra-industry trade to also increase. There is a positive relationship between IIT and the per capita income. The results also show that trade intensity, distance, exchange rate and gross domestic product are also important in determining IIT between Zimbabwe and its trading partners in the SADC region.

The results generally show that countries with similar income levels, engage in intra-industry trade. This is the case with Zimbabwe and its trading partners within the SADC region where the countries are relatively similar in factor endowments and hence income levels.

CONCLUSION

The results of this study show that similarity in income levels does influence IIT between Zimbabwe and its trading partners in the SADC region. The results are compatible with theory. Similarity in income levels has been a result of the developmental background of the countries in question. This then has an influence on the products being produced and traded within the SADC region.

It has also been unraveled that trade intensity; distance, exchange rate and gross domestic product have an impact on intra-industry trade in the region. It follows that the fluctuations in these variables will have an impact on trade. Therefore, the policy makers have to target these variables so that they produce favourable benefits to the Zimbabwean economy. In a bid increase participation in regional trade Zimbabwe entered into bilateral trade agreements with most of the SADC countries and this will in the long term result in more trade for Zimbabwe.

In order to influence the productive sector; it is recommended that the Zimbabwean government has to put in place incentives that will encourage entrepreneurs to invest and expand their existing businesses. This is what would lead to high levels of gross domestic product. More commodities will be available and Zimbabwe will be able to trade at a higher level with the SADC countries. Zimbabwe needs to produce a variety of goods which it can then use to penetrate the SADC market more vigorously.

The measures may include availing more credit facilities to the productive sector at affordable and attractive interest rates. The importation of capital goods could be made duty free, as has been done with agricultural equipment and machinery in the previous years. This has to be extended to other sectors as well to boost all sectors in the economy. Directed lending facilities by banks may help the productive sector access funds ahead of other sectors. The government could also give tax incentives to the companies so that they could expand their operations. This could result in the country being able to export more varieties of goods.

The exchange rate also plays a major role in economic activities. In order to export more Zimbabwe has to devalue its currency relative to other currencies. This will see Zimbabwe exporting more goods to its neighbours.

Zimbabwe is also encouraged to mend its international relations with the Western countries. Trade with the high income countries could bolster Zimbabwe's industry; and strengthen its trade with its neighbours. Mending relations with the west could also result in Zimbabwe being able to get funding from the Breton Woods Institutions (International Monetary Fund (IMF) and World Bank) to fund its developmental projects that would help revive its collapsing productive sector.

Zimbabwe could also enter into more bilateral trade agreements with its trading partners in the SADC region. These trade pacts may help open up economies so that large markets for tradable goods become available. Trade barriers like tariffs and quotas affect the free movement of goods, so they have to be removed or reduced to encourage more exports in the region. This can only be achieved if countries enter into bilateral trade agreements.

The study analysed the impact of the per capita income, dissimilarity in per capita income, trade intensity and distance between capital cities, exchange rate and adjacency on intra-industry trade. It did not include such variables as scale economies, number of varieties produced, comparative advantage and many other variables that are usually included in other studies. Future researches may include all SADC member countries and more variables. Future studies may also incorporate more products being traded to widen the intra- industry trade base and not limit themselves to a limited number of products. This may make the analysis more detailed and therefore produce more robust results.

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