

-RESEARCH ARTICLE-

## THE EFFECT OF ECONOMIC GROWTH AND EXCHANGE RATE ON IMPORTS AND EXPORTS: THE SOUTH AFRICAN POST-2008 FINANCIAL CRISIS CASE

**Thomas Habanabakize**

North-West University

E-mail: 26767007@nwu.ac.za / tomhaban12@gmail.com

Orcid ID: Orcid.org 0000-0002-0909-7019

### —Abstract —

Imports and exports play a vital role in every country's economy. Both of these variables depend to a great extent either on the appreciation or depreciation of the country's currency. Imports, exports and exchange rate are some of main determinants of economic growth and are also affected by economic growth. This paper aims to determine the effect of exchange rate and economic growth on both exports and imports in the South African economy. To achieve this objective, a test for cointegration was carried out using the autoregressive distributed lag (ARDL) model. This model was applied on a time series quarterly data from 2008 to 2018. The error correction model and Granger Causality tests were performed to define the short-run and causal relationship amongst variables. The regression analyses reveals the existence of a long-run relationship within the estimated variables. In support of the economic literature, the study findings indicated that economic growth positively effects on both exports and imports. Nonetheless, the analysis depicted that in the long-run, Rand appreciation leads to more imports and fewer exports. Furthermore, the Granger Causality text suggested a bidirectional causality between the exchange rate and imports; between economic growth and imports, and between the exchange rate and economic growth. Succinctly, the used variables have a causal relationship with one another. Based on the findings, the study highlighted the pertinence of economic growth and emphasised the role played by the exchange rate in maintaining the balance between imports and exports. The study recommended that both currency value

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and economic growth should be given urgent attention in order to revive the deteriorating economy of South Africa.

**Key Words:** imports and exports, ARDL, GDP, exchange rate, South Africa

**JEL Classification:** B22, B23, B26, C2, C32, F43, F62a

## 1. INTRODUCTION

A country's export of goods and services is one of the major factors in social and economic development (Konya, 2006). Nonetheless, exports do not always contribute to economic growth. For instance, if the market competition becomes more than expected; if exported products are unpopular in the markets or the targeted country for export is experiencing instability, economic growth will have to decrease (Bakari & Mabrouki, 2017:68). On the other hand, more imports are generally regarded as a reflection of the country's weakness in achieving its needs. Unlike exports, imports lead to the exit of domestic currency and weakens the trade balance, resulting in low economic growth. However, in some cases, imports are considered as a source of economic growth, particularly if they comprise electronic and hardware equipment that assists in improving and increasing investment levels (Bakari & Mabrouki, 2017:68). Based on these mentioned and other reasons, imports and exports remain a contentious subject for their ability to impact on economic and social life.

Despite its economic fluctuations, South Africa is one of the most important economic countries on the African continent (Angelopulo, 2017). Between 2015 and 2017, South Africa was the top African country exporter of manufacturing products to the rest of the world (United Nation, 2019:11). South Africa was also ranked first in Africa's agricultural exports to the rest of the world. Not only does South Africa excel in exporting to the rest of the words, its share of exports within the African continent is also highly significant (United Nations, 2019). Besides the level of exports, South Africa is one of the countries that import some goods and services. Between 2015 and 2017, South Africa was one of the top African country importers of fuel, machinery and transport equipment (United Nations, 2019). During this period, the South African currency was fluctuating and one could ask if this Rand volatility was not the reason for high exports.

A number of studies were conducted to determine the effect of both exports and imports on economic growth. Most of these focussed on the relationship between exchange rates, imports and exports while others examined the link between economic growth, export and import levels. None of these examined how economic growth and exchange rates simultaneously influence import and export

levels. In other words, they broadly focused on one side of the equation. This paper aims to scrutinise how these two economic indicators (economic growth and exchange rate) impact on both exports and imports in the South African economy.

## **2. LITERATURE REVIEW**

### **2.1. Theoretical review**

#### **2.1.1. Economic growth, imports and exports**

Achieving sustainable economic growth is one of the major purposes of any country, because economic growth is fundamental to any form of development and societal wellbeing (Sulaiman & Saad, 2009). The Neo-classical theory argues that the country's level of exports and imports plays a significant role in determining economic social development (Vijayasri, 2013). The same theory argues that exports assist in determining the foreign exchange rate required by a country to import goods and services that are not domestically produced. Thus, beside the direct positive relationship that exists between exports and economic growth, exports growth creates and boosts investment opportunities and economic levels (Jordan & Eita, 2007).

#### **2.1.2. Exchange rates, imports and exports**

Sekkat and Varoudakis (2000) assert that countries that have promoted and enhanced their export levels, have also experienced depreciation in their currencies. This statement is in line with Standard Trade Theory, suggesting that a country's currency depreciation favours the country's export performance. The reason for this is that the depreciation of a country's currency makes domestic exports comparatively inexpensive to foreign buyers, as they switch their expenditure from their domestic goods and services to inexpensive imports (Appleyard, Field & Cobb, 2010). Despite the presence of numerous approaches that elucidate the effect of currency depreciation on export performances, only two approaches are considered in this paper. The first is the elasticity approach. This approach asserts that the responsiveness of quantities exported as a result of currency depreciation depends on the extent to which domestic goods and services are demanded by foreign buyers and also to the *elasticity* of domestic suppliers who export those goods or services. Demand elasticities refer to the quantity responsiveness of demanded goods and service to variations in price. Subsequently, if goods or services are price elastic, the quantity of demanded goods and services will increase more than the decline in relative prices. As a result, the total revenue from exports will increase in response to the rise of

demanded goods and services (Alemu & Jin-sang, 2014:65). The elasticity approach is, however, criticised for not taking into account the behaviour of other markets for goods and services. Kim (2009: 214) states that the elasticity approach disregards the effects currency depreciation on macroeconomic indicators ascending from price fluctuations and production changes.

The second approach is absorption approach. Under this approach, exports level is affected by currency devaluation in two ways. The first way is the cash balance effect, where the exchange rate depreciation results in a reduction of consumptions of goods and services within the domestic market (diminished absorption). Not only this effect causes the transfer of resources towards exports production but also increases the exportable quantity of goods and services (Alexander, 1952). Nonetheless, this effect works under the assumptions that money supply is intransigent, no capital mobility and money-holders prefer to keep real cash holdings as prices rise. The second way is the effect of idle resources. In this particular case, the devaluation of the country's currency increase exports of goods and services, if these exportable goods and services do not result in a general increase in these goods' price. Additionally, the quantity of goods and services to be exported will depend on the ability of foreign buyers to absorb that increased exports (Alexander, 1952).

## **2.2. Empirical literature review**

Following the argument that previous studies failed to determine the relationship between exports, imports and economic growth, Lin and Li (2001) re-examine the effect of international trade to the Chinese economic growth and the study results suggested uneven positive relationship between export and economic growth. Another study was conducted by Velampy and Achchuthan (2013) to analyse how imports and exports impact on Sri Lanka's economic growth. The study findings revealed the existence of a strong relationship between imports and exports and that both of these variables possess a significant effect on the Sri Lanka economic growth. Additionally, Hussain and Saaed (2014) scrutinised the nexus of economic growth, imports and exports in Saudi Arabia. The study found the presence of a long-run relationship among variables with the absence of causality among variables. Contrary to those studies that found a long-run relationship between import-export and economic growth, the study of Mehta (2015) analysed the relationship between imports, exports and economic growth in the India economy. The study outcome revealed the absence of a long-run relationship among variables. The granger causality test results indicated that

GDP causes exports and yet exports do not lead to economic growth. No causation was found between economic growth and imports.

On the other hand, there has been vast literature analysing the effect of exchange rate on export levels, mostly focussing on the responsiveness of exports towards exchange rate fluctuations. A large volume of literature made a comparison between short-run and long-run elasticities. This kind of analysis is significant since economic theory argues that in the absence of distortions or market failure within the economy, currency depreciation has no long-term effect on trade movement as it does not alter the relative price. However, in the short-run, the exchange rate fluctuation has a significant effect on prices and consequently causes changes in resource allocation between non-tradable and tradable goods and services (Auboin and Ruta, 2011:10). Nonetheless, Auboin and Ruta (2011) argue that in the presence of distortions or market failures, an under-valuation of the country's currency may have long-run effects on the total level of imports or exports.

Using the Vector Error Correction Model, Variance Decomposition and Impulse Response Function, Jarita (2008) investigated the influence of exchange rate fluctuations on the prices of imports and exports in Malaysia between 1999 and 2006. The study result indicated that variations of exchange significantly influence changes within import and export prices in the Malaysian trade. Contrary to Jaritas (2008) findings, a study of Moshen (2013) examined the impact of exchange rates on both import and export product prices. Results suggested that the exchange rate does not affect macroeconomic variables. Muhammad (2014) analysed the effect of exchange rate volatility on imports, and exports and, found that exchange rate depreciation positively affects exports levels.

Based on these contradicting findings from various studies, it is important to conduct a thorough analysis to determine what the South African case should be. The subsequent section focuses on the methodological framework followed by estimations and result discussion.

### **3. DATA AND METHODOLIGAL FRAMEWORK**

#### **3.1. Data and variables**

Time series data running from 2008Q1 to 2019Q1 was used to scrutinise the effect of both economic growth and the real exchange rate on the South African imports and exports. The time frame was chosen based on the availability of data, which was obtained from the South Africa Reserve Bank (SARB). In order to

uniformalise the used series, variables were transformed into a natural logarithm. Exports and imports were used as dependent variables, the economic growth and the exchange rate were considered as independent variables. Next section discusses the unit root test.

**3.2. Unit Root Test**

Various tests such as the Augmented Dicky (AD), the Augmented Dicky Fuller (ADF) and the Philip and Perron's test are used to detect a unit root within the series. In this study, the Augmented Dicky Fuller (ADF), is used for a unit root test.

Using the AR (1) model, the unit equation is expressed as follow:

$$X_t = \gamma X_{t-1} + e_t \dots\dots\dots (1)$$

Where  $e_t$  denotes white noise stochastic and  $|\gamma| < 1$  suggests a stationary condition

Broadly, three cases are possible:

- (i) When  $|\gamma| < 1$ : the series is stationary
- (ii) When  $|\gamma| > 1$ : the series is explosive
- (iii) When  $|\gamma| = 1$ : the series has a unit root, thus it is not stationary

In other words, if  $|\gamma| = 1$ , then by deducting  $X_{t-1}$  from both sides of equation (1), we will have:

$$X_t - X_{t-1} = X_{t-1} - X_{t-1} + e_t \dots\dots\dots (2)$$

$$\Delta X_t = e_t$$

Where  $\Delta X_t$  refers to a stationary series. In this case, if the series  $X_t$  is stationary at level, it is said to be integrated of order zero and it is written as I (0). However, if it is stationary after being taken to the first difference, it is said to be integrated of order one and written as I (1). As mentioned before, ADF is used in this study for the unit root test and order of integration verification.

**3.2.3. Augmented Dicky-Fuller (ADF) Test for Unit Roots**

The ADF test is preferable as it rectifies some errors from the DF test. To eliminate autocorrelation amongst residuals, it adds an extra lagged term of the dependent variable. In this study that extra term is determined by the Schwartz information Criterion (SIC). Although the AIC is the most prevalent and most used, the SIC is more desired for its strictness and rigorous features (Neath &

Cavanaugh, 1997:559). The Augmented Dicky-Fuller unit root test equation is expressed as follows:

$$\Delta X_t = X_{t-1} + \sum_{i=1}^p \beta_i X_{t-1} + \varepsilon_t \dots\dots\dots (3)$$

Where  $\Delta$  is the first difference operator,  $p$  is the lag operator,  $t$  is the time subscript and  $\varepsilon$  is the error term. Using the ADF tests, the following three options are possible:

(i) Without intercept and trend (none):  $\Delta X_t = \gamma X_{t-1} + \sum_{i=1}^p \beta_i \Delta X_{t-1} + \varepsilon_t \dots\dots (4)$

(ii) Without intercept:  $\Delta X_t = \alpha_0 + \gamma X_{t-1} + \sum_{i=1}^p \beta_i \Delta X_{t-1} + \varepsilon_t \dots\dots\dots (5)$

(iii) With intercept and trend:  $\Delta X_t = \alpha_0 + \beta t + \gamma X_{t-1} + \sum_{i=1}^p \beta_i \Delta X_{t-1} + \varepsilon_t \dots\dots (6)$

The null hypothesis ( $H_0$ ) for the ADF unit root test suggests that the series contains a unit root and the alternative suggests otherwise. The decision is made based on the ADF critical values and the T-statistics or P-values. If t-statistics > the ADF critical value, the null hypothesis is not rejected, meaning that the series contains a unit root. However, if t-statistics < the ADF critical value, the null hypothesis is rejected, meaning that the series has no unit root or is stationary.

#### 4. MODEL SPECIFICATION

This study investigates the relationship between the dependent (imports and exports) and independent (economic growth and exchange rate) variables using statistical and econometric techniques. Firstly, descriptive statistics are used to provide simple and meaningful data representation. Secondary, the unit root test is conducted to ensure the stationarity of variables and their order of integration. Thirdly, the autoregressive distributed lag (ARDL) model is employed to establish the short and long-run amongst variables. The Granger causality test is used to establish the causation amongst variables. Since the application of the ARDL model on variables that are stationary after second difference I (2) as argued by Ouattara (2004), the ADF unit root test preceded the application of ARDL to confirm that none of the variables is I (2). Given that the study consists of two independent variables (imports and exports), the following two ARDL models are analysed:

$$\Delta LIMP_t = \alpha_0 + \sum_{j=1}^k \beta_j \Delta LIMP_{t-j} + \sum_{j=1}^k \varphi_j \Delta LGDP_{t-j} + \sum_{j=1}^k \delta_j \Delta LEXCH_{t-j} + \gamma_1 LIMP_{t-1} + \gamma_2 LGDP_{t-1} + \gamma_3 LEXCH_{t-1} + u_t \dots\dots\dots (7)$$

$$\Delta LEXPO_t = \alpha_1 + \sum_{j=1}^k \beta_j \Delta LEXPO_{t-j} + \sum_{j=1}^k \varphi_j \Delta LGDP_{t-j} + \sum_{j=1}^k \delta_j \Delta LEXCH_{t-j} + \gamma_1 LEXPO_{t-1} + \gamma_2 LGDP_{t-1} + \gamma_3 LEXCH_{t-1} + u_t \dots\dots\dots (8)$$

Where  $\Delta LIMP_t$ ,  $\Delta LEXPO_t$ ,  $\Delta LGDP_t$  and  $\Delta LEXCH_t$  denote changes in the natural log of imports, exports, GDP and the exchange rate respectively. The  $\alpha_0$  and  $\alpha_1$  are both intercepts,  $k$  is the lag operator, while  $u_t$  denotes the white noise error term. Additionally,  $\beta_j$ ,  $\varphi_j$  and  $\delta_j$  determine the short-run model dynamism, whereas  $\gamma_1$ ,  $\gamma_2$  and  $\gamma_3$  are the long-run coefficients. The following are the formulated hypotheses to test for co-integration amongst variables:

- $H_0 : \gamma_1 = \gamma_2 = \gamma_3 = 0$  (for no co-integration)
- $H_1 : \gamma_1 \neq \gamma_2 \neq \gamma_3 \neq 0$  (for co-integration)

Using the bound test for co-integration, the calculated F-statistics is compared to the critical values from Pesaran, Shin and Smiths (2001) table. If the value of the calculated F-statistics is greater than the upper bound critical value, then the  $H_0$  is rejected in favour of the  $H_1$ , implying the presence of cointegration amongst variables. In contrast, if the tabulated critical value is greater than the calculated F-value, the  $H_0$  claim prevails and the conclusion is that variables do not cointegrate. Furthermore, if the value of the calculated F-value falls between the upper and lower bound critical values, the results are inconclusive (Dube and Zhou, 2013). The presence of cointegration amongst variables suggests the estimation of the error correction model (ECM). For the current study, ECM is expressed by the following equation:

$$\Delta LIMP_t = \alpha_0 + \sum_{j=1}^k \beta_j \Delta LIMP_{t-j} + \sum_{j=1}^k \varphi_j \Delta LGDP_{t-j} + \sum_{j=1}^k \delta_j \Delta LEXCH_{t-j} + \lambda ECT_{t-1} + u_t \dots\dots\dots (9)$$

$$\Delta LEXPO_t = \alpha_1 + \sum_{j=1}^k \beta_j \Delta LEXPO_{t-j} + \sum_{j=1}^k \varphi_j \Delta LGDP_{t-j} + \sum_{j=1}^k \delta_j \Delta LEXCH_{t-j} + \lambda ECT_{t-1} + u_t \dots\dots\dots (10)$$

Where the error correction term is denoted by  $ECT$  and the  $\lambda$  denotes the coefficient of error correction term. The subsequent section focuses on the empirical analysis and results discussion.



## 5. EMPIRICAL FINDINGS AND RESULTS DISCUSSION

### 5.1. Descriptive Statistics

Table 1 displays the descriptive statistics of the study variables. The mean for analysed variables is 13.65947 for LEXPO, 13.67699 for LIMP, 14.89166 for LGDP and 2.312210 LEXCH respectively. Looking at these means, LGDP recorded the highest. This suggests that the quarterly economic growth is of larger magnitude as compared to other variables. The quarterly magnitude of imports and exports are close to each other (13.67699 and 13.65947), whilst the exchange rate records the lowest. Considering the variability of variables from one quarter to the other, as elucidated by the standard deviation, the exchange rate and imports are considered to encounter high variations, while economic growth appears to face low fluctuations between 2008 and 2018. The skewness is the measure of the extent to which a variable is symmetrical around the mean and is expected to be zero or close to zero for a symmetric normal distribution. Except for the exchange rate, all variables under the study are negatively skewed. Thus, they portray a left tail and concentration of data points. In respect to the kurtosis, the benchmark value is 3 for a standard normal distributed variable. Except for imports, the rest of the variables have a kurtosis values less than 3, suggesting that these variables exhibit shorter and thinner peaks. Nonetheless, the import variable has a Kurtosis value of 3.350952 which is greater than 3. Thus, it has longer and fatter tails.

**Table 1: Descriptive Statistics summary**

	LEXPO	LIMP	LGDP	LEXCH
Mean	13.65947	13.67699	14.89166	2.312210
Std. Dev.	0.075056	0.110637	0.057614	0.262787
Skewness	-0.648382	-1.136983	-0.396099	0.063873
Kurtosis	2.708203	3.350952	1.709466	1.551162
Jarque-Bera	3.312644	9.926408	4.299478	3.966471

### 5.2. Unit Root Test

The current study employed the Augmented Dickey-Fuller (ADF) (1979) to test for unit root amongst variables. The unit root test results in Table 2 indicate that all variables are integrated of order one [I (1)]. Since none of is integrated of order two and the sample size is not enormous, the suitable model for cointegration is ARDL.

**Table 2: Unit root results of the ADF and KPSS stationarity test**

Variable	Model specification	ADF	
		Levels	1 <sup>st</sup> difference
GDP	Intercept	0.7423	0.0008*
	Intercept & trend	0.9484	0.0049*
EXCH	Intercept	0.8336	0.0000*
	Intercept & trend	0.6561	0.0003*
EXPO	Intercept	0.4476	0.0000*
	Intercept & trend	0.1503	0.0002*
IMPO	Intercept	0.7228	0.0000*
	Intercept & trend	0.4848	0.0001*

Note: \* rejection of null hypothesis at a 5% level of significance

Within the regression process, the optimum number of lags included in the model plays an important role. The number of optimum lags in this study was selected before the establishment of the ARDL models. Irrespective of the many criteria for lag selection, the Schwarz information criteria (SIC) was used due to its strictness. Thus, the ARDL (1, 1, 0) was selected for the imports model and the ARDL (1, 1, 2) was selected for the exports model. Table 3 displays the optimum lag for each model.

**Table 3: Lag length and the best ARDL model section**

Dependent variable	Selected model	Model criteria	Trend specification
Imports	ARDL (1, 1, 0)	SIC	Rest. constant
Exports	ARDL (1, 1, 2)	SIC	Rest. constant

### 5.3. Cointegration analysis

Having established the order of integration and best ARDL models, the subsequent step is to determine the cointegration amongst variables by applying an ARDL bounds test. Two models are applied. The first tests the cointegration between imports, economic growth and the exchange rate, while the second model analyses a cointegration between exports, economic growth and the exchange rate. The Bound test result in Table 4 suggests the presence of a long-run relationship between variables. The calculated F-statistics for both model, 10.01998 for the

import model and 6.805066 for the exports model, is greater than all upper bound critical values at a 5 percent level of significance. Thus, the null hypothesis of no cointegration is rejected. Consequently, a long-run relationship exists between the variables of interest. These are results are in line with many other studies (Lin of Li, 2001; Moshen, 2013; Muhammad, 2014; Velnampy and Achchuthan, 2013).

**Table 4: Bound tests for cointegration**

Model	Calculated F-value	Pearson et al. critical value at 5 % level	
		Lower bound	Upper bound
Imports: ARDL (1, 1, 0)	<b>10.01998</b>	3.1	3.87
Exports: ARDL (1, 1, 2)	<b>6.805066</b>	3.1	3.87

Following Equations 7 and 8, the long-run responsiveness of imports and exports towards changes within economic growth and the exchange rate was established. The subsequent two cointegration Equations (11 and 12) display the long-run coefficients obtained from regressing Equations 7 and 8.

$$\text{LIMPO} = -26.3694 - 0.2498 * \text{LEXCH} + 2.7275 * \text{LGDP} \dots\dots\dots (11)$$

$$\text{LEXPO} = 2.5747 + 0.1381 * \text{LEXCH} + 0.7203 * \text{LGDP} \dots\dots\dots (12)$$

These results suggest an inverse relationship between the exchange rate appreciation and the total imports of goods and services. Import levels decrease by 0.2498 percent as a response to a 1 percent increase in the exchange rate. Nonetheless, a positive relationship exists between economic growth and the import of goods and services. A 1 percent increase in economic growth leads to a 2.7275 percent increase in the total export of goods and services. On the other hand, both currency appreciation and economic growth stimulate and boost the level of domestic export of South African goods and services. A 1 percent increase in both exchange rate and economic growth results in 0.1381 and 0.7203 in exports of goods and services respectively. Similar to these findings, the study of Aliyu (2011) and Muhammad (2014) found that exchange rate appreciation expands import levels, while discouraging exports. On the other hand, they found that currency depreciation results in an increase in exports. Additionally, a positive relationship between imports and economic growth was also found in various other studies, such as those of Chandra and Love (2005); Hassan and Murtala, (2016); Rangasamy (2009); and Kumari and Malhotra (2015). Looking

at the results in both Equations 11 and 12, one can conclude that the South African import and export of goods and services are positively affected by economic growth. The more the South African economy improves, the large the number of imports required by South African consumers.

#### 5.4. Analysis of short-run relationships and the error correction model

In the presence of a long-run relationship amongst variables, it is necessary to investigate the property of the error correction model and the short-run relationship. The error term needs to be negative and significant to allow the model to fix any short-run shocks. Thus, using the negative and significant error term, one can determine how long it takes for the model to return to its long-run equilibrium. In the case of the current study, as suggested by the results in Table 5, the error term for both import and export models is negative and significant. While 0.442189 of shocks in the imports model are fixed each quarter, the quarterly adjustment in the export model is 0.468137. Thus, it takes approximately 2.26 quarters for the import model to reach its long-run equilibrium, it takes only about 2.14. As such, the speed of adjustment is high in the export model as compared to the import one. In terms of short-run relationships, both exports and imports are passively influenced by economic growth and currency appreciation. As seen for long-run relationships, economic growth remains the engine of changes within the export and import of goods and services.

**Table 5: Error correction model and short-run relationship**

	Variable	Coefficient	Std. Error	t-Stat.	Prob.
Model for Imports	D(LEXCH)	0.129351	0.055047	2.34981	0.023
	D(LGDP)	1.829386	0.544716	3.35842	0.001
	CointEq(-1)	-0.44218	0.072744	-6.0786	0.000
Model for Exports	D(LEXCH)	0.210552	0.058810	3.58023	0.001
	D(LGDP)	2.782235	0.633280	4.39337	0.000
	D(LGDP(-1))	1.480978	0.732583	2.02158	0.050
	CointEq(-1)	-0.46813	0.086208	-5.4303	0.000

#### 5.5. Causal relationship examination

The Granger causality test was used to determine the short-run causation. Findings, as represented in Table 6, suggest a bi-directional relationship. All p-values are significant. However, the causation potent of the exchange rate towards

the export of goods and services and one of the imports towards economic growth are both weak. They are significant only at a 10 percent level. Briefly, the short-run relationships in Table 5, are confirmed by Granger causality results exhibited in Table 6.

**Table 6: Causation analysis**

Null Hypothesis:	F-Stat	Prob.	Causation?	Direction
LEXCH does not Granger Cause LIMP	5.431	0.008	Yes, at 1%	↔
LIMP does not Granger Cause LEXCH	7.883	0.001	Yes, at 1%	
LGDP does not Granger Cause LIMP	9.343	0.000	Yes, at 1%	↔
LIMP does not Granger Cause LGDP	2.577	0.089	Yes, at 10%	
LEXPO does not Granger Cause LEXCH	7.634	0.001	Yes, at 1%	↔
LEXCH does not Granger Cause LEXPO	2.990	0.062	Yes, at 10%	
LEXPO does not Granger Cause LGDP	11.06	0.000	Yes, at 1%	↔
LGDP does not Granger Cause LEXPO	10.23	0.000	Yes, at 1%	

### 5.6. Residuals diagnostic tests

Four diagnostic tests, namely normality, serial correlation, heteroscedasticity and stability were conducted to verify both models' robustness. Results from these tests indicated that a set of the analysed series was normally distributed, uncorrelated and homoscedastic. Additionally, the stability test suggested that the model was stable.

## 6. CONCLUSIONS AND POLICY RECOMMENDATIONS

The study analysed and discussed the effect of economic growth and exchange rates on imports and exports in the South African economy. The reviewed literature provided a mixture of results. Some literature indicated that economic growth and exchange rates exert a positive effect on import and export levels, whilst others suggested an inverse relationship amongst these economic variables. Using the bound test for cointegration, this study found the existence of a long-run relationship between economic growth, exchange rates, imports and exports in South Africa. The study found also that, in the long-run, economic growth impacts more on imports than exports. This result suggests that South African products are highly expensive as compared to those from abroad and when the economy is at the booming stage, consumers prefer to import goods and services

than buying from domestic markets. It was also found that the weak exchange rate favours imports while boosting exports. The granger causality test suggested a bi-directional relationship between imports, exports, exchange rates and economic growth. This implies that, in the short-run, each of the analysed variables can assist in predicting changes in others.

Since improvement in economic growth favours the consumption of imports more, probably because the high price of domestic goods and services, government and policy-makers should find a way to subsidise local producers in order to lower the cost of production and thereafter the price for domestic goods and services. This level of subsidies would prevail when the economy is booming and when the currency is weakened. Meaning that during a booming economy, subsidies will encourage the consumption of domestic goods and services and during currency depreciation, subsidies will assist in producing more goods and services for exports.

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