

Investigating the Causal Relationship between Primary Commodities Exports and Economic Growth in Namibia

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Abstract

This paper analyses the causal relationship between primary commodities exports and economic growth in Namibia using quarterly data for the period 1998 to 2014. Time-series econometric techniques such as unit root, cointegration as well as Granger-causality test within the vector auto-regression framework has been used. The results of the unit root test showed that the variables are integrated of order one. Furthermore, the results of the Johansen cointegration test revealed that no cointegration exists among the variable, suggesting that there is no long-run relationship. Finally, the results of the Granger-causality test showed that primary commodities exports do Granger-cause economic growth but economic growth does not Granger-cause primary commodities exports. This suggests that there is a unidirectional causality running from primary commodities export to economic growth in the Namibian context.

Key Words: *Primary commodities exports, economic growth, Namibia, unit root, cointegration, Granger causality test*

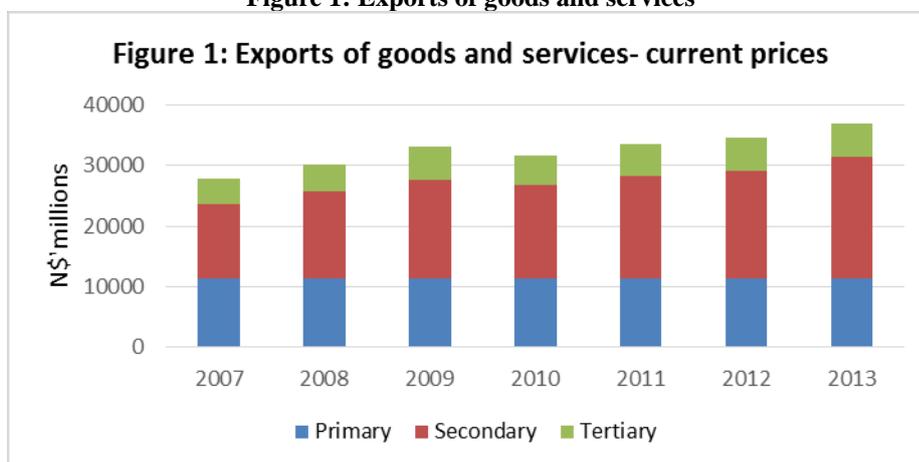
1. Introduction

This study analyses the relationship between export components and growth. In particular, the paper investigated the linkage of primary commodity exports to economic performance in Namibia. Prior investigations conducted in Namibia on the relationship between exports and economic growth. One such study is that of Niishinda and Ogbokor (2002) which find a positive relationship between the two variables.

The growth-theory indicates that growth in export is relevant in enhancing economic growth and development. Different vindications have been advanced to narrate the export and growth relationships. First, the export growth is likely to stimulate factor productivity growth through its positive impact on higher rates of capital formation. Second, the exports growth will help to relax the foreign exchange constraints, thereby facilitating imports of capital goods and hence faster growth. Third, competition from overseas ensures an efficient price mechanism that fosters optimum resource allocation and increases the pressure on industries that export goods to keep costs relatively low and to improve technological change, thereby promoting economic growth (Chien & Bwo, 2002). Therefore, logically, the above arguments suggest that exports contribute positively to economic growth.

Namibia's economy is characterised as relatively small, that relies greatly on minerals extraction, fish and agricultural products that are exported in raw form (National Planning Commission (NPC), 2012). However, recent trends show that, the primary industry contribution to export and subsequently to the Gross Domestic Product (GDP) subdued following the economic recession of 2009, coupled with the ongoing financial crisis mainly in the Euro Zone and other western nations who are Namibia's main trading partners (see figure 1 below). Therefore, domestic economic growth is exposed to the risks of falling commodity prices and highly volatile exchange rate (Bank of Namibia, 2014). Hence, diversification of the economy is imperative.

Figure 1: Exports of goods and services



Source: Namibia Statistics Agency

Considering the fact that the main exports for Namibia consist of mainly primary industry products, there is a possibility of a downward pressure on a foreign reserve revenues and subsequently the monthly import cover which is likely to undermine growth. Moreover, if the world commodities prices fall, especially minerals, then economic growth to slow down and rely only on secondary and tertiary industries of the economy which are equally underdeveloped. Full employment is unlikely to be reached when the country rely more on revenue of a volatile primary industry. The severe problem here is high volatility in primary commodity prices.

It is against this background that this study draws its primary interest. Therefore, the objective of this study is to investigate the relationship between primary commodities and economic growth in Namibia. The paper is organized as follows: the next section presents a literature review. Section 3 discusses the methodology. The empirical analysis and results are presented in section 4. Section 5 concludes the study.

2. Literature Review

2.1 Theoretical Literature

Theoretical propositions indicate that exports of goods and services do not only provide an opportunity for countries to earn foreign exchange reserve to ease the balance of payments, but also a chance to expand the employment base (Ndoricimpa, 2009). Moreover, exporting of goods results in economic growth through increased local and foreign direct investment (FDI) in a country. Thus, meeting the increasing demands due to new export market would require that producers must increase the efficiencies in their production practices. In this context, increasing efficiencies may mean optimal operations management styles in producing a good, and faster and error-free distribution to the foreign markets (Pandhi, 2007). Subsequently, with better practices, and a more reliable economy, foreign investors will be more incentivised and willing to invest in an economy that lower their risk through productive or reliable practices. Foreign direct investment may come in many forms, such as the introduction of foreign corporations into a country or collaborations with already existing firms to expand them through investment. In fact, capital that is attained through FDI brings additional benefits such as changes in attitudes in terms of investment (Thirwall 2000).

In general, trade theories indicate that trade happens because of price differences which results from the differences in supply and demand as well as technology difference and resource. For example the comparative advantage theory on trade states that exports create market for producers where countries with comparative advantage in certain areas of trade are able to expand their production and importantly increase economies of scale. Economies of scale occurs when a country is able engage in higher production at a very low cost than all other countries preferably in the same region (Pandhi, 2007).

Carmignani (2007) states that primary commodity exports account for 65 per cent of total exports for developing countries. The biggest constituent of such export is fuels. Collier (2002) indicate that practically all developing countries were heavily dependent upon exports of primary commodities and the opportunities offered by primary commodity production and exports for economic growth have often been considered limited. And such dependence poses a serious problem because of the high volatility in commodity prices, lack of governance and higher risk of civil war. Many developing countries have since then realised how important it's to diversify export, despite absolute comparative advantage, and primary commodity endowment. Many Sub-Sahara African (SSA) countries are heavily depending on primary commodities with less diversified export.

2.2 Empirical Literature

There are numerous preceding studies conducted in determining the causal relationship between export and economic. A few selected studies are presented below.

Muhammad and Sampath (1997) utilizing a unit root and cointegration techniques on the data for the period 1960 – 1992, find that of ninety-six (96) countries only eight (8) show unidirectional or bidirectional causality from exports to GDP with positive relationship between the two variables.

In Ghana, Boame (1998) examined empirically the causal relation between GNP growth and export growth using annual data for the period 1960 - 1992. The Granger causality test showed that export growth Granger-cause economic growth.

Pandhi (2000) analysed the theories behind the role that exports play in growth by applying regression analysis on four African countries namely, Democratic Republic of the Congp, Guinea Bissau, Malawi and Nigeria. The study period used start from 1981-2003. The data show a mostly positive relationship between exports and growth and mixed results for the other independent variables, investment and population.

Jordaan & Eita (2010) also conducted Granger causality test between export and economic growth for Botswana, using quarterly data for the period 1996 to 2007. The results show that there is bi-directional causality between export and economic growth.

Elbeydi, Hamuda and Gazda (2010) examined a relationship between export and economic growth in Libya. Granger causality test was conducted on annual data for the period 1980 – 2007. The results revealed a long-run bidirectional causality between the exports and income growth and that export-led growth does exist in Libya.

In Nigeria, Chimobi (2010) investigated a relationship between economic growth, investments and export using the Johansen cointegration and Granger causality tests. The annual time series used was for the period ranging between the years 1970 to 2005. Cointegration tests results found no long run relationship between the variables under study. Nevertheless, the Granger causality was found to be bidirectional between Investment and

Economic growth as well as between Investment and Export. The causality results between export and economic growth was statistically insignificant in Nigeria.

Niishinda and Ogbokor (2013) carried out a study exploring the export-economic growth relation in Namibia using time series for the period 1972 to 2010. The methodology used includes a Johansen co-integration test, the vector-error correction model (VECM) and the Granger causality. Granger causality test results showed uni-directional causation from export to economic growth in Namibia.

In Jordan, Shihab, Soufan and Abdul-Khaliq (2014) assessed a causal relationship between economic growth and exports in Jordan. A Granger causality test was applied on the data for the period 2000-2012. The research results indicated that there is a causal relationship going from the economic growth to export, but not from export to economic growth.

Kumari and Malhotra (2014) conducted a cointegration and causality analysis for export led growth in India using annual time series data for the period 1980 to 2012. The study findings made a conclusion that there is no long run relationship between exports and GDP per capita. However, there was bidirectional Granger causality running from exports to GDP per capita and vice versa.

Many preceding studies conducted on these two variables used a combination of various econometric techniques but the Granger causality appears to be pre-dominant. There have been mixed findings ranging from unidirectional to bi-directional. The only study in Namibia that comes close to this is the one by Nishiinda and Ogbokor (2013). However, this study used aggregate exports. The point of departure for this study is that primary commodity exports component is used as opposed to aggregates. This is due to the fact that Namibia exports are largely comprised of primary commodities. Therefore, this is the gap this study intends to fill.

3. Methodology

This research adopted an econometric model used of Abbas (2010) in determining causality between exports and economic growth. In this regard the study will follow the sequence as outlined below.

3.1 Econometric or Analytical Framework

In following the vector auto-regression procedure, the first step entails the analysis of the order of integration of the variables by examining whether the variables are stationary (does not contain unit root). When data contains a unit root it means any result derived from such data will be spurious or nonsensical. Spurious regression implies that relationship between variables may appear statistically significant, though no meaningful relationship among the variables exists. Furthermore, being non-stationary implies that the mean, variance and covariance are not constant over time. There are various methods for testing for unit roots

such as: Augmented-Dickey test (ADF), the extension to the Dickey Fuller test for example Pantula tests, Phillips Peron tests, Kwiatowski-Phillips-Schmidt-shin (KPS), Elliot-Rothenberg-stock point optimal (ERS), Ng-Perron tests and the graphical analysis and the correlogram test. However, this study used ADF and PP tests for unit root.

3.1.1 Testing for VAR Stability

One of the essential steps in VAR analysis is to test the stability of the dynamic model. Thus, it was important to confirm if the VAR model satisfy the stability condition. This was essential to determine whether to estimate the model in levels or in difference.

3.1.2 Determination for Optimal Lag Length

Determination of optimal lag length is conducted for the following reasons. Too few lag length will lead to “omission of relevant variable bias,” and the danger can be serious. Likewise, if one choose more unnecessary lags there might be an “inclusion of irrelevant variable bias”. The lag length is usually selected based on lag length criteria. Therefore, the convergence lag length is a critical step in VAR analysis.

3.1.3 Testing for Co-integration

The next step is to establish if there exists cointegration among the variables of interest. Cointegration is a process of bringing two or more non stationary time series of individual variables to a linear combination to realise stationarity. Cointegration amongst time series indicates a long run or equilibrium relationship between variables (Gujarati, 2010).

3.1.4 Granger Causality

Granger-causality test was employed to determine direction of causation. Granger (1960) presents this test to help time series forecasting. If a variable Y is granger cause U then it mean that past value of Y are useful in forecasting value of U, without considering past values of U, similarly if Y Granger cause U it means the past value of U are useful in forecasting value of Y, without considering past values of Y.

$$\Delta \ln GDP_t = \sum_{i=1}^n \alpha_{11} \ln GDP_{t-i} + \sum_{j=1}^n \alpha_{12} \ln PCE_{t-i} + \mu_t$$

$$\Delta \ln PCE_t = \sum_{i=1}^n \alpha_{21} \ln GDP_{t-i} + \sum_{j=1}^n \alpha_{22} \ln PCE_{t-i} + \mu_t$$

In the equation above the lag length is denoted by “i” and “j”. If there is cointegration between export and GDP variables, correct statistical inference will be obtained by means of analysing causality using the error correction model (Engel and Granger, 1969). In order to check for both short run and long-run causality between the two variables a VECM will be employed. The VECM is estimated by following VAR framework;

$$GDP_t = \sum_{j=1}^n \beta_j GDP_{t-j} + \sum_{j=1}^n \alpha_j \Delta PCE_{t-j} + \delta \mu_{t-1} + \varepsilon_t$$

$$PCE_t = \sum_{i=1}^n \alpha_i \Delta GDP_{t-i} + \sum_{i=1}^n \beta_i PCE_{t-i} + \delta U_{t-1} + \varepsilon_t$$

μ_{t-1} and U_{t-1} are the error correction terms derived from Long run cointegration relationship. δ denotes the error term which denotes deviation of the endogenous variable from the long run equilibrium.

3.2 Data, Data Sources and Data Measurements

The data used to carry out the model estimation are quarterly for the period 1998 to 2014. Gross domestic product and primary commodities export data were obtained from National Accounts at Namibia Statistics Agency and the Bank of Namibia. Time series were transformed into natural log. The variables will then be denoted as a) LNGDP which stands for natural log gross domestic product, and b) LN PCE meaning natural log primary commodity export.

4. Empirical Analysis and Results

4.1 Unit Root Test

Table 1 reports the results of the unit root. The following tests were used: namely, the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The results of the unit root test shows that both variables are stationary in first difference, meaning that the variables are integrated of first order

Table 1: Unit root tests: ADF and PP in levels and first difference

Variable	Model specification	ADF	PP	ADF	PP	Integration order
		Levels	Levels	1 st difference	1 st difference	
lngdp	Intercept	-0.248	0.526	-11.651**	20.888**	1
	Intercept and trend	-5.117**	-5.082**	-11.559**	-20.539**	1
lnpce	Intercept	-0.4823	-0.469	-7.893**	-25.304**	1
	Intercept and trend	-4.753**	-4.647**	-7.823**	-25.185**	1

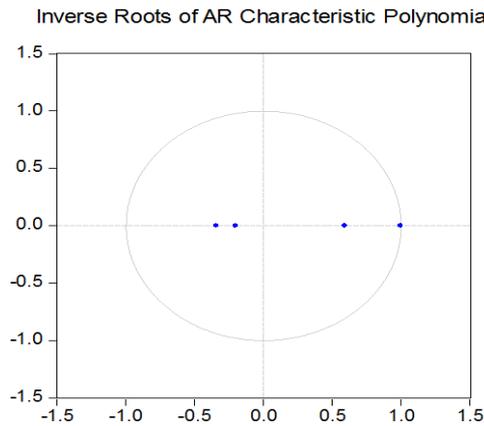
Source: Author's compilation and values obtained from Eviews

Notes: ** means null hypothesis is rejected at 5%.

4.2 VAR Stability Test

Prior to cointegration test the study conducted a stability test in order to determine the stability of the VAR estimated model. The model does indeed satisfy the stability condition as shown in figure 1 below.

Figure 1: VAR Stability Test



Source: Author's compilation

4.3 Determination for Optimal Lag Length

Based on the lag length criteria, the optimal lag length chosen by the majority of the test is 3 as shown in table 2 below. Accordingly, this study concluded that the lag length of three is appropriate.

Table 2: Optimal Lag Length

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-0.751119	NA	0.003752	0.090201	0.159410	0.117324
1	121.6280	232.7210	7.74e-05	-3.791082	-3.583455*	-3.709711*
2	125.2844	6.713464	7.83e-05	-3.779818	-3.433773	-3.644200
3	132.4567	12.69837*	7.07e-05*	-3.883825*	-3.399362	-3.693960
4	134.5701	3.603256	7.53e-05	-3.821971	-3.199090	-3.577858
5	135.3409	1.263593	8.41e-05	-3.716095	-2.954797	-3.417735
6	136.6081	1.994320	9.24e-05	-3.626496	-2.726779	-3.273889

Source: Author's compilation

4.2 Testing for Cointegration

Table 4 shows that the results of the Johansen cointegration test based on trace statistics and Maximum Eigen values. Both test statistic fail to reject the null hypothesis of no cointegration because the calculated values are lower than the critical values at 5%. Therefore our results indicate that there is no existing long-run equilibrium relationship between LNGDP and LNPCE.

Table 3: Johansen Cointegration test results based on the Trace and Maximum Eigen values

		Maximum Eigen Test		Trace Test			
H0: rank=r	Ha: rank=r	Statistics	95% critical value	H0: rank=r	Ha: rank=r	Statistics	95% critical value
r=0	r=0	6.328857	15.49471	r=0	r=0	6.307055	14.26460
r<=1	r<=1	0.021802	3.841466	r<=1	r<=1	0.021802	3.841466

Source: Author's compilation

Note: Both Max-Eigen value and Trace tests indicates no cointegrating equations at 5% level.

4.3 Granger Causality Test

Upon establishing that there was no existence of cointegration between the variables LNGDP and LNPCE, a VAR model was estimated where the Granger-causality test results were derived from. The estimated results are presented in Table 4. The results found that there is causality running from LNPCE to LNGDP, but no causality from LNGDP to LNPCE at 5% level of significance. The results of this study are similar to that of Boame (1998). Furthermore, the results suggest a unidirectional causality in the Namibian context running from primary commodities export (LNPCE) to (economic growth (LNGDP)).

Table 4: Granger causality

Regressor	Dependent variable	
	LNGDP	LNPCE
LNGDP	0.000	0.3295
LNPCE	0.0178**	0.000

Source: Author's compilation

*Notes: **meaning rejection of the null hypothesis at 5%.*

5. Conclusion

The study examined a causal relationship between primary commodities export and economic growth in Namibia within the vector auto-regression framework. The study used quarterly data for the period 1998 to 2014. Time-series econometric techniques such as unit root, cointegration and Granger causality test were used in this study. The results of the unit root test showed that both variables are integrated of order one. The results of the Johansen cointegration test revealed that there is no long-run relationship between primary commodities exports and economic growth in Namibia. The Granger causality test results showed primary commodities export Granger-cause economic growth but there is causality from economic growth to primary commodities export. In other words, primary commodities exports do help to predict economic growth. Thus, there is a unidirectional causal relationship running from primary commodities export to economic growth. The implication is that commodities such as mining and fishing products are non-renewable natural resources which might be depleted if not harvested sustainably. The same commodities also expose the country to falling commodity prices and highly volatile exchange rate risks. The same commodities are also vulnerable to price shocks.

It is recommended that the government should encourage investments into value addition to raw commodities before exports. This will not only compensate for the falling commodity prices but it will also create local employment. It is also recommended that more investments should be channelled through to the manufacturing sector in order to avoid overdependence on primary commodity exports. The government may consider granting more incentives specifically targeting firms interested in setting up as manufacturers. This should be encouraged through entrepreneurial programs. Implementation of trade facilitation,

investment, improved transport infrastructure and access to finance policies is necessary for economic transformation.

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