No Miracles Here: Trade and Economic Progress

Cyril Ayetuoma Ogbokor

Associate Professor of Economics, Polytechnic of Namibia//Namibia University of Science & Technology, Private Mail Bag 13388, Windhoek, Namibia. Author's e-mail addresses: cogbokor@polytechnic.edu.na and ayetuoma@hotmail.com

Abstract

Indubitably, striving for greater economic growth that can lead to a general improvement in the well-being of the people constitutes one of the fundamental macroeconomic goals of all modern economies these days. In this study, the possibility of achieving economic growth through trade is investigated. The study employed the unit root test, co-integration test, pairwise Granger-causality test, and forecast error variance decomposition technique to assess the issue under focus by using Namibia as a case study. Further, the study employed quarterly macroeconomic time-series data for the period, 1992 to 2014. The VAR estimates indicate a long-run relationship among the variables investigated. Exports in particular were found to Granger cause economic growth. The forecast error variance decomposition result demonstrates that exports and foreign direct investment contributed more towards innovations in economic growth compared to exchange rate during the chosen time horizon. The study also found that consistently, economic growth itself accounted for a lion share of the innovations that occurred over the selected time horizon. The important message to policymakers in Namibia from the outcome of the study is that the promotion of exports should constitute a crucial part of a country's macroeconomic policies in order to accelerate economic growth.

Keywords: Trade, co-integration, time-series, growth, Granger-causality, Namibia

1. Introduction

Enormous research works have been published concerning the impact of trade on growth for many countries. For example, see the empirical evidence contained in (Awokuse, 2005), (Mag, 2010) and (Kehinde *et al*., 2012). Indeed, the matter is even receiving greater attention these days by empirical researchers, social scientists and policy practitioners mainly due to a massive rise in the value and volume of international trade during the past three decades (Ogbokor, 2011). However, it is pertinent to caution that the impact of trade on growth cannot be considered to be world-wide. Accordingly, the study engages macroeconomic time series data to test for a co-integrating and causality relationships between trade and growth in Namibia. The rest of the study is organised in the following manner: Section 2 discusses the major theories of economic growth. Section 3 reviews the existing literature concerning trade and growth. Section 4 details data sources, while section 5 presents the econometric method. Section 6 reports and discusses the empirical results, while section 7 concludes and puts forward an important message to policymakers.

2. Theories of Economic Growth

It is pertinent to note that all growth theories, be it classical, neoclassical or modern, recognises the need for every society to strive at attaining continual and sustained levels of economic growth. This is principally because economic growth is seen among other things, as a necessary condition to eliminate poverty, raise the quality of life and influence the level and distribution of wealth within a country. Economic performances differ from one country to another. Hence, the impact of economic

growth on developmental issues such as poverty alleviation, the standard of living, and the distribution of wealth usually is expected to differ from country to country.

More fundamentally, the impact of economic growth would depend on the capacity, abilities, as well as the willingness of the political leadership of that country to translate the attained economic growth into addressing these developmental issues. Other economic growth studies have concerned themselves with issues such as: Why have some countries grown at more rapid rates than others? What are some of the critical factors that impact economic growth within an economy? Should countries converge to steady state paths and at what rate, or diverge? In search of answers to these questions, various theories have been advanced to provide a theoretical foundation for the empirical analysis of economic growth. The neoclassical theory and endogenous growth models (often called new growth theories) have received the widest attention in the literature. This study acknowledges that a complete and exhaustive discussion of the theory of economic growth will tantamount to a fruitless exercise. Therefore, this study only discusses the neoclassical and endogenous growth theories, since they furnish the theoretical foundations to most of the empirical models found in the existing literature on economic growth. It is also instructive to note that the theoretical approaches have examined two key issues: convergence and diversity, as well as the sources of economic growth.

2.1 Neo-Classical Growth Theory

In a sense, the neo-classical growth theory essentially expanded upon the Harrod-Domar formulation by bringing into the model two extra factors, namely labour and technology in the growth equation (Rebelo, 1991). Solow's neo-classical growth model manifested waning returns to labour and capital, when both factors are separated from each other, as well as constant returns when both factors are combined. According to traditional neo-classical growth theory, output growth arises from one or more of three factors. These factors are, namely, labour availability, capital stock and technology. Closed economies with lower saving rates, *ceteris paribus*, are generally characterised by sluggishness when it comes to economic growth, especially in the short-run in relation to those experiencing high savings. Open economies, however, whether with low or high saving rates demonstrate greater level of economic growth in both short-run and long-run periods. Further, openness could potentially lead to improvements in technology (Bhagwati, 1958).

The neo-classical approach to economic growth usually begins with an examination of Solow (1956) and Swan (1956). In view of this, the model is often referred to as the Solow-Swan growth model. An important aspect of Solow's work was the incorporation of factor substitutability to generate a stable equilibrium growth path. Subsequently, a huge amount of the literature has been developed overtime, representing various adaptations to the basic neoclassical framework. The neo-classical approach is anchored on a simple aggregate production function that takes the following form:

$$Y \, \Box \, Af = (K, L) \qquad (4.1)$$

Where f is a functional notation, which relates national income or output (Y) to technological change (A) and two basic factors of production (physical capital, K and labour, L). Solow maintained that technical change is any development that shifts the production function. This change could be as a result of

improvement in education or technology. In addition, the production function is assumed to exhibit constant returns to scale.

Over the years, the neoclassical approach has faced a number of criticisms. The most significant one being the huge amount of the focus on achieving some degree of consistency with one or more of the stylised facts rather than developing models that are amenable to empirical estimation and evaluation (Arora & Athanasios, 2005).

Easterly (2001) succinctly identified five stylised facts pertaining to total factor productivity (TFP). These are: Firstly, factor accumulation does not explain the bulk of cross-country differences in the level or growth rate of gross domestic product per capita. However, TFP does. Secondly, there are massive and growing differences in GDP per capita. However, the big story should relate to divergence and not conditional convergence. Thirdly, growth is not importunate over time, but capital accumulation is. Fourthly, all factors of production usually flow to the same destinations, suggestive of imperative externalities. Fifthly, national government policies do influence growth, especially in the long-run.

Also contributing to the discussion Renelt (1991) assessed the theoretical and empirical literature concerning economic growth. He observed that one significant reason for the success of the standard neoclassical growth model is that it provided a convenient approach for organising data regarding the sources of economic growth. However, the model did not account for much of the growth taking place. An implication of the model is that countries with similar technologies and preferences will converge to the same steady state output levels. Whilst this is true for some countries, there is little evidence of convergence, particularly in developing countries. Furthermore, some empirical findings have clearly shown that the gross national product (GNP) could display long-term resistance to shocks (Helpman, 1999).

In similar fashion McCallum (1996) was of the opinion that the main issue arising from the neo-classical theory was its inability to explain several basic issues relating to the process of economic growth. Given the essential premise upon which the neoclassical notion was built, this theory tended to suggest either equal or different growth rates for all countries, which the model itself is unable to explain. The truth of the matter is that different economies have in fact achieved different growth rates in the long-run.

2.1.1 Endogenous Growth Theory

Endogenous growth economists generally believed that improvements in productivity are generally enhanced by innovation and human capital investment. Further, they stressed the involvement of the public, as well as the private sector in the process of innovation. In addition, they recognised knowledge as a factor that can contribute significantly to the growth process of a country (Grossman & Helpman, 1994).

Besides, the proponents of endogenous growth theory stated that a knowledge-based economy is in a better position to maintain and sustain its competitive advantage in foreign markets, especially in fast-growth industries (Pack, 1994). Furthermore, the endogenous growth economists regarded technology as

a variable rather than a constant term in growth models. This is because changes in policies can either suffocate or promote innovation and production.

Madsen et al., (2010) stated the other important economic ideas flowing from the proponents of endogenous growth theorists as follows: Firstly, they believe that either every market or industry has the potential to experience economies of scale or increasing returns to scale. Secondly, they consider investment in research and development as an effective source of technical progress. Thirdly, they advocated for government policies that would encourage entrepreneurs to create new businesses and also expand upon existing businesses in order to stimulate employment opportunities in the economy.

As earlier alluded to, this approach generally linked permanent changes in certain policy variables to permanent changes in economic growth rates. Endogenous growth models may be further dichotomised into two groups. The early sets of models were driven by the works of Lucas (1988), Rebelo (1991) and Romer (1986). Subsequently, the writings of Aghion and Howitt (1992) and Grossman and Helpman (1994), which elaborated more specifically on endogenous technological change followed (Oviatt and McDougall, 1994). These later models also emphasised the role of research and development in technological change and promotion of economic growth. In contrast with the neo-classical model, endogenous growth theory regarded technical change as an endogenous variable (Melitz, 2003).

Romer (1986) maintained that the generation of knowledge is positively linked to the scale of economic activity, which is in turn assumed to be proportional to capital accumulation. In order to achieve sustained growth, constant returns to the reproducible factors are needed. Furthermore, he recognised the possibility of knowledge spill over, which may cause a single firm to experience diminishing returns to capital. However, in general, there would still be increasing returns to scale. In similar fashion Lucas (1988) invoked and subsequently applied an aggregate production function approach that gave room for externalities to human capital.

Also contributing to the literature on endogenous growth Aghion & Howitt (1992) advanced a Schumpeterian model of growth through creative destruction, allowing for learning-by-doing, as well as the fact that new innovations may make old ones out-of-date. Hufbauer (1991) in his contribution maintained that, like the neo-classical model, the endogenous growth theory has been attacked on several grounds. First, the challenge with measuring human capital has led to the use of various proxies for this particular variable. Examples of such proxies are primary and secondary enrolment ratios, literacy rates, and expenditure on education. Secondly, it is very doubtful if any of the proxies used are consistent with the theoretical meaning of human capital. Further, the absence of a standard definition of human capital has led to wide disparities in the definition and measurements of the various proxies used over time and across various countries.

3. Literature Review

Many empirical studies relating to trade and economic growth are found in the existing literature. The study reviews a few of the documented literature concerning the relationship between trade and economic growth in a chronological way.

Abual-Foul (2004) tested the export-led growth hypothesis in Jordan through the use of co-integration and causality tests procedures. The empirical results indicated unidirectional causality from exports to output. It also supported the export-oriented growth strategy pursued by Jordan of attracting foreign direct investment and boosting exports in order to promote a faster growing economy.

Reppas and Christopoulos (2005) carried out a study based on a combination of 22 Asia and Africa countries. The researchers made use of co-integration and OLS techniques to test the relationship between exports and economic growth for the period running from 1969 to 1999. Their finding suggests that there is a positive long-run relationship between export growth and economic growth for the majority of the countries under investigation. However, the co-integration results indicate that the causality runs from economic growth to export. By implication, these countries would need to, first of all, improve upon their level of economic growth in order for them to speed-up their export-drive. The use of both OLS and co-integration techniques simultaneously by the researchers is highly commendable.

Awokuse (2005) explored the relationship between exports and output growth, using South Korea as a case study. He tested the following proposition: whether either the export-led growth or growth-led export hypothesis holds in South Korea. This study investigated the possibility of a dynamic causal relationship between exports, output growth, capital/investment, terms of trade, and foreign output shock by making use of quarterly data running from the year 1963 to 2001. The study relied upon the application of two theoretical methodologies, namely vector error correction model (VECM) and an augmented level of vector auto-regression (VAR). Both methods confirmed a bidirectional link between exports and GDP. This means that South Korea could either use economic growth to boost its exports or rely upon increasing its exports as a way of stimulating economic growth.

Halicioglu (2007) also attempted to prove the validity of the export-led growth hypothesis using quarterly data from 1980 to 2005 and Turkey as a case study. The author made use of a combination of co-integration and error correction modelling procedures in his study. The empirical results arising from the study indicate that a long-run relationship exists among variables in which the industrial production index is a dependent variable. In addition, augmented Granger causality suggested unidirectional causality from exports to industrial production. A change in exports and terms-of-trade through the error correction model will change the industrial production index in the long-run.

Razmi & Blecker (2008) assessed the impact of introducing a constraint on the growth of manufactured exports in the developing countries. The study made use of 18 developing countries, namely Bangladesh, China, Hong Kong, India, South Korea, Malaysia, Pakistan, Philippines, Singapore, Sri Lanka, Thailand, Taiwan, Turkey, Mexico, Dominican Republic, Jamaica, Mauritius and Tunisia. The study revealed that out of the 12 countries that yielded stable estimates, nine of them, namely Bangladesh, China, the Dominican Republic, India Jamaica, Sri Lanka, Pakistan, Singapore and Turkey yielded a positive and statistically insignificant coefficient for the relative price term with respect to other developing countries. The study further found that only three countries, namely South Korea, Mexico and Taiwan yielded significant estimates for the relative export price relative to industrialised countries. In terms of income elasticity, the study found that they were statistically significant and correctly assigned in almost all cases and had values that fell within the range suggested by previous studies. The study also observed that east and south-east Asian countries appeared to have higher income elasticises than others. The estimated coefficients also suggest that most developing countries that reported significant price effects competed

with other developing country's exports and not with manufacturers in the industrialised countries. This implied that competition is more common and intense among the developing countries.

Also Mag (2010) econometrically tested the export-led growth paradigm using South Korea as a case study. He employed macroeconomic datasets based on the export pattern of South Korea since the 1960s, as well as the country's export policies. The study found that the economic miracle that swept across South Korea during the period under investigation was mainly caused by tax concessions, financial incentives, political commitment, as well as the establishment of a number of export promotion agencies on the part of the South Korean government.

Mina (2011) using econometric data, measured the impact of Africa's trade with China for the period covering 1995 to 2008. The study reported four important findings. Firstly, the study did not find any evidence to suggest that exports to China helps to promote economic growth in Africa. Secondly, the study found that countries that export one major commodity to China have a greater possibility of benefitting in terms of economic growth than those with diversified export-base. Thirdly, the study found that imports from China were generally promoting economic growth in Africa. Lastly, the finding of the study supports the hypothesis which states that the destination of a country's exports matter, especially when it comes to the promotion of economic growth.

Kehinde *et al.*, (2012) empirically assessed the influence of international trade on economic growth in Nigeria for the period 1970 to 2010. The study made use of a number of time-series econometric procedures. The study confirmed that export, foreign direct investment and exchange rate are statistically significant at 5 percent. These variables were also found to be positively related to real GDP. Correspondingly, other variables such as import, inflation rate, and openness had a negative influence on real GDP. In addition, the study found that increased participation in foreign trade on the part of Nigeria has helped in ensuring that the country gains from trade in both static and dynamic terms. Besides, both international trade volume and trade structure towards high technology exports resulted in a positive effect on Nigeria's economy. Therefore, the authors recommended that the way forward is for the government of Nigeria to design and implement trade policies that can boost exports, stimulate foreign direct investment and maintain exchange rate stability in order to ensure macroeconomic growth and stability in its economy.

Manni *et al.*, (2012) established the connection between trade and the economy of Bangladesh for the period running from 1980 to 2010 using OLS techniques and procedures. This study analysed the achievements of the economy in terms of important variables such as growth, inflation, export and import after the implementation of trade liberalisation policies in Bangladesh. The analysis clearly indicates that GDP growth increased consequent to liberalisation. Trade liberalisation does not seem to have affected inflation in the economy. The analysis also suggests that greater openness has had a favourable effect on economic development. Both real exports and imports have increased with greater openness. The liberalisation policy certainly improves exports of the country, which eventually led to higher economic growth during the period under consideration. The findings of this study can be an interesting example of a trade liberalisation policy study in developing countries. It would be useful for other developing countries that are currently fraternising with liberalisation policies to also conduct similar studies in order to determine the effectiveness of this policy on their economies.

Arodoye & Iyoha (2014) econometrically tested the connection between foreign trade and economic growth in Nigeria by using vector auto-regression method that accounted for feedbacks. The study confirmed a stable, long-run connection between foreign trade and economic growth. The result also alluded to the fact that the principal sources of Nigeria's economic growth variation are largely due to foreign trade innovations and own shocks. The study, therefore, recommends the adoption of a vibrant trade policy for purposes of speeding-up the process of economic progress in Nigeria. The VAR method used by the authors of this study is highly penetrating from an econometric standpoint.

4. Data Sources

The data used in this study were obtained from secondary sources due to the nature of the research topic under investigation. In this regard, the study employed macroeconomic time-series data-sets covering 1992 to 2014. Effectively, the study made use of the following sources for purposes of collating relevant macroeconomic data: National Planning Commission (NPC), Ministry of Labour (MoL), Bank of Namibia (BoN), World Bank (WB) Statistics, and International Labour Organisation (ILO) Statistical bulletins, as well as, the Namibia Statistics Agency (NSA). The data employed in the study were transformed into their respective natural logarithms' forms before being used for the process of estimation. The data were also deflated using a base year that was judged to be appropriate before the process of estimation took place. This driving objective of deflating the datasets was to eliminate the detrimental effect of inflation, which is an inevitable occurrence in all modern economies.

5. Econometric Procedure

The study utilised the method of VAR, which is one of the commonly used econometric time-series techniques in empirical studies nowadays. In this regard, the following procedures were employed in the research as a matter of technical necessity: Unit root tests, co-integration tests, error correction modelling, diagnostic tests, Granger-causality tests, and forecast error variance decomposition analysis.

Unit root test, alternatively, stationarity test is a standard procedure in most empirical econometric time series studies. The function of this test is to check for the presence of unit roots or stationarity in the time series datasets used in the study. The use of non-stationarity time series data in the estimation process would most likely produce spurious results, hence the necessity of this procedure. The null hypothesis of the non-existence of stationarity is tested against the alternative hypothesis, which mimics the existence of stationarity in respect of the time series datasets. The basic rule to be followed in either accepting or rejecting the null hypothesis is to compare the computed or calculated values with the critical values. There is the presence of stationarity of variables if calculated values are greater than critical values. Otherwise, the variables are simply regarded as nonstationary. The test is inconclusive if calculated values are equal to critical values. The study employed the Kwiatkowski, Phillips, Schmidt and Shin (KPSS) procedures in testing for unit roots owing to the following considerations: Firstly, the KPSS test is widely acclaimed in the existing literature to have a higher power than the Dickey-Fuller (DF), augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) unit root tests. Secondly, the KPSS test is considered to be more efficient in relation to the DF, ADF and PP unit root tests.

Co-integration mimics the existence of long-run relationships among the variables used in the study. That is, the existence of a long-run equilibrium to which an economic system converges over time.

The empirical literature provides for a number of procedures for testing for co-integration relations. The rule is that the presence of, at least, one co-integrating vector or relation in a model implies the existence of long-run relationships among the variables used in the estimation process. Indeed, if this is the case, the study can then proceed with the estimation of the error correction model. The study employs the Johansen method in testing for co-integration relations. The rule is that co-integration exists among the variables if the calculated values (Trace and Max-Eigen statistics) are superior to the critical values. Once co-integrating relation among the variables is established, the study can proceed to estimate the long-run equation and should the need be the short-run error correction model. The error correction model (ECM) is usually derived from the long-run equation.

Diagnostic tests are employed to check for the presence of serial correlation, conditional heteroscedasticity, as well as finding out if the model is normally distributed. Granger causality provides for the following three possibilities: Unidirectional, bidirectional or a no Granger-causality relationship among the variables under investigation. In a sense, causality implies a correlation between the current value of one variable and the past values of others. The impulse response functions are used to produce the time path of the dependent variables in the VAR, to shocks from all the explanatory variables. If the system of equations is stable any shock should decline to zero, an unstable system would produce an explosive time path.

The forecast error variance decomposition analysis is an alternative method to the impulse response functions for examining the effects of shocks in respect of the dependent variables. This technique determines how much of the forecast error variance for any variable in a system, is explained by innovations to each explanatory variable, over a series of time horizons. Usually own series shocks account for most of the error variance, although the shock will also affect other variables in the system. Since the impulse response functions analysis is similar to the forecast error variance decomposition analysis the study restricted itself to the latter.

6. Analysis of Empirical Results
Unit root test: The study employed the KPSS procedures in testing for unit roots. Table 1 displays the unit root test results.

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

Variable	Model specification	Levels	First difference	Remarks
$lnRGDP_t$	Intercept and trend	0.249	0.067**	I(1)
	Intercept	1.172	0.094**	I(1)
$lnXPORT_t$	Intercept and trend	0.251	0.119**	I(1)
	Intercept	1.105	0.135**	I(1)
$lnFDI_t$	Intercept and trend	0.057**	0.019**	I(0)
	Intercept	0.177**	0.059**	I(0)
$lnEX_t$	Intercept and trend	0.063**	0.052**	I(0)
	Intercept	0.092**	0.087**	I(0)

Notes that ** implies rejection of the null hypothesis at 5 percent.
Source: Author's computation.

The KPSS test results indicate that the FDI and EX variables achieved a stationary status in levels, while the RGDP and XPORT variables only became stationary after first differencing.

Co-integration Test: Table 2 reports the co-integration test results. As earlier mentioned, the approach adopted to test for co-integration relations is the Johansen method.

Table 2: Johansen Co-integration test

Maximum Eigen test				Trace test			
H_0: rank = r	H_a: rank = r	Statistic	95% Critical value	H_0: rank = r	H_a: rank = r	Statistic	95% Critical value
r = 0	r =1	35.319	28.237	r = 0	r >=1	87.553	68.463
r <=1	r = 2	19.581	26.455	r <= 1	r >= 2	29.997	25.788
r <=2	r = 3	13.229	19.681	r <= 2	r >= 3	13.326	18.539
r <=3	r = 4	3.267	7.698	r <= 3	r >= 4	1.995	5.733

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.

It is apparent from the results reported in Table 2 that the variables under investigation are co-integrated. However, before proceeding with the estimation of the long-run (LR) equation, there is the need to determine the optimal lag length that shows the convergence of the lag length for the VAR system. In this regard, the following procedures are employed: The LR test statistic, final prediction error (FPE), Akaike information criterion (AIC), Schwarz information criterion (SIC) and Hannan-Quinn information criterion (HQIC). The results indicate that the lag convergence is 6 as highlighted in Table 3.

Table 3: VAR lag order selection criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-72.54431	NA	7.81e-03	3.247510	3.371009	3.420643
1	256.0735	503.1749	3.89e-05	-5.963482	-5.351963	-5.564583
2	317.5739	121.6011	8.19e-03	-7.94529	-6.531963*	-6.553772
3	320.9104	20.96423	9.15e-02	-7.745296	-6.873521	-5.058245
4	321.0129	6.510162	1.30e-08	-6.838186	-4.720937	-5.993589
5	381.3491	86.42754	4.05e-09	-8.036462	-5.421036	-6.993136
6	**412.2213**	**37.20027***	**3.03e-07***	**-8.358267***	**-5.342923**	**-7.476540***
7	414.0789	5.551380	4.45e-09	-8.056186	-4.444409	-6.615404
8	421.9338	8.704070	6.08e-09	-7.836048	-3.726094	-6.196537

* indicates lag order selected by the criterion

Source: Author's compilation.

At the selected lag length, the VAR system is expected to satisfy the stability condition. This occurs when all the inverse roots of the characteristic Auto-regression (AR) polynomial have a modulus of less than one and lie inside the unit circle. The results reported in Table 4 indicate that the estimated VAR satisfies the stability condition.

Table 4: Roots of characteristic polynomial

Root	Modulus
0.985410	0.985410
0.790409 - 0.281187i	0.838936
0.790409 + 0.281187i	0.838936
0.641891 - 0.342990i	0.727782
0.641891 + 0.342990i	0.727782
0.596453	0.596453
0.481193 - 0.277322i	0.555387
0.481193 + 0.277322i	0.555387

No root lies outside the unit circle.

VAR satisfies the stability condition.

Source: Author's construct.

On the basis of the results reported in Tables 1, 2, 3 and 4 the study proceeded to estimate the long-run equation for the variables under investigation, which produced the following:

$$\Delta In\ RGDP = 1.411 + 0.716\Delta InXPORT + 0.892\Delta InFDI + 0.953InEX \tag{1}$$

The equation (1) confirms a long-run relationship among the dependent and independent variables used in the study. Indeed, all the independent variables, namely, exports, foreign direct investment and exchange rate were positively related to real gross domestic product. A further scrutiny of the estimated model suggests that a 10 percent increase in export leads to approximately 7.2 percent jump in economic growth, while a 10 percent increase in foreign direct investment is also expected to lead to approximately 9 percent rise in economic growth. Correspondingly, a 10 percent increase in exchange rate will result to approximately 9.5 percent rise in economic growth. This result contradicts theoretical expectations and should be taken with caution. When a country's national country becomes expensive to purchase, the general expectation is that its exports will be negatively affected since they will be expensive. If this situation continues for long the country's economic growth objective will also be negatively affected.

Diagnostic Tests: The study tested for serial correlation and conditional heteroscedasticity. 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 vigorous, at least, from a technical perspective. The results are reported in Table 5.

Table 5: **Diagnostic checks**

Test	Null hypothesis	t-statistic	Probability
Langrange multiplier (LM)	No serial correlation	35.335	0.592
Jarque-Bera (JB)	There is normality	13.074	0.531
White (chi-square)	No conditional heteroscedasticity	43.137	0.186

Source: Author's construct.

Granger-causality tests: The Granger-causality results are reported in Table 6.

Table 6: Granger-Causality Test Results

Pairwise Granger Causality Tests

Null Hypothesis:	Obs	Prob.
RGDP does not Granger Cause XPORT	88	0.355
XPORT does not Granger Cause RGDP		**0.016****
RGDP does not Granger Cause FDI	88	0.217
FDI does not Granger Cause RGDP		0.250
RGDP does not Granger Cause EX	88	0.736
EX does not Granger Cause RGDP		0.461
XPORT does not Granger Cause FDI	88	0.515
FDI does not Granger Cause XPORT		0.727
XPORT does not Granger Cause EX	88	0.861
EX does not Granger Cause XPORT		0.944
FDI does not Granger Cause EX	88	0.996
EX does not Granger Cause FDI		0.803

Note that ** means the rejection of the null hypothesis at 5 percent.
Source: Author's computation.
As highlighted in Table 6, a unidirectional relationship running from exports to economic growth was found by the study. Therefore, exports can be considered as a useful tool, when it comes to the

stimulation of economic growth in Namibia. None of the other pairs investigated exhibited causality relationships.

Forecast error variance decomposition analysis: The variance decomposition (forecast error decomposition) is the percentage of the variance of the error made in forecasting a variable due to a specific shock at specific time horizon. The variance decomposition provides information about the relative importance of each random innovation. That is, to assess the pass-through of external shocks to each of the economic variables used in the study. The results are as presented in Table 7.

Table 7: Forecast error variance decomposition

Variance decomposition of RGDP				
Quarter	RGDP	XPORT	FDI	EX
1	100	0	0	0
4	96.291	0.909	1.901	0.899
8	88.388	3.823	5.070	2.719
12	85.885	5.534	5.461	3.120
16	85.443	6.144	5.392	3.021
20	84.961	6.552	5.428	3.049
24	84.674	6.821	5.443	3.063

Source: Author's construct.

Table 7 presents forecast error variance decompositions for each variable in the model over a 24-quarter forecast horizon. It should be noted that the forecast horizon is not done over the total quarters over the period in total. However, it should be extended to the period that would give an indication of the fluctuations in the variable caused by itself or by the other variables. This could also imply that a researcher is at liberty to determine the extent of the forecast horizon. The results show that consistently, economic growth itself accounted for most of the changes or innovations that occurred with respect to economic growth for the entire period under consideration. Indeed, the results show that in the first quarter the fluctuations in economic growth are 100 percent purely driven or explained by economic growth itself. This is not unusual.

Amongst the three explanatory variables used in the model, exports and foreign direct investment contributed more towards innovations in economic growth during the forecast horizon. More specifically, the Table 7 shows that the changes in economic growth were dominated over the forecast horizon with exports and foreign direct investment contributing almost an equal share of over 5 per cent after 12 quarters. Afterwards, exports contribution relatively exceeded those of foreign direct investment. It is also important to mention that, the exchange rate variable made the weakest contribution towards explaining economic growth consistently for the forecast period of 24 quarters.

7. Conclusion

The study contributes to the protracted empirical discussion concerning the connection between exports and economic growth. The study employed quarterly datasets stretching from 1992 to 2014. The VAR estimates indicate a long-run relationship among the variables investigated. Exports in particular were found to Granger cause economic growth. The forecast error variance decomposition result demonstrates that exports and foreign direct investment contributed more towards innovations in economic growth

compared to exchange rate during the chosen time horizon. The study also found that consistently, economic growth itself accounted for a lion share of the innovations that occurred over the selected time horizon. This is not surprising, since in numerous cases own series shocks are expected to explain most of the error variance. Correspondingly, the results of the study are similar to the findings of (Awokuse, 2005), (Mag, 2010) and (Kehinde *et al*., 2012) that were reviewed. The lesson to policymakers in Namibia from the outcome of the study is that the promotion of exports should constitute a crucial part of a country's macroeconomic policies in order to achieve a higher level of economic growth. Otherwise, its aspiration for economic miracles will remain elusive.

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Author's profile

Cyril Ayetuoma Ogbokor is an Associate Professor of economics in the department of accounting, economics and finance, School of Management Sciences of the Polytechnic of Namibia/Namibia University of Science and Technology, Windhoek, Namibia. He has a first, second and third degrees in economics. He previously lectured in the following universities in Nigeria: University of Uyo, Military University Kaduna, and the University of Abuja before journeying to Namibia on an international assignment. His research areas are macroeconomics, development economics and international economics. He has written and published several peer-reviewed research articles in these areas by employing econometric methods. He serves as a reviewer for a number of journals. He is actively involved in community service, especially through electronic press media interviews. Besides, he is always enthusiastic about imparting his research knowledge to colleagues who are in need of such support. He has won the school of management sciences best researcher award thrice since its inception.