International Journal of Innovation, Creativity and Change. www.ijicc.net
Volume 13, Issue 12, 2020

Investigating Short and Long-term relationship between Foreign Direct Investment and Economic Performance: New Evidence from Brazil

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This study aims to discover the relationship plus the impact of FDI on economic performance in both long and short term in Brazil from 1980 to 2019. An analysis of time series approaches: Vector Error Correction model and Johansen Cointegration test are used. The demonstration of results relating to the stationarity test indicates that the included variables are stationary in first difference and integrated into order one. Furthermore, cointegration test of Johnsen for detecting the association ship in the long run, indicated to all the variables are cointegrated, which implies the existence of long-run relationship between FDI and growth of the economy. Continuously, estimated results of an empirical model of VECM affirms that the FDI impact on economic performance is positive and statistically significant, in addition, these results showed the double effect of FDI and important in explaining the economic performance, and the causality only runs from one side (unidirectional causality) runs from FDI toward RGDP in the long run. Finally, the short-run dynamic (speed of adjustment) estimated to be (62%) for any annual deviation of last years toward long-run equilibrium. Such findings are a significant part of an open and efficient economy, which suggests that foreign direct investment is a significant driver to the development of the economy.

Key words: *Cointegration, VECM, Foreign Direct Investment, Economic performance.*

Introduction

Developing countries are suffering and experiencing significant obstacles to economic growth due to lack of investment level in both domestic and foreign, in which countries that are developing aim to attract international funding FDI which can decrease the gap between savings and investment. In such countries, economic performance and FDI have a significant leading role toward the high level of growth in the economy. The growth cycle of production capacity is totally dependent on economic performance, liberalisation of trade regimes, foreign capital and term of technology. A view of globalisation may entail unparalleled opportunities for emerging countries to have growth rates through investments and commercial growth of investment across countries, particularly for companies and other entities involved in various transacting activities (Hailu, 2010). Researchers and developing world Governments have become very involved in the association between economic development and FDI. Since FDI attractive policies are the main priority of economic growth, attention has been accorded during economic development in these countries (Vo et al., 2019a).

Throughout the 1970s, Brazil's economy was split into massive FDI inflows. The key wealth components of the FDI's portfolio remain linked with the non-discriminatory accumulation and economic growth. Owing to a lack of confidence in failure to honour international commitments and the uncertainty of economic results, all these in the 1980s contributed to increased risk with unsureness as to how inflation can be minimised by different plans. The revival of foreign direct investment inflows was a product in Brazil's economy in the early (1990.) decade of convergence of financial markets and free privatisation with incentives to increase growth (Pereir, 2013). During the decade (the 1990s) the foreign investment curve developed rapidly. There was thus positive hope that the advantages of the new motor could be taken from FDI to modernise Brazil's economy and make it marketable. However, international capital has struggled, leading countries to be challenged whether more foreign capital might be drawn from beyond their growth capacity (Calegario, 2013).

Review of Literature

The ongoing subject of the nexus between FDI and growth of the economy had been empirically and experimentally investigated in addition to many studies by scholars. However, despite the multiplicity and diversity of these previous studies, the reported findings pertaining to the influence of FDI on the development of national economies have been both inconsistent and inconclusive and yielded no definitive consensus. It appears that the impact of FDI is largely determined by the characteristics of the FDI recipient countries, and could range from negative to inconsequential or be positive in respect of stabilising the host country’s macroeconomics, its technology as well as its formal environment. Initially, research empirically done on FDI and its connection with the development of a host country’s

economy was subjected to adaptation and made familiar by Solow, whose methodology describes the expanded Solow growth model in respect of technological knowhow, capitalisation, workforce, foreign capital inflow, besides the implications of additional variables including the quantum of imports and exports. On the basis of this theory, quite a number of studies concerned with the impact of foreign capital inflows have overly emphasised their influence on production outcomes and efficiency, in addition to the cooperation between FDI and human resources and side by the side of technology transfer (Noy & Vu, 2009).

In a time, series approach for an empirical study, Basem and Abeer (2012), examined the part played by foreign capital in the growth of the economy employing the Cointegration approach to obtain a double-sided feedback Causality on the basis of FDI-led growth hypothesis. It was a Jordan-based case study that lasted from 1990 to 2009. Empirically, the findings proposed that foreign capital inflows do not directly stimulate the economy to grow but together with exports positively impacts the real GDP.

Bashir (2012) examined the consequence of FDI on GDP in South Asian countries using multiple regressions and found the general model significant. They reported that GDP and capital inflows were positively and significantly associated. In 2012, Soltani explored the impression of FDI on the development of the Tunisian economy employing econometric time series analysis. Empirically, it has been proposed that foreign capital inflows are capable of helping to enhance development in the long-term. Furthermore, Soltani (2012) asserts that over time, the global economy has evolved as a completely free form of trade, with unrestricted mobility of foreign capital and goods with domestic investment becoming crucial, particularly for unindustrialised nations.

The influence of capital flows from abroad on the economy of Pakistan' was explored by Saqib in (2013) in a case study; data were gathered for the period from 1981 to 2010. In addition to FDI, supplementary variables were contained within, such as inflation level, accumulation of fixed capital, national debts and openness of trade. An OLS estimation approach was performed, finding a negative influence of foreign capital on Pakistan's economy outstanding to the negative impact of inflation level, national debts and openness of trade only consequences of the accumulation of fixed capital showed that possibility to stimulate the development of the economy.

Umoh (2013), in a case study of Nigeria, used time-series data that covered 1970 – 2010. The study examined how foreign capital and economic growth rate of GDP are correlated together besides the direction of the causality. A simultaneous equation scheme was used for examining the possibility of two-way causation between flows of abroad capital and economic performance. The results of the empirical analysis confirmed that foreign inflows

of capital and economic performance are determined by both directionals of causality impacts that run from FDI to GDP and vice versa.

In 2013, Calegario explored the impact of foreign capital strategies on Brazil current account stability. Their findings suggest FDI flows promote increased exports and imports, in particular for firms that seek new markets. Additionally, results of Causality test indicated that flows of FDI boost exports in both short and long term, but boost only imports in the short run (Calegario, 2013).

Olusanya (2014) studied how FDI inflow affected growth rate of the Nigerian economy from 1970 to 2011, in per and post liberalisation of economy, employing causality analysis. The study had separated the economy into three different timelines, opening timeline from 1970 to 1986; middle timeline, from 1986 to 2011, and full-frame period from 1970 to 2010 for the examination of causation feedback between foreign capital inflows and economic performance. Outcomes exposed the existence of a causality relationship in the opening period of deregulation (1970-1986) which run from booting economic performance toward foreign direct investment, but for the middle-deregulation period (1986-2010), the results inferred no feedback Causality relation between FDI and progress of the economy, but for the period of 1970 to 2010, two-way causality was detected between FDI and growing of the economy in Nigeria. However, in the full-frame period 1970 to 2010, economic growth stimulated FDI, implying unidirectional Causality run from economic stability toward inflows of foreign capital.

Brazil Economic Growth and FDI Outlook

Stability of Macroeconomic Frame

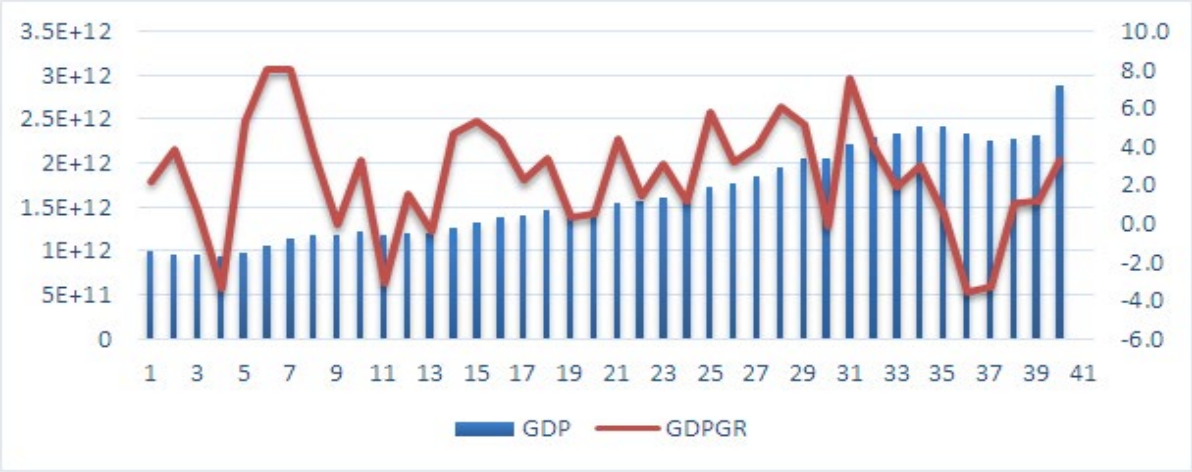
Brazil is one of the major and largest states in the South American in terms of performance of the economy, land size in addition to the total population number. The population in Brazil is 170 million, according to Brazilian institution of statistics and Geography. The total number of citizens existing in urban zones totalled 13 million represents 0.81%. Around (130) millions of citizens were living in the urban that reached 0.81 per cent of the total population. In terms of the domestic market, Brazil has sizeable scale growth potential but suffers from inequality of income distribution across regions. A substantial decline from the late 1980s until the early 1990s when Brazil's market growth experienced restrictions, However, two years after the Real Plan was implemented, a considerable strengthening of public purchasing power was noted attributed to the monetarist stabilisation. The year of 1988 to 1990 negative rates of growth were recorded in the Brazil economy, with the per cent of -4.3 and -4.7, but in 1994 the as soon as the economy of Brazil begin to recover with a positive rate of growth reached (6%) and was stable in the average rate of growth till 2009 when it experienced 4.2

per cent of the negative rate of growth due to the financial crises that happen around the globe.

The forthcoming of the Brazilian economy was simplified by integrating the local marketplace. In 1991, it showed the establishment of a customs union common marketplace named the MERCOSUR which involved Paraguay, Uruguay, Argentina and Brazil. The establishment of such a unified mutual marketplace was expected to significantly benefit the participating countries, especially after the Argentinean currency was depreciated, and Brazil's economic growth was restored. Therefore, all these factors support Brazil to be considered the one and the foremost country in South America in term of the importance of commercial partner.

Brazil's GDP in 2019 was US$ 2.024 trillion, making it one of 10 nations worldwide with high volume GDP based on the overall annual value of all produced services plus goods in an economy which constitutes the country's GDP (Figure 1).

Figure 1. Growth rate and Real GDP (USD B)



Source: World Bank data, World Indicators for Growth, 2019.

A substantial increase in imports was noted due to the need to maintain high levels interest rate overvalues of local currency preserving of high levels of interest rates and currency appreciation which resulted in the rapid decline of the external accounts of Brazil. The instability of the economy was clearly shown, particularly after the Mexican crisis in 1995, and after depreciation of the local currency in 1999.

There was a complete overhaul of the Foreign trade in Brazil's economy had following the consolidation of an open regime in line with WTO requirements. During the period of the late 1980s, Brazil dismantled trade barriers and improved the foreign sector in a move to be liberal, taking steps to harmonise tariffs with a small average level of protection. This

approach was obvious in 1990s Industrial sector of Brazil and agenda of foreign trade, which lowered tariff and non-tariff trade measurements to be fulfilled till 1994. The significant aim of this strategy was to progressively eliminate the extensive protectionism passed down by the previous import substitution regime (see Figure 2).

Figure 2. Exports, imports and foreign trade balance (USD B)

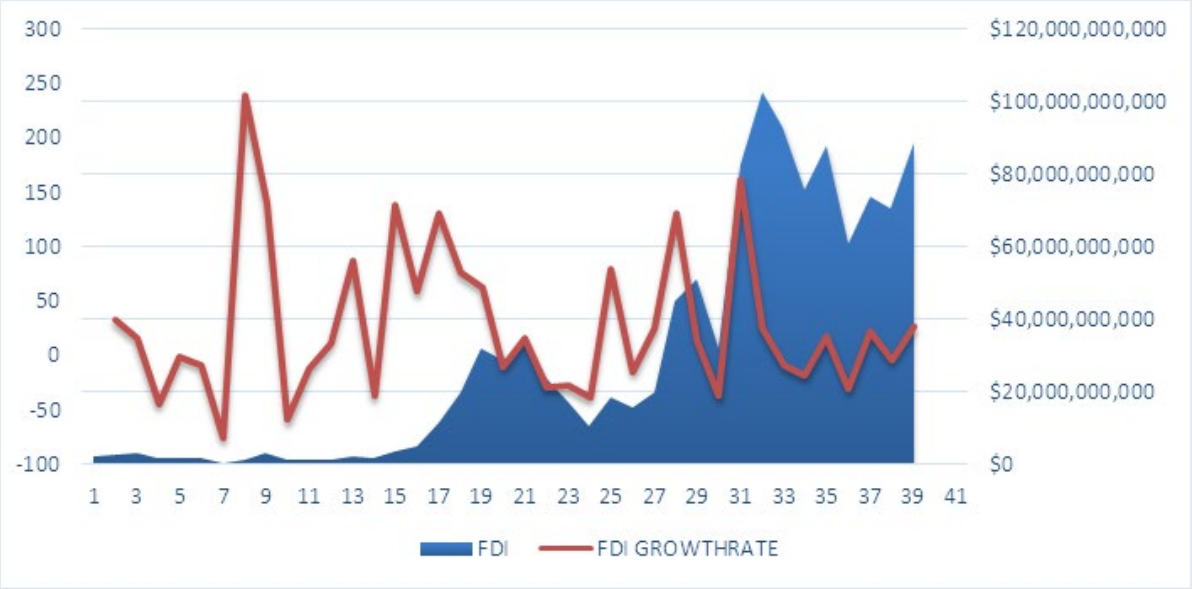
Source: World Bank data, World Indicators for Growth, 2019.

Economic Catalogue of Freedom as an index of trade openness, 179 countries registered in and Brazil is one of them with the rank of 113 which record at 55.6 out of 100—suggesting that Brazil does not have total economic freedom. The country's global score was below the global average score (WDI, 2013).

Foreign Direct Investment Developments in Brazil

The flow of FDI into the Brazilian economy began during the years from 1955 to 1960, with the launching of certain governmental projects specially designed to attract foreign capital to strategically fund the development of the industrial sector via import-substitution activities. In the 1970s, Brazil experienced a period of high optimism and impressive economic growth rates as a result of foreign capital, mostly in association with consolidating a political regime that supported inflows of capital from abroad. Contrary to the 1980s, during this period mechanisms existed that provided the stimulation for accumulations of capital and encouraged in retaining inflows of foreign capital previously financed in Brazil (Pereira & Calegario, 2013).

Figure 3. Net inflows of FDI into the Brazilian economy (US$ 'B)



Source: World Bank Info, World Indicators for Growth, 2019.

The main factors of the FDI's provision were the emphasis on economic development and the non-discriminatory accumulation of foreign resources. Throughout the 1980s, capital flows were reversed primarily as lack legitimacy because of failing to meet international commitments, economic turmoil and increased uncertainty in the sense of anti-inflationary schemes. Since the 1990s, FDI growth has risen remarkably, reflecting the effects of financial globalisation, mergers and purchasing incentives due to the start-up and privatisation of the Brazilian economy (Calegario, 2013). Significant growth by FDI (in the 1990's) led to expectations of FDI becoming the catalyst of a new development stage and modernising Brazil's business conditions. FDIs 'endogenous reduction was doubting the feasibility of slowly attracted FDO amounts to feed current account deficits (Sarti & Laplane, 2003). As a result, increased foreign involvement in the economy also raised questions about the quality of investment earned. Specifically, in Brazil, the problems are mainly linked by the effect of globalisation on Brazil's economy, mainly with respect to the acceleration and current fragility of the balance of transactions (Calegario, 2013).

Methodology and Econometric Modelling

Specification of Empirical Model

The study has attempted to research the links between the economic growth and FDI of countries in academic literature. Some time-based evidence, while others concentrated on cross-sectional data and proof. This study shows that Brazil's economic changes influence FDI. The research will incorporate these macro-variable variables between external direct

investment and development based on the general theme of the production function evaluated. This could lead to a shift in a certain quantity of savings and investment inputs in the host country's output capacity and thus, either capital accumulation or economic growth (Solow, 1957).

This paper uses Solow's neoclassical growth model. A consistent return to the size of the summary function $Y = f(K)$, provided by Solow, of a particular Cobb-Douglas form of growth is assumed or considered:

$$Y_{(t)} = K_{(t)}^{\alpha} A_{(t)} L_{(t)}^{1-\alpha} \quad (1)$$

Y signifies real income; accumulation of capital denoted by K; L refers to labour; A characterises as labour efficiency which increases coming with the time at an exogenous proportion; and t reflects the specification of time, to conclude any transformation or change in both K, L will infer to equal ratio of change in Y in equation (2).

$$\Delta Y = f(\Delta K, \Delta L) \quad (2)$$

To capture the impact of capital inflows on economic performance the term K expanded to contains two parts that are Foreign Direct Investment plus the accumulation of fixed capital as a domestic investment) that could be demonstrated as follows:

$$Y = f(F_{invs}, D_{invst}) \quad (3)$$

Level of real income Y reflects development in the economy, and dependent on joint investment in the economy (F invst: foreign investment and D invst: national investment). Furthermore, the random variable plugged into the model for capturing the impacts of unincluded variables that could explain the growth of the economy.

$$RGDP_t = \beta_0 + \beta_1 FDI/GDP + \beta_2 GFCF/GDP + \mu_t \quad (4)$$

t characterises the time; ***the rest of the mentioned variables and their proxies are illustrated in Table 1***.

Table 1: Variables illustration, proxies and signs

Variables		Variable description and proxy	Anticipated Sign
Economic growth	RGDP	Real growth rate of Gross domestic product	Dependent variable
Foreign investment	FDI	Foreign direct investment net inflows as a share of GDP	Regressor 1 (+ positive)
Domestic investment	DIN	Gross fixed capital formation as a share of GDP	Regressor 2 (+ positive)

Source: Author: adapted from the empirical literature.

Data Issue

For the purpose of employing the cointegration approach, the data for all the included variables (RGDP, FDI/GDP and GFCF/GDP) are collected from the word bank data (world development indicator) which includes 40 observations, from 1980- 2019.

Estimation Techniques

The cointegration methodology contains deference techniques at the same time it has some properties to satisfy; the following steps are considered the foremost well used steps regarding empirical literature:

Stationarity Test

First of all, the property of stationarity which considered the first and foremost property to satisfy in order to avoid the result of the superior, thus, authors conduct the unit rote test (augmented dicky fuller). Recognition of the data, whether the variable is stationary or non-stationary. T—the stationarity model requires differencing to become stationary (Dickey & Fuller, 1981).

The ADF test hypothesis:
$H_0: \beta = 0, X_t$ is non- stationary, (existence of unit root)
$H_1: \beta \neq 0, X_t$ is stationary, (no existence of unit root)

Lag Length Criteria

There are several criteria for choosing the optimal lag length in a time series; the discrimination function differs from one to another criterion. We can, therefore, obtain

conflicting results. Therefore, the selection of optimum lags is very significant to obtain preferable and accurate results (Engle & Granger, 1991).

Cointegration Test of Johansen

The main objective of conducting cointegration test of Johansen is to demonstrate the existence of long-run association ship among variables. cointegration analysis allows investigation of possible vectors of cointegration among a series of variables (Johansen & Juselius, 1990). The process could be shown in Vector Auto Regressive model:

Johansen test uses both the trace test and the maximum eigenvalue test for cointegration. Result for cointegration depending trace statistics is preferable and adoptable among researchers (Katircioglu et., 2012). The trace statistic *(λ trace)* could be calculated by the following formula:

$$\lambda_{trace} = -T \sum Ln(1-\lambda_i), i = r+1 \ldots n-1 \quad (6)$$

And the hypotheses are:
H_0: r = 0 , H_1: r ≥ 1
H_0: r ≤ 1, H_1: r ≥ 2
H_0: r ≤ 2 H_1: r ≥ 3

Vector Error Correction Model

Specifying Vector Error Correction model, where the growth of the economy possibly will not directly regulate to their long-run equilibrium levels in which the speed of adjustment between the short-run and long-run levels can be captured by the term of **(***EC_{t-1}*)** in the Error Correction. According to (Olusanya, 2014) when the variables are cointegrated in other words variables have at least one cointegration vector among them that give us a green lite to employ (VECM) model for the purpose of examine the short plus long-run relationship between the included variables. The expected sign of the coefficient of error correction term (*ECT_{-1}*) should be negative and statistically significant. The estimated model could be written under VECM approach as follow:

$$\Delta \text{RGDP}_t = \beta 0 + \sum_{i=1}^{P} \beta_1 \Delta \text{RGDP}_{t-1} + \sum_{i=0}^{P} \beta_2 \Delta \text{DFDI/GDP}_{t-1} + \sum_{i=0}^{P} \beta_3 \Delta \text{DGFCF/GDP}_{t-1} + \sum_{i=0}^{P} \beta_4 \Delta \text{l EXPT/GDP}_{t-1} \sum_{i=0}^{P} + \beta_5 \text{EC}_{t-1} + \mu t \quad (7)$$

Diagnostic Tests

According to (Pereira and Calegario, 2013)In time series analysis the final step after estimation of the econometric model is the diagnostic tests, the aim of these tests is to satisfy the assumptions of time series analysis, on the other hand, the diagnostic tests help us to seek for validation of the obtained results that most often can be used for decision making. The most commonly used tests in the empirical literature review are:

1. Lagrange Multiplier (LM) test for serial correlation of residuals.
2. Joint White test for Heteroscedasticity of residuals.
3. Joint Normality test for Normality distribution.

Findings and Discussion of Results

Stationarity Test

The authors used Augmented Dicky-Fuller test, which meant for detecting the existence of unit root for all included variable. The outcomes of the stationarity test represented in Table (2).

Table 2: Results of Stationary test

Augmented Dickey-Fuller Test					
Variables	**ADF (At Levels)**		**ADF (First Difference)**		Rank order
	T. statistics	**Prob. Value**	**T. statistics**	**Prob. Value**	
RGDP	-3.476199	0.0578	-4.211868	0.0000*	*I(1)*
FDI	- 4.262735	0.0684	-4.296729	0.0398*	*I(1)*
GFCF	- 4.211868	0.1047	-4.219126	0.0000*	*I(1)*
* Rejection of null unit root hypothesis at 5%significance point					

Source: Calculated by authors from the outcome of E-Views 10.

The results of stationarity test indicated that the null hypothesis *(H_0)* was not rejected for each included variable RGDP, FDI and GFCF, showing that all variables have a unit root or they are non-stationary at 5% significant level, where the probability value equals to 0.0578, 0.0684 and 0.1047 respectively for RGDP, FDI and GFCF. Moreover, all the calculated probability value was more than 0.05. Nevertheless, the outcome proposes that the null

hypothesis (H_0) regarding with stationarity rejected at 5% level of significance for all the variables thus the variables become stationary afterwards first difference and they are integrated of *I(1)*, despite the fact that probability value of variables was 0.0000*, 0.0390* and 0.0000* respectively for GGDP, FDI and GFCF, and they were all less than 0.05.

Optimum Lag Structure Criteria

Confirming stationarity at the first difference of included variables as all the variables are integrated in the same order which is one *I(1)*. The pre-step before proceeding cointegration test is determining the appropriate lag number. The most well-used criteria in the empirical analysis are Schwarz information criterion SC, Hannan-Quinn information criterion HQ and Akaike information criterion AIC. Consequently, the mentioned criterions above suggested the optimum lag number to be chosen was 1 lag.

Table 3: Selection of Lag Order

# Lags	AIC	SC	HQ
0	13.16277	13.29473	13.20882
1	10.71126*	11.23910*	10.89549*
2	11.16261	12.08633	11.48501
3	11.00264	12.32224	11.46322
4	10.88569	12.60117	11.48444

Source: Calculated by author from the outcome of E-Views 10.

Johansen Cointegration Test

Continuing to next step of estimation, which is performing Johansen cointegration test for the purpose of detecting and testing the long-run equilibrium among the included variables. Accordingly, the outcomes of Johansen cointegration test are shown in the Table (6.3), in the basis of all variables where integrated in the same order *I(1)* and the optimum lag number is 1.

Table 4: Johansen's Cointegration Test result

Co-integration Rank: Test (Trace)				
Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	Sig. level: 0.05 Critical Value	Prob.**
None *	0.383341	32.57529	29.69706	0.0233
At most 1	0.287628	14.20462	15.39471	0.0775
At most 2	0.034058	1.316760	3.741466	0.3142
Trace test indicates 1 co-integration at the 0.05 level * signifies rejection of the hypothesis at the 0.05 level.				
Johansen Cointegration (Maximum Eigenvalue)				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesised No. of CE(s)	Eigenvalue	Max-Eigen Statistic	Sig. level: 0.05 Critical Value	Prob.**
None *	0.383341	28.37066	21.0016	0.0116
At most 1	0.287628	12.88786	14.12600	0.0815
At most 2	0.034058	1.31676	3.931466	0.3621
Max-Eigen Statistic indicates 1 co-integration at the 0.05 level *denotes rejection of the hypothesis at the 0.05 level.				

Source: computed by authors

* Denotes the rejection of the null hypothesis at the 0.05 level

Outcomes of Johnsen cointegration test show that the hypothesis of null *(H_0)* for there is no cointegration equation among the included variables was rejected at 5% significance level for each value of (Trace Statistics 32.57529, Max-Eigen 28.37066) respectively, besides the probability value were 0.0233, 0.0116 respectively. In addition, they are less than 0.05 per cent indicating that there is one cointegration equation in the long run between RGDP and regressors variables FDI and GFCF. The proposed outcomes of Cointegration test arise in line with the conclusion of Borensztein (1998) and De Mello (1997).

Vector Error Correction Model (VECM)

Long-run Relationship Results

The existence of cointegration between investment indicators FDI and GFCF and economic growth (RGDP) gives the green light to proceed the VECM model, for the purpose of capturing the significance of long-run association and causality interchange effects between FDI and RGDP. Long-run causality and significance relationship results are obtained from normalised cointegration equation coefficient (EC_{t-1}) from VECM model and summarised in the Table 5.

Table 5: Outcomes of the VECM Model

Estimation of the long-run coefficients				
Ec_{t-1}	**FDI $_{t-1}$**	**$GFCF_{t-1}$**	**$GDP1_{t-1}$**	**Constant (C)**
- 0.629267 Prob.V (0.0048)	0.536335 (-0.037144) [1.44392] P.V (0.02574)	0.203617 (-0.022415) [0.90839] P.V (0.0299)	1.0000	- 6.953616

Source: Author's computation adopting E-Views 10.
Note: ( ) refers to Standard errors , [ ] refers to t-statistics and Prob.V represents probability value.

Results of VECM model indicated that there are long-run relationships between FDI, GFCF and GDP, since the coefficient of error correction term is - 0.629267 with the sign of negative and the probability value of the *ECT-1* was 0.0048, which it is less than 0.05 confirming that there is long-run unidirectional causation running from the FDI, GFCF towards GDP.
The interpretation of speed of adjustment implies that any deviation from long-run equilibriums of the previous year could be corrected and adjusted at the speed of 62 % annually which called short-run dynamics, while the other per cent (38%) of correction refers to some others explanatory variables out of the model. The long-run cointegration equation of VECM can be written as follows:

$$\boldsymbol{EC\,t-1} = 1.0000\,\boldsymbol{GDPt-1} + 0.536335\,\boldsymbol{FDIt-1} + 0.203617\,\boldsymbol{GFCFt-1} - 6.953616$$

The outcomes from the long-run model refer to that FDI and GFCF have positive signs, and they are statistically significant with the probability value of 0.02574, 0.0299 correspondingly, as summarised in Table 6.4.

Nevertheless, the figure of the speed of modification is not exactly high because of decreasing interests of investment over the long term as indicated by the neoclassical growth model as well as overseas corporations they do not tend to invest in their profits in the long term that perchance to drive economic growth forward (Li and Liu 2005). Nonetheless, the findings were well-matched with theory, in theoretical suggestions; foreign capitals impulse a growth in the economy due to the spill-over impressions on the accumulation of the capital, the term of technology transmissions and growth in the size of the production (Coe, 1997; Blomstrom, 1994).

Short Run Relationship Results

Results of VECM model in the short term are represented in Table 6.5. The coefficient of the variable DFDI $_{t-1}$ in the short term has a positive impact on RGDP and statistically significant, denoting the existence of short-run causality which runs from DFDI $_{t-1}$ to RGDP, The signifying conclusion totally comes to a line with the philosophy of neoclassical model of growth supporting the viewpoint that FDI inspires economic development via the collective volume of investment that could extend the existing stock of knowledge in the host countries in the way of labour training agendas, new skill acquirement plus transmission, and the primer of advanced administrative achieves and organisational measures (Gezahegne, 2011; Aga, 2014).

On the other hand, the D(GFCF t-1) seems to have a negative sign that reflects the negative impact of domestic investment on the growth of the economy in the short run, and the impact concluded to be non- statistically significant for the probability value more than 0.05.

Table 6: Outcomes of the VECM Model

Short-run Coefficients		
Variables	**Coefficients**	**Prob. value**
D(FDI t-1)	0.559222	0.00908
D(GFCF t-1)	0.110974	0.6778

Source: Author's computation, E-Views 10.

The diagnostic tests are performed in order to confirm the acceptable results that enable us to avoid counterfeiting bias in the results. The results of the diagnostic tests are presented in Table 7.

Table 7: Residuals Diagnostics Results

	Diagnostic test	**Probability value**	**Null Hypothesis H_0**
1	LM	0.9882*	Existing of Serial Correlation
2	Joint White	0.4575*	Existing is Heteroscedasticity
3	Normality Distribution	0.3941*	The residuals ate not normally distributed

Inference: The P. value should be more than 0.05 for the rejection of H_0 .
(*) Indicate that the rejection of H_0
Source: Author's computation, E-Views 10.

The outcomes of diagnostic tests indicate that:

- The probability value of existing serial correlation among residuals was 0.9882, and it was more than 0.05. Thus, the null is rejected, indicating that there is no serial correlation among the residuals.
- The probability value of existing heteroscedasticity of residuals was 0.4575, and it was more than 0.05. Thus, the null is rejected, inferring that there is no heteroscedasticity of residuals.
- The probability value of the normality test was 0.3941, and it was more than 0.05. Thus, the null is rejected, meaning that the residuals are normally distributed.

Conclusions

The paper was an attempt to reveal and investigate the long-run and short-run association between foreign direct investment and economic performance in Brazil from 1980-2019. The real growth rate of GDP was used as a proxy of economic growth plus gross fixed capital formation and inflows of foreign direct investment were used as a proxy of domestic investment and foreign capital flows, respectively. The study employs analysis of time series by means of Johansen cointegration approach and vector error correction model.

All variables were stationary at the first difference by using the ADF test, while the Johnsen cointegration test indicates at least one long-run cointegration relation between FDI and RGDP.

In the long run: the obtained results from an econometric model of error correction proposed that there is significant and positive long-run relation between Investment indicators FDI and GFCF and economic growth. In addition, the long run causality direction of the study suggests unidirectional causality running from investment indicator to economic growth.

In the short term: the empirical findings imply insignificant relation between economic growth and investment indicators as jointly impact (FDI and GFCF), despite the fact that the impact of FDI in associate with the change in economic growth was statistically significant in the short run, in contrast with the domestic investment that was statistically insignificant in explaining the changes in RGDP.

Finally, the short-run dynamics change toward the long-run equilibrium was 62% percent, indicating that 62% per cent on annual will be the speed of correction and adjustment to long-run equilibrium for any deviation that might happen in the previous year.

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