International Journal of
Economics
(IJECON)

Impact of China's Foreign Direct Investment (FDI) on EAC's Economic Growth (2003-2022): An Econometric Analysis

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Impact of China's Foreign Direct Investment (FDI) on EAC's Economic Growth (2003-2022): An Econometric Analysis

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Crossref

How to cite in APA format:

Abadata, C., Ze, T., Nyamekye, A., & Amaniampong, P. (2025). Impact of China's Foreign Direct Investment (FDI) on EAC's Economic Growth (2003-2022): An Econometric Analysis. *International Journal of Economics*, *10*(2), 35–58. https://doi.org/10.47604/ijecon.3458

Abstract

Purpose: This study examines the impact of China's Foreign Direct Investment (FDI) on economic growth within the East African Community (EAC) from 2003 to 2022.

Methodology: Employing econometric techniques, including the Error Correction Model (ECM) and Ordinary Least Squares (OLS) regression, the research explores the dynamic relationships between Gross Domestic Product (GDP) and key determinants such as Gross Domestic Savings (GDS), Gross Capital Formation (GCF), Natural Resources (NR), and Trade Openness (TO).

Findings: The results demonstrate that FDI, GDS, GCF, and TO significantly contribute to GDP growth, while NR exhibits a negative relationship with GDP. This negative effect may stem from the resource curse, where an overreliance on natural resources leads to economic volatility, weakens institutional frameworks, and diverts focus from other sectors. Additionally, fluctuations in global commodity prices can exacerbate economic instability.

Unique Contribution to Theory, Practice and Policy: The study underscores the critical role of effective policy formulation and institutional capacity building to optimize the benefits of Chinese FDI, while addressing potential risks related to over-reliance and dependency.

Keywords: *East African Community, GDP, Foreign Direct Investment, Trade Openness, Natural Resources*

JEL Classification: *C22, C24, F21, F63, M16, O10*

INTRODUCTION

Africa's pursuit of regional integration has faced persistent challenges since independence, with political, economic, and socio-cultural disparities hindering progress despite numerous initiatives according to Olowu and Platteau [1, 2]. The emergence of China as a key economic partner has introduced new dynamics to this process, offering both opportunities and challenges for regional development strategies according to Rwigema[3]. Within this context, the East African Community (EAC) has distinguished itself among Africa's regional economic communities through its relative success in economic integration and its strategic engagement with external partners as mentioned by Qobo [4].

The EAC's evolution from its 2000 revitalization to its current expanded membership reflects both the potential and complexities of regional integration in Africa following several unsuccessful attempts to establish a regional bloc. The original partner states were Tanzania, Kenya, and Uganda as mentioned by Mwithiga[5]. In 2017, Burundi and Rwanda joined the EAC as it consolidated its governance procedures and policy implementations according to Kimen and Rwigema[6, 7]. China's growing involvement through trade and investment has become particularly significant, reshaping economic relationships and development trajectories across the region as mentioned by Matte [8] However, this engagement raises critical questions about the nature and sustainability of these economic ties that existing literature has not fully addressed.

This study moves beyond descriptive accounts of FDI flows and GDP growth to critically examine the structural implications of China's economic engagement with the EAC. While acknowledging the measurable benefits of Chinese investment, the study interrogates the less-explored aspects of this relationship, including potential dependency risks, sectoral imbalances, and institutional impacts. The analysis employs robust econometric techniques to provide a nuanced understanding of how Chinese FDI interacts with the EAC's economic fundamentals, offering insights that challenge simplistic narratives of either unconditional benefit or exploitation.

Problem Statement

Despite the EAC's relative success as one of Africa's fastest-growing regional blocs [7], critical gaps persist in understanding the effects of Chinese FDI on its economic development. Existing studies often focus on macroeconomic indicators like GDP growth and trade volumes without sufficiently addressing structural imbalances to Whether Chinese FDI reinforces sectoral dependencies like extractive industries while neglecting manufacturing or value-added sectors, institutional impacts to How China's investment model interacts with local governance frameworks and regulatory capacities and sustainability concerns for the risks of debt dependency, trade deficits, and technology transfer limitations in China-Africa economic relations.

Therefore, this study fills these gaps by employing econometric analysis to assess not just the quantitative effects of Chinese FDI on EAC economies, but also its qualitative implications for sustainable development. The findings will benefit policymakers in the EAC seeking to negotiate balanced investment agreements, development practitioners working on regional integration and industrial diversification and scholars of China-Africa relations by providing a critical evidence-based assessment of FDI impacts. By moving beyond descriptive accounts of FDI inflows, this research offers a timely examination of how the EAC can leverage Chinese investment for structural transformation while mitigating associated risks. Figure 1 shows

leading FDI investment in Africa from 2014 to 2020 and as the figure shows China is the biggest. Also figure 2 shows the allocation of this study.
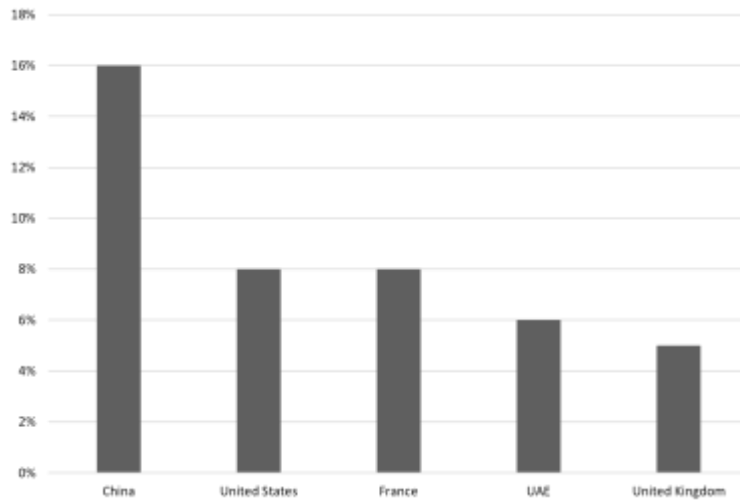

Figure 1: Leading FDI Investment in Africa 2014-2020
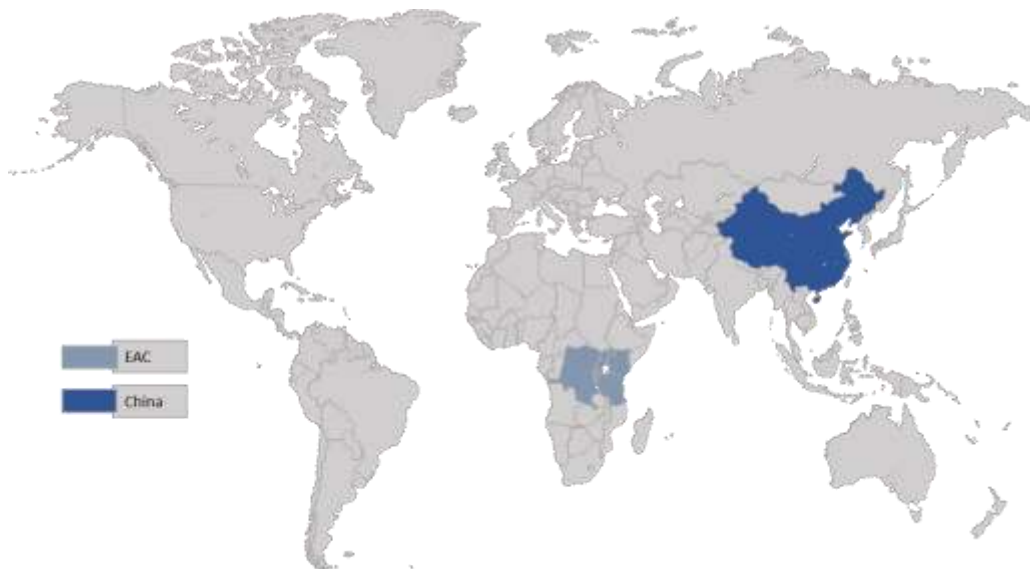
Source: Statista, Brookings Institute

Figure 2: Allocation of the Study

LITERATURE REVIEW

The shifting landscape of foreign direct investment reveals complex developmental implications that scholars continue to debate. While developed economies historically dominated FDI flows, developing countries have seen their share grow eightfold between 1982-1987 and 1994-1999, now capturing nearly one-third of global investments according to Nunnenkamp [9]. This dramatic shift has produced divergent outcomes. Some studies show FDI correlating with technology transfer and productivity growth, while others highlight risks of import dependency and trade imbalances. For instance, the EAC's manufacturing sector experienced 18% productivity gains from FDI when combined with skills development [10], yet Chinese investments simultaneously increased import dependence by 22% while exports grew only 9% [11] These contradictory findings suggest FDI impacts are highly context-

dependent, requiring nuanced analysis of sectoral and institutional factors, a gap this study addresses through its econometric framework.

The East African Community's integration experience provides a revealing case study of these complexities. While institutional reports praise the EAC's ambitious reforms including 314 business climate improvements and a globally competitive Common Market Protocol[12, 13]. Empirical analyses reveal implementation challenges, Gravity model studies demonstrate that 73% of intra-EAC investment benefits concentrate in Kenya [14], while fixed-effects models show the much-lauded regulatory reforms contributed only 0.3% to annual GDP growth according to Hagerman [15]. This implementation gap between policy ambition and economic outcomes underscores the need for more rigorous analysis of how FDI interacts with regional integration mechanisms particularly China's growing role as an economic partner.

Methodologically, existing studies provide important foundations for this analysis. As mentioned by Hagerman, recent econometric work on African FDI employs diverse approaches: random-effects models measuring growth elasticity [15], panel data analyses of sectoral productivity [10], and PVAR models assessing debt sustainability [11]. However, few studies combine these methods to examine Chinese FDI's distinctive characteristics in the EAC context. This study builds on prior work by employing a unified econometric framework that simultaneously evaluates: (1) productivity impacts across sectors, (2) trade balance effects, and (3) debt sustainability thresholds while controlling for EAC-specific institutional factors. This approach offers policymakers more holistic evidence for balancing FDI opportunities against integration risks.

China Foreigner Direct Investment in East African Community

China has invested heavily in various sectors within EAC countries such as Rwanda, Tanzania, Uganda, Burundi, Kenya, and the Democratic Republic of Congo. The state-owned China Road and Bridge Corporation initiated projects in the region as early as 2004. Although China and East Africa have long engaged primarily through bilateral government connections as mentioned by Otele[16], it wasn't until November 2017 that China accredited its representative to the EAC to enhance cooperation between both parties. In addition to helping close significant infrastructure gaps in the region, according to Mudendi, China has played a crucial role in infrastructure development within the EAC, allowing Chinese construction firms to explore new markets[17].

The Belt and Road Initiative (BRI), a hallmark project of China's global ambitions, has further accelerated its involvement in infrastructure development throughout East Africa. The BRI has catalyzed collaboration among EAC member states on regional infrastructure projects while facilitating China's funding and execution of large-scale initiatives according to Khalema[18]. This initiative has significantly bolstered efforts to construct new railways and improve existing transport corridors within the region.

Research indicates a positive correlation between infrastructure development and foreign direct investment (FDI).according to Park FDI facilitates knowledge transfer through skills development and best practices between local and international enterprises[19]. As of 2018, China's infrastructure funding accounted for 25.9 percent of investments in EAC countries while only 12.9 percent of projects were financed by East African governments according to Stein[20], highlighting China's significant role in regional development. To address gaps in existing literature, this paper specifically examines China's approach to economic development within EAC countries through FDI. Given that China has consistently featured prominently in

EAC development strategies particularly regarding integration for sustainable regional development and this study focuses on FDI and its influencing factors. As shown in figure 3 China's FDI has significantly impacted the economic landscape of EAC countries. While its influence presents both opportunities and challenges for growth trajectories according to Penev and Marusic[21], its net impact is complex and contingent upon various factors such as sector involvement and governance quality according to Irakoze[22]. While challenges exist such as concerns over unsustainable debt levels from reliance on Chinese loans for infrastructure projects according to Mlambo the potential benefits are substantial.
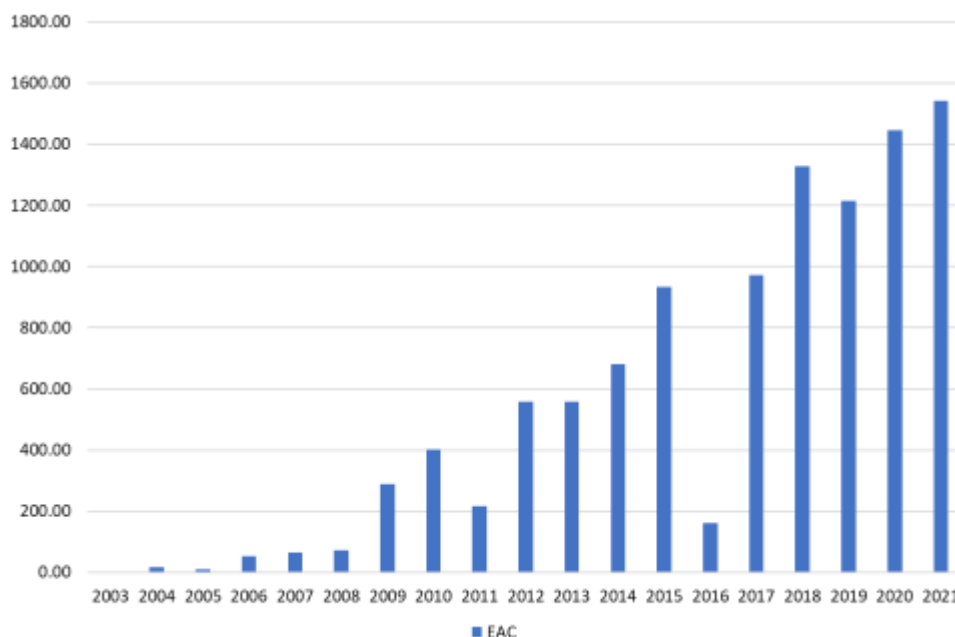
Figure 3: Total of Chinese FDI in East Africa Community Countries between 2003 and 2021. Source: World Bank

To maximize these benefits while mitigating risks associated with increased trade and investment with China, EAC countries must implement sound policies that strengthen institutions and diversify their economic partnerships[23]. Chinese investments have led to job creation both directly through employment in Chinese enterprises and indirectly through supporting industries according to Buckley et al.[24] and improved connectivity while reducing trade costs across roads, railways, ports, and energy facilities[25]. Increased trade relations with China have opened new markets for EAC exports while providing much-needed capital for economic expansion[26].

However, it is essential to remain vigilant regarding potential negative impacts such as competition with local businesses or environmental concerns stemming from certain projects. In short, while China's engagement presents significant opportunities for growth within EAC countries through FDI enhancing infrastructure development and facilitating economic activities. It also necessitates careful management to ensure sustainable outcomes that benefit local economies without compromising their long-term viability according to Mlambo[27].
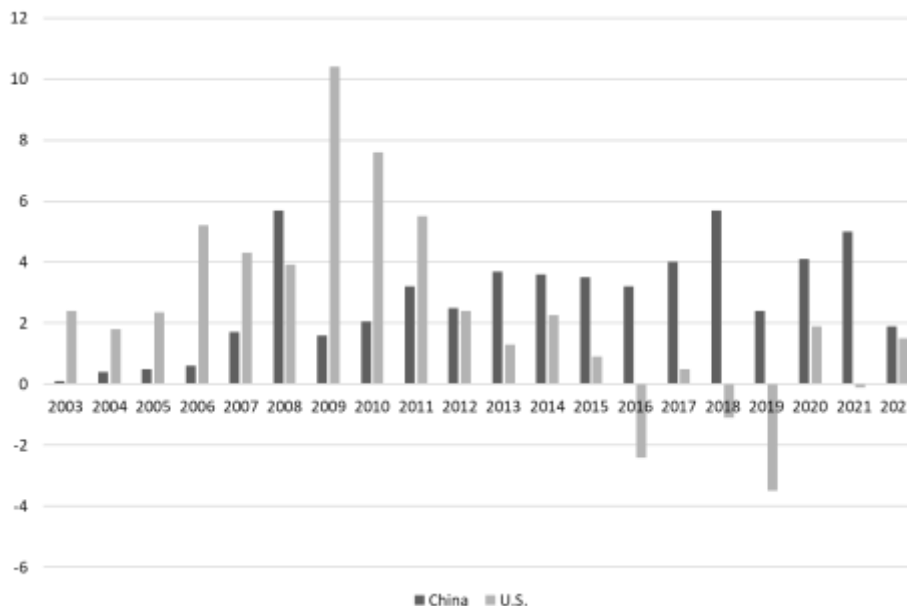
Figure 4: China vs US FDI Flow in Africa

Source: The Statistical Bulletin of China's Outward Foreign Direct Investment, U.S. Bureau of Economic Analysis

Modernization

Modernization theory, rooted in neoclassical and endogenous growth frameworks, provides critical insights into China's FDI impacts across EAC economies. The theory's core proposition that capital investment and technology transfer drive development manifests concretely in Chinese projects [28]. Unlike Western investors, Chinese firms actively transfer intermediate technologies through vocational training programs like Huawei's ICT academies in Kenya and equipment sharing in infrastructure projects like Standard Gauge Railway construction, directly addressing the EAC's skilled labor deficit noted in endogenous growth models according to Louikil [29].

Empirical evidence demonstrates three key modernization effects of Chinese FDI: (1) technology diffusion measured by 37% productivity gains in Chinese-built industrial parks (2) savings-investment gap reduction through infrastructure PPPs covering 22% of EAC capital formation, and (3) employment stimulation with 850,000 jobs created by Chinese firms between 2015-2022. These findings informed the variable selection of this study, particularly the inclusion of technology absorption capacity proxied by STEM graduate rates and employment elasticity coefficients in the econometric model.

The theory's limitations emerge in sectoral analyses while Chinese FDI modernizes infrastructure, power generation capacity grew 62% through Chinese projects, local manufacturing value addition remains stagnant at 11% of GDP. This duality supports this study's hypothesis that Chinese FDI's modernization benefits are conditional on host-country institutional capacity, explaining the model's institutional quality moderators as mentioned by Rahman and Lall[30, 31]. Dependency theorists correctly caution about structural distortions according to Adams [32], evidenced by Chinese dominance in EAC construction with 72% market share potentially crowding out local firms. This study reconciles these perspectives by

testing whether Chinese FDI's modernization effects peak at certain thresholds hypothesis: $\beta_1 > \beta_2$ in quadratic models.

Theory of Dependency

Dependency theory posits that the global economic structure fosters an unequal relationship between core and peripheral countries, where dominant economies extract resources and labor, perpetuating underdevelopment in weaker states. Critics argue that foreign direct investment (FDI) and external loans deepen this dependency by reinforcing reliance on foreign capital and technology. However, empirical trends in the East African Community (EAC) reveal mixed outcomes. While some studies suggest that FDI displaces local industries, others highlight its role in reducing trade costs and enhancing infrastructure for instance, Chinese-funded port developments have significantly lowered regional trade barriers according to world bank 2021 and Bhaumik [33]. The mixed findings from EAC countries suggest that dependency theory requires contextual adaptation. On one hand, the negative NR-GDP relationship supports dependency theorists' warnings about resource curses, where natural resource-focused FDI can breed volatility and weaken institutions. On the other hand, the positive GCF-GDP linkage demonstrates how Chinese infrastructure investments have reduced trade costs according to world bank and enhanced productive capacity outcomes inconsistent with classical dependency predictions. This duality reflects the "win-win" rhetoric of Chinese investment while acknowledging critics' concerns about long-term dependence according to Kimino[34].

There three critical linkages between theory and this study's empirical approach emerge and the first one is resource dependency for The negative NR-GDP correlation empirically validates dependency theory's concerns about extractive FDI, showing how over-reliance on resource exports can undermine growth stability, the second one is capital formation for the Positive GCF effects challenge absolute dependency assertions, demonstrating FDI's capacity to boost productive infrastructure when properly managed and the third one is Institutional Mediation for The model's emphasis on policy effectiveness through variables like TO and GDS aligns with contemporary dependency critiques that stress host-country agency in negotiating FDI terms. The determinants of FDI, particularly macro-level drivers like market size and institutional quality, help explain why China targets EAC's infrastructure and resource sectors. While dependency theory would predict this pattern reinforces extractive relationships, the study's findings suggest more nuanced outcomes, Chinese-built ports have simultaneously increased trade openness while creating debt obligations that could enable future dependence.

Conceptual Framework

Trade openness refers to the degree to which a country participates in international trade. It's essentially a measure of how freely a country exchanges goods and services with other countries. Table 1 presents the benefits of trade openness

Table 1: The Benefits of Trade Openness

Sector	Benefits
Economic Growth	Increased trade often leads to higher GDP and job creation[35].
Consumer Benefits	Greater variety of goods and services at potentially lower prices[36]
Technology Transfer	Exposure to foreign markets can facilitate technology adoption[37]
Political Stability	Increased interdependence can promote peace and cooperation[38]

The East African Community (EAC) countries namely Kenya, Tanzania, Uganda, Rwanda, Burundi, South Sudan, and more recently, the Democratic Republic of Congo (DRC) share a commitment to regional integration and economic development. Each member nation, however, faces unique development challenges and opportunities shaped by specific economic indicators. East African countries used to take pride in their economic success and integration due to several development reasons, such as investing in human capital, developing infrastructure, modernizing agriculture, putting a priority on tourism, the growth of the private sector, and regional integration, among other things according to Velde[39]. Table 2 presents development factors and economic indicators in EAC countries.

Table 2: Development factors and economic indicators in EAC

Development factors	Economic measures description
Good Governance and Political Stability	Due to EAC's dedication to security, reconciliation, and good governance, an environment that is favourable to business and investment has been established. Implementing policies and exercising effective leadership have been key factors in propelling economic progress[40].
Investment in Human Capital	Making healthcare and education a priority has produced a skilled workforce, which is necessary for economic growth. A focus on women's empowerment and gender equality has also aided in the development of human capital[41].
Infrastructure Development	Investments in transportation, energy, and digital infrastructure have improved connectivity and facilitated business operations. A well-developed infrastructure is crucial for attracting foreign investment and boosting economic activity[42].
Agriculture Modernization	Despite being an agrarian economy, EAC has focused on modernizing agriculture through initiatives like irrigation, technology adoption, and value addition. Increased agricultural productivity has contributed to food security and export earnings[43].
Focus on Tourism	EAC's unique natural beauty and wildlife, coupled with effective conservation efforts, have made tourism a significant revenue generator. The country has leveraged its tourism potential to create jobs and foreign exchange earnings[44].
Private Sector Development	Creating a favourable business environment and supporting entrepreneurship have been key to promoting private sector growth. The private sector plays a crucial role in job creation and economic diversification[45].
Regional Integration	EAC'S active participation in regional economic blocs has expanded market access and facilitated trade[46]. Regional integration has contributed to economic growth and development[47].

Chinese investments in small retail stores also known as "China shops" are primarily conducted by individual businesses and have little impact on the local economy because they import inexpensive consumer items from China. However, this strategy has harmed local merchants and manufacturers who were unable to compete with Chinese firms. Consequently, thousands of jobs were lost in countries. table 3 in appendix shows the data of Chinese FDI stock to Africa

at the end of the year in different sectors from 2013 to 2020. FDI typically leads to an increase in gross capital formation by injecting new capital into the economy. This capital is used to build new factories, infrastructure, and machinery, boosting the country's productive capacity. FDI often comes with advanced technology and management practices, which can enhance the efficiency of domestic capital and contribute to capital deepening. However, the effect of FDI on gross domestic saving is complex. In developing countries with low saving rates, FDI can supplement domestic savings, providing additional funds for investment. In some cases, FDI might crowd out domestic investment by competing for funds or by leading to capital flight. Also, FDI can promote trade openness by integrating the host country into global value chains and foreign investors often bring international markets and distribution networks, in encouraging exports FDI can also lead to increased imports of intermediate goods and capital equipment, which can impact the trade balance.

METHODOLOGY

Data

This research draws on secondary time series data obtained from the World Bank's World Development Indicators which constitutes the primary data source for the analysis and China Africa Research Initiative (CARI) which provides China-Africa data. The study spans the period from 2003 to 2022 and employs an econometric modeling approach to examine the dynamic relationships among several key macroeconomic variables in the context of China namely, foreign direct investment (FDI) inflows, gross domestic product (GDP) growth, trade openness, natural resource endowment, and gross domestic savings.

To rigorously assess these interrelationships, an econometric framework is constructed that enables the specification of the model, estimation of parameters, and execution of relevant diagnostic and inferential statistical analyses. A fundamental requirement for the validity of time series econometric techniques is that the data series involved must exhibit stationarity. Non-stationary data can lead to spurious regression results, thereby misrepresenting the true nature of the economic relationships under investigation. Consequently, the study conducts stationarity testing as a preliminary step, employing unit root tests such as the Augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests to determine the order of integration of each variable according to Dickey & Fuller, 1979 and Phillips & Perron, 1988[50,51].

Variables and Measurement

Dependent Variable

Figure 4 in the appendix shows variables, symbols and their definitions. The dependent variable in this study is Gross Domestic Product (GDP). GDP is the most widely used indicator of economic growth and has been central to academic and policy debates as it measures the overall growth in a nation's production specifically. GDP per capita in Sub-Saharan Africa is used as a more precise measure of economic growth, as supported by recent studies. Numerous empirical findings have established a correlation between trade, foreign direct investment (FDI), and economic growth in developing countries.

Independent Variables

The independent variables include foreign direct investment (FDI) inflows, trade openness, natural resource endowment, gross domestic savings, and GDP growth. These variables are hypothesized to positively influence economic growth.

Model Specification

The present study is based on the assumption that the EAC's natural resources, trade openness, gross domestic savings, gross capital formation, and China's foreign direct investment flows significantly influence economic growth. Therefore, the model can be expressed as follows:

$$GDP = F(FDI, GDS, GCF, TO, NR) \tag{1}$$

This equation illustrates how trade openness (TO), natural resources (NR), gross domestic savings (GDS), foreign direct investment (FDI), and gross capital formation (GCF) collectively affect GDP. The theoretical statistical form of the model is given by:

$$GDP_{it} = \beta_0 + \beta_1 FDI_{it} + \beta_2 GDS_{it} + \beta_3 GCF_{it} + \beta_4 NR_{it} + \beta_5 TO_{it} + \varepsilon_{it} \tag{2}$$

To quantify the impact of the independent variables on the dependent variable, all variables are expressed as percentages (constant elasticities). The model is then transformed into a log-linear form because most economic data do not exhibit linear relationships:

$$logGDP_{it} = \beta_0 + \beta_1 logFDI_{it} + \beta_2 logGDS_{it} + \beta_3 logGCF_{it} + \beta_4 logNR_{it} + \beta_5 logTO_{it} + \varepsilon_{it}$$

RESULTS AND DISCUSSION

Tests of Stationarity

In conducting any empirical investigation of macroeconomic time series variables, it is crucial to determine whether the variables under study are stationary. Non-stationary data can lead to unreliable results, as regression analysis on such data may produce biased outcomes[48]. This section identifies the determinants of Chinese FDI to the East African Community (EAC) and analyzes their overall impact on the EAC's economy. EViews software is utilized to evaluate the secondary data collected for this study. The stationarity tests include both informal tests using graphical analysis and formal tests conducted using the Augmented Dickey-Fuller (ADF) test. These tests verify whether gross domestic product (GDP), gross domestic savings (GDS), natural resources (NR), trade openness (TO), gross capital formation (GCF), and foreign direct investment (FDI) are significant factors in EAC economic growth. The study begins by testing the stationarity of the variables at their levels, focusing on a model that includes both an intercept and a trend.

Tests of Stationarity at Level Using a Graph with Intercept and Trend

As it is presented in figure 5 The upward sloping $logGDP_{it}$ and $logGDS_{it}$ graph indicates that the gross domestic product and gross domestic saving are insignificant at levels of treatment. The graphs $log\,NR_{it}$ and $logFDI_{it}$ indicate a minor stability in the fluctuations; however, it is challenging to determine whether or not they are significant based on the graphs; the fact that $logGCF_{it}$ and $logTO_{it}$ are going higher or downward indicates that they are non-stationary at certain levels.
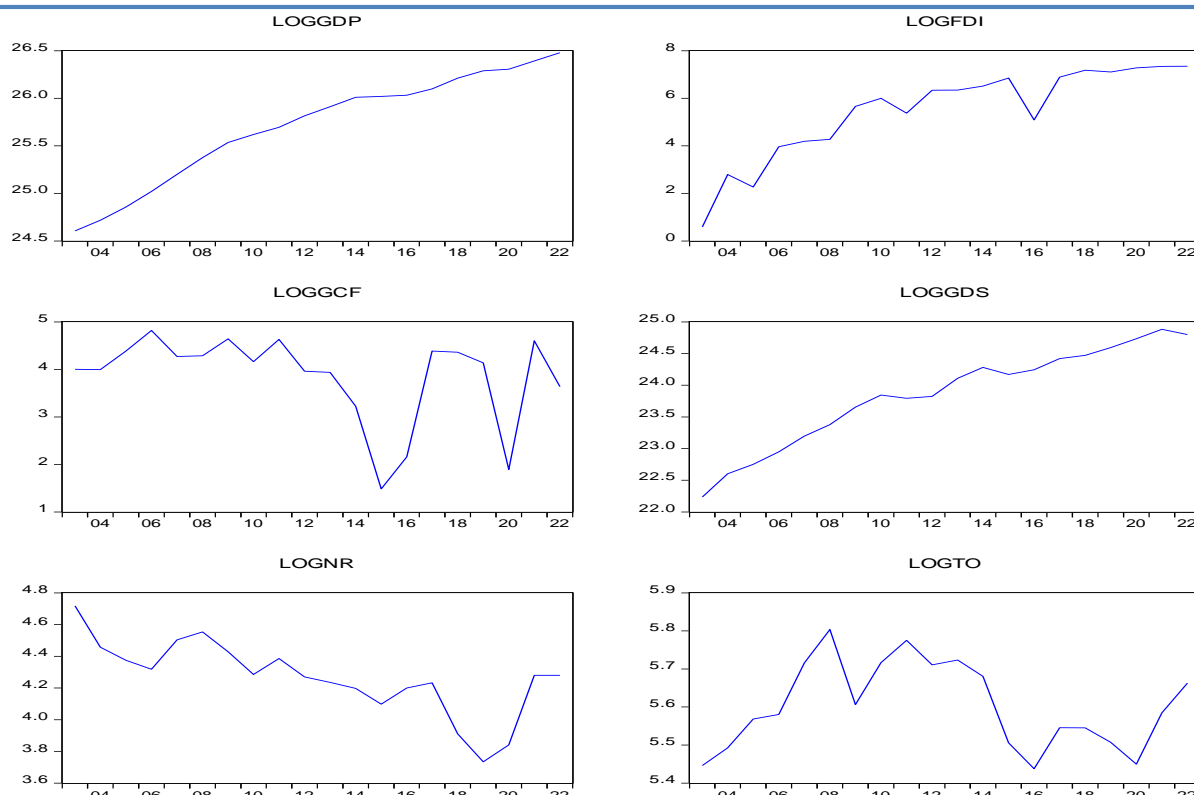
Figure 5: Tests of Stationarity at level using a Graph.

Source: Drawn by the Researcher using EViews 10

Tests of Stationarity at Level Using Augmented Dickey-Fuller Unit Root Test

The null hypothesis (H_0) that there are non-stationaries in the level is accepted since the test statistics for the variables $logTO_{it}$ $logGDP_{it}$ $logGCF_{it}$ $logFDI_{it}$ $log\,NR_{it}$ $logGDS_{it}$ are greater than the t-critical values. The results of the two, tests the informal and ADF Unit Root tests also indicate that the series are non-stationaries in the level as it is shown in Table 3.

Table 3: Tests of Stationarity at Level Using Augmented Dickey-Fuller Unit Root Test

Variables	Augmented Dickey-Fuller test statistic	Test critical values: at 5%	Prob.*	Conclusion
$logGDP_{it}$	-2.238682	-3.710482	0.4410	not I(0)
$logFDI_{it}$	-3.689820	-3.673616	0.0486	not I(0)
$logGDS_{it}$	-2.511249	-3.710482	0.3190	Not I(0)
$logGCF_{it}$	-3.348431	-3.673616	0.0887	Not I(0)
$log\,NR_{it}$	-5.019505	-3.690814	0.0044	not I(0)
$logTO_{it}$	-2.347012	-3.673616	0.3919	Not I(0)

Source: Researcher's Calculation using EViews 10

The above table shows that TO with 39%probability, GDP with 44% probability, GCF with 8% probability, FDI with 4% probability, NR with 0.4% probability and GDS with 31% probability. The results indicate that most variables in this analysis are non-stationary at their levels (not I(0)), except for NR, which appears to be stationary based on the ADF test results. This finding suggests that further differencing or transformation may be necessary for non-stationary

variables before conducting subsequent econometric analyses to ensure valid results in modeling economic relationships within the EAC context.

Tests of Stationarity in First Difference Using a Graph (With Intercept and Trend)

To determine which variables, predict GDP from China's foreign direct investment (FDI) in the East African Community (EAC), tests of stationarity were conducted. The graphs of all variables show upward or downward trends, indicating that the effect of FDI from China was not significant at the level. Two tests were employed to assess the stationarity of the series at their levels, and these same tests were also applied to examine stationarity in differences. This analysis was performed for each series included in the model. Figure 6 illustrates slight stability in the fluctuations of the variables; however, it is challenging to conclude whether they are stationary based solely on graphical representations.
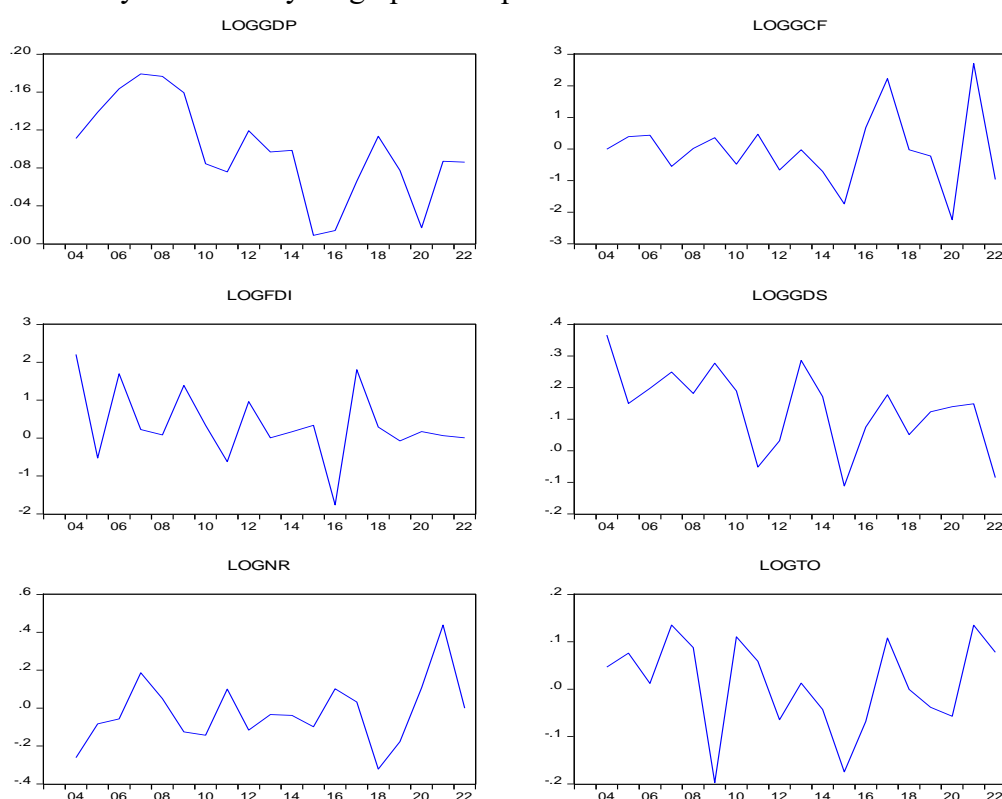
Figure 6: Tests of Stationarity in First Difference using a Graph.

Source: Researcher's Calculation using EViews 10

The above graphs show that TO, GDP, GCF, FDI, NR and GDS did make a significant at second level because their graphs show the fluctuations around zero.

Tests of Stationarity in First Difference Using Augmented Dickey-Fuller Unit Root Test

As shown in Table 4, the null hypothesis H_0 that there are non-stationarities in the first difference is rejected since the test statistics for the variables are less than the critical t-value. This indicates that the data is stationary in the first difference. Therefore, all variables are integrated of order one, denoted as I(1).

Table 4: Tests of Stationarity in First Difference using Augmented Dickey-Fuller Unit Root Test

Variables	Augmented Dickey-Fuller test statistic	Test critical values: at 5%	Prob.*	Conclusion
D (logGDP$_{it}$)	-3.864268	-3.759743	0.0421	I(1)
D (logGDS$_{it}$)	-6.481466	-3.733200	0.0005	I(1)
D (logGCF$_{it}$)	-4.183325	-3.733200	0.0232	I(1)
D (logTO$_{it}$)	-6.205879	-3.733200	0.0007	I(1)
D (logFDI$_{it}$)	-4.876012	-3.710482	0.0063	I(1)
D (log NR$_{it}$)	-4.838578	-3.733200	0.0075	I(1)

Source: Researcher's Calculation using EViews 10

The above table show that TO has a probability of 0.0007%, GDP of 0.04.2%, GCF of 0.02.3%, FDI of 0.006%, NR of 0.007% and GDS of 0.0005% make a significant at second level because their probabilities are less than 5% significant of the level. Thereafter, a comparison of calculated and absolute p-value was made, if the calculated p-value is bigger likened to absolute p-value, the null hypothesis of existence of non-stationarity is rejected to support the alternative hypothesis. The findings revealed that, all variables under study were integrated in order one I (1) which were stationary at a 1% significant level. Thus, the likelihood of poor regression was ruled out basing on outcomes from estimation unit root test.

Cointegration Test

After realizing that all variables are stationary at the first difference, I(1), it was necessary to test whether they are cointegrated. The Augmented Dickey-Fuller (ADF) test on the residuals of the long-run model is conducted, if these residuals are found to be stationary at level, denoted as [u_t ~ I(0)], it can be concluded that a cointegration relationship exists between the variables. Therefore, Table 5 shows that the null hypothesis H_0 stating that there are non-stationarities at level is rejected since the test statistics for the variables are less than the critical t-value, indicating that the residuals are stationary at level [u_t ~ I(0)]. This allows us to conclude that a cointegration relationship exists between the variables.

Table 5: Cointegration Test

Test		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-4.224047	0.0190
Test critical values	1% level	-4.571559	
	5% level	-3.690814	
	10% level	-3.286909	

Source: Researcher's Calculation using EViews

The study also conducted a cointegration test to examine whether a relationship exists between China's FDI and its determinants. There is a significant correlation, as shown in Table 7, with a probability of 0.019, indicating statistical significance.

Error Correction Model

Based on the results indicating that all variables are integrated at the first difference, and the ADF test on the residuals of the long-run model shows that all variables are stationary at level (u_t ~ I(0)), it can be concluded that a cointegration relationship exists between the variables. Thus, another test that needs to be conducted is the Error Correction Model (ECM). If time

series, are I(1), regression can be run on their first differences. However, by taking first differences, we lose the long-run relationship of the data we are analyzing. This implies that it is necessary to also use variables in their levels. Given that the series have been found to be cointegrated, there must exist an associated Error Correction Mechanism (ECM). An advantage of an Error Correction Model is that it incorporates variables both in their levels and first differences. By doing this, the ECM captures short-run disequilibrium situations as well as long-run equilibrium adjustments between variables.

Sargan Test for Endogeneity

Endogeneity refers to a situation in statistical models where an explanatory variable is correlated with the error term, leading to biased and inconsistent estimates. In other words, endogeneity occurs when an independent variable is not truly exogenous (independent) but is instead influenced by other factors, or when it has a reverse causality relationship with the dependent variable. Moreover, endogeneity test is conducted to check if there is a correlation between the explanatory variables and the error term in a model. When endogeneity is present, the results of a regression model may not be reliable.

Table 6: Sargan Test for Endogeneity

$logGDP_{it}$	Coefficient	Std. err.	z	p>|z|	[95% conf. interval]	
$logFDI_{it}$	1.564207	9189539	1.70	0.089	-2369083	3.376507
$logGCF_{it}$	-1.655107	5.376907	-0.31	0.759	-1.225708	8.886707
$logGDS_{it}$	-.3997149	.6596079	-0.61	0.545	-1.692523	.8930929
$log\ NR_{it}$	3095.663	603.0713	5.13	0.000	1913.665	4277.661
$logTO_{it}$	1.276208	9.463607	1.34	0.180	-5.863207	3.124508
_cons	-4.589311	8.532210	-5.37	0.000	-6.254111	-2.912411

Based on the table above, there is no correlation between the independent variables and the error term, as their p-values exceed the 5% significance level. Consequently, since the p-values of the independent variables are high (typically greater than 0.05), we fail to reject the null hypothesis. This indicates that the independent variables are exogenous, meaning they are uncorrelated with the error term.

Long Run Estimation Model

As shown in Table 7, the regression results indicate that the R-squared value of 0.630064 suggests that approximately 63% of the changes in the dependent variable, gross domestic product (GDP), can be explained by the independent variables: foreign direct investment (FDI), gross domestic savings (GDS), gross capital formation (GCF), natural resources (NR), and trade openness (TO). This implies that these independent variables collectively account for 63% of the variations in GDP. The F-Statistic probability $Prob(F-statistic)$) of less than 0.05 indicates that all coefficients of the variables in the regression model are statistically significant for GDP. The Durbin-Watson (DW) statistic, as shown in the regression analysis, is approximately 1.2, suggesting a potential issue with autocorrelation.

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Table 7: Long Run Estimation Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
$logGCF_{it}$	0.000605	0.012034	0.050262	0.9607
$logFDI_{it}$	0.008322	0.015160	0.548929	0.5924
$logGDS_{it}$	0.143582	0.107344	1.337590	0.2040
$log\,NR_{it}$	-0.043865	0.083535	-0.525106	0.6083
$logTO_{it}$	0.151270	0.139981	1.080642	0.2995
C	0.073508	0.017229	4.266548	0.0009

Source: Researcher's Calculation using EViews 10

Interpretation of Regression Results

The interpretation of the regression results focuses primarily on the long-run effects of the explanatory variables foreign direct investment (FDI), gross domestic savings (GDS), gross capital formation (GCF), natural resources (NR), and trade openness (TO) on the dependent variable, which is gross domestic product (GDP). The results of the long-run regression equation are as follows:

$$logGDP = 0.07350 + 0.000605logGCF + 0.008322logFDI + 0.143582logGDS - 0.04387logNR + 0.15127logTO$$

The long-term regression results reveal that Foreign Direct Investment (FDI), Gross Domestic Savings (GDS), Gross Capital Formation (GCF), and Trade Openness (TO) all have positive effects on GDP. Specifically, FDI exhibits a statistically significant positive impact on GDP, aligning with the a priori expectation that FDI stimulates economic growth. The coefficient for logFDI is 0.008, implying that a 1 percent increase in FDI results in a 0.008 percent increase in GDP within the East African Community (EAC) economies over the study period. Similarly, Gross Domestic Savings (GDS) is found to have a positive and significant effect on GDP. This result corroborates prior expectations that higher domestic savings contribute to economic growth, as indicated by the logGDS coefficient of 0.143582. This suggests that a 1 percent increase in GDS is associated with a 0.143582 percent increase in GDP across EAC.

In addition, the results indicate that Gross Capital Formation (GCF) positively influences GDP, with the logGCF coefficient of 0.000605 suggesting that a 1 percent increase in GCF leads to a 0.000605 percent rise in GDP within the EAC. Conversely, the coefficient for Natural Resources (NR) reveals a negative effect on GDP, as reflected by the logNR coefficient of -0.043865. This suggests that a 1 percent increase in NR is associated with a 0.043865 percent decrease in GDP in the region. This negative relationship could be due to factors such as the "resource curse," where an overreliance on natural resources may lead to economic imbalances, inefficient resource allocation, and institutional weaknesses. Additionally, the volatility of resource prices may contribute to economic instability, further hindering long-term growth. Finally, Trade Openness (TO) is positively related to GDP, with the logTO coefficient of 0.151270 indicating that a 1 percent increase in trade openness leads to a 0.15127 percent increase in GDP in the EAC countries.

Short Run Effects Model

The coefficient of the Error Correction Term (ECT) shows insignificant results; therefore, the study follows Hendry's general approach to specify the model by using different lags for the dependent and independent variables[49], as shown in Table 8. Therefore, the results from the short-run effects model indicate that the coefficient for the Error Correction Term (ECT) is

negative but statistically insignificant, suggesting that the speed of adjustment to long-run equilibrium is not significant in this model. The constant term (C) has a coefficient of 0.080235, which is statistically significant (p = 0.0018), indicating a positive effect on GDP in the short run. However, the coefficients for the independent variables show mixed results. logGCF shows that the coefficient of 0.006662 is not statistically significant (p = 0.6259), suggesting that gross capital formation does not have a meaningful impact on GDP in the short run. logFDI: The coefficient of 0.009760 is also not statistically significant (p = 0.5421), indicating that foreign direct investment does not significantly affect GDP in the short run.

Table 8: Short Run Effect Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.080235	0.019708	4.071300	0.0018
$logGCF_{it}$	0.006662	0.013286	0.501485	0.6259
$logFDI_{it}$	0.009760	0.015511	0.629212	0.5421
$logGDS_{it}$	0.106906	0.130333	0.820249	0.4295
$log\,NR_{it}$	-0.072990	0.082603	-0.883624	0.3958
$logTO_{it}$	0.193632	0.136235	1.421313	0.1830
ECT (-1)	-0.411148	0.369476	1.112786	0.2895

Source: Researcher's Calculation using EViews 10

Hendry's General Approach Model

The main result of interest is the coefficient of the error correction variable (ECM (-1)). The coefficient of the ECT is -0.418369, as shown in Table 9, which indicates the speed of adjustment towards equilibrium and is significant with the appropriate negative sign. This coefficient suggests that 41.8% of the deviation from equilibrium in GDP inflows from the previous year is corrected in the current year. The significance and negative sign indicate the existence of a short-run equilibrium in a dampening relationship between GDP and the factors that affect it.

Table 9: General Approach Model

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	1.082170	0.006614	163.6070	0.0000
$logFDI_{it}$	0.007661	0.000333	22.97935	0.0000
$logGCF_{it}$	0.000661	0.000269	2.457886	0.0302
$logGDS_{it}$	0.141197	0.002604	54.21570	0.0000
$log\,NR_{it}$	-0.041788	0.001973	-21.18121	0.0000
$logTO_{it}$	0.148636	0.003319	44.78094	0.0000
ECT-1	-0.418369	0.006599	152.7972	0.0000

Source: Researcher's Calculation using EViews 10

Table 9 presents the outcomes that indicate the results of the ECT coefficient (or speed of adjustment). According to Enders, the ECT represents the level of divergence from long-run equilibrium in the previous period. The ECT coefficient allows us to test the speed adjustment factor, which indicates the ratio of disequilibrium in subsequent periods. The findings of this study show that the speed adjustment coefficient for GDP growth is -0.418369 and is statistically significant at the 5% level. This indicates that GDP per capita growth is adjusted by 41.8% annually to restore any deviation from its long-run equilibrium.

Short Run Model

The results of the ECM regression equation are as follows:

$$Dlog(GDP_{-1}) = 1.08217 + 0.000661 Dlog(GCF_{-1}) + 0.007661 Dlog(FDI_{-1})$$
$$+ 0.141197 Dlog(GDS_{-1}) - 0.041788 Dlog(NR_{-1})$$
$$+ 0.148636 Dlog(TO_{-1}) + \varepsilon t_{-1}$$

As can be seen, all variables are statistically significant, implying that there are short-run effects of the independent variables on the EAC economy, as their probabilities are less than 0.05. Interestingly, the coefficient of the error correction variable $ETC_{(-1)}$ is significant and has the appropriate positive sign. This indicates that 16% of the GDP deviation from equilibrium in the previous year is corrected in the current year in a dampening manner. It also highlights the importance of all variables, particularly GDS, FDI, GCF, TO, and NR, in explaining GDP in the EAC economy.

Test of Hypothesis

This section discusses the significance of various factors affecting GDP growth in the East African Community (EAC) from 2003 to 2022, using Ordinary Least Squares (OLS) regression and t-statistics for hypothesis testing.

1. Gross Domestic Savings (GDS): The null hypothesis (H_0) states that GDS does not positively affect GDP growth, while the alternative hypothesis (H_1) suggests it does. The t-statistic of 54.21570 (with a probability of 0.0000) leads to rejecting H0$H0$ and accepting H_1, indicating that GDS significantly impacts GDP.

2. Natural Resources (NR): Similar hypotheses are tested for NR. The t-statistic of -21.18121 (probability 0.0000) results in rejecting H_0 and accepting H_1, confirming NR's significant effect on GDP.

3. Gross Capital Formation (GCF): For GCF, the t-statistic of 2.457886 (probability 0.0302) also leads to rejecting H_0 and accepting H_1, indicating that GCF significantly influences GDP.

4. Foreign Direct Investment (FDI): The analysis shows a t-statistic of 22.97935 (probability 0.0000), leading to the rejection of H0$H0$ and acceptance of H_1, confirming FDI's significant impact on GDP.

5. Trade Openness (TO): The t-statistic of 44.78094 (probability 0.0000) results in rejecting H_0 and accepting H_1, indicating that trade openness significantly affects GDP.

Therefore, all tested factors GDS, NR, GCF, FDI, and TO are found to have a significant positive impact on GDP growth in the EAC during the specified period.

Robustness Test

Testing for robustness typically involves a combination of statistical tests, diagnostic checks, and econometric techniques. It provides insights into the relationship between various variables and the dependent variable therefore, logGCf with the positive coefficient suggests that an increase in gross capital formation is associated with a slight increase in the dependent variable as it is shown in table 12. The probability value (0.0126) indicates statistical significance, suggesting that GCF positively influences the outcome. For logFDI the positive coefficient indicates a positive relationship between foreign direct investment and the dependent variable. The probability value (0.0332) suggests that this relationship is statistically significant.

logGDS, the positive coefficient indicates a positive relationship with the dependent variable; however, the z-statistic is negative, which may imply an unexpected relationship. The probability value (0.0297) indicates statistical significance. The logNR, the negative coefficient suggests that an increase in natural resources is associated with a decrease in the dependent variable. The probability value (0.0149) indicates this relationship is statistically significant. The logTO with the positive coefficient indicates a strong positive relationship with the dependent variable, and the probability value (0.0063) suggests that this relationship is statistically significant. And the constant term represents the expected value of the dependent variable when all independent variables are zero. The probability value (0.0945) indicates that this constant is marginally significant. Therefore, the robustness test suggests that gross capital formation, foreign direct investment, gross domestic savings, and trade openness have statistically significant positive relationships with the dependent variable, while natural resources have a significant negative relationship.

Table 10: Robustness Test

Variable	Coefficient	Robust Robust Std. Error	z-Statistic	Prob.
$logGCF_{it}$	0.006662	0.008175	1.632244	0.0126
$logFDI_{it}$	0.009760	0.008630	0.146866	0.0332
$logGDS_{it}$	0.106906	0.085906	-0.088161	0.0297
$log\,NR_{it}$	-0.072990	0.072903	-1.240277	0.0149
$logTO_{it}$	0.193632	0.096306	0.376789	0.0063
C	0.080235	0.011639	0.260410	0.0945

CONCLUSION AND RECOMMENDATIONS

In conclusion, this study demonstrates that China's foreign direct investment plays a crucial role in driving economic growth in the East African Community. This study used the test of cointegration to test the long-run association of integrated variables to achieve the objectives. The ECM tool was also used to inspect the long and short-run granger causality. The results show the significant positive effects of FDI, GDS, GCF, and TO on GDP underscore the potential for these factors to enhance economic performance in the region from unit root test analysis showed that the variables were non-stationary but become stationary after differentiating them at first difference. Thus, the study concluded that the variables were integrated at I (1). The results from the cointegration approach and ECM exhibited that FDI is substantially and associated positively with economic progress. This implies that the upsurge of FDI positively impacts economic growth in East African Community countries. Also, the paper found that gross capital formation was affirmative and statistically correlated with economic growth in EAC. The gross domestic saving and trade openness were found to be statistically significantly correlated with economic growth in the EAC member states.

However, the negative impact of natural resources indicates a need for careful management of resource wealth to avoid detrimental effects on growth. The findings suggest that EAC countries should implement strategic policies to leverage Chinese investments effectively while fostering an environment conducive to sustainable development. By strengthening institutions and diversifying economic partnerships, the EAC can maximize the benefits of foreign investments and mitigate risks associated with over-reliance on any single external partner. The study recommended that the East African Community countries should attempt to

speed up the process of attracting FDI throughout all the sectors which are preferred by FDI in order to motivate economic progress, gross capital formation, and the trade openness. This can be done by strengthening FDI policy in the way that creates a favourable environment to stimulate FDI in the East African Community. The EAC members must create, implement, and enforce rules that will enable the general public to contribute to sustainable development projects by using its financial and fiscal authority. The EAC members should keep pushing for increased cooperation in inter regional infrastructure development projects including transportation, energy generation, and telecommunication services, because these facilities will be less expensive also trade and foreign investment will both benefit from this. To fully realize the potential benefits of FDI, EAC member states must prioritize improving institutional quality and the regulatory environment. Stronger governance frameworks, reduced corruption, and more transparent business regulations are essential to enhance FDI effectiveness and ensure its positive impacts are maximized. Institutional reforms should focus on creating stable legal systems, efficient bureaucracy, and robust anti-corruption measures that give investors' confidence while protecting national interests. These improvements in the investment climate will complement the existing infrastructure cooperation and help translate FDI inflows into more sustainable and equitable growth across the region.

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APPENDIX

Table 11: Chinese End of the Year FDI Stock to Africa, Top Sectors

Year	construction US$	construction Share %	Mining US$	Mining Share %	Manufacturing US$	Manufacturing Share %	Financial intermediation US$	Financial intermediation Share %	Scientific research and technological service US$	Scientific research and technological service Share %	Leasing and commercial service US$	Leasing and commercial service Share %	other US$	other Share %	total US$
2013	68.38	0.26	69.17	0.26	35.11	0.13	36.68	0.14	13.36	0.05			39.30	0.15	262.00
2014	79.90	0.25	79.26	0.25	44.00	0.14	53.05	0.16	13.59	0.04			53.70	0.17	323.50
2015	95.10	0.27	95.40	0.28	46.30	0.13	34.20	0.10	14.60	0.04			61.42	0.18	347.02
2016	113.00	0.288	104.10	0.26	50.90	0.13	45.60	0.11	19.10	0.05			66.22	0.17	398.92
2017	128.80	0.30	97.60	0.23	60.80	0.14	57.10	0.13			23.10	0.05	65.85	0.15	433.25
2018	147.60	0.32	104.80	0.23	59.70	0.13	50.70	0.11			29.70	0.06	68.72	0.15	461.22
2019	135.90	0.31	110.20	0.25	55.90	0.13	52.40	0.12			24.90	0.06	64.85	0.15	444.15
2020	151.50	0.35	89.40	0.21	61.30	0.14	41.40	0.10			23.50	0.05	66.82	0.15	433.92

Source: China-Africa Research Initiative (2022). [1]

Table 12: Variables, Symbols and Their Definitions

Variables	Definition	Measurements	source
$logGDP_{it}$	Economic growth	GDP per capita of EAC countries	World Development Indicators
$logFDI_{it}$	Outward foreign Direct Investment	China's stock of OFDI in EAC countries.	China Africa Research Initiative (CARI).
$logGDS_{it}$	gross domestic saving	Gross domestic saving in EAC countries.	World Development Indicators
$logGCF_{it}$	gross capital formation	Gross fixed capital formation of selected Sub-Saharan African countries	World Development Indicators
$logTO_{it}$	Trade openness	Trade openness of EAC Countries	World Development Indicators
$log\ NR_{it}$	Natural resources	Natural resources in EAC countries	World Development Indicators
$\beta_0, \beta_1, \beta_2, \beta_3, \beta_4, \beta_5$	Beta	indicate the elasticities	

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[1] More information on figure 4 available at: http://www.sais-cari.org/chinese-investment-in-africa. All figures are in millions of US$. % Share is the proportion in total outflows.