The relationship between Trade openness, Terms of trade and Economic Growth in Zimbabwe: A VAR Approach.

Robson Mandishekwa

Economics Department,
Midlands State University,
Gweru,
Zimbabwe

Abstract

The objective of the paper is to investigate whether the conventional wisdom of openness as a panacea to economic development applies in Zimbabwe. To investigate this issue, vector auto-regressive and Granger-causality methods of testing for causality were applied. Using trade openness index and terms of trade as trade indicators, it was established that the three variables Granger caused each other, except for Terms of trade and GDP growth which showed unidirectional causality running from GDP growth to terms of trade. Variance decompositions, however, show that the variance of GDP are mostly from GDP itself while the variance decompositions of terms of trade emanates also mainly from GDP changes. The Zimbabwean government is therefore urged to pursue liberalisation so as to attain its development goal. This is so because trade openness was found to Granger-cause GDP growth. Since variance decompositions showed that GDP was found to add more to variations in GDP, the government is recommended to minimise the variations in GDP especially those in the negative.

Key words: Trade openness, Gross Domestic Product, Terms of Trade, variance decomposition, Zimbabwe

JEL classification: F14, F43

Introduction

Trade theory argues that opening up a country to trade will improve welfare of the domestic residents. Proponents of free trade even go on to argue that trade restriction especially using tariffs is welfare reducing for small open economies, Zimbabwe included. However, debate still prevails in that some countries have not been benefitting from this school of thought. Zimbabwe has been open to the world for some time now. This paper aims at studying the effects of these actions on welfare as proxied by Gross Domestic Product growth.

The period immediately after independence was characterised by trade restrictions. This paved way for the Bretton Woods institutions to give policy prescription, however, backed by conditionalities. These conditions were made for the economy to access financial assistance from these multilateral finance institutions. Under

Economic Structural Adjustment Program, the government was advised to liberalise all sectors of the economy from capital account to agriculture. This gave rise to the privatisation of companies such as Dairiboard Zimbabwe from Dairy Marketing Board. It also gave rise to removal of interest rate ceilings.

The major anticipation was that, through liberalisation, exchange rate pegging would be minimised and hence economic growth will be boosted. This did not go as per expectation since exchange rates became even more volatile than before. The GDP per capita even worsened from US$203.4 per individual in 1991 to US$ 164.65 in 1992 before plunging further to US$158 in 2002, (Penn World Tables 6.1). For the same period the terms of trade plunged from 270 in 1991 to 203 in 2002, (Pen World Table 6.1). These all took place against the backdrop of a depreciating Zimbabwe dollar. The anticipated result of trade liberalisation was to boost trade, thus improving terms of trade and hence economic growth, but the figures show otherwise.

The plunge in GDP per capita in 1992 may be attributed to the drought that wrecked havoc in the country. Thus, in some instances Zimbabweans associate ESAP with the 1992 drought when they had to fend for food through food for work programmes and food rations from the Government and well-wishers (donors).

Given the government's stance of export-led growth, the study examines whether this can help lift the country from the economic doldrums it found itself in. The causal relationship between trade openness, terms of trade and economic growth is going to be investigated using the vector autoregressive model.

It is of no doubt that the effect of exchange rates on other macroeconomic variables is very important. It is the objective of the current study to find the direction of causality among trade openness, exchange rate, terms of trade and economic growth. Thus exchange rate takes a central role in policy making especially in the economically less developed countries.

Literature Review

Several studies have been done on what lead to economic growth. So many factors have been found but economists have not achieved the core determinants so as to recommend policy-makers to use them to attain the envisaged economic growth. While, being one of the oldest research areas, consensus still lacks as to what determines economic growth. Some economists have gone as far as to propound growth through trade, which argues that free trade leads to economic development. Traditional theories of international trade argue that a country gains from opening up to trade. Absolute advantage advocated by the Father of economics, Adam

Smith (1776), argues that a country gains if it trades with a country that produces a second good more cheaply than it does. This means that the two countries will each specialise in the production of the goods they are efficient in. From this perspective, if one country has absolute advantage in both goods, there is no trade to take place.

On the other hand, David Ricardo argued that even if a country has absolute advantage in both commodities, it is still possible to gain from trade, Salvatore (2012). This gave rise to comparative advantage. Thus, comparative advantage introduced the concept of opportunity costs into international economics. Heckscher and Ohlin argued that trade will be a result of factor endowments. Thus, a country will specialise in production of a good that requires the intensive use of its abundant factor of production. For example, if Zimbabwe is relatively labour abundant compared to Britain, Zimbabwe will specialise in labour intensive goods and export them to Britain. Britain will also specialise in capital intensive goods which she will export to Zimbabwe. All this will be possible under a number of assumptions, chief among which is that one country has to be abundant in one factor of production and the other country in another factor. Samuelson (1948), on the other hand argued that by trading commodities, countries will be indirectly trading factor inputs and at the end the countries may have factor price equalisation which might be in absolute or relative terms. This means that, in the above example, as Zimbabwe exports labour intensive goods more labour will be required hence wages will rise. This also happens in Britain for price of capital. As relative prices of the factors of production in the two nations increase, there will come a point of equilibrium where the ratios of the prices will be equal. This, then gives factor-price equalisation.

Most literature on the effects of trade restrictions, the direct opposite of trade openness, is merely static in nature. Salvatore (2012) presents a partial equilibrium analysis of a tariff, which shows that for a small country like Zimbabwe, a tariff is welfare reducing. It is established that there is a deadweight loss represented by Corden triangles named after Max Corden.

Growth could also have effects on terms of trade as argued by the theory of immiserising and neutral growth, (Dunn and Mutti, 2004). According to the immiserising growth theory, if a country whose comparative advantage is in a lowly priced commodity on the world market, experiences growth, its welfare will be reduced. The relative commodity price will fall and hence the terms of trade line will fall, thus making the country worse off. Salvatore (2012) and Dunn and Mutti (2004) concur that this is a rare scenario in the real world. Neutral growth theory, on the other hand argues that if trade is free and growth occurs, terms of trade improves and the welfare of the country's residents improves.

Thirlwall (2000) argues that most developing countries are constrained in their growth performance because of foreign currency shortages. Theories relating growth to exchange rates argue that growth should first be experienced before exchange rate appreciation. The argument emanates from the fact that as a country grows, more investors are lured to invest in that country, thus demand for the local currency increases, (Dunn and Mutti, 2004). This will force the local currency to appreciate. On the other hand, it may also be argued that as the economy grows, domestic residents may also increase their demand for foreign produced goods. This will mean more demand for foreign currency which will have an adverse effect on the domestic currency, that is domestic currency is expected to depreciate. Thus, there is no consensus on theoretical grounds on which one comes first.

Bakhromov (2011) studied the relationship between exchange rate volatility and trade balance in Uzbekistan. The study used the Johansen cointegration test to test the long run relationship among trade functions. The results revealed that the null hypothesis of no cointegration could not be accepted. Again, it was found that trade openness increases trade flows into Uzbekistan. To boost overall trade and economic growth, the Government of Uzbekistan was recommended to minimize exchange rate volatility. This is likely to boost confidence in the currency of the aforementioned country. Contrary to that Mahmood *et al* (2011) investigated the effects of exchange rate volatility on four macroeconomic variables in Pakistan. It was established that exchange rate volatility positively affects GDP and trade openness and negatively affects inward FDI.

On the other hand, Gandolfo and Nicoletti (2002) looked at the causality between real exchange rate volatility and trade openness in ten OECD countries, USA and UK included. The study used Geweke's (1982) measure of feedback. This would detect the possibility of causality among variables. It was observed that exchange rate volatility Granger-causes trade openness. Evidence from South and South East Asia confirms that trade openness helps reduce real exchange rate fluctuations, (Amor and Sarkar; 2008). The same study also established that financial liberalization increased exchange rate fluctuations in those two regions.

In a study by Yanikkaya (2003), trade openness was generally found to be a statistically significant determinant of growth, although it was measured using two different proxies. Thus, the study confirmed that open economies grow faster than their counterparts. The study also revealed some truth of the new growth theories, where it is argued that a country would gain by adopting advanced technology from its trading partners. These results came about because the study found out that developing countries would gain more by trading with developed countries than with developing countries. This is in line with Vernon's (1966) Product life cycle model of international trade. On the other hand the study found

that trade openness measured by the ratio of tariff revenue as a proportion of import values would also lead to growth. This is contrary to usual economic reasoning that trade restrictions are growth reducing.

Thirwall (2000) analysed the relationship between trade and growth for 41 developing countries, Zimbabwe included. The results of the ordinary least squares could not fully confirm that trade leads to growth. The problem with panel data regressions lies in the fact that country specific features are pooled into one and hence this creates problems of one size fits all.

From the above literature review, one would note that little has been done on the causality between trade openness, terms of trade and economic. Thus the current study aims to close that gap in literature. It is the intention of the study to shed light on the causal relationship among the variables using the model specified below.

Methodology

The data used in the study was obtained from Pen-World Tables, thus it relies on time series data. The necessary pre-regression tests that were undertaken include the cointegration tests and stationarity tests, among others. It is paramount that cointegration will help us to see if there is a long run relationship between the variables under study. This, however, has been used by some researchers to test for Granger-causality but the problem is that it only indicates association of which most, if not all, econometricians agree that association does not mean causality. As a quantitative study with the objective of establishing direction of causation, the study employed a Vector Auto-regressive (VAR) Model to estimate the directions of causality among trade openness, terms of trade and economic growth. Variance decompositions were also used in the study. In the VAR model, one regresses several variables in terms of their own and other variables' past values. The VAR model estimated is stated as in equation 1:

$$TOP_t = \beta_0 + \beta_1 \sum TOP_{t-i} + \beta_2 \sum TOT_{t-i} + \beta_3 \sum GDPG_{t-i}$$

$$TOT_t = \alpha_0 + \alpha_1 \sum TOT_{t-i} + \alpha_2 \sum TOP_{t-i} + \alpha_3 \sum GDPG_{t-i}$$

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$$GDPG_t = \delta_0 + \delta_1 \sum GDPG_{t-i} + \delta_2 \sum TOP_{t-i} + \delta_3 \sum TOT_{t-i}$$

From the system of equations in *1* above,

TOP represents trade openness which is measured as the sum of exports and imports as a percentage of GDP.

TOT is the terms of trade which is the value of exports per given imports value. GDPG is the economic growth variable which is proxied by GDP growth.

A key point to note about the model specified above is that it is *atheortical,* (Koop; 2012). This means that it does not rely heavily on economic theory. Koop (*ibid*) argues that theory will only help to select variables. However, the good thing about these models lies in their excellent forecasting performance which outweighs the sophisticated macroeconomic models.

In the above equations, one variable will Granger cause another if and only if its coefficient has a p-value less than 0.05 or t-statistic that is greater than 2 at 5% level of significance. This implies that that coefficient is statistically different from zero.

Results and Discussions

It was established that all variables were stationary at first differencing. This means that they were stationary after being differenced once. These results are summarized in Table 1:

Table 1: Unit root test results

Variable	ADF Statistic	Critical Value (5% level	Level of Integration
GDPG	-6.427218	-2.9137	I(0)
TOP	-3.605245	-2.9137	I(0)
TOT	-7.049203	-2.9146	I(1)

Table 1 above shows that the ADF statistics are all greater than the critical values at 5%. This therefore implies that all variables are stationary hence we do not accept the hypothesis of presence of a unit root and therefore do not reject the hypothesis of absence the same. Again the table above shows that GDP growth (GDPG) and trade openness (TOP) are integrated of order zero while terms of trade (TOT) is integrated of order one. This means that TOT becomes stationary after first differencing while GDPG and TOP are level stationary.

Having done this it is imperative that we now present the cointegration test results from the Johansen cointegration test. These results are presented in Table 2.

Table 2: Cointegration Test

Hypothesized No. of CE(s)	Trace Statistic	5% Critical Value	1% Critical Value
None **	58.24696	29.68	35.65
At most 1 *	21.85057	15.41	20.04
At most 2	1.939158	3.76	6.65

The results indicate that the trace statistics are greater than the critical values at 5% for no cointegration and at most one cointegrating equation but for the situation of at most two cointegrating equations the critical values exceed the trace statistic. This implies that we have at least two cointegrating equations. Thus we can conclude that a long run relationship among the variables exists. From this we can make a preliminary conclusion that there should be at least a direction of causality among the variables under discussion.

Variance Decomposition

Table 3: Variance decomposition of GDP growth   Table 4: Variance decomposition of Openness

Period	GDPG	TOP	TOT
1	100	0.00	0.00
2	99.90	0.07	0.03
3	95.45	2.28	2.27
4	93.73	2.28	3.99
5	92.91	2.19	4.90
6	92.45	2.35	5.20
7	92.09	2.63	5.29
8	91.82	2.87	5.31
9	91.66	3.03	5.31
10	91.57	3.11	5.32

Period	GDPG	TOP	TOT
1	0.19	99.81	0.0
2	0.88	99.04	0.07
3	4.09	94.96	0.95
4	8.47	88.52	3.01
5	13.73	81.80	4.48
6	17.36	77.45	5.29
7	19.60	74.74	5.66
8	20.82	73.36	5.82
9	21.49	72.63	5.88
10	21.86	72.22	5.92

Table 5: Variance decomposition of TOT

Period	GDPG	TOP	TOT
1	52.78	12.24	34.98
2	58.48	9.29	32.23
3	64.33	8.44	27.23
4	66.03	8.89	25.08
5	66.51	9.96	23.53
6	66.44	10.94	22.62
7	66.27	11.66	22.07
8	66.12	12.12	21.76
9	66.02	12.40	21.58
10	65.97	12.55	21.48

The three tables above show the various variance decompositions of the variables for ten periods. Table 3 shows that 100% of variations in GDP growth are solely as a result of GDP variations. This contribution declines throughout the ten periods until it is 91.57% in period ten. During the tenth period, 91.57% of variations in GDP growth are coming from GDP growth while 3.11% is from trade openness and 5.32% are from terms of trade variations.

In Table 4, we note that 99.81% of the variations in trade openness emanate from trade openness itself while GDP growth only contributes 0.19% and terms of trade contributes nothing to trade openness variations during the first period. The contribution of trade openness variations is continuously declining resulting in 72.22% of variations coming from trade openness in period ten. The contributions of GDP growth and terms of trade are on an upward trend. This is evidenced by increases in GDP growth and terms of trade contributions from 0.19% and 0.0 respectively, in period one to a high of 21.86% and 5.92% for GDP growth and terms of trade respectively in period ten.

In Table 5 we show the variance decomposition of terms of trade. It is shown that even in the first period changes in terms of trade contributes below 50% of variations in itself. As time passes-by, the contribution of terms of trade declines until it is 21.48% in period ten from 34.98 in period one. GDP growth contributes

the majority of variations in terms of trade with 52.78% in period one and increasing to 65.97% in period ten. However, during intermediate periods there is variation in contributions of GDP growth, whereby it increases and decreases.

Granger Causality Test Results

Table 6 shows the Granger causality test results that were found.

Table 6: Granger Causality Test Results

Null Hypothesis (H_0)	F statistic	P-Value	Decision
TOP does not Granger cause GDPG	0.77344	0.38312	Reject H_0
GDPG does not Granger cause TOP	1.95255	0.16814	Reject H_0
TOT does not Granger cause GDPG	7.19431	0.00973	Do not reject H_0
GDPG does not Granger cause TOT	1.54208	0.21978	Reject H_0
TOT does not Granger cause TOP	4.79891	0.00973	Reject H_0
TOP does not Granger cause TOT	0.89682	0.34793	Reject H_0

Table 6 shows that in all cases, the null hypothesis is rejected; except for the TOT does not Granger cause GDP growth case. This implies that there is a bi-directional causality between GDP growth and Trade openness and trade openness and terms of trade but a unidirectional causality between terms of trade and GDP growth running from GDP growth to terms of trade.

The results imply that GDP growth Granger-cause terms of trade. Therefore, this means that a shock on the GDP growth rate will impact heavily on the terms of trade in the long run as indicated by Table 5. In line with the findings of Yanikkaya (2003), trade openness and economic growth, in Zimbabwe, were found to be dependent. This implies that any shock in one of the variables will have an effect on the other variable. It has been established that the contributions of trade openness to economic growth increases as time progresses just like that of growth to openness.

Conclusions and Recommendations

The findings from the study show that most variations in GDP are a result of GDP itself although GDP has been found to be Granger-caused by trade openness also.

It means that any shock in trade openness will be transmitted to GDP changes, however, after sometime. It was also established that a change in GDP will lead to a more proportionate change in terms of trade as time passes by.

Despite the controversies surrounding liberalisation in Zimbabwe, the results support conventional wisdom that liberalisation will enhance economic growth. It is therefore recommended that the country should put more efforts to liberalise the economy as shown by the 57 years data. However, the liberalisation must be well sequenced. This is the possible reason why the majority would argue against liberalisation. A poorly sequenced liberalisation process will lead to unfavourable results.

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