



TESTING THE EXPORT-LED GROWTH PARADIGM THROUGH ECONOMETRIC  
METHODS: EMPIRICAL EVIDENCE FROM NAMIBIA

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ABSTRACT

Despite the large volume of documented empirical studies in the existing literature concerning the export-led model in the last four decades, the exact connection between exports and economic growth remains largely unanswered. Indeed, both theoretical and empirical inquiries are still seeking for definite answers. Accordingly, this study employs the VAR technique to empirically assess the applicability of the export-led growth model in the context of Namibia through the help of quarterly time-series data-sets for the period covering 1990 to 2012. In this regard, the study tested for the existence of a long-run relationship between exports and economic growth. The results of the unit root test indicated that, foreign direct investment and exchange rate variables attained a stationary status in levels, while real gross domestic product and exports only became stationary after first differencing. The co-integration test suggests a stable long-run relationship among the variables used in the VAR specification. The Granger-causality test found a unidirectional relationship running from exports to economic growth. Therefore, the study recommends that trade policies which encourages export expansion should be aggressively pursued by the government of Namibia, while simultaneously striving towards improving upon the competitiveness of its exports in foreign markets.

*Keywords:* Exports, Co-Integration, Growth, Paradigm, Namibia.

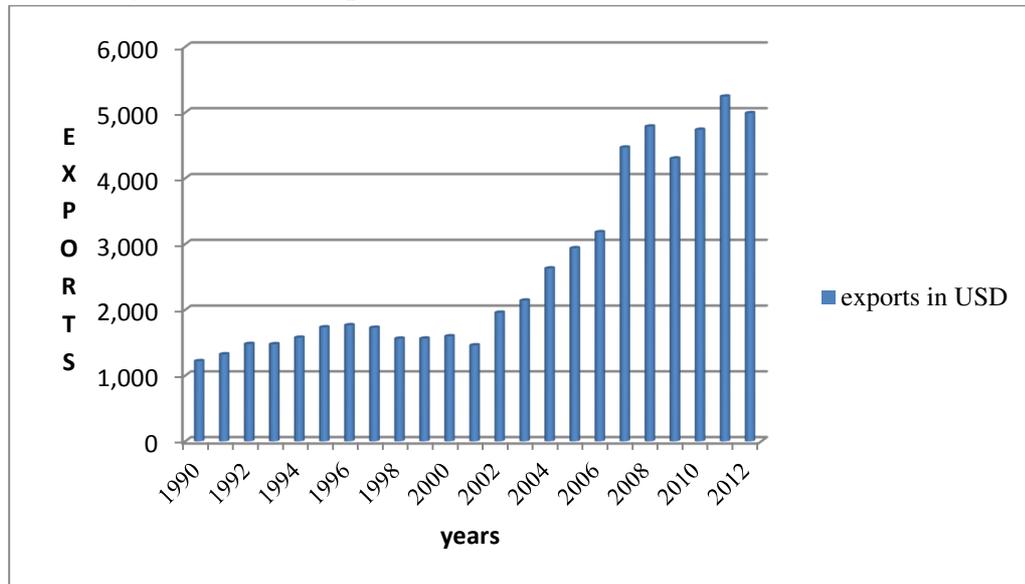
*JEL Classification:* D9, F43, O4, G34.

1. INTRODUCTION

Ever since the attainment of its independence in March 1990, Namibia has consistently and significantly relied upon exports as a major source of revenue to its government treasury. Indeed, the country's export sector contributes to employment generation and creation, a source of livelihood to a number of its citizenry, transfer of technology, improvements in the competitiveness of the country's products in foreign markets, as well as serving as a centre of attraction for multinational corporations just to mention a few (Bank of Namibia Annual symposium report, 2006). The country's primary exports are mainly solid minerals, such as diamonds, gold, uranium, zinc, as well as beef, fish, live animals and manufactured products. Further, Chow (1987) identified Namibia's major export destinations as Botswana, South Africa, the European Union, especially Germany and the United Kingdom, as well as the

United States of America (USA). Graph 1 depicts the annual revenue accumulated by the government of Namibia through exports for the period stretching from 1990 to 2012.

Fig. 1: Namibia’s exports revenues, 1990 to 2012 in USD billions



Source: Author’s construct from Namibia statistical agency bulletin (2013).

An examination of Fig. 1 shows that Namibia’s export revenue was relatively stable between 1990 and 2001 due mainly to a consistent demand for its exports, especially solid minerals. However, there was a continuous rise in Namibia’s exports revenue between the periods 2002 and 2006 due principally to the depreciation of its national currency, which ensured that its exports were cheaper in foreign markets (Bank of Namibia Annual report, 2009). A much greater and continuous increase in its exports revenue was observed between the years 2007 and 2012 due mainly to developments in its mining sector, especially increased foreign investments in uranium mining. The various free trade agreements that Namibia signed with some of its major trading partners did also contribute to the rise in its exports revenue between the periods 2007 and 2012 (Bank of Namibia Annual report, 2013).

Despite the huge revenue accruing to the government treasury from exports, no comprehensive empirical studies concerning the export-led growth model in Namibia are common in the existing literature. Therefore, this study is driven by the following considerations Firstly, it examines the relationship between exports and economic growth within a dynamic framework. By adding the effect of foreign direct investment and exchange rate to the analysis, this study became significantly comprehensive. This further widens the scope for policy-making for Namibia, as well as any other developing country on a similar route. A number of related studies only made use of OLS techniques, which is essentially a static analysis from an econometric point of view; and therefore limits the policy relevance of such studies. The works of (Voivodas, 1973); (Gupta, 1975); (Balassa, 1978) and (Tyler, 1981) are typical examples.

Secondly, the study employed a modern econometric time series technique, namely VAR in investigating the research topic under consideration. A number of existing studies pertaining to the issue under investigation employed ordinary least squares (OLS) approach, which makes the results obtained from such studies to be prone to time series analysis issues like autocorrelation and conditional heteroscedasticity, as well as the contemporaneous production of spurious results.

Thirdly, this study made some significant contributions to the theoretical and empirical literatures that it reviewed through constructive comments and suggestions. Fourthly, this study employed a single country framework, in this case Namibia. This provided opportunity

for the study to present an in-depth analysis in respect of Namibia. Fifthly, the various policies put forward by this study will in many ways reinforce the current trade policies of Namibia and also assist in addressing the various bottlenecks that have been undermining the efficacy of its trade policies over the years. Although this study is based on Namibia, it nevertheless, envisages that the policies emerging from the research could also be applicable to other developing countries on a related path, when it comes to formulating policies for the promotion of exports in particular and economic growth in general.

Given these facts, the results obtained by this study from a methodological, technical and policy standpoints are more robust in relation to previous studies reviewed. In consideration of the research background, the driving objective of this study is to econometrically test the export-led growth model for Namibia through the use of the vector auto-regression (VAR) method. The roadmap for the rest of the research article is as follows. Section 2 distinguishes between economic growth and economic development. Section 3 briefly reviews the literature concerning trade-led growth model. Section 4 details data sources and econometric approach. Section 5 reports and discusses the empirical results. Section 6 concludes and puts forward opportunities for further research regarding the issue under consideration.

## 2. EXPLAINING THE DIFFERENCES BETWEEN ECONOMIC GROWTH AND ECONOMIC DEVELOPMENT

Although the terms economic growth (EG) and economic development (ED) are highly connected, both terms are, however, not synonymous. The literature provides a variety of definitions regarding the term economic growth. However, for purposes of this study, the author makes use of two of such definitions. Todaro & Smith (2006) consider the term economic growth as a steady process by which the productive capacity of the economy is expanded upon over a given period of time in order to bring about rising levels of national output and income. Also contributing to the meaning of the term economic growth McConnell & Brue (2002) explain economic growth in terms of an outward shift in the production possibilities curve of a nation or society. The authors maintained further that the outward shift in the production possibilities curve could result from the following sources: It could be as a result of an increase in resource supplies or quality or an improvement in technology. Furthermore, it could result from an increase in a country's real gross domestic product (RGDP) or real gross domestic product per capita (RGDPC).

It is pertinent to note that the two definitions of economic growth so far discussed are quantitative in nature. In addition, it does not address the issue of spread of wealth. In other words, it does not tell us if a country that experiences economic growth will necessarily enjoy a general improvement in terms of the general welfare of its people. Therefore, the fundamental question that arises from the discussion regarding the meaning of the term economic growth that needs further interrogation is presented as follows: Are the terms economic growth and economic development synonymous? The answer to this fundamental question is brought to light in the following discussion.

Generally, the term economic development is regarded in the literature as a process that leads to a general improvement in the quality of life on the part of a society, community or country. This process should also leads to improvements in the economic health of the people, as well as greater access to the basic needs of life (clean water, shelter/housing, sanitation, education and health). This process should also be sustainable over a protracted period of time (Lucas, 1988). Further, economic development can also be seen as a process leading to a general improvement in a country's human capital capabilities and capacity, physical infrastructure, regional rankings and competitiveness, environment, social inclusivity, health facilities, security needs, literacy level, and welfare schemes (Meier, 1968). The literature also alluded to the fact that economic growth is one aspect of the process of

economic development. The following are other explanations of the term economic development.

Goulet (2006) identifies and explains the three basic components or core values of economic development (life-sustenance, self-esteem and freedom) in the following way: Life-sustenance is concerned with the provision of basic needs. The basic needs approach to development places emphasis on the following basic needs of life: shelter, clothing, portable water, cleanliness, food and education, especially primary education. It is pertinent to re-echo the fact that no country can be regarded as economically developed if it cannot provide its entire people with these needs. Therefore, a cardinal objective of development must be to liberate people out of primary poverty, as well as provide them with basic needs. Self-esteem is concerned with the feeling of pride, confidence, dignity and independence. No country can be regarded as economically developed if it is exploited by others and does not have the capacity, capabilities, power and influence to conduct relations on equal footings. In view of this fact, developing countries are in continuous search for economic development in order for these countries to experience greater economic opportunities that would lead to the eradication of opportunistic diseases, reduce their dependence on the developed world, as well as having greater access to freedom. Freedom in this context implies the ability of a society or country to plan for its own future and make choices on its own.

The three fundamental aspects of economic development so far explained, namely, life-sustenance, self-esteem and freedom are highly related to each other (Galbraith, 1980). The study also observed that these three aspects of economic development are similar to Sen's own explanation of economic development. Sen (1999) considers economic development as a process that should always lead to improvements in the quality of life, greater privileges, as well as a general improvement in the capacity of a society to create things, while Goulet (2006) emphasised the importance of the basic need components in the process of economic development. The thesis observed that both authors as a matter of facts did stress the importance of a nation improving upon the general welfare of its citizenry in the process of economic development.

Based on Goulet (2006) and Sen (1999) concept of development, the study inferred that development is generally a situation, which is characterised by an improvement in basic needs, as well as a greater sense of expanded people's entitlements, capabilities and freedoms. Given the distinction made regarding the terms economic growth and economic development the following inferences are worth noting: First, the terms economic growth and economic development are not synonymous. Secondly, whereas economic development is a policy intervention endeavour with the aim of improving upon the general economic and social well-being of the people, economic growth on the other hand is a phenomenon of the market productivity and rise in gross domestic product. Further, whereas economic development addresses the issue of spread, economic growth often does not. Besides, in order to have economic development, economic growth must first occur. However, it is possible for a nation to experience economic growth without necessarily achieving economic development.

### 3. EMPIRICAL LITERATURE

A number of opposing views are found in the existing literature concerning the relevance of the export-led growth hypothesis in modern economies. This study will only review a few of such studies in a selective and sequential manner. Voivodas (1973) employed OLS procedures to examine the relationship between exports, foreign capital inflow, and domestic growth rates. He made use of 22 countries for the period stretching from 1956 to 1966 and found that both exports and foreign capital inflow have a positive impact on GDP. Exports in particular were found to have a greater influence on economic growth. Gupta (1975) also contributing to the literature assessed the impact of foreign capital inflows on economic growth of forty developing countries using the two stage least squares (2SLS) method and

cross-country data-sets. His findings indicate that economic growth is directly related to all forms of foreign capital.

Balassa (1978) investigated the relationship between exports and economic growth for 11 LDCs by using annual macro-economic data for the period running from 1960 to 1973, as well as OLS techniques. The result indicated that export expansion affects economic growth rates positively. Besides, this study provides evidence to further support export-led strategies as against import-substitution strategies. Tyler (1981) used OLS models to analyse the relationship between export and economic growth for 55 middle income developing countries covering the period, 1960 to 1977. The study found that higher growth rate of exports is associated with a higher growth rate of GDP. Therefore, the study recommends that countries need to first, improve upon their export competitiveness in order for them to achieve a higher economic growth rate. Kavoussi (1984) probed into the relationship between export expansion and economic growth for 73 developing countries for the period 1960 to 1978 by employing econometric time series procedures. He found a direct relationship between exports and economic growth for the countries used in his study. He also observed that export expansion raises the productivity level, which in turn leads to a positive correlation between the exports growth rates and GNP in developing countries.

Hsiao (1987) employed co-integration and causality procedures to establish the nature of relationship between export growth and GDP growth for Hong Kong, South Korea, Singapore, and Taiwan over the period covering 1960 to 1984. The study found that the export-led growth hypothesis was only supported by Hong Kong's data-sets. This is a very surprising result, since these countries considers exports as the main propeller of economic growth.

Kugler (1991) investigated the existence of short-run and long-run relationships in 6 developed countries (US, Japan, Switzerland, Germany, the United Kingdom and France), using quarterly macro-economic time series data for the period 1970 to 1987. The author found that exports cannot be excluded from the co-integration relationship in the case of Germany and France, while the UK found no co-integrating relationship. In effect, only a weak evidence to support export-led growth hypothesis was found. Leamer (1995) criticised tests of causation, arguing that these studies are not identifying causal directions between exports and economic growth, but are only inquiring whether movements in one variable precede or follow movements in the others. He further questioned whether these studies actually relate at all to the growth-openness debate.

Islam (1998) tested the relationship between export and economic growth in 15 selected Asian countries by employing co-integration procedures. The results suggests that export expansion Granger caused economic growth in 11 of the 15 countries that were studied, while in the remaining 4 countries a bi-directional relationship was found between exports and economic growth. In similar manner Fountas (2000) tested the export-led growth hypothesis for Ireland using annual time series data-sets for the period 1950 to 1990. The study did not find evidence of long-run relationships between economic growth and exports in respect of Ireland. This could be interpreted to imply that the export-led growth hypothesis is not relevant to the Irish situation.

Along the lines of co-integration analysis Phan et al., (2003) econometrically estimated the long-run relationship between export and growth in Vietnam, using annual data-sets stretching from 1975 to 2001. The study found no econometric evidence to support the theory that export expansion has made a dynamic contribution to the economic performance *cum* growth of Vietnam.

Silverstovs & Herzer (2006) econometrically investigated the possibility of a dynamic relationship between exports expansion and economic growth for Chile using annual time series data-sets from 1960 to 2001. The study considered primary and manufactured exports. The study found that both primary exports and manufactured exports are significantly and positively related to economic growth in Chile. The study also found that, the Granger causality runs from manufactured exports to economic growth, while primary exports do not

Granger cause economic growth. Therefore, the need for Chile to continually improve upon its economic growth by paying particular attention to her manufactured exports cannot be overstretched.

Also Mag (2010) probed into whether export policies could lead to export expansion and correspondingly economic growth in South Korea. Indeed, the study found that the economic miracle, which South Korea has experienced for the past four decades are attributable to the government's various export support schemes, especially tax concessions and financial incentives that were aggressively used to promote the country's export sector.

Arodoye & Iyoha (2014) econometrically assessed the relationship between foreign trade and economic growth in Nigeria by employing quarterly time series data-sets for the period 1981 to 2010. A VAR specification that accounted for feedbacks was employed. The study found a stable, long-run connection between foreign trade and economic growth. The study also found that the principal sources of Nigeria's economic growth variation are largely accounted for by foreign trade innovations and "own shocks". Therefore, the reliance on foreign trade as a potent policy instrument of catalysing the process of economic growth in Nigeria cannot be over-stretched. In particular, the methods used by the authors of the study are exceedingly rigorous and revealing.

#### 4. METHODOLOGY

The data-sets used in the study are mainly from the Bank of Namibia and the Namibia Statistical Agency Bulletins. The data-sets have been collated on an annual basis over a period of 22 years. That is 1990 to 2012, and afterwards converted into quarterly datasets. The data-sets covered the following variables: real gross domestic product, exchange rate, exports and foreign direct investment. In addition, all the nominal data-sets used in the estimation process were deflated using relevant techniques, in order, to control the harmful impact of price disturbances.

The study adopts the VAR model used by (Arodoye & Iyoha, 2014) in assessing the relationship between foreign trade and economic growth in Nigeria owing to the following considerations: Firstly, several studies which have recently assessed the relationship between foreign trade and economic growth have utilised the VAR technique. Secondly, the existing literature demonstrates that the VAR technique serves as a powerful tool for examining the inter-relationships among non-stationary time-series variables, as well as for obtaining reliable predictions. Thirdly, the VAR technique has made it possible for researchers to simultaneously determine the relative importance, as well as the dynamic impact of shocks on macroeconomic variables in a system of equations. Along the principles of the VAR technique the following procedures are implemented by the study: Unit roots tests, co-integration tests and pair-wise Granger-causality tests. These tests are further elaborated upon in the following manner. Unit tests are used to find out if the time series datasets incorporated in the model are characterised by non-stationarity. Using non-stationary data in time series studies would potentially lead to the production of spurious regression results. It logically follows that inferences drawn from such studies will be deemed to be invalid, unreliable and accidental. Therefore, one of the principles observed in modern time series studies concerns checking the datasets for either stationarity or unit roots. The study engaged the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) procedures in testing for unit roots or stationarity. Co-integration mimics the existence of long-run relationships among the variables used in a specific econometric model.

Econometric time series literature warns that, it would tantamount to an exercise in futility to investigate variables that have no long-run relationship among themselves. Therefore, co-integration tests usually follows unit roots test in almost all modern econometric time series studies nowadays. This study employs the Johansen co-integration test in order to check for the possibility of long-run relationships among the four variables in the model. Granger-causality tests are used to determine causal relationships among the variables used in

time series studies. It is sometimes referred to as pair-wise Granger-causality test, since it always involves pairing any two variables in the model at a time.

There are three possibilities, when it comes to expected results arising from causality tests: A unidirectional relationship, bi-directional relationship and no causality relationship. A unidirectional relationship indicates that X granger-cause Y. In other words, it is X that makes Y to either decrease or increase and not the other way round. A bidirectional relationship suggests that X could lead to a change in Y and vice versa. A no causality relationship would imply that the two variables under consideration, say X and Y, have no relationship whatsoever in terms of X either causing an increase or a decrease in Y or vice versa.

The study postulates a 4-variable (real gross domestic product, exports, foreign direct investment and exchange rate) VAR model and further considers these 4 variables to be simultaneously interconnected. For purposes of improving upon results and determining the degree of responsiveness among the variables as a result of shocks arising from the system of equations the study first transformed all the variables into their natural logarithm forms before proceeding with the estimation process. Given this background, the study employed the following VAR specification:

$$V_t = \alpha + \sum_{i=1}^k A_i V_{t-1} + \mu_t \tag{1}$$

$V_t = (RGDP, XPORT, FDI, EX)$ , the vector of real gross domestic product, exports, foreign direct investment and exchange rate  $\alpha$  = intercepts of autonomous variables

$A_i$  = matrix of coefficients of all the variables in the model

$V_{t-1}$  = vector of the lagged variables

$\mu_t$  = vector of the stochastic error terms

## 5. DISCUSSION OF ECONOMETRIC RESULTS

The empirical estimation process regarding the study began with testing for unit roots or the univariate characteristics of time series. In this regard, the study employed the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) procedures in testing for unit roots in preference to the Dickey-Fuller (DF), augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests for the following reasons. First, the KPSS test as widely acknowledged in the existing literature has higher power than the DF, ADF and PP tests. Besides, the KPSS test is considered to be more efficient by econometricians in relation to the DF, ADF and PP unit root tests. Table 1 summarises the unit root test results.

Upon inspection of table 1, it was observed that foreign direct investment and exchange rate variables attained a stationary status in levels, while real gross domestic product and exports only became stationary after first differencing. Next, the study tested for co-integrating relationships among the variables used in the econometric model. It is essential to establish whether the variables have some long-term relationships. That is, the existence of a long-run equilibrium to which an economic system converges over time. The approach used to test for co-integration in this regard is the Johansen co-integration test. Table 2 summarises the co-integration test results.

Table 2 show the results for the Johansen co-integration test based on a VAR system of four variables. The Maximum Eigen test shows one co-integrating equation, while the trace test indicates two co-integrating equations at the 0.05 level. Therefore, there is every reason to suspect the existence of a long-run relationship among the four

variables under investigation. Afterwards, the study proceeded with the estimation of the long-run equation which yielded the following result:

$$\Delta \ln \text{RGDP}_t = 1.214 + 0.685 \Delta \ln \text{XPORT}_t + 0.724 \Delta \ln \text{FDI}_t + 0.861 \ln \text{EX}_t \quad (2)$$

Table 1: Unit root tests: KPSS in levels and difference

Variable	Model specification			
		Levels	First difference	Order of integration
lnRGDP <sub>t</sub>	Intercept and trend	0.220	0.049**	I(1)
	Intercept	1.110	0.076**	I(1)
lnXPORT <sub>t</sub>	Intercept and trend	0.234	0.108**	I(1)
	Intercept	1.116	0.123**	I(1)
lnFDI <sub>t</sub>	Intercept and trend	0.062**	0.017**	I(0)
	Intercept	0.141**	0.039**	I(0)
lnEX <sub>t</sub>	Intercept and trend	0.083**	0.048**	I(0)
	Intercept	0.083**	0.077**	I(0)

Note that \*\* implies rejection of the null hypothesis at 5 percent.

Source: Author’s computation.

The equation (2) confirms a long-run relationship among the dependent and independent variables used in the study. Indeed, there is a positive relationship among real gross domestic product, exports, foreign direct investment and exchange rate. From an analytical standpoint, a 1 percent increase in export leads to a 0.69 percent jump in economic growth, while a 1 percent increase in foreign direct investment causes a 0.72 percent rise in economic growth. Further, a 1 percent increase in exchange rate will result to approximately 0.9 percent rise in economic growth. Next, the study tested for serial correlation and conditional heteroscedasticity.

Table 2: Johansen co-integration test

Maximum Eigen test				Trace test			
H <sub>0</sub> : rank = r	H <sub>a</sub> : rank = r	Statistic	95% Critical value	H <sub>0</sub> : rank = r	H <sub>a</sub> : rank = r	Statistic	95% Critical value
r = 0	r = 1	33.232	29.584	r = 0	r >= 1	85.249	58.532
r <= 1	r = 2	20.239	24.332	r <= 1	r >= 2	27.249	23.137
r <= 2	r = 3	11.712	17.685	r <= 2	r >= 3	10.008	15.495
r <= 3	r = 4	1.473	5.562	r <= 3	r >= 4	0.737	3.841

Note: The Maximum-Eigen test shows one co-integrating equation, while the Trace test indicates two co-integrating equations at the 0.05 level. Source: Author’s construct.

The results confirm the absence of serial correlation and conditional heteroscedasticity. Besides, the model was also found to be normally distributed. Therefore, the econometric model employed in the study is indeed robust, at least, from a technical perspective. These results are displayed in Table 3.

Table 3: Diagnostic checks

Test	Null hypothesis	t-statistic	Probability
Langrange multiplier (LM)	No serial correlation	33.823	0.411
Jarque-Bera (JB)	There is normality	11.290	0.504
White (chi-square)	No conditional heteroscedasticity	40.591	0.179

Source: Author’s construct.

Next, the study reports on the Granger-causality tests. The Granger-causality results are shown in Table 4.

Table 4: Pairwise Granger-Causality Test Results

<i>Null Hypothesis</i>	<i>Obs</i>	<i>Prob.</i>
RGDP does not Granger Cause XPORT	88	0.379
XPORT does not Granger Cause RGDP	88	0.004
RGDP does not Granger Cause FDI	88	0.296
FDI does not Granger Cause RGDP	88	0.25
RGDP does not Granger Cause EX	88	0.839
EX does not Granger Cause RGDP	88	0.353
XPORT does not Granger Cause FDI	88	0.55
FDI does not Granger Cause XPORT	88	0.755
XPORT does not Granger Cause EX	88	0.8343
EX does not Granger Cause XPORT	88	0.985
FDI does not Granger Cause EX	88	0.974
EX does not Granger Cause FDI	88	0.847

Note that \*\* means the rejection of the null hypothesis at 5 percent.

Source: Author’s computation.

Upon inspection of Table 4, a unidirectional relationship running from exports to economic growth was found. By implication, exports could be used to accelerate economic growth. The rest pairs did no demonstrate causality relationships between themselves.

## 6. CONCLUSION AND RECOMMENDATIONS

This study econometrically assessed the relevance of the export-led growth model in the context of Namibia using VAR procedures. The results of the unit root test indicated that, foreign direct investment and exchange rate variables attained a stationary status in levels, while real gross domestic product and exports only became stationary after first differencing. The co-integration test suggests a stable long-run relationship among the variables used in the VAR specification. The Granger-causality test found a unidirectional relationship running from exports to economic growth. Indeed, exports are drivers of economic growth in Namibia. Further, the findings arising from the study are similar to the results that were attained by (Balassa, 1978), (Tyler, 1981), (Siliverstovs & Herzer, 2006), (Mag, 2010) and (Arodoye & Iyoha, 2014).

Therefore, the study recommends that trade policies that encourages export expansion should be aggressively pursuit by the government of Namibia. In this regard, it would be a good idea to include tax incentives as part and parcel of the strategies that are used in the promotion of the country’s exports in foreign markets.

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