AN ASSESSMENT OF THE RELATIONSHIP BETWEEN FOREIGN TRADE AND ECONOMIC PERFORMANCE: EMPIRICAL EVIDENCE FROM SOUTH AFRICA

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─Abstract ─
The driving objective of the study was to estimate the impact of foreign trade on economic performance using the economy of South Africa as a test site. The study contributes to the empirical literature by testing for a long-run relationship between foreign trade and economic performance in South Africa by employing quarterly data stretching from the period 1995Q1 to 2015Q4. The method of vector autoregression (VAR) was employed. Variables included in the study consisted of real GDP, exports, openness of the economy and exchange rate. The study found cointegrating relationships among the variables investigated**,** and that export was found to contribute more towards economic performance compared to openness of the economy and exchange rates. When it came to Granger-causality analysis, the study found a number of unidirectional relationships between the pairs of variables examined in the model. For example, it was found that economic growth granger causes exports and also openness of the economy granger causes exports. The forecast error variance decomposition suggests that economic performance itself accounted for most of the innovations that ensued during the 10-period forecast horizon employed in the analysis. Policymakers could utilize the results of this study, when it comes to policy formulation and design for the economy of South Africa. The findings of the research could be used to improve upon economic policy for South Africa and other developing countries on a similar path. The study creates opportunities for further research endeavours concerning the issue under investigation so as to unveil more evidence on the nature of the relationship between foreign trade and economic performance in the economy of South Africa.

Keywords: Foreign trade, economic performance, long-run, causality, vector autoregression, South Africa.

JEL Classification: C5, C13, C22, C51, E6, F00, O5.

1. INTRODUCTION

According to Sharer (1999), foreign trade and specifically exports appear to be engine of growth. Foreign trade has been for a number of years an important tool in economic growth processes, especially due to globalization (Ogbokor, 2002). Thirwall (2011) observed the economic growth of 133 countries from 1995 to 2006 and came to the conclusion that export performance was the single most important parameter for economic growth in individual countries. He also added that for effective trade to take place, efficient allocation of resources are required. Further trade will allow growth to be transferred across countries and regions.

According to Krueger (1998), growth in exports generally has a positive effect on countries growth, due to a boost in savings and investments. Increased efficiency within an economy could lead to an increase in trade and export and therefore it could be expected that economic growth is likely to lead to trade rather than trade leading to growth (Chow, 1987).

In terms of theory on international trade, as early as the 1700's, economists realized the importance of trade for economic development. Smith (1776) encouraged exports while discouraging imports as developed in his theory of absolute advantage. This concept states that regions should only produce and export goods that can be produced more effectively. A modern trade theory is the Heckscher-Ohlin trade theory which explains that comparative costs in trade is as a result of differences in the proportion in which nations are naturally endowed with factors of production (Enders and Lapan, 1987).

Another pertinent theory worthy of mentioning is the Porter's theory of competitive advantage theory that was developed in the 1990s. The theory identified quality of clusters of cooperating businesses as the competitive advantage of nations (Jones, et al, 1999). He identified four factors that defines the competitive advantage of a nation within the international trade context namely factor endowments, local and foreign demand conditions, firm level structure and rivalry, and lastly the quality of related and supporting industries (Combes, et al, 2005).

The South Africa economic has been in a down-turn phase during the last few years. Major macroeconomic indicators have been experiencing negative growth rates and

in particular its gross domestic product and manufacturing output. Unemployment is consistently on the increase and currently it is above 26% (StatsSA, 2017). Linked to these negative indicators are relatively high levels of inflation, which is currently below 5%, as well as the interest rates (repo rate) that has maintained a rather high single digit figure of approximately 6.75% (SARB, 2017). The research has the primary objective of determining the relationship between economic growth and foreign trade in South Africa from 1995 to 2015. The econometric analysis employs variables such as real GDP, export, openness of the economy and exchange rates. The rest of the article comprises of an analysis of empirical literature, a time series analysis using the Johansen cointegration VAR method, a comparison of results with previous empirical results, as well as conclusions and recommendations.

2. EMPIRICAL LITERATURE

One of the oldest discussions in the literature concerns the relationship between foreign trade and economic growth. Such discussions are even gaining more attention nowadays, especially in the face of increasing trade among the nations of the world. In this section, an attempt is made to review past empirical studies on the relationship between foreign trade and economic growth in a selective and chronological fashion.

Papanek (1973) probed into the impact of foreign capital on economic growth. The study confirmed the existence of a positive relationship between economic growth and domestic savings. Moreover, the study observed that both foreign aid and foreign private investment positively influenced economic growth. However, the explanatory variables used in the model were only able to account for approximately 37 percent of the systematic variation in economic growth, suggesting that the explanatory power of the model is weak. Contributing to the empirical literature, Gupta (1975) using the two stage least squares (2SLS) method and cross-sectional data assessed the impact of foreign capital inflows on economic growth for forty selected developing countries. He found a direct connection between the growth rate of gross domestic product (GDP) and all forms of foreign capital inflows. He also found that gross domestic savings rate positively influenced the growth rate of GDP. The reduced form coefficient indicated that the structural equations exaggerated the impact of the explanatory variables on growth rate of GDP. However, in both estimations, the coefficients of the explanatory variables maintained the expected a priori signs.

Balassa (1978) in applying the production function framework, analysed the relationship between exports and economic growth for eleven selected Less

Developed Countries (LDCs). He made use of three ratios, namely, growth of exports versus growth of output; growth of exports versus growth of output in net export; as well as, the average ratio of exports to output versus growth of output. Annual macroeconomic data for the period stretching from 1960 to 1973 was also used for this study. The result indicated that export expansion affects economic growth rates in a positive way. Moreover, this study provides evidence to further strengthen export-led industrialisation strategies as against import-substitution industrialisation strategies. Tyler (1981) examined the relationship between export expansion and economic growth for fifty five selected middle income developing countries for the period covering 1960 to 1977. He expanded upon the work of (Balassa, 1978) by employing a bivariate model to test the degree of association between GDP growth and selected economic variables, including the growth of manufacturing output, manufacturing export, total export, and investment. Tyler's results demonstrate that a higher growth rate of exports is associated with a higher growth rate of GDP. Indeed, the study also found that countries with a faster economic growth rate are expected to simultaneously experience greater manufacturing exports expansion.

Jung and Marshall (1985) applied Granger-causality test procedures to investigate the relationship between export growth and economic performance. They found that export-led growth was supported in four of the thirty seven countries studied. These four countries are Indonesia, Egypt, Costa Rica and Ecuador. Besides, the results obtained from Iran, Kenya and Thailand supported the growth-led export hypothesis, while Greece and Israel supported the growth reducing exports hypothesis. Likewise, countries with rapid growth rate, namely, South Korea, Taiwan and Brazil provided no statistical evidence to support the export-led growth hypothesis. Also, contributing to the empirical literature on trade and economic growth, Afxentiou and Serletis (1991) assessed the relevance of the export-led growth hypothesis in the context of sixteen selected industrial countries, using cointegration, error correction and causality test procedures. They found that bidirectional causality is supported in the United States of America and Norway, while growth-led export was evident in Canada and Japan. The remaining twelve countries results did neither support export-led or growth-led hypothesis.

In similar way, Love (1994) also used a combination of granger causality techniques and Akaike's Final Prediction Error to test the export-led growth hypothesis for a number of selected countries, and found a rather weak support for the export-led growth hypothesis for the countries that were studied. Fountas, (2000) tested the export-led growth hypothesis for Ireland, using two different sets of time series

macroeconomic data. First, he used annual data from 1950 to 1990 and, thereafter, monthly data from 1981 to 1994. While the data for the period, 1981 to 1994 supported the existence of long-run relationships among the variables investigated, those for the period 1950 to 1990 proved otherwise.

On China, Al Mamun and Nath (2005) assessed the export-led growth hypothesis using Bangladesh as a test centre. The researcher made use of quarterly time series data for the period, 1996 to 2003. The study found evidence of a long-run relationship between exports and industrial output over the period covered by the study. The authors also found that exports granger-cause industrial output. Also in China, Lui *et al*., (2010) tested the relationship between growth and exports and found a long-run relationship between the variables with bi-directional causality. This result indicates the importance of an open door policy regarding trade. Cui and Shen (2011) estimated international trade in financial services and economic growth connection in China through the use of cointegration procedures. The results suggests a long-run equilibrium relationship between the two modes of financial service trade, and that both of them, indeed, improved the economic growth of China during the period under examination. Manni *et al*., (2012), investigated the relationship between trade and growth in Bangladesh from 1980 to 2010. A basic OLS method was used in the analysis. The study found that growth increased with improved trade liberalisation and openness of the economy resulted in increased exports.

Mina (2011), analysed the impact of Africa's trade with China from 1995 to 2008 and found that exports did benefit most African countries. In Nigeria, in a study by Kehinde *et al*., which tested the relationship between trade and growth from 1970 to 2010 also found a positive relationship between the two variables. Arodoye and Iyoha (2014) econometrically assessed the relationship between foreign trade and economic growth in Nigeria by employing quarterly time series datasets for the period 1981 to 2010. A vector autoregressive model was used, in order, to account for feedbacks. The result of the study confirms a stable, long-run connection between foreign trade and economic growth. The result also confirms that the principal sources of Nigeria's economic growth variation are largely propelled by foreign trade innovations and "own shocks". The study, therefore, considers the adoption of trade as a potent policy instrument for catalyzing the process of economic growth in Nigeria. The technical procedures used by the authors of this study are highly penetrating, and therefore, commendable.

The empirical studies so far reviewed points to differences in findings regarding the relationship between foreign direct investment and economic performance in various countries across the globe. Moreover, a number of econometric techniques, economic parameters, models and macroeconomic datasets have been utilized by various researchers so as to determine the nature of the relationship between foreign direct investment and economic performance. Despite these previous inquiries, the exact nature of the relationship remains unsettled. The study contributes to the empirical literature by investigating this relationship using South Africa as a test hub.

3. ECONOMETRIC APPROACH AND DATA

In this study, the VAR approach is used. In particular, this study adapted the VAR procedure employed by Arodoye and Iyoha (2014). The use of VAR technique gained popularity due to its ability to investigate the inter-relationships among non-stationary time-series variables (Sims, (1986). This process has been successfully used in situations involving developed countries and emerging markets. This justifies the use of a similar approach in this study. VAR is a system of dynamic linear equations where all the variables in the system are treated as endogenous. The reduced form of the system gives one equation for each variable, which specifies that variable as a function of the lagged values of its own and all other variables in the system (Gujarati, 2004). In general, a VAR model describes the evolution of a set of *k* variables (endogenous variables) over the same sample period (t = 1, …,T) as a linear function of their past evolution. The variables are collected in a k x 1 vector y_t, which it has as the i^{th} element $y_{i,t}$ the time t observation of variable y_i.
Let $Y_t = (y_{1t}, y_{2t}, \ldots y_{nt})'$ denotes an *(n* x *1)* vector of time series variables. A reduced form ρ – lag vector autoregressive (VAR(ρ)) model has the form;

$$Y_t = c + \Phi_1 Y_{t-1} + \Phi_2 Y_{t-2} + \ldots + \Phi_\rho Y_{t-\rho} + \varepsilon_t \qquad (3.1)$$

Where there is a vector of endogenous variables, c is k x 1 vector of constants (intercept), Φ_i are (*k* x *k*) coefficient matrices (for every i=1,…,p) and ε_t is an (*k* x *1*) vector of error terms satisfying the following conditions;

$E(e_t) = 0$ – error term has mean zero

$E(e_t e_t') = \Omega$ – the contemporaneous covariance matrix of error terms is Ω (n x n positive definite matrix) and

$E(e_t e'_{t-k}) = 0$ for any non-zero k – there is no correlation across time; i.e. no serial correlation in individual error terms.

Therefore, the vector Y_t is defined using an unrestricted vector auto-regression (VAR):

$$z_t = A_1 z_{t-1} + ... + A_k z_{t-k} + \mu_t \quad (3.2)$$

where; z_t is $(n \times 1)$ vector of variables; A_t is an $(n \times n)$ matrix of parameters, u_t denotes residuals or $(n \times 1)$ vector of innovations. The vector, z_t, consists of (n) potentially endogenous variables. Each variable in the model is regressed on both its lagged values and the lagged values of other variables in the system. From the literature, the following variables has been identified; real gross domestic product (RGDP), exports (XPORT), openness (OP) and exchange rate (EXCR) for purposes of the study. Real gross domestic product (RGDP) implies the total amount of goods and services produced in a year divided by the population index and adjusted for price disturbances. Exports (XPORT) refers to the total amount of goods from a particular country to the rest of the world expressed in monetary terms, and also adjusted for price changes. Openness (OP) is measured as exports plus imports divided by gross domestic product (GDP). Indeed, the higher the openness index the larger the influence of trade on domestic activities, and correspondingly the stronger that country's economy is considered to be. Exchange rate (EXCR) refers to the price, strength or value of a country's currency in relation to that of another country's currency. In this study, the exchange rate of the South African Rand in relation to the United States Dollar over time was used, since the United States Dollar is generally considered as the language of international commerce.

VAR models came to the fore as they were first introduced by Sims (1980) as an alternative to traditional large-scale dynamic simultaneous equation models. The prominence of this approach is its ability to model all endogenous variables jointly as opposed to one equation at a time. Indeed, there is voluminous literature on the specification and estimation of the various forms of VAR models. One of such forms is the reduced-form VAR time series model, which can be estimated by ordinary least squares. However, Sims (1980) stressed that the estimations of the reduced form of VAR cannot be used to draw and make inferences about long-run relationships. Hence, a reasonable economic interpretation from the estimated reduced form of VAR becomes credible only when exploiting the long-term

structural disturbances that respond to typical random shocks after transforming the residuals to an orthogonal form. Further, in order to capture the long-term information, the VAR model can be reformulated into a Vector Error Correction model (VECM) form in the following way:

$$\Delta z_t = \Gamma_1 \Delta z_{t-1} + ... + \Gamma_{k-1} \Delta z_{t-k+1} + \Pi z_{t-k} + \mu_t \quad (3.3)$$

Johansen (1991) states that the estimates of Γ_i and Π describes the short-run and long-run adjustment to changes in z_t, respectively. The vector Π denotes a matrix of long-run coefficients, defined as a multiple of two *(n* x *r)* vectors, (α) and (β); and they, indeed, signify the speed of adjustment to equilibrium, and a matrix of long-run coefficients, respectively.

VAR practitioners and advocates argue that these models can reveal the important dynamic characteristics of the economy without imposing structural restrictions from a particular economic theory. In essence the unrestricted VAR separates the residuals into orthogonal shocks by calculating a Cholesky decomposition of the covariance matrix for the residuals. This statistical decomposition depends on the succession in which the variables are ordered. The use of the Cholesky decomposition imposes a restriction on the ordering of the variables in the VAR. This has led to criticism that the results sensitive to VAR orderings are difficult to interpret, especially, if a recursive economic structure is implausible (Keating, 1992). Therefore, in addressing the problem of ordering, practitioners introduced the generalized impulse response functions (GIRF) as an alternate tool to the traditional Cholesky impulse response and variance decomposition as evidenced in Koop, Pesaran and Potter (1996) as well as Pesaran and Shin (1998). Koop (2000) maintained that the generalised impulse response function (GIRF) can be applied to both the linear and the nonlinear multivariate models. In this study, the terms economic growth and economic performance are used in an interchangeable fashion.

The study utilised secondary datasets. More elaborately, the study uses macro-economic time-series quarterly data-set for the period 1995 to 2015. The explanatory variables used in this study are exports, foreign direct investment and exchange rate, while real gross domestic product serves as the dependent variable. The macroeconomic dataset used in this study are sourced from the South African Reserve Bank (SARB) database.

4. RESULTS AND DISCUSSION

The discussion of results are presented in the following sequence: Correlation analysis, Unit root tests, cointegration tests, estimation of the long-run equation, diagnostic checks for autocorrelation, heteroscedasticity and normality, causality tests, as well as, the forecast error variance decomposition analysis.

Table 1: Correlation analysis

Variables	RGDP	Export	Openness of economy	Exchange rate
RGDP	1.0000			

Export	0.9457	1.000000		
	[26.3502]	-----		
	(0.0000)	-----		
Openness of the economy	0.6681	0.8259	1.000000	
	[8.1327]	13.2662	-----	
	(0.0000)	0.0000	-----	
Exchange rate (R/$)	0.7220	0.7620	0.4321	1.000000
	[9.4507]	[10.6578]	[4.3398]	-----
	(0.0000)	(0.0000)	(0.0000)	-----

Note: ( ) indicates the p-value and [ ] indicates the t value.

Table 1 is a correlation coefficient matrix involving the following variables: Real gross domestic product, exports, openness and exchange rate. Furthermore, the Pearson product moment values computed are positive for all the variables under consideration. This indicates that there is a positive relationship amongst the four variables under discussion. With a correlation coefficient value of 0.945, export and real gross domestic product exhibited the strongest positive relationship between themselves. The results so far implies that an increase in exports, ceteris paribus, is expected to lead to a jump in real gross domestic product and vice versa. Moreover, the coefficients of the four variables were consistently found to be statistically significant at the 5 percent level.

The next step in the analysis of the relationship amongst the selected variables is the unit root test. The study employed the augmented Dickey-Fuller (ADF) procedures for this purpose. Table 2 summarises the unit root test results.

Table 2: Unit root tests: Augmented Dickey-Fuller (ADF) in Levels and First Difference

Variables	Levels	First Difference	Remarks
	ADF stat	ADF stat	
Ln(Real GDP)(RGDP)	-1.216422	-4.5763656**	I (1)
Ln(Exports)(XPORT)	-1.3702123	-12.41939**	I (1)
Ln(Openness)(OP)	-0.552745	-8.026821**	I (1)
Ln(Exchange rate)(EXCR)	-6.158060**	-7.623741**	I (1)

Note that ** implies rejection of the null hypothesis at the 5 percent level.
Source: Author's compilation.

Upon inspection of Table 2, it was observed that the four variables under consideration namely RGDP, XPORT, OP and EXCR only became stationary after first differencing I(1). Subsequently, the study tested for the possibility of long-term relationships among the variables under examination. That is, the existence of a long-run equilibrium to which an economic system converges over time. In this regard, the study made use of the Johansen cointegration test. Table 3 displays the cointegration test results.

It is apparent from the results reported in Table 3 that the variables under investigation are cointegrated with both tests indicating significance at the 5% level.

Table 3: Johansen cointegration test results

Maximum Eigen test				Trace test			
H_0: rank = r	H_a: rank =	Statistic	95% Critical Value	H_0: rank = r	H_a: rank =	Statistic	95% Critical Value
r = 0	r =1	34.53739	24.1590	r = 0	r =1	53.89775	40.17493
r <=1	r =2	15.44318	17.79730	r <=1	r =2	19.36036	24.27596
r <=2	r =3	3.828207	11.22480	r <=2	r =3	3.917178	12.32090
r <=3	r =4	0.088971	4.129906	r <=3	r =4	0.088971	4.129906

Note: Both Maximum-Eigen test and Trace test shows one co-integrating equation at the 5 percent level. Source: Author's construct

The cointegration test result provides justification for the estimation of a long-run equation that yielded the following:

$$\Delta InRGDP = 8.38399 + 1.124\Delta XPORT + 0.352\Delta OP - 0.093\Delta EXCR \ldots\ldots\ldots\ldots\ldots (1)$$

The equation (1) confirms a long-run relationship among the dependent and independent variables used in the study. Indeed, all the independent variables except exchange rate were positively related to real GDP. A further scrutiny of the estimated model suggests that a 1 percent increase in exports leads to approximately 1.12 percent rise in real GDP, while a 1 percent increase in openness of the economy is also expected to lead to approximately 0.35 percent jump in real GDP. Similarly, a 1 percent increase in the exchange rate only has a slight negative effect on real GDP of 0.093%. The findings are similar to recent findings by authors such as Lui *et al*., (2010), Cui and Shen (2011), Manni *et al*., (2012), Mina (2011), Kehinde *et al*., (2012) and Arodoye and Iyoha (2014).

The study also conducted a diagnostic test to check for serial correlation, heteroscedasticity, as well as the normality of the model. The results confirm the absence of serial correlation and conditional heteroscedasticity. Besides, the model was also found to be normally distributed. The results are reported in Table 4.

Table 4: Diagnostic checks

Test	Null hypotheses	t-statistic	Probability
Durbin-Watson stat	No serial correlation	1.9845	0.1402
Jarque-Bera (JB)	There is normality	2.0499	0.4748
White (Chi-square)	No condition heteroscedasticity	1.9062	0.1183

Source: Author's construct.

Thereafter, the study reports on the Granger-causality tests. The Granger-causality results are displayed in Table 5. The pairwise Ganger-causality test results suggest a unidirectional relationship running from openness to exports, real GDP to exports, openness to exchange rates; and real GDP to openness. Afterwards, the study reports on forecast error variance decompositions.

Table 5: Pairwise Granger-causality test results

Null Hypothesis:	Obs	F-Stat	Prob.
Export does not Granger Cause RGDP	82	1.8469	0.1646
RGDP does not Granger Cause Export		**15.4994**	**2.E-06****
Openness of the economy does not Granger Cause RGDP	82	1.2797	0.2840
RGDP does not Granger Cause Openness of the economy		**10.6229**	**8.E-05****
Exchange rate does not Granger Cause RGDP	82	1.2364	0.2961
RGDP does not Granger Cause Exchange rate		0.8362	0.4372
Openness of the economy does not Granger Cause Export	**82**	**3.3755**	**0.0393****
Export does not Granger Cause Openness of the economy		1.3325	0.2698
Exchange rate does not Granger Cause Export	82	0.0553	0.9462
Export does not Granger Cause Exchange rate		2.5648	0.0835
Exchange rate does not Granger Cause Openness of the economy	82	0.2834	0.7540
Openness of the economy does not Granger Cause Exchange rate		**3.1368**	**0.0490****

Note: ** means the rejection of the null hypothesis at the 5 percent level.
Source: Author's computation.

The variance decomposition results are displayed in Table 6. The table presents forecast error variance decompositions for each variable in the model over a 10-period forecast horizon. The results depict that consistently real GDP itself accounts for most of the changes or innovations that occurred with respect to real GDP for the forecast horizon under consideration. Indeed, the results show that in the first period the fluctuations in real GDP are 100 percent explained by real GDP itself. It was also found that amongst the three explanatory variables used in the model, openness of the economy consistently contributes more towards innovations in real GDP during the forecast horizon compared to export and exchange rates.

Table 6: Forecast error variance decomposition

Period	Ln(Real GDP)	Ln(Exports)	Ln(Openness)	Ln(Exchange)
1	100.0000	0.0000	0.0000	0.0000
2	96.7449	0.4760	2.1813	0.5977
3	95.9093	0.3591	2.7168	1.0146
4	95.0817	0.2814	3.3335	1.3032
5	94.5507	0.2017	3.7494	1.4981
6	94.1154	0.1432	4.1049	1.6362
7	93.7667	0.1028	4.3929	1.7373
8	93.4699	0.0776	4.6385	1.8138
9	93.2145	0.0641	4.8480	1.8732
10	92.9904	0.0593	5.0296	1.9206

Source: Author's construct.

5. CONCLUSION AND POLICY IMPLICATIONS

The study probed into the impact of foreign trade on economic performance using econometric time series procedures. South Africa was used as a test hub. Quarterly macroeconomic data stretching from 1995 to 2015 was employed for purposes of estimating the model used in the study. The findings of the study are quite fascinating. The study found convincing reasons to suggest that foreign trade will remain one of the key propellers of economic growth in South Africa for a long time to come. Indeed, the studies of (Love 1994; Al-Mamun and Nath 2005; Arodoye and Iyoha 2014) further give credence to the results of the study under consideration.

Therefore, from as policy standpoint the need for South Africa to pay special attention to developments in its export sector cannot be overstated. Indeed, policies that will assist South Africa in improving upon the competitiveness of its exports in its domestic, regional and international markets cannot be emphasised. Moreover, the need for South Africa to mobilise more resources for purposes of investing on infrastructures that will enable the country to unleash its full export potentials should be given a practical expression. Likewise, creating an incentive-package to specifically encourage production for exports should be considered as a matter of importance. Furthermore, South Africa as the Southern African Development Community (SADC) industrial giant should further explore ways of maximising its benefits from this economic market, while correspondingly putting measures in

place to ensure that stronger industrialised countries do not use its economy as a dumping ground.

The authors of this study would like to suggest the need for more research to be undertaken regarding the issue under consideration so as to unveil more empirical facts about the exact nature of the relationship between foreign trade and economic growth in South Africa, as well as the other countries in SADC.

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