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CAUSAL RELATIONSHIP BETWEEN IMPORTS AND ECONOMIC GROWTH IN ZIMBABWE: AN EMPIRICAL ANALYSIS 1975 – 2013

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ABSTRACT

This study analysed the interconnectedness between economic growth and imports in the short and long run in Zimbabwe from 1975 to 2013. The Zimbabwean economy generally experienced positively associated trend between Gross Domestic Product and imports over the years. For precise and effective policy formulation, it is therefore necessary to understand the nexus between the two mentioned macroeconomic variables. Based on the results of the Johansen causality method, there is a short run unidirectional link between Gross Domestic Product and imports, running from imports to Gross Domestic Product. In the long run no evidence exists for the connection between the two variables according to the Johansen co-integration tests.

Keywords: Imports, Economic growth, Policy, Johansen causality, VAR analysis, Zimbabwe.

Contribution/ Originality

This study contributes in the existing literature on the relationship between imports and economic growth. This study is one of very few studies which have investigated the causal relationship between imports and economic growth in Zimbabwe over a period of 38 years.

1. INTRODUCTION

Most countries of the world have become concerned about the welfare of their citizens given the integration and clustering of world markets that come as a result of globalization and liberalization (Thangavelu and Rajaguru, 2004). Development economics literature reveal two trade related strategies that could be used to influence growth both in developed and developing countries like Zimbabwe which includes Export-led Growth (ELG) and Import-led Growth (ILG) strategies. Recent endogenous growth models have emphasized the importance of imports as an important channel for foreign technology and knowledge to flow into the domestic economy. The new technology could be seen as embodied in imports of intermediate goods such as machines and labour productivity could increase over time as workers acquire the knowledge to unbundle the new embodied technology (Thangavelu and Rajaguru, 2004).

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On the other hand comparative international trade theory argues that international trade induces specialization which in turn increases productivity. In the long run trade expansion and higher productivity creates opportunities for people to enhance their welfare (Samuelson and Nordhau, 2001). It is therefore apparent that international trade plays a crucial and significant role in the growth and development of a third world country like Zimbabwe. Given this background however most empirical researches have put much emphasis and focus on exports and growth relationship while the nexus on imports and economic growth remains a debatable issue.

2. BACKGROUND

Zimbabwean empirical data shown in figure 1, below reveal that there is a general positive association between GDP and M.

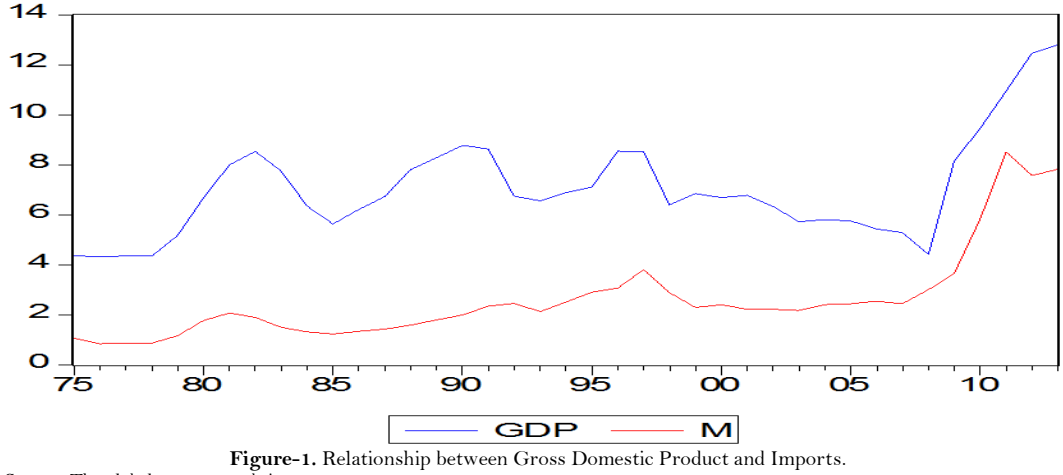

Figure-1. Relationship between Gross Domestic Product and Imports.
Source: The global economy website.

Thus economic growth that has been experienced over the past four decades is generally accompanied by increasing total expenditures on foreign produced goods like capital goods, raw materials, food items, automobiles amongst others. Regardless of this common trend between GDP and imports in Zimbabwe, however, empirical studies have given little attention to the nexus between these two macroeconomic variables as compared to that between exports and growth.

In the Zimbabwean context, some studies which tested the ELG hypothesis include Todaro and Smith (2003); Riezman (1996); Pomponio (1996) and Mafusire (2001). The first three were cross-sectional studies in which Zimbabwe along with many other countries were included in a two or three variable causality model framework. The studies found no evidence of any causal relationship between real export growth and real output growth for Zimbabwe thereby invalidating the ELG strategy. On the contrary Mafusire (2001) study validated the ELG strategy in Zimbabwe. Others who carried out studies that have validated ELG strategy in Zimbabwe are Chiguwisa (2011). Thus, while there has been vast studies on the relationship

between exports and growth relative to that between imports and growth, however results are conflicting and inconclusive in Zimbabwe.

Saungweme (2013) on the other hand gives a brief account of Zimbabwe's trade dynamics for the 1980-2012 periods. He revealed that the economy moved from being close to self-sufficiency in the 1990s to a total import dependent by 2008. This shows that there was a total economic transition from being export-oriented to import-oriented economy according to the report. This gives a suggestion that imports have been expanding over the years given the economic growth that has been achieved so far.

Regardless of the imports restrictions put in Zimbabwe, the country has generally been experiencing continued expansion in imports as compared to exports resulting in BOP deficits over the years. Making the situation even worse, the country is a developing nation whose exports are mainly less valuable raw primary products while its imports include consumables, fertilizers, manufactured goods, equipment and machinery and motor vehicles perceived to be more valuable than the former. In the 1990s Central Statistical Office and World Bank reported that Zimbabwe current account deficit expressed as a percentage of GDP increased sharply from 2.5 in 1990 to 8.8 in 1991 while it stood at 13.6 in 1993. On the other hand RBZ in its annual reports indicates that the country experienced worsening and continued trade deficit in the multi-currency era. It stood at –USD 4billion in 2009 and at –USD1.7 billion in 2010 falling sharply to –USD5.5 billion in 2011. Recent de-industrialization and contraction of the economy that has adversely affected welfare has been blamed on the continued increase in imports as compared to exports.

In the finance ministry statistics report of 2013, exports were reported to have declined by an average of 2% while imports increased by 23% for the first half of the year with expectations that the trend would continue until the end of the year. This is because imports demand is relatively inelastic due to capacity constraints in the economy while exports demand is relatively elastic due to availability of substitutes in the foreign markets.

Some studies that have been conducted elsewhere are of the opinion that there is a uni-directional causality running from imports to economic growth while in some cases it runs from economic growth to imports. Other empirical studies support bi-directional causality where there is both import-led growth and growth- led imports existing at a time in an economy. However, there are also some who argue that there is no causality in any direction between economic growth and imports.

To examine economic growth and factors that influence it, economists have employed different theoretical framework ranging from the Neo-Classical growth model up to more recent models based on endogenous economic growth. Both approaches consider technological progress to be a key factor in enhancing long-run growth. However the traditional growth model considers technological progress as exogenous while the endogenous growth models consider it as determined by the internal forces of the system. The latter give an attempt to explain how

factors like trade through imports influences technological progress which in turn causes economic growth in a country.

Piazolo (1996) opines that it is endogenous growth theory that grants a greater role to technological advancement in the growth of both developed and developing countries. He further described that technological progress can be seen as embodied in capital goods, informal innovation activities, in the abilities of human capital or in improved production efficiency. Grossman and Helpman (1991) are of the view that in the less developed economies, there are scant research and development activities and scarce original discoveries needed for industrialization process. They further stipulate that developing countries are unable to produce most of the machinery and equipment required by the process of industrialization. As a result economic growth in these countries is largely dependent on imports of such goods.

Tong (1995) explored the relationship between economic growth and import, and he recognized that import at different times contributed to economy differently, but as a whole, there was a positive correlation between import and economic growth. Frankel and Romer (1999) in their study on cross-country data found that higher trade contributes to long-term economic growth, after accounting for the effect of growth on trade. Although they considered total trade (export plus import), their research methodology attributed the same response to import that it applies to export, that is, import causes economic growth. Humpage (2000) on the other hand, stressed that import does not lower economic growth. He believed that imports and economic growth are positively correlated, with causality running in both directions. Faster economic growth does indeed lead to higher import, but the countries that are opened to trade tend to grow faster than those with a closed economy or less accessible.

In Malaysia Kogid (2011) investigated the association between economic growth and imports. They used annual data ranging from 1970-2007. Cointegration of variables has been checked by using Engle-Granger test and Johansen's cointegration test which suggest no long-run relationship. Granger's causality test and Toda-Yamamoto test for causality have been employed to check the causality direction between variables. The results of both tests suggested bidirectional causality between economic growth and imports. The study concludes that imports of Malaysia contribute towards its economic growth.

Given this background in Zimbabwean trade and trends between GDP and Imports data it is in the interest of this study to investigate how imports could be related to economic growth in Zimbabwe especially when considering that economic growth is a significant determinant of quality of life in any nation. This would serve to fill in the information gap with the aim of aiding decision making and policy formulation.

3. DATA AND METHODOLOGIES

This study employed annual fire series data from 1975 to 2013 which were obtained from the Global economy site. Most economic researches involving econometrics rely on secondary data since it could be impractical for primary data collection techniques to yield required information

for a wide range of time. However, care should be taken so that official and more reliable secondary sources of data can be used. In this research data up to 2013 was employed as that regarding the figures for 2014 were yet to be available. The researcher did not anticipate any significant differences in results between using up to 2013 and up to 2014 data figures. Data that was collected included Gross Domestic Product (GDP) and imports (M) expressed as a proportion of total exports.

3.1. Stationarity Tests

Time series regression analysis begins with testing for the order of integration (stationarity) of each variable. A variable is said to be of order d, denoted as I(d), if it has to be differenced d times for it to be stationary. Stationarity of a variable implies that its mean, variance and covariance are independent over time. It is important to test stationarity of variables because estimating regression using non-stationary variables based on ordinary least squares (OLS) results in spurious and inconsistent outcome (Gujarati, 2004).

Although there are several ways of testing stationarity, however, this study relied on Augmented Dicky-Fuller (ADF) and Phillips-Perron (PP) unit root tests. It is important, however, to remember that information on the long-run relationship between variables is lost by running regression using a differenced data. Conducting cointegration analysis helps as a solution to this problem.

3.2. Cointegration Tests

The Engle-Granger two step procedures and Johansen Maximum likelihood approaches are commonly used techniques in testing for cointegration relationships between variables in macro econometrics. However, this study employed the latter because of its perceived superior merits as compared to the former. The Engle-Granger procedure estimates the cointegrating regressions first and then tests the resulting residual whether it is stationary or not. If residual is stationary, the implication is that the variables under concern are cointegrated, that is, they have long run relationships (Gujarati, 2004). This procedure, however, has a serious challenge in the sense that it is difficult to determine the number of equilibrium relationships if the variables are more than two. Making it more of a disadvantage, again, it requires prior information on the endogeneity and exogeneity of dependent and independent variables respectively. There is also potential inefficiency in estimating a single equation since information is lost when endogenous and exogenous variables are not clearly defined. Where there are contradicting results between Engle-Granger and Johansen procedure, it is advisable to rely on the Johansen method because it offers solutions to the problems of the former.

3.3. Model Specification

Generally, in the case where GDP and M are stationary variables I(0), equation (1) and 2 below without the error correction term can be estimated using the least squares method in level

form. But if GDP_t and M_t are non-stationary variables, I (1) and are not cointegrated, the VAR model such as equation (1) and (2) without the error correction term in the first difference can be used. When GDP_t and M_t are I (1) and are cointegrated then the VECM, equation (1) and (2) exactly can be used to model relationship between the variables (Gujarati, 2004).

$$\Delta GDPt = \alpha 0 + \sum_{i=1}^{n} \alpha 1i\, \Delta GDPt - i + \sum_{j=1}^{n} \alpha 2j\, \Delta Mt - j + \alpha 3\varepsilon t - 1 + \upsilon t \quad (1)$$

$$\Delta Mt = \beta o + \sum_{i=1}^{m} \beta 1i\, \Delta GDPt - i + \sum_{j=1}^{m} \beta 2j\, \Delta Mt - j + \beta 3\varepsilon t - 1 + \nu t \quad (2)$$

where α and β are unknown parameters, υ and ν are error terms and $\varepsilon t - 1$ is the error correction term obtained from cointegration tests.

The optimal number of lags to be included in the model is selected according to AIC and SC methods to determine the best model. The criteria is to select the model with the lowest values of both AIC and SC suggested to be most suitable according to these approaches.

3.4. Causality Tests

As already indicated earlier, if cointegration has been detected between GDP_t and M_t the study employs VECM. In case of no cointegration, VAR is used. Thereafter, the research immediately proceeds to Granger causality tests to establish causal link between the variables aforementioned. Granger causality can be defined as a statistical hypothesis of causal influence based on prediction via vector auto regression. There are three possible links according to this approach namely, bi-directional, unidirectional and non-causality between the variables under concern.

4. EMPIRICAL RESULTS ANALYSIS

Like any other econometric modeling cycle, this study carried out tests for stationarity, cointegration and Granger causality between GDP and M in Zimbabwe in this case. Practical results were found to be as follows:

Table-4.1. Results of Unit root test

Variable	ADF	Order of Intergration	Decision
GDP	-3.5145* **	I (1)	Stationary
M	-3,7982* ** ***	I(1)	Stationary

Key: *, **, *** represents level of significance at 1%, 5% and 10% respectively.

The first step in using any time series methodology is to check if the data is stationary. The variables (GDP and M) used in this study were tested for their stationarity by employing ADF and PP unit root tests. These test the null hypothesis that the data generating process is non-stationary. As shown in table 4.1 above, differencing the variables once produces stationary

making it safe for the conclusion that the series are integrated of order 1, that is, I(1). At level the variables used were found to be non-stationary. Stationarity of variables under concern is a necessary condition in order for the researcher to test for cointegration whose information is usually lost by running regression using some differenced data. The cointegration tests based on the Johansen procedure yielded results shown in Table 4.2. This approach to cointegration concludes that there is no long run cointegration between GDP and M macroeconomic variables. These empirical decisions imply that there is no long run equilibrium relationship between the two variables. Consequently, the error correction model shown by equation (1) and equation (2) is not suitable and cannot be used to analyze relationship between economic growth and imports in Zimbabwe because there is no practical evidence for existence of any cointegration vector between the aforementioned variables. Thus the VAR model revealed by equation (1) and equation (2) in first difference form without the error correction term can be applied to analyze the dynamic short-run connection between economic growth and imports.

Table-4.2. Johansen cointegration test

Likelihood ratio test					
H_0	H_1	LR test	5%CV	1%CV	Conclusion
r=o	r≥1	14.29	15.41	20.04	Accept Ho
r≤1	r≥ 2	0.89	3.76	6.65	Accept Ho
Eigen value test statistic					
H_0	H_1	EV test	5%CV	1% CV	Conclusion
r=o	r=1	0.30	15.41	20.04	Accept Ho
r=1	r=2	0.02	3.76	6.65	Accept Ho

Source: Eviews 8.0 – Own Calculations

In the Johansen procedure both Eigen and Log ratio test statistics are in agreement that there is not even a single cointegration equation between the two variables so an unrestricted VAR would be used instead of the VECM. The optimal lag length is selected according to AIC and SC methods to come up with the best VAR as illustrated in Table 4.3 below. At level the variables were found to be non-stationary as shown earlier in the table 4.1.

Table-4.3. Optimum lag selection criteria

LAGS	**AIC**	**SC**
1	4.7720	5.0306
2	4.5828	5.0182
3	4.6175	5.2333

Source: Eviews 8.0 – Own Calculations

As shown in the table 4.3 above, AIC and SC suggests a twice lagged VAR to be the most suitable since it has the lowest combination of AIC and SC. Appendix 2 from EViews illustrates the VAR estimates. Put in other terms, the absence of a long-run relationship requires equation (1) and (2) without the error correction term to be used to test the causality between GDP and M

as shown in Table 4.4 below. The application of VAR in time series forecast is to test whether the lags of included variable has useful predictive content above and beyond other variables in the model. The claim that a variable has a predictive content is synonymous to the null hypothesis that the coefficients on all lags of that variable are different from zero (Hamilton, 1994).

Since there is no evidence for long run relationship between the variables under concern, Johansen causality test as shown in table 4.4 below, then becomes a useful technique to show the short run predictive content of the regressors. According to Toda (1995) short run causality is determined by using a test on the joint significance of the lagged explanatory variables using F-test or Wald test.

Table-4.4. Results of OLS estimates-GDP dependent variable

Variable	Coefficient	Std error	t-statistic	Probability
C	0.4444	0.8523	0.5214	0.6057
GDP(-1)	1.1065	0.1638	6.7560	0.0000
GDP(-2)	-0.3664	0.1746	-2.0987	0.0438
M(-1)	0.3665	0.6403	0.5724	0.5710
M(-2)	0.9772	0.6794	1.4382	0.1601
R-squared	0.7900	Mean dependent variable		7.2192
Adj R-squared	0.7638	S.D Dependent variable		1.9715
s.e of regression	0.9582	Sum Squared Residual		29.3826
D. Watson	2.1082			

Source: Eviews 8.0 – Own Calculations

Table-4.5. Short Run Causality Test

Wald Test:				
Equation: Untitled				
Null Hypothesis:	C(4)=0			
	C(5)=0			
F-statistic	2.620768		Probability	0.088300
Chi-square	5.241536		Probability	0.072747

Source: Eviews 8.0 – Own Calculations

The F-statistic of 2.62 with a P-value of 0.0883 shows that the null hypothesis of no causality between GDP and M is rejected at the 10% significance level. This implies that M does granger cause GDP although this may not be so at 5% and 1% significance levels of test. Thus lagged vales of M in table 4.4 above are statistically significant and different from zero at 10% level of significance.

Table-4.6. Results of OLS Estimates- M dependent variable

Variable	Coefficient	Std error	t-statistic	Probability
C	0.223484	0.237175	0.942277	0.3531
GDP(-1)	0.030922	0.045576	0.678469	0.5024
GDP(-2)	-0.026885	0.048584	-0.553362	0.5839
M(-1)	0.593934	0.178175	3.333425	0.0022
M(-2)	0.212349	0.189069	1.123133	0.2697
R-squared	0.5254	Mean dependent variable		1.1784
Adj R-squared	0.4661	S.D Dependent variable		0.3649
s.e of regression	0.2667	Sum Squared Residual		2.2754
D.Watson	2.0940			

Source: Eviews 8.0 – Own Calculations

Table-4.7. Short Run Causality Test

Equation: Untitled				
Null Hypothesis:	**C(2)=0**			
	C(3)=0			
F-statistic	0.230210		Probability	0.795671
Chi-square	0.460420		Probability	0.794367

Source: Eviews 8.0 – Own Calculations

In testing whether GDP granger causes M or not, the F statistic of 0.230210 with a P-value of 0.7957 shows that the null hypothesis of no causality cannot be rejected at 1%, 5% and 10% significance levels. The implications here are that lagged values of GDP in table 4.6 are statistically insignificant and are not different from zero at these levels of significance. To be precise these results show that GDP does not granger cause M even in the short run.

5. CONCLUSIONS AND RECOMMENDATIONS

This study investigated causal relationship between imports and economic growth in Zimbabwe. The empirical study findings established no evidence for long run relationship between the two afore mentioned macroeconomic variables in Zimbabwe. However Wald and F Tests in the Johansen causality procedure indicate that in the short run imports could be influencing growth while economic growth does not influence imports in Zimbabwe (unidirectional causality).The implications are that there is no practical evidence that imports could help stimulate long run growth in the Zimbabwean case. There could be other significant determinants of economic growth in the country. Also absence of evidence for cointegration between the two macroeconomic variables under concern, suggests that economic growth does not create incomes to be spent on imports in the long run as it would be expected for a developing country like Zimbabwe. Expansion of imports could be influenced by other factors rather than economic growth in Zimbabwe. On the other hand short run import influence on GDP suggests that regardless of import restriction policies put in the country; however, imports continue to expand suggesting that the measures are not effective enough to deter expenditure on foreign products by Zimbabweans.

Since the study revealed no practical evidence for long run cointegration between economic growth and imports in Zimbabwe, government macroeconomic policy should focus on other factors that could be influencing or influenced by economic growth since it is said to be a crucial issue for sustainability and poverty reduction. However future studies may find this piece of work as a useful starting point in analysing the connection between economic growth and imports in Zimbabwe. While this research focused on the nexus between imports and growth by considering aggregate variables however it could have been a sophisticated idea to decompose or disaggregate imports into various categories. This is because some classes of imports could be stimulating growth while others could be stifling it in an economy. Therefore, specific policy recommendations should be directed to particular import categories depending on how they are related to economic growth. This implies that future researches may take this investigation on

the connection between imports and growth by using disaggregated imports so as to precisely inform the economic policy formulation.

REFERENCES

Chiguwisa, L., 2011. Export-led growth hypothesis in Zimbabwe: Does export composition matter? Internal Journal of Economic Resources, 2(4): 111-129.

Frankel, J.A. and D. Romer, 1999. Does trade cause growth? American Economic Review, 89(3): 379-399.

Grossman, G.M. and E. Helpman, 1991. Innovation and growth in the global economy. Cambridge: MIT Press.

Gujarati, D.N., 2004. Basic econometrics. 4th Edn., New York: The Mc Grew-Hill Cos.

Hamilton, D., 1994. Time series analysis. Princeton: Princeton University Press.

Humpage, O.F., 2000. Do imports hinder or help economic growth? Federal Reserve Bank of Cleveland. Economic Commentary.

Kogid, M., 2011. Does import affect economic growth in Malaysia. Empirical Economics Letters, 10(3): 297-307.

Mafusire, A., 2001. Export –led growth and foreign direct investment: The Zimbabwean experience. The University of Queensland School of Economics Brisbane Qld: Discussion Paper Series, No. 295.

Piazolo, M., 1996. Determinants of Indonesian economic growth, 1965-1992. Seoul Journal of Economics, 9(4): 269-298.

Pomponio, X.Z., 1996. A causality analysis of growth and export performance. Atlantic Economic Journal, 24(2): 168-176.

Riezman, G.R., 1996. The engine of growth or its Handmaiden? A time series assessment of export-led growth. Empirical Economics, 12(1): 77-110.

Samuelson and Nordhau, 2001. Economics. 7th Edn., New York: The McGraw-Hill Companies.

Saungweme, T., 2013. Trade dynamics in Zimbabwe: 1980-2012. Internal Journal of Economic Resources, 4(5): 29-38.

Thangavelu, S.M. and G. Rajaguru, 2004. Is there an export or import led productivity growth in rapidly developing Asian countries? A multivariate VAR analysis. Applied Economics, 36(10): 1083-1094.

Toda, 1995. Statistical inference in vector autoregressions with possibly integrated processes. Journal of Econometrics, 66(1-2): 225-250.

Todaro, P. and S.C. Smith, 2003. Economic development. 8th Edn., Singapore: Addison Wesley.

Tong, J., 1995. Price change of stock and economic running price change of stock and economic running. Tainjin: Nankai University Press.