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FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH IN TANZANIA

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Abstract

Tanzania has continued to experience an unprecedented increase in foreign direct investment (FDI) inflows for the past three decades. Using a vector error correction model (VECM) on data on Tanzania for the 1980–2020 period, we find the bi-causality between economic growth and FDI net inflows in the short and long run. The results imply that in Tanzania, FDI is associated with an increase in income; at the same time, economic growth leads to FDI eventually and stirs movements in FDI. We advocate for developing the local productive capacity and providing incentives to foreign firms so that they may provide positive spill overs to other sectors

Keywords: foreign direct investment, economic growth, absorptive capacity, human capital, market liberalization

JEL Classification: JEL-Codes 011, 047, 055

1. Introduction

Most countries have experienced growth in foreign direct investment (FDI) inflows after liberalizing trade (Bekana, 2016; Sehleanu, 2017) and following the adoption of economic reforms (Vogiatzoglou and Nguyen, 2016). Tanzania made massive efforts to make economic reforms and liberalize its trade. Despite lingering structural constraints and deficiencies, these measures have considerably impacted FDI inflows (Gammoudi and Cherif, 2016). Tanzania's net inflows (Figure) increased from US$387.8m in 1990 to US$ 17,152.9 m in 2020, and as per Figure 2, after a drastic drop in the 1980s, FDI flows to Tanzania had an uphill trend in the 1990s and 2000s.

Fig. 1. Tanzania: FDI stock net inflows in US$m, 1990-2020

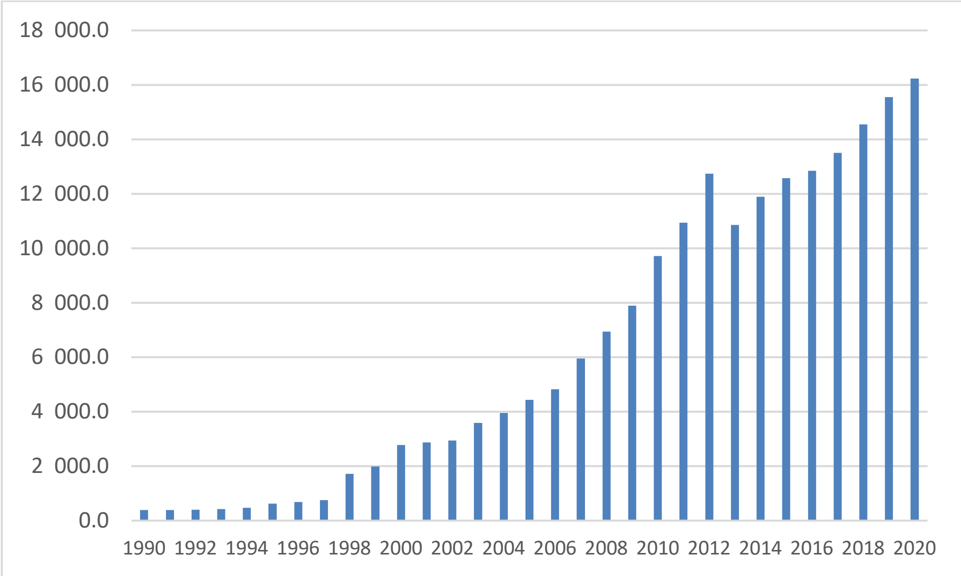
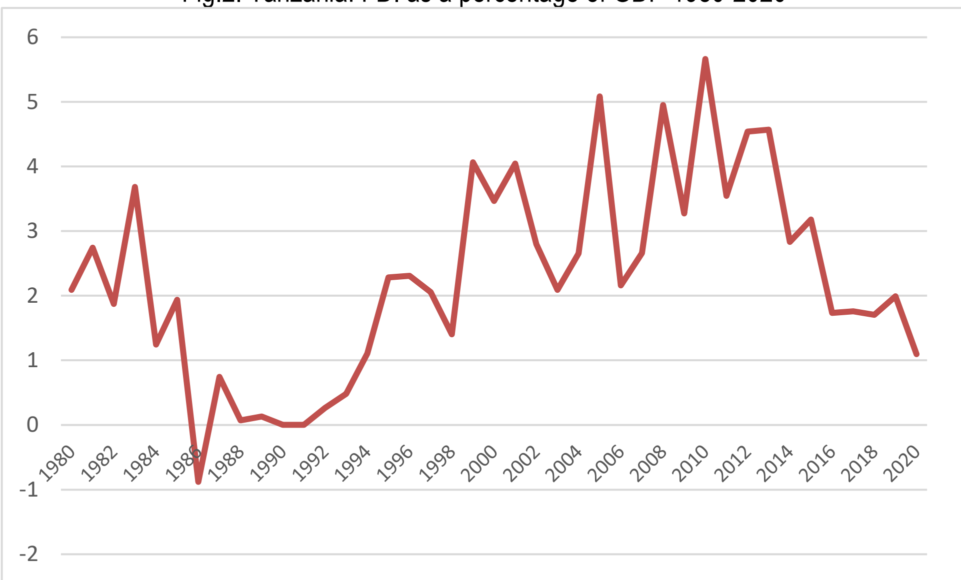


Fig.2. Tanzania: FDI as a percentage of GDP 1980-2020



Using data on Tanzania from 1980 to 2000, this paper applies a vector error correction model (VECM) to establish whether FDI inflow generates synergies in boosting economic growth and whether economic growth (expressed as the annual growth rate of the real GDP per capita) has any influence on FDI net stock inflows in U.S. dollars. The following section discusses the literature review; Section 3 describes the data and the method used in this study, the empirical results are presented and discussed in Section 4, and Section 5 concludes further research.

2. Literature Review

The traditional neoclassical approach, based on Solow's (1956) growth model and the augmented neo-classical growth model of Mankiw *et al.* (1992), that extended the Solow model, emphasizes the importance of investment (in physical capital) as a driver of economic growth. With a lower savings rate, growth is achieved partly through foreign investment; FDI as fixed capital is assumed to directly affect economic growth by contributing to gross fixed capital formation, thus considered an essential supplement for capital and investment shortages. This model, however, suffers from its short-term focus and the diminishing returns to capital that limit growth (Dada and Abanikanda, 2022).

The new or endogenous growth approach based on growth models developed by Lucas (1988), Romer (1986, 1990) and Grossman and Helpman (1991) focuses on the long run and on the internal forces of the economy, particularly those that provide opportunities and incentives to create technological knowledge (Durham, 2004).

FDI plays the role of directly increasing capital accumulation. It also indirectly increases knowledge stock and fosters technological growth in inferior recipient economies (Borensztein *et al.,* 1998; de Mello, 1999; Opoku et al., 2019; Huynh *et al.,* 2021). There is much empirical coverage on the Causality between FDI and economic growth, which can be set into four groups: bi-directional Causality (Akadiri *et al.,* 2020; Amade *et al.,* 2022; Keho, 2015; Mahmoodi and Mahmoodi, 2017); unidirectional Causality from FDI to economic growth (Adam, 2018; Al Faisal and Islam 2022, Babaloa, *et al*., 2018; Ibrahim and Acquah, 2021; Nadar, 2021; Sothan and Zhang, 2017); unidirectional Causality from economic growth to FDI (Adam, 2018; Anh *et al.,* 2021; Antwi and Zhao, 2013); and absence of Causality (Mohammed *et al.,* 2013; Morshed and Hossain, 2020; Onuoha *et al.,* 2018).

Many studies (Hsiao and Hsiao, 2006; Malikane and Chitambura 2017; Ramirez, 2011) have not explicitly focused on Causality; they have produced mixed findings on the relationship between FDI and economic growth. For space reasons, only some studies focusing on Causality are reviewed here.

As for bi-directional causation, Akadiri *et al.* (2019) use 25 African countries from 1980 to 2018 and find that GDP Granger causes FDI and vice versa, consistent with the findings of Zhang (2000), and Menyah et al. (2014). Amade *et al.* (2022), for Nigeria's data from 1981 to 2018, find bidirectional Granger causes between economic growth and FDI. Keho (2015), finds relationships among foreign direct investment, exports, and economic growth in 12 selected sub-Saharan African countries over the period 1970 to 2013; in line with Esso (2010), for Cote d'Ivoire, Gurusamy and Amdu (2010), for India, Dritsaki *et al.* (2004), for Greece and Hsiao and Hsiao (2006), for East and Southeast Asian economies. Mahmoodi and Mahmoodi (2017), looking at the relationship between FDI, exports, and economic growth, two panels (8 from Europe and eight from Asia) of developing countries find in developing European countries bidirectional Causality between GDP and FDI.

As for Causality from FDI to GDP,[1] Adam (2018), examines 3 ECOWAS economies using annual data from 1970 to 2015 and finds Causality running from FDI to economic growth in Guinea Bissau and Sierra Leone, collaborating with the findings of Ajide & Raheem (2016). Al Faisal and Islam (2022), study the impact of foreign direct investment on the economy of Bangladesh using a time series from 1986 to 2018 and found FDI Granger-causing the GDP. Babaloa *et al*. (2018), look at Nigeria from 1980 to 2015 and find a short-run unidirectional causality jointly running from FDI and other variables to economic growth and attribute it to consistent inflows of productive FDI into oil and gas, telecommunication, and manufacturing sectors of the Nigerian economy. Ibrahim and Acquah (2021), re-examine the causal relationships among FDI, economic growth and financial sector development in 45 African countries using data from 1986 to 2016 and find that FDI does Granger-cause GDP growth rate arriving to a conclusion that changes in FDI inflows could be used to predict GDP growth rates in Africa. Their findings are similar to those by Sothan (2017). Nadar (2021), looks at the impact of FDI on GDP per capita in India using data from 1970-2019 and finds a unidirectional causality running from FDI to GDP per capita.[2] Sothan and Zhang (2017), look at the Causality between FDI and economic growth in Cambodia from 1980 to 2014 data and find unidirectional Causality to run from FDI to GDP in the long run; consistent with studies of Ramírez (2000), Fedderke and Room, (2006); Vogiatzoglou and Thi, (2016). All these studies support the FDI-led growth proposition that a higher level of FDI is associated with an increase in income and vice versa and propose that governments design policies attract FDI.

As for Causality from GDP to FDI, Adam (2018), examines 3 ECOWAS economies using annual data from 1970 to 2015 and finds causalities running from economic growth to FDI in Benin. Anh *et al.* (2021), look at the relationships between foreign direct investment, state-owned investment, private investment, import, export, and economic growth in Vietnam from 1985 to 2019 and find that GDP Granger causes FDI. Similarly, a one-way causal relationship is found between GDP, private investment and FDI in the short run. Antwi and Zhao (2013), find that in Ghana, over the period 1980-2010, GDP Granger causes FDI. Thus, GDP leads to FDI in the long run

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[1] FDI is often argued to play a significant role in enhancing economic growth. FDI acts as a catalyst for growth, most especially in the developing, emerging, and underdeveloped countries. FDI drives technology transfer from the developed nations to the developing, emerging, and underdeveloped ones. It facilitates domestic investment and encourages improvement in institutions and facilitates human capital development of the host countries.

[2] As for the for short run he performs the Wald test approach under VECM (Vector Error Correction Model) and finds no causality between FDI and GDP per capita, suggesting that, in the short-run, FDI and GDP per capita does not cause each other.

and can stir movements in FDI. These studies imply that past values of GDP significantly contribute to predicting current FDI.

As for non-causality, Mohammed *et al.* (2013), find no FDI/economic growth causality in the short and long run for Malaysia using 1970 to 2008 data. Morshed and Hossain's (2020), causality analysis of the determinants of FDI in Bangladesh and find that the GDP growth rate does not Granger cause the FDI inflow in Bangladesh, like a few other studies (Asheghian, 2016; Temiz and Gokmen, 2014). Onuoha *et al.* (2018), study the causal relationship between foreign direct investment (FDI) and the macro-economy of selected West African countries from 1990 to 2016 data. They find that no individual or joint Causality runs from independent variables to a dependent variable and vice versa, implying that FDI does not Granger cause economic growth and vice versa. As in Malaysia's case, non-causality results are surprising given that governments have introduced FDI-friendly policies and environments to attract FDI, leading to a general observation that results may indicate poor policies.

3. Methodology

3.1. Model specification

In this paper, we use WDI (World Bank) data covering the period 1980–2020 to find any causal relationship between economic growth, expressed as the annual growth rate of GDP per capita and FDI net stock inflows in Tanzania using the following specification:

$$Y_t = \beta_0 + \beta_1 fdi_t + \varepsilon_t \tag{1}$$

Where Y_t is the annual growth rate of GDP per capita, β_o is the intercept, β_1 is the coefficient of FDI, $\mathcal{E}_t$ is the stochastic error term, and *t* is the time.

3.2. Stationarity test

In our investigation of the Causality between two or more variables, the series must be stationary; that is the series must have no seasonality, a constant mean, a constant autocorrelation structure and tend to return to the long-term trend following a shock. We cannot use time series that are nonstationary; that is those that have a non-constant mean, a non-constant variance, and a non-constant autocorrelation over time (Yuan et al. 2007, cited in Akinwale and Grobler, 2019; Asteriou & Hall, 2011, cited in Mongale *et al.* 2018). If we fit regressions that use nonstationary series our results will be spurious, and their outcomes cannot be used for forecasting or prediction (Granger and Newbold, 1974; cited in Akinwale and Grobler, 2019). Therefore, it is vital to check whether the series is stationary (Mongale *et al.,* 2018). Several tests, including the Augmented Dickey-Fuller (ADF), Phillips-Perron, DFGLS, Levin-Lin-Chu and Im-Pesaran-Shin, are used for testing stationarity, also called unit root tests. Two of these, ADF and Phillips-Perron, are discussed here. The ADF test is an extension of the Dickey-Fuller test which includes extra lagged terms of the endogenous variable to remove autocorrelation in the error term by adding the lagged difference terms of the regressand (Pradhan, 2016 and Makhoba *et al.,* 2019). According to Gujarati and Porter, 2009; as cited in Ilesanmi and Tewari, 2017; the ADF test involves estimating the following specification

$$\Delta y_t = \alpha + (\rho - 1)\, y_{t-1} + \sum\nolimits^{m}_{\rho=1} \delta i \Delta y_{t-\rho+1} + u_t \tag{2}$$

Where α is a constant, ρ is an autoregressive coefficient for the series, y_t is the variable in period t, u_t is the error term with mean zero and variance 1; t the linear time trend and m is the lag order. Two hypotheses are assessed:

H_0: ρ =1 (contain unit, the data is not stationary).

H_a: ρ <1 (do not contain a unit root, the data is stationary).

Phillips and Perron (1988) (cited in Chikalipah and Maikina, 2019) developed a generalization of the ADF test. They used non-parametric statistical methods to take care of the serial correlation in the error terms without adding lagged difference terms (Gujarati, 2004 as cited in Ilesanmi and Tewari, 2017). The Phillips-Perron test can eliminate useless parameters in the cases where errors are not distributed' (Makhoba *et al.,* 2019). It corrects for any autocorrelation and heteroscedasticity in the errors, and as such, it gives robust estimates when the series has serial correlation and time-dependent heteroscedasticity (Odhiambo, 2009; cited in Ilesanmi and Tewari, 2017). Phillips and Perron test is specified as follows:

$$\Delta y_t = \beta_0 + \gamma\, y_{t-1} + \mu_t \tag{3}$$

If the series is nonstationary, differencing is made to make them stationary. The order of differencing at which the series becomes stationary is said to be integrated of order *d,* i.e. *I(d)*; for the first order, it is said to be integrated of order *I (1)*; for the second order, it is said to be integrated with the order *I (2)*. (Fang and Wolski, 2016; cited in Ilesanmi and Tewari, 2017). The results of the stationarity test are presented below.

3.3. Lag length

Also, in our investigation of the Causality between two or more variables, it is crucial to remember that economic processes are dynamic; a dependent variable takes time to respond to the effect of regressors (Scott Hacker & Hatemi, 2008; cited in Chikalipa and Okafor 2019). Failure to capture all past information could entail the estimation framework being mis-specified. Using lags becomes essential and choosing the optimal lag length is vital. Choosing the optimal number of lags avoids losing degrees of freedom, multicollinearity, serial correlation, and misspecification errors. A rule of thumb is to have between 1 and 2 lags for annual data. We multiply the lags across periods by 4 or 12, i.e., between 4 and 8 lags for quarterly data and between 12 and 24 lags for monthly data. However, econometric packages (Akaike's Information Criterion (AIC), Hannan and Quinn Information Criterion (HQIC) and Schwarz's Bayesian Information Criterion (SBIC)) are available and are very useful in estimating the appropriate (optimal) number of lags. These are employed here to choose the optimal lag length for our series, and results are presented further down.

3.4. Cointegration test

Since it has been established from the stationary test in the previous section that the series is stationary of order one, we proceed to do a cointegration test to establish whether a long-run relationship exists between or among variables (Ilesanmi and Tewari, 2017). Cointegration indicates that time series move together eventually and that the error term resulting from the linear combination of time series quantifies the deviation of the time series from their typical long-run relationship, which can be used to predict their future values (Granger, 1986; cited in Akinwale and Grobler, 2019). We use the Johansen test (also could use the Engle-Granger test) to determine the long-run relationship between economic growth and FDI in Tanzania (Johansen, 1991; Johansen and Juselius, 1990; both cited in Chikalipah and Makina, 2019). Following Makhoba *et al.* (2019), the equations for the trace and maximum eigenvalue test can be written in the following form:

$$\lambda trace(r) = -T \sum_{i=r+1}^{n} In\ (1 - \lambda_i) \quad (4)$$

$$\lambda max\ (r, r+1) = -T\ In\ (1 - \lambda_{r+1}) \quad (5)$$

Where equation (4) represents the trace test and (5) is the maximum eigenvalue test, λ represents the estimated value of the i^{th} value of the long-run coefficient matrix. T is the number of observations, and r represents the number of cointegrating vectors. The $\lambda trace$ statistic probes the null hypothesis that cointegrating relationships are $r = r^* < k$ against the alternative that cointegrating vectors are $r = k$. The λmax statistic tests the null of that is the same as the trace test against the alternative of that cointegrating relationships are $r = r^* + 1$. The testing for the number of cointegrating vectors is sequential for $r^* = 1,2$. The first number of cointegrated vectors rejected by the null hypothesis becomes the estimate of r. Furthermore, the trace test is considered superior to the maximum eigenvalue test because it does not compromise the degrees of freedom, and skewness and kurtosis are more robust under trace statistic' (Österholm and Hjalmarsson, 2007; cited in Makhoba *et al.,* 2019). Two hypotheses are evaluated:

$H_{0:}$ no cointegration

H_1: $H_{0:}$ is not true

We reject H_0 at a 5% critical value if the trace statistic is lower than the critical values; and take our results to mean that there is cointegration. If there is cointegration, it means that first, the series are related and can be combined linearly. Second, even if there are shocks in the short run, which may affect the movement in the individual series, they would converge with time (in the long run). Third, we estimate both short and long-run models. Fourth if there is no long-run cointegration, then we do not conduct a long-run relationship (VECM) but only a short-run (VAR). Our results are displayed in the results section.

3.5. Granger causality test

Given that there is a long-run relationship between economic growth and FDI for Tanzania, we run the vector error correction model (VECM) to know the direction of Causality in both the long and short run (Granger, 1988; as cited in Akinwale and Grobler, 2019). We assume that all the variables are not exogenous and are also premised on the fact that the independent variables' past values explain the dependent variable and the dependent variable's past values (Soriyan and Ozturk, 2015, as cited in Akinwale and Grobler, 2019). Following Akinwale and Grobler (2019), the two equations for our two series are stated thus:

$$\Delta y_t = \theta_1 + \sum^{p} i=1 \, [\alpha_{1i}\Delta y_{t-i} + \sum^{k-1}\beta_{1i}\Delta fdi_{t-j}] + \mu_1 EC_{t-1} + \varepsilon_{1t} \quad (6)$$

$$\Delta fdi_t = \theta_2 + \sum^{p} i=1 \, [\alpha_{2i}\Delta y_{t-i} + \sum^{k-1}\beta_{2i}\Delta fdi_{t-j}] + \mu_2 EC_{t-1} + \varepsilon_{2t} \quad (7)$$

'Where θ is a constant term, α and β are the coefficients of the lagged regressors. These parameters represent the short-term impacts of the explanatory series on the dependent series. E.C.$_{,t-l}$ is the lagged value of the residuals from the cointegration regression of the dependent variable on the regressors containing long-run information derived from the long-run cointegration relationship. ε_{it} is the residuals (stochastic error term), often impulse or innovations or shocks). The F-test of joint significance of these lagged terms constitutes the short-run Granger causality. For instance, if all the coefficients β in Eq. (7) are jointly significant, then Causality flows from FDI to economic growth in the short run. μ is the symbol associated with the error correction term E.C. which represents the adjustment speed towards the long-run equilibrium. The significance of μ implies that past equilibrium errors are essential determinants of the current outcomes. For example, if the coefficient μ is significant in Eq. (7), then FDI Granger causes economic growth in the long term. Similarly, the analysis above applies to the system's remaining equations (Akinwale and Grobler, 2019).

The result of the short-run Causality is shown in Table 3.

4. Results

4.1. Stationarity test results

Table 1 below shows that Y is stationary both at the level *I*(0) both for ADF and Phillips-Perron) and at first differences, *I*(1), supported by a lower R^2 (0.310 in our spurious regression model) than a Watson statistic (2.185) implying the series are stationary at level. FDI is nonstationary at the level for both ADF and Phillips Perron tests but stationary at first in both ADF and Phillips Perron. We adopt integration results in order one *I*(1) at the difference.

Table 1: Unit Root Test Results

TESTS	*Y*	*FDI*
ADF		
Levels	-0.860***[0.002]	-0.181* [0.077]
Differences	-2.273***[0.000]	0.996***[0.001]
P.P.		
Levels	-6.581***[0.000]	-1.843 [0.684]
Differences	15.075***[0.000]	6.091*** [0.000]

Notes: *** denotes significance at 1% and *denotes significance at 10%, *p* values in parentheses
Source: Estimations by author.

4.3. Lag length results

We adopt the lag length of one lag as suggested by all three tests of Akaike's Information Criterion (AIC), Hannan and Quinn Information Criterion (HQIC) and Schwarz's Bayesian Information Criterion (SBIC) (Table 2).

Table 2. Lag length results

Lag	0	1	2	3	4
AIC	2.135	-1.49255*	-1.347	-1.401	-1.265
HQIC	2.165	-1.40045*	-1.193	-1.186	-0.988
SBIC	2.222	-1.23132*	-0.911	-0.791	-0.481

The values with an asterisk signify the optimal lag length for a particular information criterion.
Source: Estimations by author.

4.4. Cointegration test results

The results (Table 3) show that the null hypothesis of no cointegrating vector (r = 0) is rejected by both trace (15.788>15.41) and the maximum eigenvalue (14.439>14.07) statistic at a 5% level of significance. Nevertheless, the null hypothesis of no cointegrating vector (r = 1) is not rejected by both trace and the maximum eigenvalue (1.350< 3.76) at a 5% level of significance. Therefore, this model has a maximum of one cointegrating equation, indicating a long-run relationship between economic growth and FDI for Tanzania.

Table 3: Results of the cointegration test

Rank	Trace	Critical value at 5%
0	15.788	15.41
1	1.350*	3.76
2		
	Maximum	Critical value at 5%
0	14.439	14.07
1	1.350	3.76
2		

Notes:
Trace- and Maximum-eigenvalue test indicates one cointegrating at the 0.05 level
* Denotes rejection of the null hypothesis at the 0.05 level
Source: Estimations by author.

4.5. Causality test results

Table 4 reports a long-run causality from FDI to economic growth in the ΔY equation and from Y to FDI in the ΔFDI equation. As expected, the error correction term for the ΔY equation is negative, but the error correction term for the ΔFDI equation is positive (not as expected); the terms are significant in both equations. The results show that each of the variables has bidirectional Causality overall.

Table 4: Results of the granger causality test

Causality	The long-run Error correction term	Short run Chi-square
ΔY equation	-2.161***	
ΔFDI		196.33 ***
ΔFDI equation	0.331***	
ΔY		24.94 ***

Note: *** Significant at 1% level
Source: Estimations by author.

Results of the VECM model

$$\Delta y_t = \theta_1 + \sum^{p} i{=}1\ [\alpha_{1i}\Delta y_{t-i} + \sum^{k-1}\beta_{1i}\Delta fdi_{t-j}] + \mu_1 EC_{t-1} + \varepsilon_{1t} \quad (8)$$

$$= -0.0013 + 0.3943 - 0.0385 - 2.1626$$

$$\Delta fdi_t = \theta_2 + \sum^{p} i{=}1\ [\alpha_{2i}\Delta y_{t-i} + \sum^{k-1}\beta_{2i}\Delta fdi_{t-j}] + \mu_2 EC_{t-1} + \varepsilon_{2t} \quad (9)$$

$$= -\ 0.0082 - 0.1723 - 0.4236 + 0.3305$$

The adjustment term -2.1626 is statistically significant at the 1% level, suggesting that the previous year's errors (or deviation from the equilibrium) for economic growth are corrected for within the current year at the convergence speed of 216.26%. Similarly, the adjustment term 0.3305 is statistically significant at the 1% level, suggesting that the previous year's errors (or deviation from the equilibrium) for FDI are corrected for within the current year at the convergence speed of 33.05%.

The long-run model is

$$ECT_{t-1} = [y_{t-1} - \beta fdi_{t-1}] = [1.000y_{t-1} - 0.3859fdi_{t-1} + 0.0114] \quad (10)$$

Here GDP is the dependent variable. On average, eventually, FDI positively impacts economic growth in Tanzania, *ceteris paribus.* But the coefficient (-0.3859) is not statistically significant ($p = 0.125$)

4.5. Diagnostic test

4.5.1. Autocorrelation

We have established that our model has no autocorrelation, as the coefficients are significant at 5%.

Table 6: Results of the autocorrelation test

lag	Chi^2	df	Prob>Chi^2
1	1.6236	4	0.80454 **
2	5.0558	4	0.28162 **

Note: ** Significant at 5% level
Source: Estimations by author.

4.5.2. Normality

However, our model failed the normality test (Table 7): errors are not normally distributed as the coefficients are insignificant at 5% for each equation or the overall model.

Table 7: Jarque-Bera test results

Equation	Chi^2	df	Prob>Chi^2
D2-yc	6.751	2	0.03421
D-fdist	16.331	2	0.00028
ALL	23.082	4	0.00012

Note: ** Significant at 5% level
Source: Estimations by author.

4.5.3. Stability

Results in Table 8 show that the VECM specification imposes a unit modulus, and therefore, the model is stable.

Table 8: Eigenvalue stability condition

Eigenvalue	Modulus
1.000	1.000
-0.4502189 + 0.5165127i	0.685188
-0.4502189 + 0.5165127i	0.685188
0.07689524	0.076895

Source: Estimations by author.

5. Conclusion

Theoretically, FDI is expected to close the savings gap or lead to capital accumulation by increasing current savings, thus increasing economic growth in host countries where multinational companies make investments. Besides, it can be asserted that FDI plays an essential role in increasing economic growth by creating positive externalities in the local market, increasing the productivity of physical capital, providing productivity gains, creating employment opportunities, and leading to technological development and its spread. Moreover, FDI increases the quality of the human capital of a host country's know-how and management skills of local firms. Using a vector error correction model (VECM) on data on Tanzania for the 1980–2020 period, we find the bi-causality between economic growth and FDI net inflows in the short and long run. Given this, the policy measures may include the government providing incentives to foreign firms so that they may provide positive spillovers to other sectors while developing the local productive capacity to use the spillovers effectively. From these results, also we provide suggestions for further research. First, regarding the practical research design, there is a need to consider differences in technological development and proficiency levels across Tanzania regions. Second, one should be cautious about selecting proxies for economic growth and FDI. A poor choice of proxies may lead to misleading conclusions and, thus, inaccurate policy implications. Third, the length of the time series may influence results.

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