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An empirical analysis of the relationship between FDI and economic growth in Tanzania

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6

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DEVELOPMENT ECONOMICS | RESEARCH ARTICLE An empirical analysis of the relationship between FDI and economic growth in Tanzania

Benedict Huruma Peter Mwakabungu^{1*} and Jignesh Kauangal²

Abstract: This study examines causal relationship between foreign direct investment (FDI) inflows and economic growth in Tanzania during 1990–2020. As financial development and trade were not incorporated in extant studies, we included them as intermediate variables because of their intermediation role in this study. FDI inflow is considered an important economic growth catalyst in developing economies. Neoclassical growth theories claim that it enhances economic growth by augmenting capital stock and technology. According to the neoclassical theories, FDI does not enhance the long-run growth rate but instead is related to the level of output. However, empirical evidence is rather mixed, with some supporting the neoclassical theoretical views on economic growth, while others opposing them. We employ the autoregressive distributed lag model and Granger causality tests to analyze the relationship. The results indicate that there exists a long-run relationship among the variables under considerations in Tanzania. Furthermore, the finding reveals positive and statistically significant unidirectional causality running from FDI inflow to economic growth in Tanzania in the long and short run. Hence, we



Benedict Huruma Peter Mwakabungu

ABOUT THE AUTHORS

Benedict Huruma Peter Mwakabungu is a lecturer at the College of Business Education Dodoma, in Tanzania. He is presently pursuing a Ph.D. in Economics at Gujarat University in India. His areas of interest include development economics, financial economics, applied econometrics, and tourism economics. This study contributes to wider knowledge in the fields of development economics, financial economics, and applied econometrics. It provides insights into the connection between foreign direct investment and economic growth that is vital for national development, particularly in the developing economies such as Tanzania.

Jignesh Kauangal (Ph.D., M.Phil. in economics) is a faculty at Shree Narayana College of Commerce, Ahmedabad in India. He has been incharge of the college since its inception. He has more than 20 years of teaching experience and has presented and published papers nationally and internationally. His major research area is industrial economics.

PUBLIC INTEREST STATEMENT

In most developing economies, a shortage of capital for investment continues to be a major obstacle to economic growth and national development. This can be attributed to deficient savings, low level of technology, and insufficient managerial skills. However, foreign direct investment (FDI) is considered an important driver of economic growth in developing countries as it augments the stock of capital, managerial skills, and technology. The current study examines the relationship between FDI and economic growth in Tanzania during 1990–2020. This study has empirical and methodological contributions in the field. The hypotheses were analyzed within the autoregressive distributed lag model because of the small sample size. The findings show that FDI boosts economic growth in Tanzania irrespective of the time frame. Therefore, to attain the desired economic progress, the Government of Tanzania should focus on creating a business atmosphere that would attract foreign investors to the country.





© 2023 The Author(s). Published by Informa UK Limited, trading as Taylor & Francis Group. This is an Open Access article distributed under the terms of the Creative Commons Attribution License (http://creativecommons.org/licenses/by/4.0/), which permits unrestricted use, distribution, and reproduction in any medium, provided the original work is properly cited. The terms on which this article has been published allow the posting of the Accepted Manuscript in a repository by the author(s) or with their consent. conclude that Tanzania should emphasize FDI-led growth policies to enhance economic growth to realize the desired economic objectives.

Subjects: Economics and Development; Economics; Finance

Keywords: Foreign direct investment; causal relationship; economic growth; Granger causality; financial development; trade

1. Introduction

The steady inflow of foreign direct investment (FDI) into developing countries began in the early 1990s, following the acceptance of trade openness policies in the 1980s (Sakyi et al., 2015). The flow of FDI attracted the attention of many scholars to explore the causal link between FDI and economic growth in the host countries (Musibau et al., 2019; Sothan, 2017; Taylor, 2020). An investment is considered an FDI if a foreign firm owns 10% or more of the voting power of a firm in a host country (Rahman, 2015; Siddikee & Rahman, 2021). In developing countries, where capital deficit is among the main hindrances to economic growth, attracting foreign investments is an important goal for policymakers (Abdul Bahri et al., 2019). Therefore, FDI in developing economies is viewed as a key driver of economic growth through favorable effect on income generation from capital inflows, advanced technology, management skills, and creation of employment opportunities (Agrawal, 2015; Tintin, 2012). FDI can help reduce unemployment problems in the country. High and continued unemployment is a sign of inefficiencies of resource allocation which threatens economic growth in a country (ILO, 2022). In Tanzania, for example, over the years, FDI has been an important driver of economic growth. Nevertheless, some empirical evidence from extant studies (Li et al., 2013; Udemba et al., 2022; Udemba, 2019a) contends the ability of FDI inflow to promote economic growth in the recipient countries (Rjoub et al., 2017). The economic growth along with reduced inequalities is a part of a comprehensive set of sustainable development goals (SDGs) that must be realized globally by the end of 2030 (Guang-wen et al., 2022; UNDP, 2023). The underlying targets of economic growth and reduced inequalities under the SDGs focus on sustaining per capita economic growth, attaining higher levels of economic productivity through growth of technology, supporting progress-oriented policies, enhancing the capacity of domestic financial institutions, and encouraging financial flows in developing and least developed countries. The neoclassical growth models postulate that the long-run growth rate in the host country is determined by either savings rate (Domar, 1946; Harrod, 1939) or technical development rate, as proposed by Solow (1956). However, while FDI promotes economic growth in developing countries, the empirical evidence from extant studies continues to report mixed results regarding the relationship between the FDI inflows and economic growth. Moreover, to validate the FDI-led growth hypothesis, most empirical studies have focused on Asia and Latin America, affording African countries, particularly Tanzania with little country-specific studies (Odhiambo, 2011). Furthermore, most previous studies on this subject have three major limitations: First, several empirical studies have been based on a bivariate analysis, which may be biased due to the omission of one or more important variables that affect both FDI inflows and economic growth (Odhiambo, 2021). The weakness of a bivariate Granger causality model is well documented in the literature (Maziarz, 2015); therefore, the introduction of one or more other variables in the bivariate model between two variables may not only alter the magnitude of the results but also alter the direction of causality between the two variables. Second, some previous studies have used the maximum likelihood test based on S. Johansen (1988) and J. Johansen and Juselius (1990) that may not be appropriate for a small sample size (Narayan & Smyth, 2005). Third, extant studies that have over-relied on cross-sectional data cannot adequately address the country-specific issues due to financial and economic variations among countries (Baiashvili & Gattini, 2020; Gupta et al., 2022; Odhiambo, 2011).

To enhance economic growth, reduce inequalities, strengthen financial flows, and sustain economic growth in developing countries, the current study considering the objectives of SDGs (SDG8 and SDG10) investigates the relationship between FDI inflows and economic growth in Tanzania using annual data during 1990-2020 (UNDP, 2023). To fulfill this mission, we have included financial development (FD) and trade as intermediate variables in our model to form a system of multivariate causality analysis, as these variables aid FDI inflows to the receiving countries (Ayenew, 2022; Sultanuzzaman et al., 2018). The development of the financial sector, for example, opens up FDI inflow and increases banking participation (Shahbaz et al., 2018). However, FD goes hand in hand with trade. Hence, the objective of this study is to examine whether, in the recent decades, FDI inflows in Tanzania have significant long-run connection with economic arowth and to explore the nature and direction of the relationship in the short and long run. We aim to answer the following questions: does the FDI inflow have a significant long-run relationship with economic growth in Tanzania? What is the nature and direction of the relationship in the short and long run during 1990-2020? We analyzed the hypotheses within the autoregressive distributed lag (ARDL) model framework. The ARDL technique has three major advantages compared with the traditional cointegration methods. First, it can be applied when the variables under the study are integrated either of order one, order zero, or mixed. Second, the ARDL test is relatively more efficient in the case of small and finite sample data size. Third, by applying the ARDL technique, the long-run unbiased estimates of the model are attained (B. N. Adeleye, 2020; Kripfganz & Schneider, 2016; N. Adeleye et al., 2018; Shrestha & Bhatta, 2018).

This study contributes to the extensive literature in theory based on FDI inflow and the economic growth of Tanzania. Several empirical studies have investigated the linkage among FDI inflow, FD, trade, and economic growth within the ARDL framework separately with other economies (Abidin et al., 2015; Duarte et al., 2017; Rani & Kumar, 2018; Salahuddin & Gow, 2016). Unlike the earlier studies, the current study extends a new dimension of knowledge in the literature by exploring the link among FDI inflows, FD, trade, and economic growth jointly in the context of Tanzania during 1990–2020. This period represents sustained economic growth along with tremendous flow of FDI in the country, which led the country to attain lower middle-income country status in July 2020 (Battaile, 2020). This development motivated us to conduct this empirical research. To the best of our knowledge, this is the first study that examines the link among FDI inflows, FD, trade, and economic growth jointly inflows, FD, trade, and economic growth along with the country status in July 2020 (Battaile, 2020). This development motivated us to conduct this empirical research. To the best of our knowledge, this is the first study that examines the link among FDI inflows, FD, trade, and economic growth jointly in Tanzania in recent times using modern time-series methods.

The rest of the study is structured as follows: Section 2 discusses the literature review, and Section 3 provides materials and methods. Section 4 comprises results and discussion, and Section 5 offers conclusion and policy implications.

2. Literature review

Worldwide FDI inflows represent a major source of external funding for capital-intensive projects in a recipient country (Agrawal, 2015). Developing countries such as Tanzania have taken significant steps in creating conducive environments for attracting foreign capital. FDI boosts capital accumulation in a host country by introducing new inputs and technologies (Sultanuzzaman et al., 2018). This helps to bridge the resource (capital) gap, as most developing countries have low savings rates, required to finance investment projects for economic growth and development (Ababio et al., 2022). Neoclassical economic growth theories have explained the link between FDI and economic growth in a recipient country. They argue that countries grow economically through efficient markets, promotion of free trade, reduction or elimination of foreign investment restrictions, and removal of government regulations that affect smooth market actions (Abdu, 2013). Conventionally, economic growth was perceived to be largely driven by the expansion of capital and labor stocks (Murshed, 2022). However, there are contradictory views on the effects of FDI inflows on the economic growth of a recipient country. While the FDI-led growth hypothesis contends that FDI inflows cause economic growth in developing countries through increased capital stock and transfer of technology, others are questioning the potential ability of FDI in promoting economic growth in host countries (Rjoub et al., 2017).

Empirical evidences (Nabi et al., 2022; Rao et al., 2023; Fadhil & Almsafir, 2015; Salim et al., 2015 for Malaysia; Doku et al., 2017 for Africa; Dritsaki et al., 2004 for the Hellenic Republic of Greece; Reza et al., 2018 for the People's Republic of Bangladesh; Mohanasundaram & Karthikeyan, 2015 for India; Sunde, 2017 for South Africa; Ibrahim & Acquah, 2021 for 45 African countries; Joshua et al., 2021; Udemba, 2019b; Olorogun et al., 2020 for Nigeria; Sultanuzzaman et al., 2018 for Sri Lanka; Marobhe, 2015; Baiashvili & Gattini, 2020 based on 111 countries; Ciobanu, 2021 for Romania; Nguyen, 2020 for Vietnam) support the FDI-driven growth hypothesis. Nevertheless, for FDI to yield any accrued benefits to the host countries, the host countries must endeavor to remove bureaucratic issues that may limit the linkage between foreign firms and their local host and ensure strong financial market systems (Aziz, 2020; Fadhil & Almsafir, 2015; Rjoub et al., 2017; Udemba, 2021).

Similarly, in the inquiry by Belloumi (2014) for the case of Tunisia, the bounds tests suggest that the variables of interest are cointegrated in the long run when FDI is the dependent variable. However, there is no significant Granger causality from FDI to economic growth in the short run. Ioan et al. (2020) concluded that FDI inflow played a major role in augmenting economic growth of Central and Eastern European countries (Bulgaria, the Czech Republic, Estonia, Hungary, Lithuania, Latvia, Poland, Romania, Slovakia, and Slovenia). They asserted that the financial sector steers the process of realizing viable economic growth across Central and Eastern European countries. Therefore, FD is an important factor that enables FDI inflow to transcend the economic growth of a host country (Alam et al., 2022). However, these countries feature characteristics of emerging markets as opposed to developing economic growth using three common indicators of financial development (i.e. broad money, deposit/GDP and domestic credit to the private sector). It was revealed that in the long run, all indicators of financial development show a positive and significant impact on economic growth.

Contrary to the FDI-led growth hypothesis, it is the economic growth that leads to FDI inflow in a recipient country (Odhiambo, 2021 for Kenya; Sarker & Khan, 2020 for the People's Republic of Bangladesh; Stamatiou & Dritsakis, 2014 for Greece; Le et al., 2021 for Vietnam; Ahmad et al., 2018 for five ASEAN countries [Indonesia, Malaysia, the Philippines, Singapore, and Thailand]; Sabharwal, 2019 for MINT countries [Mexico, Indonesia, Nigeria, and Turkey]). Meanwhile, other scholars (Lema & Dimoso, 2011 for Tanzania; Ibrahim & Acquah, 2021 for 45 African countries when GDP per capita was a measure of economic growth; Iqbal et al., 2023; Gibogwe et al., 2022) in their investigation on the relationship between FDI inflow and economic growth found bidirectional causality, which meant that FDI inflow caused economic growth and then growth-led FDI boosted FDI inflow in a host country. Specifically, FDI inflow and economic growth are interdependent. However, other findings (Jayachandran & Seilan, 2010 for India; Aga, 2014 for Turkey; Sharma & Kaur, 2013 for India and the China; Louzi & Abadi, 2011 for the Hashemite Kingdom of Jordan; Shawa & Shen, 2013 for Tanzania; Velnampy et al., 2014 for Sri Lanka; Siddikee & Rahman, 2021 for the People's Republic of Bangladesh and Agblovor et al., 2016 for sub-Saharan Africa) suggest no causality in either direction between FDI and economic growth. They support the neutrality hypothesis. Yimer (2023) examined the effects of FDI on economic growth in Africa; their results showed a positive and statistically significant effect of FDI on growth in the long run in investmentand factor-driven economies. However, its short-run effect was nonsignificant in fragile economies in the short and long run. Different methodologies were applied by different scholars across countries over different timeframes. Additionally, mixed results were obtained in the study conducted by Mustafa (2023) in four Asian countries (i.e., India, Pakistan, Sri-Lanka, and Bangladesh). The results of the study support growth-led FD, growth-led FDI, and growth-led trade openness hypotheses for India; for Pakistan, the results support growth-led FD and growth-led FDI. In the case of Sri Lanka, the results support the FDI-led growth and trade openness-led growth hypotheses, and the results do not support any kind of causal relationship among the variables in Bangladesh in the short run. Meanwhile, in Cote d'Ivoire Keho (2017) reported that trade openness has positive effects on economic growth both in the short and long run.

Although the debate on the relationship between FDI inflow and economic growth has attracted numerous empirical studies, most studies have focused mainly on Asia and Latin America (Odhiambo, 2011). African countries have either limited coverage or none. Studies like this in countries such as Tanzania are almost nonexistent. Even where such studies have been conducted, the empirical findings on the direction of causality between FDI inflow and economic growth have been largely inconclusive. Therefore, the current study aims to explore the relationship between FDI inflow and economic growth in Tanzania during 1990–2020 by incorporating FD and trade as intermediate variables because of their role in the FDI—economic growth model. Reportedly, no study in the Tanzanian context has jointly incorporated the two intermediate variables while analyzing FDI inflow—economic growth relationship. FD opens up FDI and increases banking participation among other benefits (Shahbaz et al., 218). Nevertheless, FD goes hand in hand with trade openness. In accordance with the neoclassical economic growth theories, this study posits the following hypotheses:

H1: There is a long-run relationship between FDI inflow and economic growth in Tanzania.

H2: In the long run, FDI inflow causes economic growth in Tanzania.

H3: In the short run, FDI inflow causes economic growth in Tanzania

3. Materials and methods

3.1. Data overview

We obtained yearly data on Tanzania's GDP, FD, trade (TRD), and net FDI during 1990–2020 from World Bank Group and OECD National Accounts data files. Data on GDP (i.e., a measure of economic growth) are in percentages of yearly GDP growth. FD, TRD, and FDI data are in percentages of yearly GDP. In the recent decades (1990–2020), Tanzania has experienced surging FDI inflows along with sustained GDP growth that led the country to attain lower middle-income country status in July 2020 (Battaile, 2020; World Bank, 2022).

Figure 1 shows that all the variables exhibit an up and down trend; however, GDP, FDI, and FD have a steady trend compared to TRD. This is the primary sign of non-stationarity series at level.

The descriptive statistics in Table 1 show that the values of standard deviations for GDP and FDI exhibit little variation of no greater than ± 2 during the sample period compared with the remaining variables in the data set. However, the skewness for all the variables is near 0, and their kurtoses are <3, implying a relatively smooth trend in the data set variables.



Notes: GDP = gross domestic product; FDI = foreign direct investment; FD = financial development; and TRD = trade

Source: Drawn by the authors using EViews[®] 12



Table 1. Descripti	ve statistics of the	variables		
Variables	GDP	FDI	FD	TRD
Mean	5.205109	2.573369	9.605513	42.11872
Standard deviation	2.028551	1.510036	3.950234	12.07433
Kurtosis	2.579493	2.342099	1.801994	2.211177
Skewness	-0.842405	0.169309	-0.553694	0.317164
Observation	31	31	31	31

Note: GDP = gross domestic product; FDI = foreign direct investment; FD = financial development; and TRD = trade. Source: Authors' computation via $EViews^{(0)}$ 12.

3.2. Model of study

In the literature, scholars have applied various econometric models to examine the short- and long-run relationship between time-series variables. The ordinary least squares (OLS) method is mostly used, and most researchers have recently applied the ARDL model developed by Pesaran et al. (2001) because of its advantages. ARDL is an OLS model used for series integrated either of order zero, I (0) or order one, I (1) or mixed but does not work for order two, I (2) series (Shrestha & Bhatta, 2018). This ARDL model produces robust results and performs better for a study with a small sample. This study has 31 observations and thus falls under a small sample. Endogeneity is less of a problem with ARDL because all variables are assumed to be endogenous. The model does not require all the variables to be integrated in the same order (Nkoro & Uko, 2016). It can be applied whether variables are integrated of order zero, order one, or mixed but cannot be applied for order two, I (2), or higher. Stationarity test is essential to ensure that no variable is stationary at order two, I (2), or charge over time (Palachy, 2019).

We employed the augmented Dickey—Fuller (ADF) and Phillips–Perron (PP) for the stationarity test. However, before the stationarity test, the optimal lag for each variable in the dataset must be calculated.

3.2.1. Lag selection

To determine the optimum order of lag length for this study, we applied the vector autoregressive model based on the Akaike information criterion (AIC) because AIC has exclusive power when estimating the optimal lag length for small samples (Islam et al., 2018). In Table 2, lag 1 is for GDP Equation, and lag 2 is for FDI, FD, and TRD Equations.

The level of integration for each variable is ascertained by testing the null against the alternative hypothesis. If the p-value of the ADF and PP test statistics is <0.05, the series is stationary or has no unit root. Otherwise, the series is nonstationary.

Table 3 reports the results of the stationarity test; we find that all variables are stationary at the first difference and none of them are integrated at order two or higher.

3.2.2. ARDL—bounds tests for cointegration

The ARDL model, as suggested by Pesaran et al. (2001), is stronger than the traditional cointegration tests because the approach tends to yield strong and reliable results for a small sample (Narayan & Smyth, 2005). Moreover, it provides unbiased long-run estimates even when some regressors are endogenous (Odhiambo, 2021). Therefore, we used the ARDL bounds testing approach to estimate the cointegration among the variables.

IdDIE 2. VECTOF DU	luoregressive lug ord	ier selection pased o					
Endogenous	Lag	LogL	LR	FPE	AIC	SC	Å
GDP	Ļ	-47.88114	23.50753*	1.826535*	3.440078*	3.534375*	3.469611*
	2	-47.84415	0.066330	1.952984	3.506493	3.647937	3.550791
FDI	-	-45.29484	9.191262*	1.528146	3.261713	3.356009	3.291245
	2	-43.34927	3.488608	1.432422*	3.196501*	3.337946*	3.240800*
FD	Ţ	-51.34030	53.66946*	2.318646	3.678641	3.772937*	3.708174
	2	-50.10857	2.208604	2.283082*	3.662660*	3.804105	3.706959*
TRD	Ļ	-93.65947	37.22190	42.92898	6.597205	6.691501	6.626737
	2	-89.53947	7.387221*	34.63665	6.382047*	6.523491*	6.426345*
Note: * indicates lag or	der selected by the criter	ion at the 5% significance	e level. LR= sequential m	odified LR test statistic; I	PE = final prediction error	; AIC = Akaike information	rcriterion; SC = Schwarz

information criterion; HQ = Hannan-Quinn information criterion. GDP = gross domestic product, FDI = foreign domestic investment, and TRD = trade.
Source: Authors' computation via EViews [®] 12

Variables		Augmented Dickey-	-Fuller (ADF) test	Phillips- (PP)	-Perron test	Order of	Stationarity
tested	Optimal lag (AIC)	t-statistic	p-Value	t-statistic	p-Value	integration	status
GDP	Ţ	-6.080365	0.0001*	-6.643668	0.0000*	I(1)	Stationary
FDI	2	-6.164722	0.0001*	-12.04908	0.0000*	I(1)	Stationary
FD	2	-4.446852	0.0073*	-5.529649	0.0060*	I(1)	Stationary
TRD	2	-3.446061	0.0173**	-3.533777	0.0141**	I(1)	Stationary

Table 3. Results of unit root (stationarity) status

Note: AIC = Akaike information criterion; GDP = gross domestic product; FDI = foreign direct investment; FD = financial development; and TRD = trade.

*, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively. The truncation lag in the PP test was based on bandwidth 3 (Newey—West) using Bartlett kernel Source: Authors' computation via EViews[®] 12.

$$D(GDP)_{t} = \alpha_{0} + \sum_{i=1}^{P} \alpha_{1i} D(GDP)_{t-i} + \sum_{i=0}^{q_{1}} \alpha_{2i} D(FDI)_{t-i} + \sum_{i=0}^{q_{2}} \alpha_{3i} D(FD)_{t-i} + \sum_{i=0}^{q_{2}} \alpha_{3i} D(FD)_{t-i} + \alpha_{1i} D(FD)_{t-i} + \alpha_{2i} D(FDI)_{t-i} + \alpha_{2i} D$$

$$D(FDI) = \beta_0 + \sum_{i=1}^{p} \beta_{1i} D(FDI)_{t-i} + \sum_{i=0}^{q^1} \beta_{2i} D(GDP)_{t-i} + \sum_{i=0}^{q^2} \beta_{3i} D(FD)_{t-i} + \sum_{i=0}^{q^3} \beta_{4i} D(TRD)_{t-i} + \beta_{5} (FDI)_{t-i} + \beta_{6} (GDP)_{t-i} + \beta_{7} (FD)_{t-i} + \beta_{8} (TRD)_{t-i} + \mu_{2t},$$
(2)

$$D(FD)_{t} = \delta_{0} + \sum_{i=1}^{p} \delta_{1i} D(FD)_{t-i} + \sum_{i=0}^{q^{1}} \delta_{2i} D(FDI)_{t-i} + \sum_{i=0}^{q^{2}} \delta_{3i} D(GDP)_{t-i} + \sum_{i=0}^{q^{3}} \delta_{4i} D(TRD)_{t-i} + \delta_{5}(FD)_{t-i} + \delta_{6}(FDI)_{t-i} + \delta_{7}(GDP)_{t-i} + \delta_{8}(TRD)_{t-i} + \mu_{3t}, \text{ and}$$
(3)

$$D(TRD)_{t} = \pi_{0} + \sum_{i=1}^{P} \pi_{1i} D(TRD)_{t-i} + \sum_{i=0}^{q^{1}} \pi_{2i} D(FD)_{t-i} + \sum_{i=0}^{q^{2}} \pi_{3i} D(FDI)_{t-i} + \sum_{i=0}^{q^{3}} \pi_{4i} D(GDP)_{t-i} + \pi_{5}(TRD)_{t-i} + \pi_{6}(FDI)_{t-i} + \pi_{8}(GDP)_{t-i} + \mu_{4t},$$
(4)

where GDP = gross domestic product (a measure of economic growth); FDI = foreign direct investment; FD = financial development; TRD = trade; α_0 , β_0 , δ_0 , and π_0 denote respective constants; $\alpha_1 - \alpha_4$, $\beta_1 - \beta_4$, $\delta_1 - \delta_4$, and $\pi_1 - \pi_4$ denote respective short-run coefficients; $\alpha_5 - \alpha_8$, $\beta_5 - \beta_8$, $\delta_5 - \delta_8$, and $\pi_5 - \pi_8$ denote respective long-run coefficients; letters p, q₁, q₂, and q₃ are the respective lag length; t = time period; μ_{1t} , μ_{2t} , μ_{3t} , and μ_{4t} = white—error terms. Finally, "D" = first difference operator.

In the ARDL-bound testing approach, the order of lags in the first difference variables is obtained using the AIC or the Schwartz—Bayesian Criterion. We have selected AIC because of its exclusive power in estimating the optimal lag length for small samples (Islam et al., 2018; Shahbaz et al., 2018).

After obtaining the optimal lags, we computed the F-test bounds for each equation (i.e., 1–4) to determine if there was a long-run relationship among our study's variables. We computed the F-bounds test via EViews and report the results in Table 4.

When the computed value of the F-statistic is greater than the value of the upper critical bounds, the null hypothesis of no cointegration is rejected. However, we did not reject the null when the

Table 4. ARDL bou	unds (F-test) test fo	or cointegration		
Dependent variable	Optimal lags (AIC)	Selected ARDL (model)	F-statistic	Bounds test results
F _{GDP} (GDP/FDI, FD, TRD)	1	(1,1,0,0)	4.791101	Cointegration
F _{FDI} (FDI/GDP, FD, TRD)	2	(2,0,0,0)	1.745728	No cointegration
F _{FD} (FD/FDI, GDP, TRD)	2	(1,2,0,2)	4.057942	Inconclusive
F _{TRD} (TRD/FD, FDI, GDP)	2	(2,0,0,1)	2.617887	No cointegration
The upper-bound crit	ical value is 4.66 at th	e 1% significance level	l	
The lower-bound crit	ical value is 3.65 at th	e 1% significance level		

Notes: GDP = gross domestic product; FDI = foreign direct investment; FD = financial development; and TRD = trade. Source: Authors' computation via $EViews^{(0)}$ 12.

value of the F-statistic was less than the lower bounds value. The decision was inconclusive when the computed value of the F-statistic lay between lower and upper bounds.

3.2.3. Causality analysis based on the error correction model

After confirming the cointegration, causality analysis follows. Causality from a scientific point of view is concerned with the effects of causes, suited for empirical studies of cause–effect relationships (Berzuini et al., 2012). Although cointegration implies causality in at least one direction, it cannot provide the direction of causality of the variables under study (Menegaki, 2019). Error correction model (ECM) Granger causality test by Engle and Granger (1987) fills this gap and discloses the direction of causality. Therefore, we used the following generic ECM based on Granger causality to investigate the causality among the study variables.

We tested for causality by including the lagged error correction term (ECT) (-1), in Equation (5). Thus, causality in this incidence was examined through the significance of the coefficient of lagged ECT and the joint significance of the lagged first difference of the independent variables using the Wald test (Islam et al., 2018; Odhiambo, 2011).

$$D(GDP)_{t} = \alpha_{0} + \sum_{i=1}^{P} \alpha_{1i} D(GDP)_{t} + \sum_{i=0}^{q^{1}} \alpha_{2i} D(FDI)_{t} + \sum_{i=0}^{q^{2}} \alpha_{3i} D(FD)_{t} + \sum_{i=0}^{q^{3}} \alpha_{4i} D(TRD)_{t} + \lambda^{1} (ECTO1)_{t} + \mu_{5t},$$
(5)

where ECT_{t-i} = error correction term lagged one period; λ_1 = coefficient for the ECT; and μ_{5t} = uncorrelated residual. Other variables and characters are as defined in Equations (1-4). We refer to Equation (5) of this study and determine the short-run causality by the F-statistic (Wald test). In contrast, the long-run causality is determined by the t-statistic on the coefficient of the lagged ECT (Odhiambo, 2021). We conducted diagnostic and stability tests to assure reliability and model perfection. Diagnostic tests such as serial correlation and hetero-skedasticity are crucial for inference and efficient (Newey & West, 1987). Table 7 reports the results of the diagnostic tests.

4. Empirical results and discussion

4.1. Unit root (stationarity) results

Table 3 provides the results of the stationarity test. All variables were found to be stationary at the first difference, I (1). No variable was found integrated at the second difference, I (2) or higher. The unit root analysis results lay the foundation for conducting the cointegration analysis.

4.2. F-Bounds (cointegration) test results

Table 4 presents cointegration results. The null hypothesis of no cointegration or no levels of relationship is rejected at the 1% level when GDP is the dependent variable. We developed the

Table 5. Results for long-run estimates of the ARDL approach						
Variable	Coefficient	t-statistic	Probability			
С	2.781897	1.433520	0.1646			
FDI	1.379937	3.452790	0.0021*			
FD	-0.031956	0.217575	0.8296			
TRD	-0.026260	-0.649586	0.5221			

Notes: GDP = gross domestic product; FDI = foreign direct investment; FD = financial development; and TRD = trade. *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively.

Source: Authors' computation via EViews[®] 12.

Table 6. Result	ts of the short-r	un dynamics an	d the error corr	ection model (E	СМ)	
Dependent		F-statistics (Wald test) (p-value)				
variable	D(GDP)	D(FDI)	D(FD)	D(TRD)	[p-value]	
D(GDP)	-	7.227029 (0.0035)*	0.052089 (0.8214)	0.336452 (0.5673)	-0.609645 [0.0080]*	
D(FDI)	1.950832 (0.1758)***	-	1.831722 (0.1891)***	1.552521 (0.2253)	-	
D(FD)	0.048945 (0.8272)	3.149867 (0.0476)**	-	3.111938 (0.0494)**	-	
D(TRD)	3.422130 (0.0508)**	0.826702 (0.3731)	5.475818 (0.0288)**	-	-	

Notes: *, **, and *** indicate significance at the 1%, 5%, and 10% levels, respectively. ECT = error correction term; "D" denotes the first difference operator.

Source: Authors' computation via $\operatorname{EViews}^{\textcircled{\sc 8}}$ 12

Table 7. Test for serial correlation and heteroscedasticity

Breusch-Godfrey serial correlation LM test:

Null hypothesis: No serial correlation at up to 2 lags

F-statistic 1.327702 Prob. F (2,22) 0.2855

Obs.* *R*-Squared 3.123320 Prob. Chi-Square (2) 0.2098

Heteroskedasticity test: Breusch-Pagan-Godfrey:

Null hypothesis: Homoskedasticity

F-statistic 0.151109 Prob. F (4,24) 0.9607 Obs.* R-Squared 0.712420 Prob. Chi-Square (4) 0.9498

053. A Squared 0.712420 (105. cm Square (4) 0.5450

Note: Reject the null hypothesis if the probability of *F*-statistic \leq 5% level of significance. Source: Authors' computation via EViews[®] 12.

model with constant and no trend (case 2). The outcomes from the ARDL bounds test confirmed cointegration among the concerned variables for Tanzania during 1990–2020.

Following the cointegration test results, the long-run coefficient was estimated by normalizing GDP that is a measure of economic growth. The long-run estimates reported in Table 5 are based on case 2: restricted constant and no trend of ARDL long-run form and bounds test results.

After cointegration analysis, the ECM is executed to predict the directions of causal relationships between the variables in short and long run. Table 6 reports results from the ECM analysis.

4.3. Diagnostic and stability analysis results

We performed diagnostic and stability tests to ensure that our model is reliable and stable. Table 7 confirms no serial correlation and heteroscedasticity. The stability tests (CUSUM and CUSUM SQUARE) in Figures 2 and 3, respectively, show that both graphs of stability tests are within 5% of their critical boundaries. This confirms that our model is stable and hence reliable for predictions.

4.4. Discussion of the findings

Based on 1990–2020-time series data from Tanzania, our analysis revealed a long-run relationship among economic growth (i.e., GDP growth), FDI, FD, and TRD in Tanzania. The long-run coefficients are reported in Table 5. Table 5 shows that only the coefficient of FDI is positive and significant as expected. Nevertheless, the coefficients of FD and TRD are negative and nonsignificant. When the economic growth in percentages of annual GDP growth is the dependent variable, FDI inflow is positive and significant at 1% level, implying that the FDI inflow has a positive impact on the economic growth of Tanzania. Thus, if the FDI inflow increases by 1 unit, then the GDP growth in

Figure 2. Model stability test CUSUM (Equation 5).

Note. CUSUM = cumulative sum.

Source: Authors' computation via EViews[®] 12





Note. CUSUM = cumulative sum. Source: Authors' computation

via EViews[®] 12



Tanzania can be expected to rise by approximately 1.38% per year in the long run. This result indicates that Tanzania should investigate the FDI-friendly policies to boost economic growth in the country.

The finding of cointegration infers the existence of a causal relationship between the series; however, it does not show the direction of causality (Majid & Elahe, 2016; Menegaki, 2019). The direction of causation is identified by testing for the significance of the coefficients of dependent variables (Equations 2-5). Nonetheless, as there was no cointegration in Equations (2-4), we only estimated the ARDL (short-run model). To determine the long-run causality, we analyzed the significance of the ECT in Equation (5) and, thereafter, we tested the hypothesis of no Granger causality to ascertain short-run Granger causality from FDI, FD, and TRD to GDP; GDP, FD, and TRD to FDI; GDP, FDI, and TRD to FDI; GDP, FDI, and FD to TRD.

Results in Table 6 confirm unidirectional causality in Tanzania running from FDI inflow to gross domestic product (GDP) (FDI \rightarrow GDP) irrespective of the time frame at 1% level. The lagged error term (i.e., ECT-1) is found to be negative and statistically significant at 1% when GDP is the dependent variable. This means that the inflow of FDI, FD, and TRD Granger-cause economic growth in Tanzania in the long run. Moreover, the three variables (FDI, FD, and TRD) are positively related with economic growth in Tanzania, although FD and TRD are statistically nonsignificant.

The lagged coefficient of the ECT (-0.609645) implies that the speed of change from the shortrun imbalance to the long-run equilibrium is approximately 61%. Hence, any deviation from the long-run equilibrium level of economic growth in one period will be corrected by 61% in the next period. Specifically, the system will recuperate any shock in Tanzania's economic growth in the short run toward long-run equilibrium in less than two successive periods. Furthermore, in the short run, there is unidirectional causality from GDP and FD to FDI (GDP & TRD \rightarrow FDI) at 10% level, inflow of FDI to FD (FDI \rightarrow FD) at 5% level, GDP to trade (GDP \rightarrow TRD) at 5% level, and a bidirectional causal linkage between FD and trade (FD \leftrightarrow TRD) at 5% level of significance. Other causal connections in the short run are positive but not statistically significant (Table 6). These findings have policy implications for the country's economic prosperity. Unlike previous studies, the current study included FD and trade in the FDI—economic growth linkage in the period of sustained economic growth that led the country to attain lower middle-income status in July 2020. Hence, the findings validate the FDI-led growth hypothesis in Tanzania during 1990–2020. In this regard, Tanzania should continue implementing prudent macro-economic policies that promote FDI inflow for accelerating economic growth, hence contributing to the development of the country.

To enhance the reliability of our study, we performed Breusch—Godfrey for the serial correlation LM test, Breusch—Pagan–Godfrey for the heteroskedasticity test, and Jarque—Bera for normality. Results of diagnostic tests reveal that our model is free from serial correlation at up to 2 lags and does not suffer from heteroskedasticity. The Jarque—Bera test via EViews also confirmed that the time-series data used in this study follow a normal distribution. The CUSUM and CUSUM of square tests presented in Figures 2 and 3, respectively, show that our model is stable.

Therefore, we can assume that the findings of this study agree with the findings obtained from the causality analysis that confirm the long-run unidirectional causal link among the concerned variables and highlighted the relationship among the underlying SDGs (i.e., SDG8 and SDG10). However, these findings are contrary to the findings of Odhiambo (2021) for Kenya, Siddikee and Rahman (2021) and Sarker and Khan (2020) for Bangladesh, Agbloyor et al. (2016) for sub-Saharan Africa, and Lema and Dimoso (2011) and Masanja (2018) for Tanzania.

5. Conclusion and policy implications

The present study examines the causal relationship between FDI and economic growth in Tanzania using time-series data during 1990–2020. The relationship between FDI and economic growth has received scholarly attention in extant studies. However, the results of these studies differ over time. The current study extends the knowledge in this area by incorporating FD and trade in the study's model as intermediate variables because of their ability to enhance economic growth. Reportedly, this is the first study of its kind to be conducted in Tanzania. The analysis is based on the neoclassical growth theories and FDI-led, growth-driven hypotheses. The study employed ADF and PP unit root tests to check the stationarity of variables. To explore the long-run relationship among the variables, we applied the ARDL bounds test because the technique was relatively more efficient in the case of small and finite sample sizes. We used the ECM-based Granger causality to examine the direction of the relationship among the variables.

The findings of this study demonstrate that FDI has a positive and statistically significant relationship with economic growth in the short and long run. Moreover, the findings show that there is unidirectional causality running from FDI to economic growth in Tanzania. Deviation from the long-run equilibrium level of economic growth in the previous year will be corrected by approximately 61% in the next year. The findings support the position of the neoclassical and FDI-led growth hypothesis. Given these results, we conclude that FDI is an important determinant of economic growth in Tanzania.

Therefore, policymakers in Tanzania should continue to develop, devise, and enforce judicious macroeconomic policies that attract FDI inflows to promote economic growth of the country to attain desired economic objectives.

Based on the findings of this study, we further recommend that foreign private investment in the form of FDI should be fortified by all tiers of the government to facilitate smooth flow at all

economic levels to rapidly realize the desired economic objectives in Tanzania. Moreover, the government should continue to maintain a conducive macro-economic environment, characterized by stability and credibility, for foreign private investors. Moreover, the country's financial system needs to be developed to facilitate smooth and rapid technological diffusion in the economy for the country's prosperity.

5.1. Limitations

This study has some limitations. First, the estimation method may be subjected to the error of omission and endogeneity. Thus, future research should include other pertinent variables in a system of equations where other economic variables can also determine FDI inflows and economic growth. This can help extricate the conduits through which FDI inflows influence growth. Second, this study used a small sample size. Future studies should consider a bigger sample size and use different proxies to measure economic growth and net FDI inflows.

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Disclosure statement

No potential conflict of interest was reported by the authors.

Data availability statement

World Bank Group (2022), World Bank national accounts data, and OECD National Accounts data files are available online at https://data.worldbank.org/indicator/.

Geolocation information

Tanzania is located at -6.44055254827707, 34.81809314830465 in East Africa.

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