Exchange Rate, Export, and Foreign Direct Investment Nexus within The South African Economy

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ABSTRACT

Purpose
This paper explores the relationship between exchange rates, exports, and foreign direct investment in South Africa.

Methodology
The paper utilized Johansen cointegration, vector error correction model (VECM), and Granger causality test on annual data from 1986 to 2022.

Findings
The study reveals a substantial causal relationship between the Real Exchange Rate (RER) and Real gross domestic product per capita (GDPPC). The RER implies that an increase in the value of the home currency causes a decline in exports (EXP). Disregarding the economic conditions in South Africa, in essence, only demonstrates that any upward or negative movement in RER causes GDPPC to grow or fall since any rand depreciation offers a pathway to reduce domestic imports while raising local exports, which leads to greater GDPPC.

Conclusion
This concludes that adopting laws that support RER, exports, and foreign direct investment is important for South Africa's economic development. These policies can also be useful during national unrest, such as pandemics and emergencies. It is also important to consider the stability of domestic funds and how they affect foreign and domestic business sectors when developing a financial strategy and carefully managing foreign direct investment.

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1. Introduction

Researchers and experts have extensively discussed the relationship between exchange rate (EXR) and foreign direct investment (FDI). Several earlier studies directed to explore the issue produced opposing findings (Egger et al., 2001; Habanabakize et al., 2023; Habanabakize, 2020; Yunusa, 2020). Essentially, an analysis by Haddad et al. (1993), Girma et al. (2001), and Globerman (1979) noted that the effect of FDI on the economy of the host region is either negligible or detrimental. These results raise the question of whether it would not be wiser to increase exports rather than focus on FDI, which has contradictory effects. According to the author's extensive understanding, multiple studies were conducted to assess the impact of Foreign Direct Investment (FDI) on exports (EXP), overlooking the broader implications on the economy. In pursuit of this objective, the research employs various variables including Exchange Rate (EXR), exports, and FDI to ascertain their influence on the economy of South Africa.

This study's primary goal is to examine the relationship between EXR, exports as well as the combined effects of FDI, which is essential to the development of emerging nations like South Africa. EXR instability creates uncertainty in international trade because financial experts are unable to predict the domestic value of foreign exchanges in order to determine whether or not they should participate in international trade activities such as export. According to Chit et al. (2010), increased EXR lowers the amount of export and has an impact on economic growth. According to Manzur (1993), modifications to EXR standards have a significant impact on buying power and rent.

Basically, the contribution of exports, FDI, and EXR are key determinants of country growth (Habanabakize, 2020). Attributable to the quick development of globalization of numerous regions of the economy, the conversion standard assumes a significant part in the creation and offer of most firms inside the worldwide business sectors. The conversion scale volume (EXR) has of turned into a wellspring of vulnerability for export and FDI of numerous nations including South Africa (Habanabakize, 2023). Hypothetically, the more vulnerable the local currency, the higher the export volume. However, it is hard to obtain inputs due to a weak domestic currency which leads to low production and results in a tiny share of South Africa's exports in the international market (Lee, 2020).

Though, a lot of observational exploration has been done because of EXR on economic growth, there is still no settlement on this discourse. Others have shown that EXR and FDI is adversely connected with economic growth (Lin et al., 2018; Vo et al., 2019; Sugihartie et al., 2020), though a few authors have found an ideal relationship between EXR unpredictability and economic growth (Umaru et al., 2013; Kang, 2016). Furthermore, a few investigations show that EXR unimportantly affects economic growth (Senadza et al. 2017; Bajo-Rubio et al., 2019). In the short and long run, EXR is assumed to act unexpectedly. Even though South Africa has conducted extensive research on conversion standard unpredictability and exchange (Onafowora et al., 2008; Odili, 2015; Yakub et al., 2020), the majority of these studies concentrated on swapping scale instability and exchange stream, conversion standard unpredictability, and SA imports. A few others attempted to examine its effects on exports but did so at the sub-level, and very few studies have recently examined its properties in combination with FDI and exports. In light of the aforementioned, it was deemed important for this study to contribute to the growing body of literature by examining the implications of EXR for South Africa's economic growth with other elements, such as foreign direct investment. The purpose of this study is to

determine whether exchange rate, export, FDI, and the South African economy are critically related.

2. Literature Review

It is widely recognized that changes in a nation's currency affect the price and quantity of exports, which in turn affects economic growth (De Soyres et al., 2021). Investors, legislators, and experts give EXR volatility on economic growth significant consideration, regardless of the EXR framework adopted by a country. The instability of EXR has been reliant on several observational and theoretical analyses. A few theoretical models suggest that the time horizon of EXR, the attainable quality of capital business sectors, and assumptions made regarding risk inclinations are among the factors that influence the effect of EXR instability on export and economic growth (Chit et al., 2010; Viaere et al., 1992). A number of empirical findings (De Vita et al., 2004) supported these theoretical models, with some suggesting a negative relationship between EXR instability and export and others finding a significant positive relationship between conversion scale and products (Bredin et al., 2003; Chi et al., 2016).

Apart from the positive or negative result shown in the studies above, some other analyses' findings suggested that EXR unpredictability did not have a significant effect on export and economic growth. Caglayan et al. (2010) and Hondroyiannis et al. (2008) are incorporated into those reviews. Several studies were conducted to examine the effects of EXR unpredictability on economic growth. The results showed that, generally speaking, EXR unpredictability has negative effects in non-industrialized nations, when compared to developed ones, especially in the short term (Arize et al., 2008; Bahmani-Oskooee et al., 2018). In addition, despite numerous investigations into the relationship between exports and FDI, there is no consensus on this matter. Some studies revealed a constructive connection between FDI and EXP, while others discovered an adverse connection. Still, other studies found no connection at all between the export of the facilitating nation and FDI (Sultanzzaman et al., 2018). For instance, Eryigit's (2012) study examined any potential connections between exports and FDI in the Turkish economy. The study's findings suggested a favorable relationship between exports and FDI. Aye et al. (2019) conducted a review to examine the intended use of non-oil export in relation to the level of FDI inflows. The results of this investigation demonstrated that the volume of non-oil exports increases with an increased degree of FDI. Selim et al. (2016) conducted an analysis to examine the impact of FDI on EXP size in the Western Balkan countries. The research's findings established a positive relationship between exports and FDI. FDI inflow is generally not related to the export, as established. A few studies that assessed the impact of FDI inflow into emerging nations discovered a weak or negative correlation between EXP level and FDI inflows (Nguyen et al. 2012). Additionally, a study conducted by Sultanuzzman et al. (2018) examined the connection between EXP and FDI in Sri Lanka; the empirical outcome findings showed an indirect connection amid the variables. Additionally, some studies focus on the African continent to examine the connection between EXP, FDI, and EXR. Those evaluations include Senadza et al. (2017), Habanabakize (2018), and Bahmani-Oskooee et al. (2018). Findings from these analyses demonstrated a binary relationship between the components were analyzed. There is a nonlinear or unequal link between EXR, export, and FDI, on the one hand, and a direct or indirect relationship among the factors on the other. It is crucial to lead this evaluation and examine how EXR, export, and FDI affect the South African economy in light of these

conflicting findings regarding the relationship between EXR, FDI, and export with the host nation.

3. Methodology

Data was collected from the EIA and WDI databases. Data was collected for 36 years from 1986-2022. To test the order of integration of the variables the ADF and P-P test have been employed. At first, the variables are found to be I(0) and I(1), which indicates the possibility of a long-run relationship among variables therefore we proceed next to test for the co-integration analysis therefore the VECM and Granger causality test. The current empirical work specified the functional relationship as:

GrDPPC = f(EXR, EXP, FDI, POP) (1)

Where

GDPPC = Real gross domestic product per capita
EXR = Exchange rate
EXP = Export
FDI = Foreign Direct Investment
POP = Total Population

The econometric specification of the model is specified below:

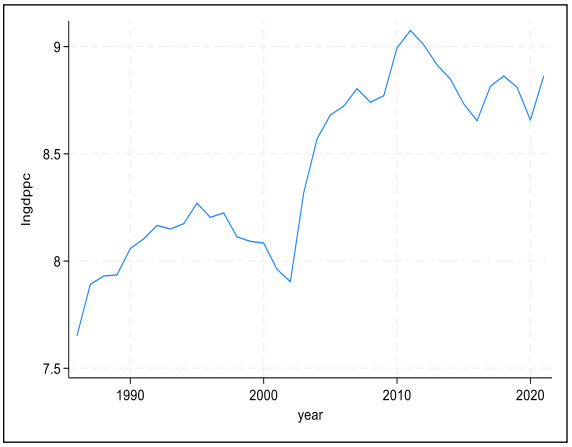
$RGrDP$ = EXR + $ForDI$ + EXP + POP (2)

GrDPPC = β0 + β1EXR + β2FDI + β3EXP + β4POP (3)

GrDPPC = β0 + β1EXR + β2FDI + β3EXP+ β4POP + $\varkappa$ (4)

GrDPPC = β0 + β1EXR + β2FDI + β3EXP + β4POP + ê (5)

GrDPPC is the endogenous variable while EXR, FDI, EXP, and POP are the exogenous variables. Equation (5) is modeled to show the connection between GrDPPC and other specified variables in South Africa (SA). β0 – β4 are the parameters to be estimated in the model.



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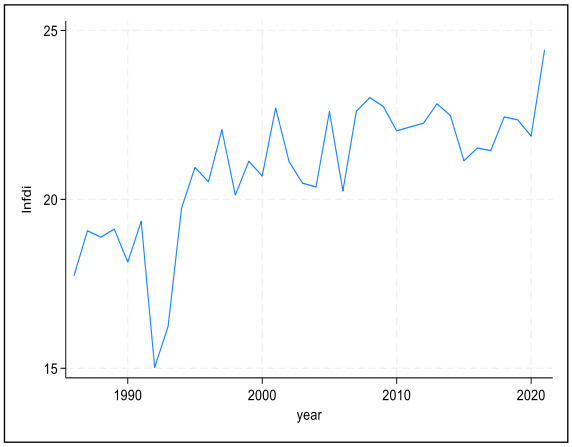

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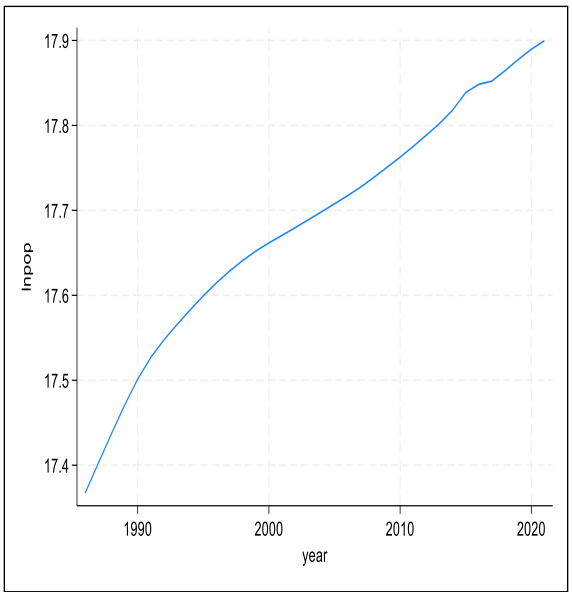

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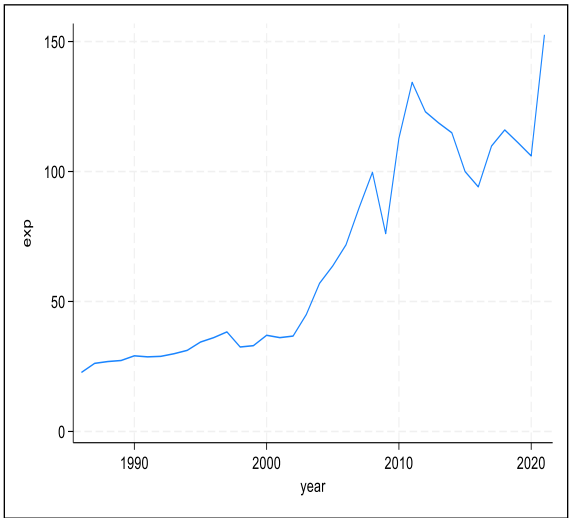

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4. Finding and Discussion

Table-01 shows the unit root test, which denotes I(0) and I(1) and acts as a barometer for whether VECM is acceptable for the study; the Schwarz information criteria is used for the optimal lag selection in Table 2, which is 2.

Table.1.Unit Root

		ADF Null (H_0): Non-stationary				DF Null (H_0): Non-stationary			
		DF_α				ERS_α			
	$z_{.t}$	$\tau_{.\mu}$	1%	5%	Prob.	τ_τ	1%	5%	Prob.
Intercept without Time Trend	$GrDPPC$	1.21	3.63	-2.94	0.53	0.61	2.63	1.95	0.54
	EXP	0.03	3.63	2.95	0.99	0.28	2.63	1.95	0.77
	$ForDI$	1.15	3.63	2.94	0.68	1.54	2.63	1.95	0.13
	RER	1.00	3.63	2.94	0.74	0.93	2.63	1.95	0.35
	POP	0.62	3.63	2.95	0.85	1.93	3.67	2.96	0.31
	$\Delta GrDPPC$	4.63	4.32	3.58	0.00	2.70	3.77	3.19	0.01
	ΔEXP	5.15	3.63	2.95	0.00	2.36	3.77	3.19	0.02
	$\Delta ForDI$	3.97	3.63	2.95	0.00	2.77	3.77	3.19	0.00
	ΔRER	3.19	4.25	3.54	0.10	3.01	3.77	3.19	0.00
	ΔPOP	3.17	4.29	3.56	0.10	6.09	3.67	2.96	0.00
Intercept with Time Trend	$GrDPPC$	5.64	3.64	2.95	0.00	3.78	2.63	1.95	0.00
	EXP	2.35	4.24	3.54	0.42	4.94	2.63	1.95	0.00
	$ForDI$	3.97	3.63	2.95	0.00	3.15	2.63	1.95	0.00
	RER	5.64	3.64	2.95	0.00	3.80	2.63	1.95	0.00
	POP	2.50	3.63	2.95	0.12	0.62	4.29	3.56	0.05
	$\Delta GrDPPC$	4.47	4.28	3.55	0.00	4.56	3.77	3.19	0.00
	ΔEXP	5.14	4.25	3.54	0.00	5.07	3.77	3.19	0.00
	$\Delta ForDI$	3.97	4.25	3.55	0.00	3.37	3.77	3.19	0.00
	ΔRER	5.49	4.25	3.55	0.00	5.03	3.77	3.19	0.00
	ΔPOP	5.50	4.26	3.56	0.00	7.17	4.30	3.57	0.00

Source: Author's own elaboration

Table.2.Lags Determination

Lag	LogL	LR	FPE	AIC	SIC	HQ
1	-106.1325	NA	0.001557	7.713674	8.835998*	8.096419
2	-66.73602	55.61851*	0.000722*	6.866825*	9.111473*	7.632314*

Source: Author's own elaboration

4.1. Johansen Cointegration Test (JCT)

JCT was utilized in the study to decide the long-run connections among the variables. Johansen's (1999) technique gives the best probability to limited request VECM and is easy to register for such frameworks. The result is shown in Table-03 below.

Table.3.Test of Unrestricted Cointegration (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.749723	111.4178	88.80380	0.0005
At most 1 *	0.646114	65.70667	63.87610	0.0348
At most 2	0.383270	31.42696	42.91525	0.4199
At most 3	0.256567	15.47729	25.87211	0.5351
At most 4	0.158469	5.693579	12.51798	0.5002

Note: Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

Source: Author's own elaboration

Table.4.Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.749723	45.71111	38.33101	0.0060
At most 1*	0.646114	34.27972	32.11832	0.0268
At most 2	0.383270	15.94967	25.82321	0.5492
At most 3	0.256567	9.783708	19.38704	0.6420
At most 4	0.158469	5.693579	12.51798	0.5002

Note: Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

Source: Author's own elaboration

4.2. Vector Error Correction Model (VECM)

The VECM connects the cointegrating conditions to their long-run static demeanors. Essentially, it is used to capture the variation, and the result is shown in Table 5 below. This model is assessed in the focus with the goal that causality tests can be performed.

Table.5.VECM Model

Cointegrating Eq:	**CointEq1**				
LNGDPPC(-1)	1.000000				
RER(-1)	0.007997 (0.00465) [1.72131]				
LNFDI(-1)	0.169250 (0.03795) [4.46001]				
LNPOP(-1)	5.321271 (1.39072) [3.82626]				
EXP01(-1)	-0.022728 (0.00277) [-8.20563]				
C	-105.4290				
Error Correction:	**D(LNGDPPC)**	**D(RER)**	**D(LNFDI)**	**D(LNPOP)**	**D(EXP01)**
CointEq1	-0.050652 (0.15145) [-0.33444]	-1.790880 (9.90591) [-0.18079]	-1.963892 (1.73626) [-1.13111]	-0.008312 (0.00299) [-2.77955]	19.92451 (15.3831) [1.29522]
D(LNGDPPC(-1))	0.737194 (0.54673) [1.34837]	16.36886 (35.7592) [0.45775]	6.328217 (6.26769) [1.00966]	-0.002055 (0.01080) [-0.19036]	49.63107 (55.5311) [0.89375]
D(LNGDPPC(-2))	0.122383 (0.60336) [0.20283]	8.207354 (39.4632) [0.20797]	-2.020074 (6.91692) [-0.29205]	0.009018 (0.01191) [0.75699]	-19.88644 (61.2832) [-0.32450]
D(RER(-1))	-0.005447 (0.00794) [-0.68637]	-0.087806 (0.51905) [-0.16917]	-0.099877 (0.09098) [-1.09783]	0.000146 (0.00016) [0.92954]	-0.428071 (0.80605) [-0.53108]
D(RER(-2))	-0.003615 (0.00700) [-0.51609]	-0.293947 (0.45814) [-0.64161]	0.068143 (0.08030) [0.84861]	-0.000106 (0.00014) [-0.76890]	0.310475 (0.71145) [0.43640]
D(LNFDI(-1))	-0.012967 (0.02438) [-0.53186]	-1.324258 (1.59460) [-0.83046]	-0.262309 (0.27949) [-0.93851]	0.001065 (0.00048) [2.21199]	-2.535720 (2.47629) [-1.02400]

	-0.003315	0.209121	-0.154735	0.000802	-1.899956
D(LNFDI(-2))	(0.02084)	(1.36302)	(0.23890)	(0.00041)	(2.11665)
	[-0.15905]	[0.15343]	[-0.64769]	[1.94887]	[-0.89762]
	-9.117560	-319.7966	-51.00737	0.614596	-349.8183
D(LNPOP(-1))	(10.1378)	(663.067)	(116.219)	(0.20017)	(1029.69)
	[-0.89937]	[-0.48230]	[-0.43889]	[3.07032]	[-0.33973]
	4.810946	314.5607	-90.02684	-0.250317	893.8992
D(LNPOP(-2))	(9.22453)	(603.336)	(105.750)	(0.18214)	(936.931)
	[0.52154]	[0.52137]	[-0.85132]	[-1.37430]	[0.95407]
	-0.003895	-0.129040	-0.040492	-2.38E-05	-0.220924
D(EXP01(-1))	(0.00372)	(0.24357)	(0.04269)	(7.4E-05)	(0.37824)
	[-1.04602]	[-0.52979]	[-0.94848]	[-0.32344]	[-0.58408]
	-0.002331	-0.073710	-0.024251	-5.17E-05	-0.198314
D(EXP01(-2))	(0.00361)	(0.23581)	(0.04133)	(7.1E-05)	(0.36620)
	[-0.64663]	[-0.31258]	[-0.58673]	[-0.72616]	[-0.54155]
	0.071491	-1.965364	2.345402	0.008673	-4.152362
C	(0.15162)	(9.91654)	(1.73812)	(0.00299)	(15.3996)
	[0.47152]	[-0.19819]	[1.34939]	[2.89714]	[-0.26964]

Source: Author's own elaboration

4.3. Granger Causality Test

Table 6 below, signifies that there is uni-directional causality amid the variables. Essentially, there is bi-directional causality among RER and GDPPC. From the different empirical assessment, it is found that RER has a critical causality with GDPPC in the study. The RER suggests that an appreciation in the local currency would prompt a fall in exports (Joshi and Little, 1994). Ignoring the financial circumstances in SA, any vertical or descending development in RER makes GDPPC fall or ascend because of any devaluation in rand makes a chance to diminish local import consequently expanding domestic exports and, in this way, meaning higher GDPPC. The results of this study are comparable with (Habanabakize et al. 2023; Okogor et al. 2023) which showed that the coefficient of RER is positive and enormous in the causality test and VECM appraisal.

Considering that by far most African countries produce consumable items for export, the unimaginable effect of export on GDPPC prompts the study to look at the central parts of GDPPC. In addition, EXP shows causality with GDPPC in one heading, suggesting EXP openness moves with growth in GDPPC. Moreover, a couple of earliest examinations show that EXP Granger causes GDPPC in the SA economy. In any case, it should be noted that the coefficient values for FDI show uni-causality, implying the causality of FDI with GDPPC. Literature analyzing the effect of FDI has accentuated over and over that the spill-over effects of FDI are dependent upon the fundamental economic circumstances in the host nations (Ouattara, 2018; Tanna et al., 2018). From the coefficients obtained in the empirical analysis, it very well may be reasoned that the positive impact of FDI on GDPPC is the best for emerging nations like South Africa. As Blomstrom et al. (1994) recommended, the technological spillovers relied upon the degree of economic growth and absorption capacity in the host nations.

Technology transfers occur frequently in a country with technology gap where the investing countries transfer a sound technology to the host nation in order to gain market share. Since specialized skills improve as nations develop, FDI will undoubtedly be more valuable in economies with a higher phase of development. Along these lines, Borensztein et al. (1998) noted that the importance of human capital formation in deciding the

absorption limit and pace of technological dispersion in host nations. Thus, a more gifted workforce is attached to a developed economy and guaranteed better yields from FDI. Further, the spillover impacts connected with FDI inflows were dependent upon the presence of specific edge externalities. Nations expected to accomplish a specific degree of improvement in their skills, well-being, innovation, infrastructure, and banking sector to receive the rewards of international capital flows (OECD, 2002). Accordingly, FDI is expected to stimulate growth in emerging economies subsequently creating economic growth.

Further, there is a uni-causality between POP and FDI, this linkage between POP and FDI as an increase in the POP draws international investors to put resources into such an economy subsequently causing the uni-causality between POP and FDI. Additionally, the effect of POP on FDI is measurably huge and positive, suggesting that FDI rises as POP rises, the result of this study is comparable with Grekou et al. (2020) who found that urbanization stimulates FDI in the host country. In general, outcomes show that FDI, POP, and RER add to GDPPC in SA. The effect of FDI on exports depend on domestic factors like macroeconomic and exchange rate stability. The vast majority of arising nations are portrayed by foundation bottlenecks and low monetary area improvement. The foundation and monetary area's advancement levels are probably going to be underneath the edge level expected for FDI to influence GDPPC positively.

Essentially, the current study aims to test the presence and direction of a causal connection between FDI, EXP, POP, RER, and GDPPC for the predefined period 1986-2022. For this reason, a Granger causality test is directed which is accessible in Table-06. From the result of the test presented in Table 6, it tends to be seen that there exists a bi-directionality or shared criticism impact among RER and GDPPC in the study. The causality result shows a unique connection between FDI and GDPPC as a rise in inflows of FDI supports GDPPC; thusly, higher GDPPC draws in more FDI. The findings of previous studies where a common feedback connection was discovered between the variables (Kartikasari 2017; Millia et al., 2021). Hence, the causality results support the speculation that FDI advances exports in this way stimulating GDPPC in the host country.

Table 6.Granger Causality Output

Null Hypothesis:	Obs	F-Statistic	Prob.
RER does not Granger Cause LNGDPPC	34	3.79646	0.0343
LNGDPPC does not Granger Cause RER		2.58646	0.0926
LNPOP does not Granger Cause LNGDPPC	34	1.69516	0.2013
LNGDPPC does not Granger Cause LNPOP		2.39314	0.1092
LNFDI does not Granger Cause LNGDPPC	34	1.15969	0.3277
LNGDPPC does not Granger Cause LNFDI		1.81007	0.0216
EXP01 does not Granger Cause LNGDPPC	34	0.38508	0.0838
LNGDPPC does not Granger Cause EXP01		1.15362	0.0295
LNPOP does not Granger Cause RER	34	3.21265	0.0549
RER does not Granger Cause LNPOP		0.38736	0.6823
LNFDI does not Granger Cause RER	34	2.06618	0.1449
RER does not Granger Cause LNFDI		2.19798	0.1292
EXP01 does not Granger Cause RER	34	2.51771	0.0981
RER does not Granger Cause EXP01		2.41248	0.1074
LNFDI does not Granger Cause LNPOP	34	0.58725	0.5623
LNPOP does not Granger Cause LNFDI		4.24357	0.0242
EXP01 does not Granger Cause LNPOP	34	7.15462	0.0030
LNPOP does not Granger Cause EXP01		1.74961	0.1917

EXP01 does not Granger Cause LNFDI	34	1.54962	0.2294
LNFDI does not Granger Cause EXP01		0.30839	0.0370

Source: Author's own elaboration

5. Conclusion

This study aims to examine the impact of RER, EXP, POP, and FDI on South Africa's aggregate growth. Different econometric methodologies were applied to accomplish the stated goal. Those approaches comprise Johansen's cointegration approach, VECM, and the Granger causality approach. The outcomes from Johansen cointegration tests showed that a long-run relationship exists between the employed variables. Over the long run, all exogenous variables were found to have at most 2 associations with the endogenous variable. Nonetheless, the RER was found to generally affect GDPPC contrasted with FDI. The VECM result indicated that the FDI with GDPPC has a direct impact. Based on these findings, policymakers and the government should devise and implement strategies that stimulate trade, RER, and FDI since they play a crucial role in the development of SA and can also be relied upon in times of financial hardship, such as a pandemic or other emergencies. Financial planning should also consider the strength of domestic capital and how it affects domestic and foreign business sectors. Not to be overlooked would be excellent or cautious management of the novel direct venture. According to this study, it is more beneficial to adopt novel theories now rather than later.

The VECM result also shows a favorable connection between FDI with GDPPC. Based on these findings, policymakers and the national authority should develop and put into action plans that support RER, exports, and foreign direct investment (FDI) since these sectors contribute significantly to SA's growth and can be counted on tough economic times like the pandemic and other crises. Furthermore, when deciding on monetary policy, consideration should be given to the steadiness of the national currency and how it affects both local and foreign markets. Finally, prudent or good running of FDI would be helpful. According to this study, foreign investments offer greater short-term benefits than long-term ones.

Author Contributions

Ahmed Adekunle carried out the conceptualization, formal analysis, revised, results estimation, tabulation of data, and response to reviewers' comments.

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Conflicts of Interest

No conflict of interest

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