Research article

Examining the external-factors-led growth hypothesis for the South African economy

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ABSTRACT

Reducing unemployment rate and achieving a sustainable economic growth underscore the Sustainable Development Goal 8. Our study investigates a new model that specifies the external-factors-led growth hypothesis for the South African economy. The independent variables include trade openness, external debt, FDI and exchange rate against GDP as the targeted variable. The ARDL approach was adopted after achieving a mixed order of integration from the stationarity test using traditional unit root tests. All external factors were found to exert a positive influence on economic expansion. Trade openness and exchange rate specifically, exert significant influence on economic growth, which means that an improvement in these factors will proportionately favour economic expansion. In essence, a 1% improvement in trade openness and exchange rate will generate an equivalent of 0.30% and 0.19% increase in GDP in the long-run. On average, trade openness, exchange rate and external loan are beneficial to the economy of South Africa. Thus, recommend the need for the authority concern to open more line of bilateral trade to enable the economy to fully tap from the benefits accrued from indulging in economic openness.

1. Introduction

Traditionally, it is believed that economic openness aids in transporting growth from one region of high concentration to the lower level. This occurs in the form of advance technology transfer and human capital development to complement the local form to generate the desired economic expansion. Rani and Kumar (2019) investigated the trade-induced nexus and submit that economic openness generates high productivity, which in turn transcend to economic advancement in the BRICS economies as supported by Rahman and Mamun (2016) for Australia. Similarly, the modernization theory asserts that developing economies achieve greater transformation from traditional society to the modern and civilize form by trading with the developed nations. In contrast, the dependency theory pioneered by Prebisch (1960) resist the basis upon which the modernization theory was formed and argues that trade openness brews cheating and economic disadvantage on the path of

developing countries, as supported by previous empirical studies (See Maune 2019; Morrissey and Mold, 2006; Ogujiuba and Omoju, 2013).

Similarly, FDI inflow is presumed by certain quotas to be an agent for economic transformation, while others criticized its potency. For instance, Sunde (2017) investigated the interaction between FDI inflow and economic expansion in South Africa and found that the former is a contributing factor to the later. Joshua (2019) submits that FDI inflow is beneficial to the economy of Nigeria especially in the long run. In a related study, Joshua et al. (2020a,b) adopted the TY causality test and found that FDI inflow is a driver of economic expansion for South Africa similar to the submission of Joshua et al. (2020a). However, Khobai et al. (2017) and Zandile and Phiri (2019), question the efficacy of FDI inflow in South Africa and Burkina Faso respectively.

External borrowing to augment domestic savings have been viewed traditionally as a promoter of economic advancement, while others prefer the efficient use of domestic resources to tackle economic distress. For instance, Sulaiman and Azeez (2012) investigated the link between

external debt and economics expansion in Nigeria and found that external debt promotes the course of economic progress as supported by the work of Fosu (1996) in Sub-Saharan Africa. On the other hand, contrary empirical investigations reported that external debt poses a threat to economic advancement. For instance, Umaru et al. (2013) adopted OLS to investigate the interaction between external debt and economic growth in Nigeria. The findings revealed that external debt hampers economic development in Nigeria.

Therefore, the uncertain impact of external factors on economic expansion perfectly describes the case of the South African economy (see Sunde, 2017; Matlanyane and Harmse, 2002; Thurlow, 2007). Additionally, Matlanyane and Harmse (2002) investigated the revenue implication of trade liberalization in South Africa and found that the trade openness exhibits significant influence on custom revenue which indicate a positive contribution to economic expansion. Jonsson and Subramanian (2001) admit that trade openness contributes to economic expansion in South Africa through its spillover effect on total factor productivity. Mabugu and Chitiga-Mabugu (2007) found that trade liberalization promotes the course of economic acceleration as supported by Mabugu and Chitiga-Mabugu (2007). Thurlow (2007) investigated the effect of trade liberalization in South Africa. The revelation shows that openness is harmful to economic expansion by significantly widening the inequality gap in the country.

South Africa is one of the fastest-growing economies in Africa which is very open to the rest of the world for mutual interaction, yet the country has not attained the desired growth at least at the threshold level. This initiates questions that require research analysis. Given this, the following questions inform the undertaking of this study: First, does the level of economic openness of South Africa not beneficial to the nation? Second, is the economy not so open enough to harvest the benefits accrued to openness? Third, has external capital flowing to the country failed to produce the desired result? Thus, the model of this study incorporates only external factors as the independent variables against economic expansion as the dependent as well as the targeted variable. As a contribution to the extant literature, this investigation for the first time in South Africa will assess the strength of the domestic economy by controlling for external factors. The highly liberalized and openness of South Africa to the rest of the world for economic interaction and gain justify its selection as a case study.

The rest of the study includes a presentation of the theoretical framework, empirical evidence and interpretation of the results, and finalized with concluding remarks.

2. Relevant theories of trade openness and empirical evidence

Globalization is viewed as an agent that assists in transporting growth from one nation to another. This presumption is supported by some empirical evidence (Joshua et al., 2020a,b) and Batuo et al. (2018), while others contend with its reality especially when the interaction involved emerging and developed countries. Similarly, there are existing theories that support this claim while others oppose it. For instance, the modernization theory opines that trade openness provides an opportunity for developing economies to be transformed from a pre-modern stage to modern and civilize stage through openness and trading with developed economies. This theory originated from the idea of Max Weber (1864–1920) which was later developed by Talcott Parsons (1902–1979). This suggests that trade openness is advantageous to emerging economies since it serves as a medium of transporting growth from the areas of high concentration to lower concentration. Similarly, Ricardo (1817) one of the early economists hypothesized the comparative cost advantage in favour of trade openness. The theory submits that an economy should specialize in the production and exportation of commodities with lower opportunity cost and import commodities with comparatively higher opportunity cost. The Heckscher-Ohlin model (1933) also supports the idea of trade openness. The theory focused on the factor endowment differences among the economies of the world

which serves as the basis for trade openness. Thus, a country with capital intensive factors should specialize in the production and exportation of capital-intensive products as applicable to the labour-intensive economy.

Supporting this claim are studies such as Joshua et al. (2020a,b); Hassouneh (2019); Tang et al. (2019). Joshua et al. (2020a,b) examined the relationship between trade openness and economic expansion in Nigeria using the ARDL method. The result validates the trade-induced expansion hypothesis. Similarly, Hassouneh (2019) confirmed the said hypothesis in Palestine and further found evidence of co-movement between the series through Johansson cointegration. A mutual link between export, import and economic expansion was also discovered through the causality test. The trade-induced growth hypothesis was validated for the Mauritius economy (Tang et al., 2019). Maune (2019) found a weak but positive influence of trade openness on economic expansion. Alsamara et al. (2019) examined the case of Turkey accordingly and found that the combined effect of financial development and trade openness spur economic expansion, aligning with the submission of Olaifa et al. (2013); and Brueckner & Lederman (2012).

Rani and Kumar (2019) adopted the ARDL method for panel data to investigate the said hypothesis. The study confirmed the evidence of long-run co-movement between the variables. A unidirectional causal effect from openness to economic advancement was found for Brazil and India as well as a bidirectional link between economic acceleration and trade openness in China and causality from economic expansion to openness for South Africa. The overall results validated the trade-induced growth hypothesis reported in existing literature (See Kalu et al., 2016; Manni and Afzal. 2012). A similar study was carried out for Zimbabwe (Maturure, 2019) which aligns with Olubiyi (2014). The results from the ARDL estimation method validated the trade-led growth hypothesis in the long run, corroborating other studies (See Rahman and Mamun, 2016; Jadoon et al., 2015; Azharuddin and Paramanik, 2014). Kalu et al. (2016) submit that trade openness is an agent of economic transformation achievable in distance future through economies of scale as a result of specialization, supporting the work of Manni and Afzal (2012) Hozouri (2017). Keho (2017) validated the trade-led growth nexus for Cote D'Ivoire for the period 1965–2014, supported by Hozouri (2017); Umer (2014); and Afaha & Njogo (2012).

Equally, the FDI-induced growth hypothesis lacks consensus in the existing literature. For example, Joshua (2019) validated the FDI-induced growth hypothesis in Nigeria similar to Gungor and Ringim (2017), Gungor and Katircioglu (2010), Gungor et al. (2014) and Khobai et al. (2017). These studies argued that FDI serves as a driving force for economic expansion in their respective areas of studies. Kalai and Zghidi (2019) and Sokhanvar (2019) revealed that FDI inflow promotes the course of economic acceleration by complementing domestic investment, supporting the FDI-induce nexus. Sarkodie and Strezov (2019) and Pradhan et al. (2019) submit that FDI inflow drives economic advancement through its spillover effect in the form of superior technology transfer. Sunde (2017) and Tshepo (2014) carried out separate studies on the subject matter and found that FDI inflow is a driving force behind the economic expansion, similar to the work of Abdouli and Hammami (2017), Pandya and Sisombat (2017), Almfraji and Almsafir (2014), Omri and Kahoulib (2013), Shahbaz and Rahman (2012).

Contrary to this, the dependency theory by Prebisch (1950) opines that economic activities in developed countries are the basis for the underdevelopment of developing economies. The theory maintained that globalization championed by the developed economies does not necessarily transcend to economic growth in developing countries as claimed by the modernization theorists. Thus, the theory suggested that nations should seek for solution inward by making efficient utilization of domestic resources rather than looking outwards which normally compound the economic problems. Empirically, Khobai et al. (2017) investigated the dependency hypothesis for Ghana and Nigeria. The findings revealed that trade openness is detrimental to the Nigeria economy as supported by Ogujiuba and Omoju (2013) and Vamvakidis (2002). Thus, the study recommended an inward approach to resolving
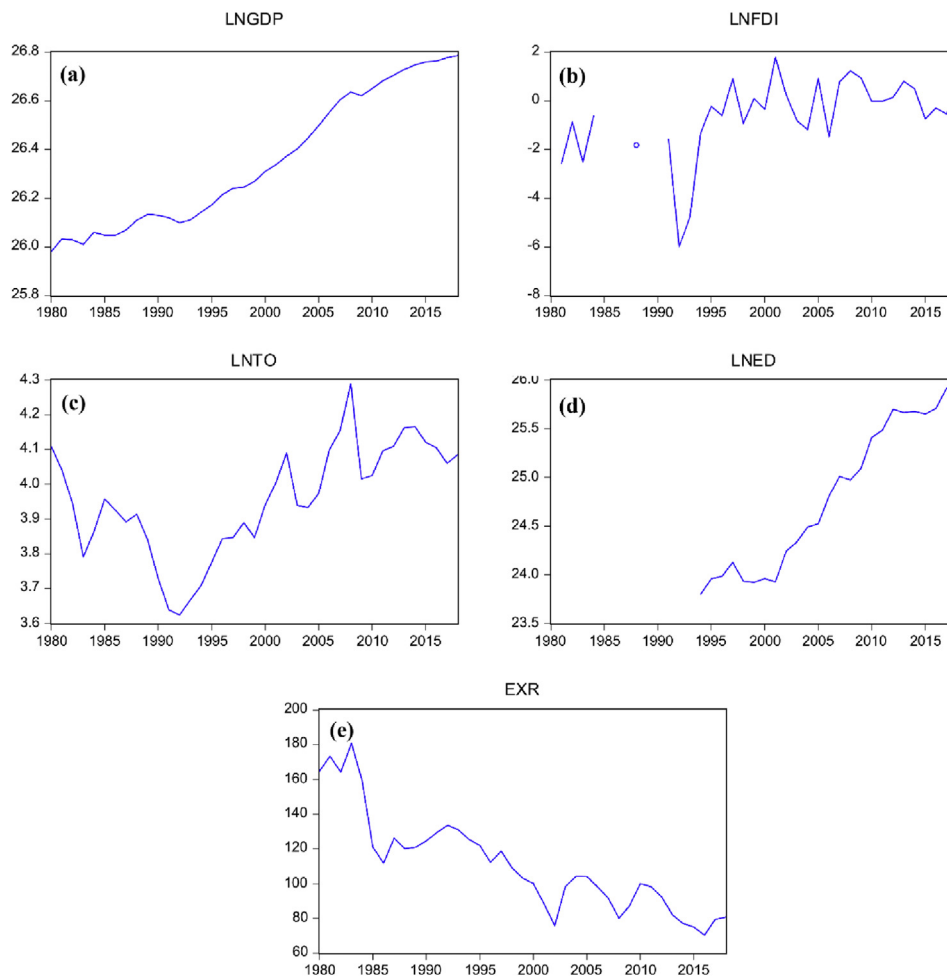
Figure 1. Trend movement of the series of interest: (a) LNGDP (b) LNFDI (c) LNTO (d) LNED (e) EXR. Legend: GDP is the real gross domestic product (constant 2010, US$), FDI signifies foreign direct investment net inflow (% of GDP), TO signifies trade as a % of GDP, ED is the external debt stocks and EXR represents the official exchange rate.

the economic crisis in Nigeria. Olaifa et al. (2013) carried out a similar study for Nigeria and found that trade openness is responsible in part for the underdevelopment of the Nigerian economy. This is supported by other literature including Maune (2019); Nurudeen et al. (2012); Yusuf et al. (2013).

Similarly, empirical evidence shows that FDI inflow inhibits economic expansion. Joshua et al. (2020a) investigated the causal relationship between FDI inflow and economic expansion in South Africa and found that the former does not drive the later. Similarly, Joshua and Alola (2020) investigated the said hypothesis for Nigeria by adopting the ARDL approach. The findings showed that FDI inflow does not promote the course of economic expansion. Zandile and Phiri (2019) found the anti-progress impact of FDI inflow in Burkina Faso. For Asian economies, Goh et al. (2017) found uncertainty regarding the role of FDI inflow in promoting growth. Joshua et al. (2020a,b) investigated the relationship between trade openness, GDP population and FDI inflow. The finding showed that FDI inflow is not an influencer of economic expansion in Nigeria.

3. Data, model and methods

This study investigates the external-factors-induced growth hypothesis for the first time in South African by assessing the validity of the modernization theory. To achieve the objective, this study leveraged on annual data sort from (WDI, 2018) for econometric estimation covering 1981–2018. The variables incorporated in the functional model consists

of real GDP (constant 2010, US$), foreign direct investment (FDI) as net inflow (% of GDP), trade as % of GDP (TO), external debt (ED) as external debt stocks and exchange rate (EXR) official rate.

3.1. Functional model specification

Contrary to the previous attempt presented in Destek et al. (2020), the model specification used in this study has GDP as the dependent variable. The regressors consist of FDI inflow, trade openness, external debt and exchange rates as indicated above. Thus, the linear form of the model is expressed as:

$$RDGP = f(FDI, TO, ED, EXR) \tag{1}$$

$$lnGDP_t = \beta_0 + \beta_1 lnFDI_t + \beta_2 lnTO_t + \beta_3 lnED_t + \beta_5 lnEXR_t + \varepsilon_t \tag{2}$$

Where, lnGDP, lnFDI, lnTO, lnED, and lnEXR are the logarithmic value of the series, ε_t is the error term, $\beta's$ are the estimated parameters.

3.2. Stationary test

It has been empirically tested that most time series data or macroeconomic aggregate such as GDP demonstrate trending characteristic in mean (Gujarati, 2009). Examining the most important nature of this trending behaviours is one of the key tasks of econometric techniques to ensure that the series is de-trended before subjecting them to analysis.

Table 1. Summary statistic.

	lnGDP	lnFDI	lnTO	lnED	EXR
Mean	26.50710	0.015280	4.011092	24.80809	94.96612
Median	26.55305	-0.005997	4.025155	24.80725	98.19824
Maximum	26.78591	1.788939	4.288614	25.91898	125.4274
Minimum	26.14238	-1.472042	3.707921	23.79924	70.35459
Std. Dev.	0.218655	0.849253	0.139363	0.760432	15.39915
Skewness	-0.229785	0.084520	-0.325215	0.103660	0.271802
Kurtosis	1.563623	2.248013	2.536165	1.425708	2.168594
Jarque-Bera	2.369150	0.618812	0.664794	2.626436	1.027855
Probability	0.305876	0.733883	0.717202	0.268953	0.598142
Sum	662.6776	0.382002	100.2773	620.2024	2374.153
Sum Sq. Dev.	1.147441	17.30953	0.466132	13.87818	5691.210
Observations	25	25	25	25	25

Notes: GDP is the real gross domestic product (constant 2010, US$), FDI signifies foreign direct investment net inflow (% of GDP), TO signifies trade as a % of GDP, ED is the external debt stocks and EXR represents the official exchange rate.

Stationarity test is critical because is useful for the selection of methods for analysis, and the avoidance of spurious estimation. Hence, we used the ADP and PP unit root tests developed by (see Dickey and Fuller, 1981; Phillips and Perron, 1988) respectively.

The formula is as follow:

$$\Delta y_t = \beta_1 + \beta_2 + \delta y_{t-1} + \sum_{i=1}^{\kappa} \alpha_i \Delta y_{t-i} + \varepsilon_t \qquad (3)$$

Where, ε_t represent the Gaussians white noise that is assumed to have a mean value of zero, and possible autocorrelation represent series to be regressed on the time t.

3.3. Cointegration

The introduction of ARDL by Pesaran et al. (2001) was to allow for the incorporation of I(1) and I(0) in the same estimation against the rule of the traditional method of OLS which combines only I(0) and I(0). This makes the ARDL more superior and advantageous over the former method. Thus, in undertaking the ARDL method, the dependent variable must be non-stationary for the model to behave better. Another condition to fulfil for the adoption of the ARDL approach is that none of the series is I(2) from the traditional ADF unit root test or Zivot Andrew test for a structural break. This study, therefore, opted for the ARDL approach because the stationarity test shows I(1) and I(0) implying a mixed order of integration.

For brevity, the generic presentation of the ARDL estimation model can be expressed as (Sarkodie and Adams, 2018):

$$y_t = \_cons + \alpha_1 {}^* y_{t-1} + \beta_0 {}^* x_t + \beta_1 {}^* x_{t-1} + \varepsilon_t \qquad (4)$$

$$\Delta y_t = \_cons + (\alpha_1 - 1) {}^* y_{t-1} + (\beta_0 + \beta_1) {}^* x_t - \beta_1 {}^* \Delta x_{t-1} + \varepsilon_t \qquad (5)$$

$$\Delta y_t = \_cons - (1 - \alpha_1) {}^* [y_{t-1} - (\beta_0 + \beta_1) / {}^* (1 - \alpha_1) {}^* x_t] - \beta_1 {}^* \Delta x_{t-1} + \varepsilon_t \qquad (6)$$

Where, y_t is the target variable in time t, x_t denotes the regressors, $\_cons$ is the constant Δ is the difference operator, $[y_{t-1} - (\beta_0 + \beta_1) / {}^* (1 - \alpha_1) {}^* x_t]$ is the long-run equilibrium relationship, $-(1 - \alpha_1)$ is the adjustment term and ε_t is the error term. Contrary to previous attempts, this study follows the novel ARDL bounds testing procedure with Kripfganz and Schneider (2018) critical values and approximate p-values. Thus, the null hypothesis of no level relationship is rejected at p-value <0.05.

To determine the direction of causality, we utilize a Granger-causality model useful for an autoregressive distributed lag relationship, expressed as (Hamilton, 1994):

$$y_t = c_1 + \sum_{i=1}^{p} \alpha_i {}^* y_{t-1} + \sum_{i=1}^{p} \beta_i {}^* x_{t-i} + D_t + \varepsilon_t \qquad (7)$$

Where p denotes lags(.), D_t represents the exogenous variables to be controlled. Thus, the null hypothesis that x_t does not Granger-cause y_t is established by testing $\beta_i = 0$ for $i = 1, ..., p$.

4. Results and discussion

To begin with, Figure 1 shows the up and down trends of the variables under investigation — describing the true nature of macroeconomic variables. Table 1 reveals that the rate of dispersion of the variables from their mean is highly noticeable whereas GDP and trade openness are negatively skewed. The Jargue-Bera test (*p-value > 0.05*) reveals that the distribution of the variables is perfectly normal. Consequently, the result from Table 2 shows a perfect connection between the series. For instance, FDI inflow significantly correlates with the GDP, which aligns with the work of Joshua (2019) and Emir and Bekun (2019). By implication, FDI inflow could drive economic expansion and vice versa.

Table 2. Correlation coefficient matrix analysis.

Observations	GDP	FDI	TO	ED	EXR
GDP	1.000				
FDI	0.4139***	1.000			
TO	0.7227***	0.4263***	1.000		
ED	0.9623**	0.3026**	0.6616***	1.000	
EXR	-0.8138***	-0.4699***	-0.5488***	-0.7245***	1.0000

Notes: **,*** denote statistical significance at 5 and 1% level. **Legend:** GDP is the real gross domestic product (constant 2010, US$), FDI signifies foreign direct investment net inflow (% of GDP), TO signifies trade as a % of GDP, ED is the external debt stocks and EXR represents the official exchange rate.

Table 3. Unit root test.

Variable	Dickey-Fuller Test				Philip-Perron			
	Level	*p-value*	1st diff.	*p-value*	Level	*p-value*	1st diff.	*p-value*
lnGDP	0.532	0.9858	-4.488	0.0002***	0.356	0.9798	-4.565	0.0001***
lnFDI	-3.700	0.0041***			-3.679	0.0044***		
lnTO	-1.687	0.4380	-5.591	0.0000***	-1.754	0.4037	-5.588	0.0000***
lnEXR	-1.569	0.4991	-5.436	0.0000***	-1.508	0.5293	-5.418	0.0000***
lnED	-1.252	0.6507	-6.072	0.0000***	-1.242	0.6554	-6.074	0.0000***

Note: *** denotes statistical significance at 1% level. Legend: GDP is the real gross domestic product (constant 2010, US$), FDI signifies foreign direct investment net inflow (% of GDP), TO signifies trade as a % of GDP, ED is the external debt stocks and EXR represents the official exchange rate.

Table 4. ARDL bound test.

Bound	10%		5%		1%		*p-value*		F/t Statistic
	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	I(0)	I(1)	
F	2.714	3.910	3.296	4.646	4.683	6.389	0.000***	0.000***	11.322
t	-2.57	-3.67	-2.92	-4.09	-3.64	-4.92	0.001***	0.015**	-4.731

Note: **,*** denote the rejection of the null hypothesis of no level relationship at 5 and 1% significance level.

Table 5. ARDL regression with short-range and long-range equilibrium relationship.

	ΔL/GDP	Coef.	Std. err.	t-stats	P > t
ADJ	ECT(-1)	-0.6756	0.1428	-4.73	0.0000***
LR	lnFDI	0.0038	0.0024	1.61	0.1190
	dlnTO	0.2957	0.0761	3.89	0.0010***
	dlnED	0.0008	0.0009	0.91	0.3690
	dlnEXR	0.1909	0.0646	2.96	0.0060***
SR	_cons	0.0159	0.0043	3.70	0.0071***

Notes: *** denotes statistical significance at 1% level. ADJ denotes the error correction term, LR is the long-run estimation, while SR is the short-run estimates. ECT(-1) represents the error correction term. **Legend:** GDP is the real gross domestic product (constant 2010, US$), FDI signifies foreign direct investment net inflow (% of GDP), TO signifies trade as a % of GDP, ED is the external debt stocks and EXR represents the official.

The results show that all the variables correlate significantly with GDP implying that the series can be used to predict the economic progress of South Africa. Similarly, the revelation indicates that all the external factors demonstrate a perfect link with trade openness as earlier expected. The implication is that South Africa borrows externally, peg its currency to the world super currency (US Dollars) through the medium of economic border openness. The result could be used to predict that external factors are critical in the quest for economic expansion. The ADF and PP test results from Table 3 show while FDI is stationary at level, TO, ED, GDP and EXR are first-difference stationary.

Similarly, PP unit root test revealed that only FDI inflow achieved stationarity at level. At first differencing, all variables became stationary at a 5% level of significance. Thus, the overall result indicates a mixed order of integration from both methods. The ARDL bounds test for cointegration is presented in Table 4. As shown in Table 4, the *F* and *t*-test statistics of the model are more extreme than the critical values of the upper bound, I(1). This is further corroborated by the novel Kripfganz & Schneider critical values and approximate p-values leading to a rejection of the null hypothesis of no level relationship. This suggests that the response variable and the predictors in the model are cointegrated, hence, a more parsimonious ARDL model can be estimated.

Using the lag selection criteria, the optimal lag selected was used in the ARDL estimation approach. The optimal ARDL model selected using the Akaike information criteria was ARDL(1,0,0,0,0) with RMSE of 0.01 and predictive power (R-squared) of 0.67. Thus, the regressors explained 67% of the target variable. Table 5 presents the long run results from the ARDL estimation adopted based on the mixed order of integration of the

unit root tests. The result indicates that FDI is a neutral agent of economic expansion in South Africa, contradicting empirical results presented in Sunde (2017) and Khobai et al. (2017) for South Africa and Goh et al. (2017) for the Asian economies. The variation in the empirical results could be attributed to country-specific differences, time frame or data set. Specifically, a 1% increase in FDI inflow will cause an insignificant transformation of GDP in the long terms. This shows that FDI to South Africa is neural in promoting the course of economic advancement.

Trade openness, on the contrary, exhibits a significant impact on GDP, confirming the trade-induced growth hypothesis. This validates existing literature and empirical evidence presented in Matlanyane and Harmse (2002) and Thurlow (2007) for the case of South Africa, Maune (2019) for the case of SADC economies, Alsamara et al. (2019) for Turkey and Rani and Kumar (2019) for BRICS economies. The findings show that a 1% increase in economic openness will generate about 0.30% acceleration on the path of economic expansion. The result which perfectly aligned with the work of Rahman and Mamun (2016) further submits that trade openness generates significant economic expansion to the economy of South Africa. The reverse will be the case if the country opts out of trade openness or reduce its level of involvement in international trade. However, this outcome negates the findings of studies such as Khobai et al. (2017) and Olaifa et al. (2013) for Nigeria which could be as a result of countries differences in terms of trade or prevailing economic and political actors.

Similarly, external borrowing proves to influence GDP positively, validating the work of Sulaiman and Azeez (2012) for Nigeria and Fosu (1996) for Sub-Saharan Africa but contradicts the work of Jibir et al.

Table 6. Model verification and validation.

Lagrange Multiplier Jarque-Bera Normality Test			
Lags (p)	Chi^2	df	Prob > chi^2
1	2.4029	2	0.3008
Breusch-Pagan/Cook-Weisberg test for heteroskedasticity			
Chi^2 (1)	0.69	Prob > chi^2	0.4076
Ramsey RESET test			
F (3, 30)	0.64	Prob > F	0.5979
Variance inflation factor			
Variable	VIF		1/VIF
dlnEXR	1.77		0.5641
dlnTO	1.72		0.5806
lnFDI	1.06		0.9427
dlnED	1.02		0.9841
Mean VIF	1.39		
Cameron & Trivedi's decomposition of IM-test			
Source	Chi^2		df
Heteroskedasticity	8.48		14
Skewness	3.84		4
Kurtosis	0.19		1
Total	12.51		19

(2018) for Nigeria. For instance, a 1% increase in external loan directly causes 0.001% improvement in the rate of economic advancement. This means that borrowing from external sources to complement domestic

Figure 2. Stability tests (a) Cumulative Sum of Recursive Residuals and (b) Cumulative Sum of Squares of Recursive Residuals.

capital is essential for the advancement of economic growth. The findings submit that exchange rate exerts a weak but positive impact on the economic acceleration of South Africa in the long terms validating the work of Sunde (2012) for South Africa and Katusiime et al. (2016) for the case of Uganda. In the long run, a 1% improvement in the exchange rate translates into an insignificant increase in GDP by 0.1%. However, the outcome contradicts the findings of Payne and Mervar (2010) in Croatia. Additionally, the estimation finds a long-run cointegration between the series indicating a future co-movement which is achieved with an adjustment speed of 68%.

The estimated model was validated using diagnostic tests presented in Table 6 and Figure 2. The diagnostic tests conducted and presented in Table 6 comprise of Lagrange Multiplier Jarque-Bera technique for normality test, Breusch-Pagan/Cook-Weisberg test for hetero-skedasticity, Ramsey RESET test for functional misspecification, Variance inflation factor for multicollinearity test, Cameron & Trivedi's decomposition of IM-test and CUSUM and CUSUMSQ plots for stability test. Table 6 reveals that the estimated model is free from multicollinearity (VIF<10), serial correlation (p-value>0.05), heteroskedasticity errors (p-value>0.05), functional misspecification errors (p-value>0.05), and the residuals are normally distributed (p-value>0.05). Figure 2 shows that the CUSUM and CUSUMSQ plots are within the 95% confidence band indicating the stability of the estimated model. Thus, the estimated model is useful for making unbiased statistical interpretations and policy recommendations.

This study further examines the granger causality between variables, with results shown in Table 7. The results show a non-causal link between trade openness (TO) and economic expansion (GDP). This suggests that trade openness under the period of investigation is not a predictor of economic growth and vice versa. The findings from this study further reveal a unidirectional causality running from GDP to FDI inflows. This implies that FDI inflows in part, determine the rate of economic expansion in South Africa. All things being equal, pursuing and achieving sustainable economic expansion is necessary for attracting more foreign investments.

Similarly, there is evidence of unidirectional causal relationship running from EXR to GDP suggesting that stable exchange rate and a favourable macroeconomic environment is essential to foster economic prosperity. Thus, to ensure the achievement of the desired goal of economic growth, the stability of the exchange rate must be pursued.
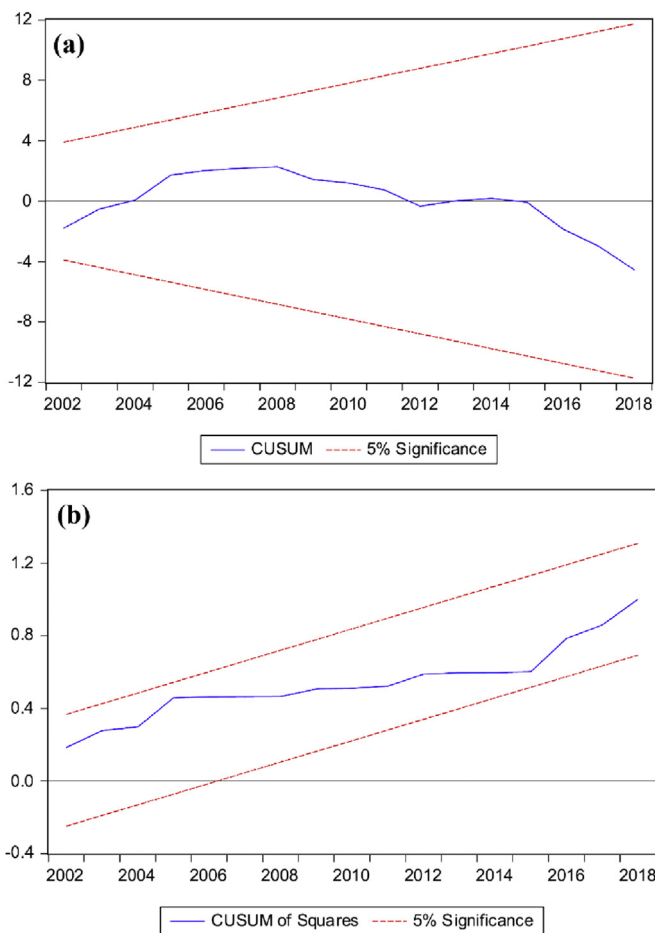
Table 7. Granger causality tests.

Causality Test (H$_0$)	Statistics	P-value	Direction of Causality
lnTO does not Granger-cause lnGDP	0.18	0.6750	No causality
lnGDP does not Granger-cause lnTO	0.04	0.8426	
lnGDP does not Granger-cause lnFDI	2.43*	0.1060	Unidirectional
lnFDI does not Granger-cause lnGDP	1.81	0.1815	
lnEXR does not Granger-cause lnGDP	4.95**	0.0141	Unidirectional
lnGDP does not Granger-cause lnEXR	0.01	0.9946	
lnED does not Granger-cause lnGDP	8.62***	0.0061	Unidirectional
lnGDP does not Granger-cause lnED	0.40	0.5302	

Note: *, ** and *** represent statiscal significance at 10%, 5% and 1% respectively.

Besides, the findings show a one-way interaction running from ED to GDP implying that external loan is a predictor of economic expansion in South Africa. The rate of change in external debt is capable to determine the rate of change in economic progress in the same proportion. Thus, the overall outcome shows that external factors are a predictor of growth — which is instructive to policymakers and the government of the day.

5. Conclusion and recommendation

The question of whether globalization serves as an agent of transformation remains debatable. Similarly, external factor dynamics such as FDI inflows — which underpin globalization lacks consensus in extant literature. On this note, this study examined the relationship between economic expansion and external factors to ascertain whether the interaction benefits South Africa. Evidence from the estimation shows a neutral effect contrary to the FDI-led growth hypothesis aligning with the modernization theory. Our study implies that FDI has a neutral impact on economic expansion in South Africa — which is informative for future adjustments in the economic structure. Besides, the results indicate that external debt, trade openness and exchange rate influence have a positive effect on economic expansion. This suggests that external capital to augment domestic saving to meet investment demands would yield a positive outcome. Consequently, trade openness through a series of gains from international trade such as growth and technology transfer will enhance the domestic economy. The overall outcome shows that the openness of the South African economy is crucial in its quest to achieve economic advancement.

Thus, a recommendation is made of the need for South African to open its economy through new bilateral agreements with other economies for economic interaction and mutual gain. This would facilitate the domestic economic transformation through foreign growth into maturity stage and international competence. More importantly, the economy should be fully integrated to allow free flow of foreign resources majorly for an economic reason to avoid unintended borrowing and spending. The inflow of external capital if properly channelled into the productive streams of the economy will yield the desired growth.

Finally, the authority concern should pursue exchange rate stability for the economy. Devaluation should never be considered as an option. This can be achieved by pursuing an export-driven policy that would promote more exportation than importation. Policies that offer a subsidy to domestic exporters, incentives and free license to companies that produce exporting products are essential to achieving sustained economic growth.

Declarations

Author contribution statement

S.A. Sarkodie: Performed the experiments; Analyzed and interpreted the data; Wrote the paper.

U. Joshua: Conceived and designed the experiments; Wrote the paper.

F. F. Adedoyin: Analyzed and interpreted the data; Wrote the paper.

Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

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