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Article

Regional Economic Integration and Sustainable Development: Case of East African Countries

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Abstract: Achieving high and sustained economic growth is a significant policy goal for any economy, particularly in emerging economies. The primary purpose of this study is to investigate how economic integration affects sustainable economic development in East Africa countries. The study estimated the short- and long-run model coefficients employing the autoregressive distributive lag (ARDL) technique. The short-run ARDL model results show that real GDP, exports, and FDI inflows at their first lag periods and the current period exports significantly and positively impact regional sustainable economic growth, while imports and foreign debt negatively impact it. Moreover, the study demonstrated a significant and favorable long–run association between the import of merchandise goods from China as a proportion of total imports, while exports to China and foreign debt negatively impact regional economic growth. It is advised that the regional governments should prioritize the implementation of policies that prohibit further defaults, reduce reliance on external borrowing, promote exports, and provide incentives to attract investment—with a focus on the adoption of labor-intensive technologies.

Keywords: economic integration, sustainable development, East Africa, trade agreement, investment flow, ARDL.

INTRODUCTION

In a world coping with complicated issues related to sustainability, a collaborative approach has become increasingly vital. Each nation has a strong linkage to its neighbors through trade, capital, financial flows, technological and knowledge transfers, and shared policies. Indeed, trade and investment-driven growth necessitates a favorable environment characterized by high integration with global and regional value chains, as well as robust inter- and intra-regional trade (Anami, 2023). Successful international collaboration allows the country to benefit from the global economic outlook. Economic integration enables countries to enhance trade and investment by removing barriers and coordinating policies, thereby enhancing opportunities for mutual cooperation and trade (Waheed J.S., 2011).

Moreover, successful economic integration among nations is crucial for emerging economies like East

Africa, where sustainable development is a major challenge for the majority of the population. In fact, East African countries exported a variety of items to the European Union and Asia, including textiles, chemicals, edible oil, cement, iron and steel, cosmetics, and medicines. On the other hand, the partner states continued to be net importers of commodities such as petroleum products, industrial machinery, textiles, crude palm oil, motor cars, cereals, rice, transportation equipment, fertilizers, chemicals, and raw materials for industrial production (Rouis, 2013). In this regard, China has emerged as a key trading partner and trusted lender to the majority of African countries. Chinese exports to Africa amounted to around 17.1 million US dollars, while African imports into Asia totaled approximately 8.3 million US dollars (IMF, 2022). Furthermore, the country has emerged as a major source of foreign direct investment in the majority of East African countries. East Africa has seen a boom in investment, notably from the United States, the UAE, France, and India, with a concentration on communications, ICT services, and consumer items. Employment in countries like Burundi and Kenya has increased due to increased FDI inflows in most partner nations. Ethiopia has got the second-highest amount of foreign investment on the continent. Uganda's investment increased 39% as a result of resource extraction projects (EAC, 2018).

In addition, East Africa is home to the fastest-growing economies, including Ethiopia, Djibouti, Kenya, Rwanda, Tanzania, and Uganda. In this instance, the IMF predicts East Africa's real GDP growth to reach 5.1% in 2023 and 5.8% in 2024, marking the highest growth rate on the continent (IMF, 2022). Despite their resource potential and economic recovery, the majority of East African nations face various sustainability challenges that have a substantial influence on their economies. Rising geopolitical tensions, regional conflicts, trade policies, financial conditions, commodity prices, and exchange rate depreciation are among the challenges that cause high debt, fiscal deficits, limited trade, and low investment in the region (AFDD, 2022). The World Bank projected that East African countries' debt-to-GDP ratio was 54.5% between 2017 and 2023. Burundi, Comoros, Djibouti, Ethiopia, Kenya, and South Sudan are among the region's most indebted countries. In spite of efforts to stabilize the fiscal position through tax reform, the increased cost of debt payment continues to constrain governments' capacity to invest in critical economic sectors. Indeed, Kenya, Ethiopia, and Zambia are heavily reliant on Chinese loans, and in 2022, China canceled $5.3 billion in loans to 17 African nations as part of its debt restructuring efforts (World Bank, 2022).

LITERATURE REVIEW

Changes in a nation's economic structure result in a significant amount of dependency on the economies of others. Viewed in this way, a collaborative approach enables nations to accomplish larger-scale activities that would be challenging for any single country to undertake alone (Kryeziu, 2016). Previous empirical studies on the drivers of sustainable development used various kinds of conceptual and methodological techniques, with a focus on macroeconomic considerations. However, the present study focuses on the analysis of the impact of economic integration in the forms of trade agreements, capital flows, and financial cooperation on sustainable economic development in East African countries.

Empirically, Batrancea Ioan (2020) established a positive linkage between economic growth and FDI inflows, while Kesuh J. Th. (2021) argues that FDI inflows negatively affect economic development. Moreover, the study conducted by Nazmi Iballi (2022) indicates that countries expand their markets by acquiring commodities and services through international trade. In this view, Saleh (2021) agrees that exports positively impact economic growth, while Mohammad Rahman (2021) asserts that exports negatively impact the growth of the economy in Somalia. Similarly, Nene (2022) argues that imports of final goods and services negatively impact economic development, while Christie (2021) suggests that imports accelerate the growth of the economy. Likewise, Muuz Hadush (2023) claims that foreign debt has a negative impact on the growth of a nation’s economy, while Sloboda (2020) suggests that external debt positively impacts sustainable economic growth. However, the results of specific factors affecting economic growth have been contradictory and inconclusive, leaving a research gap unresolved. Therefore, this study aims to address these research gaps in specific factors affecting sustainable economic development, as previous results have been inconsistent and inconclusive. The intended scientific novelty of this work lies in exploring the impact of economic integration, including trade agreements, investment, and financial cooperation, on the sustainable development of East African countries. At this stage, we analyze the key factors influencing sustainable economic growth and measure their impact on the economic development of East African economies.

RESEARCH METHODOLOGY

The study uses data over the period 2000-2021 from the WDI (2022) database to analyze the impact of economic integration on sustainable economic development. We employed the ARDL model to investigate the short- and long-term relationships between the model variables. The ARDL model allows us to capture the short- and long-run dynamics as

well as the speed of adjustment between the dependent variable and explanatory variables (Gujurati N. P., 2009). The regional real GDP growth is used as a proxy for sustainable economic development, with explanatory variables including foreign direct investment inflows, exports to China, imports from China, and foreign debt. The study utilized the Augmented Dickey-Fuller unit root test for checking stationarity, the Akaike Information Criterion for optimal lag length, and the ARDL bounds co-integration test for long–run co-integration. The applicability and robustness of the ARDL model were evaluated through post-estimation tests such as the Breusch-Godfrey serial correlation LM test, the Breusch-Pagan-Godfrey heteroscedasticity test, the VIF multicollinearity test, the Jarque-Bera normality test, the Ramsey RESET model adequacy test, and recursive stability tests using the CUSUMQ test.

ARDL model specification

The typical ARDL model is presented in the following mathematical equation:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{K} \alpha 1 \Delta GDP_{t-i} + \sum_{i=0}^{K} \alpha 2 \Delta FDI_{t-i} + \sum_{i=0}^{K} \alpha 3 \Delta DBT_{t-i} + \sum_{i=0}^{K} \alpha 4 \Delta EXPO_{t-i} + \sum_{i=0}^{K} \alpha 5 \Delta IMPO_{t-i} + \beta_1 GDP_{t-1} + \beta_2 FDI_{t-1} + \beta_3 DBT_{t-1} + \beta_4 EXPO_{t-1} + \beta_5 IMPO_{t-1} + \varepsilon it \quad (1)$$

Where Δ is the difference operator, k is the lag length, α0 is the drift component, αi is the short–run coefficient, βi is the corresponding long–run multiplier, and εit is the white–noise error term of the ARDL model. GDPt represents the real GDP growth of the region (%); FDIt is the share of foreign direct investment inflows (%); DBTt is the share of foreign debt accumulation from the total regional GDP (%); EXPOt represents exports to China as a percentage of total exports; and IMPOt is the imports from China as a percentage of total imports.

Estimation of the error correction (ECM) model based on the ARDL model

ARDL estimation provides both the short- and long-run estimation results, and the ECM model is specified as follows:

$$\Delta GDP_t = \alpha_0 + \sum_{i=1}^{K} \alpha 1 \Delta GDP_{t-i} + \sum_{i=0}^{K} \alpha 2 \Delta FDI_{t-i} + \sum_{i=0}^{K} \alpha 3 \Delta DBT_{t-i} + \sum_{i=0}^{K} \alpha 4 \Delta EXPO_{t-i} + \sum_{i=0}^{K} \alpha 5 \Delta IMPO_{t-i} + \varepsilon it \quad (2)$$

Data Analysis

Unit root tests

Before initiating any dynamic analysis, we must conduct unit root tests on the time series structure of our data. Otherwise, the model exhibits greater t- and F-statistics values, resulting in a higher R-squared value, a serious multi-collinearity problem, and insufficient results (Dickey Fuller, 1979). We used the augmented Dickey-Fuller (ADF) unit root test to determine the order of integration among variables. The ADF test result shows that real GDP growth, FDI inflows, foreign debt, and imports are stationary at level I(0), while exports are stationary after the first difference, I(1). We also used the Phillips-Perron test technique to check for stationarity among the variables.

Table 1: Unit root test results of ARDL model

Variables	Unit Root Test Results (ADF)				Unit root for Phillips-Perron test			
	t-stat	5% critical	P>|t|	Decision	t-stat	5% critical	P>|t|	Decision
Real GDP growth	-3.13	-1.740	0.003	I(0)	-4.33	-3.60	0.003	I(0)
FDI inflows	-3.34	-1.740	0.002	I(0)	-5.82	-3.60	0.000	I(1)
Foreign debt	-1.97	-1.740	0.003	I(0)	-3.80	-3.60	0.006	I(1)
Export to China	-2.84	-1.746	0.005	I(1)	-4.62	-3.60	0.001	I(1)
Import from China	-2.30	-1.74	0.007	I(0)	-3.84	-3.60	0.005	I(1)

Source: Author's own computations.

According to the test results, real GDP growth was stationary at level I(0), whereas all other variables were stationary after their first difference, I(1). In this work, we used ADF test outcomes to conduct our analysis. Table 1 shows the results of the unit root testing.

Optimum lag length selection criteria

Appropriate lag length selection becomes a critical step in choosing which variables to include in any econometric model. Indeed, a model with large number of lags is likely to produce residuals that are similar to the white noise process. The ARDL model uses (p+1)k regressions to determine an acceptable lag length for variables, where k represents the number of variables and p is the maximum number of lags (Narayan, 2005). Table 2 illustrates the maximum lag length of the ARDL model. In this particular work, we established an optimal lag length selection criterion based on the lowest AIC values, allowing a maximum of four lag lengths. The AIC approach is a better fit for interest since the ideal lag length for growth models is only up to two lags. The study utilized the ARDL (1, 2, 3, 2, 1) model with a restricted intercept and trend as the optimal lag length for this growth model.

Table 2: The maximum lag length of the ARDL model

Lag	LL	LR	Df	P	FPE	AIC	HQIC	SBIC
0	45.2157				7.9e-09	-4.46841	-4.43431	-4.22109
1	96.3121	102.19	25	0.000	5.0e-10	-7.36801	-7.16339	-5.88406
2	167.774	142.92	25	0.000	6.7e-12	-12.5304	-12.1553	-9.80986
3	1204.6	2073.7	25	0.000	7.3e-59*	-124.956	-124.41	-120.999
4	2923.66	*3438.1**	25	0.000	7.1e-21	*-314.85**	-314.23*	-310.399*

Source: Author's own computations.

ARDL bounds tests

The co-integration test is an important step in determining long-term relationships between variables in a model. We have two ways of doing this: the ARDL Bounds Test and the Johansen Co-integration Test. We use the ARDL bound test when the model's variables have mixed integration orders of I(0) and I(1). As a rule of thumb, we reject the null hypothesis [H0: $\beta1 = \beta2 = 0$] and accept [H1: $\beta1 \neq \beta2 \neq 0$] if the estimated F-statistic value is larger than the upper bound 5% critical value. If we find long-run co-integration among the variables, we utilize the ECM to estimate the long-run coefficients; otherwise, we use the unconstrained VAR model to estimate just the short-run relationships. However, the outcome is undetermined if the estimated F-statistic value falls between the upper and lower bounds of the 5% critical value (Pesaran, 2001). Table 3 shows the results of the ARDL Bound Test. As can be seen, the F-statistic value surpasses the 1% crucial value, indicating the existence of long-run co-integration among variables in the model and the feasibility of using the ECM model for estimating long-run coefficients.

Table 3: Bounds test co-integration results

Pesaran/Shin/Smith (2001) ARDL bounds test F-statistic = 20.819 H_0: no levels relationship t-statistic = -9.411				
	Pesaran et al. (2001)		Narayan (2005)	
Significance	I(0)	I(1)	I(0)	I(1)
10%	2.45	3.52	-2.57	-3.66
5%	2.86	4.01	-2.86	-3.99
2.5%	3.25	4.49	-3.13	-4.26
1%	3.74	5.06	-3.43	-4.60

Source: The author's own computations.

RESULTS AND DISCUSSION

The short-run ARDL model results

Table 4 illustrates the estimated short-run coefficients of the ARDL model. Disturbances in any of the model's variables might produce short-term departures from long-term equilibrium. As a consequence, each short-run coefficient demonstrates how each variable dynamically adjusted to its long-run equilibrium. The error correction term (ECT) measures the short-run adjustment toward a long-run equilibrium path. It measures the speed with which the dynamic model recovers to equilibrium after a disruption. For the ECT coefficient to be considered, it must be negative and substantial. A significantly substantial ECT indicates that prior equilibrium errors have a major influence on the present period's results (Wooldridge 2000). As shown in Table 4, the calculated ECT coefficient for this study has a predicted negative sign and is statistically significant, supporting the model's long-

run association. The ARDL model shows that a one-percent deviation from equilibrium is corrected at a rate of 61.38 percent in the next period, indicating substantial correction at a one-percent significance level.

The short-run ARDL model findings reveal that real GDP growth during the first lag period has a considerable and favorable impact on sustainable economic development in East African nations at the 1% significance level. In this instance, the current period's real GDP growth is 0.9138 percent, given that a 1% rise in regional real GDP growth occurred during the first lag period. The results are consistent with those of Ali N. et al. (2017). FDI inflow at its first lag period has a substantial positive short-run influence on regional economic growth at a 5% significance level. In this case, a 1% increase in FDI inflows during the first lag period enables the regional economy to grow by 1.075 percent. As a possible explanation for this conclusion, increased foreign direct investment (FDI) inflows may boost the investment (I) component of the regional economy, create employment, and encourage individuals to increase their consumption (C). Foreign corporate subsidiaries also generate government revenue and contribute to government spending. The findings are also comparable with Laseinde (2020) in Nigeria. Moreover, exports to China during the first lag period indicate a substantial and favorable short-run correlation with the region's sustainable economic growth at a 5% significance level. In this scenario, a 1% rise in commodity exports to China as a proportion of total exports during the first lag period leads to a 0.9545% growth in the regional economy. The improved nation's current account balance better explains the outcome since the performance of a country's neighbors and trading partners may have impacts on the economy. The results are comparable with the research findings of Tru (2018). The short-run model results also revealed a substantial and negative relationship between commodity imports from China and regional economic growth at a 5% level of significance. That is, a one percent rises in goods imported from China over the current period results in a 0.5676 percent drop in regional real GDP growth. The results are also compatible with that of Mukit (2020). Similarly, there is a significant negative short-term connection between foreign debt and sustainable economic development at the 5% significance level. The model results show that a 1% rise in regional governments' foreign debt leads their economies to shrink by 0.0583 percent. The results are likewise close to those of Kryeziu (2016).

Table 4: Estimated coefficients for short-run relationships

Variables		**Coefficients**	**Std. Error**	**t-Stat**	**Prob>/t/**
Real GDP growth	ΔGDP(-1)	.9138182***	.2033674	4.49	0.006
FDI inflows	FDIt	.7573776	.5799076	1.31	0.248
	ΔFDI(-1)	1.075009**	.4649688	2.81	0.039
Exports to China	EXPOt	.9545885**	.3116264	3.06	0.028
	ΔEXPO(-1)	.7692002**	.2380098	3.23	0.023
	ΔEXPO(-2)	.3359835	.1967524	1.71	0.148
Imports from China	IMPOt	-.5676772**	.2763019	-3.05	0.045
	ΔIMPO(-1)	.2825519	.3025869	0.93	0.393
Foreign Debt	ΔDEBTt	-.0583358**	.0156117	-3.74	0.013
ECT (-1)	-.613818	.2033674***	.2033674	-9.41	0.000

Source: The authors' own computations.
Note: The *** and ** represent the significance levels at 1% and 5%, respectively.

The long-run ARDL model results

Table 5 displays the long-term ARDL model results, revealing that exports, imports, and foreign debt significantly contribute to regional sustainable economic growth. In this discussion, the export coefficient was negative, implying a long-term negative impact on regional economic development, i.e., a 1 percent increase in commodity exports from China results in a 0.3496 percent slowdown in regional real GDP growth in the long term. This result is consistent with that of Bahloul (2023). The model findings also revealed a considerable favorable long-term relationship between imports and East African countries' sustained economic development. That is, a 1% increase in merchandise imports from China leads to a 0.953% rise in the region's long-term economic growth. The probable explanation for this outcome could be that when a country imports mostly productive assets, such as machinery and equipment, it indicates strong domestic demand and an economy that is expanding. In this context, imports are more beneficial to a country since productive assets increase economic productivity over time. The findings are comparable with Abdennadher's (2019) results in North African countries. Likewise, the long-term ARDL model results demonstrate that foreign debt has a substantial adverse effect on regional economic growth, with a one percent increase in foreign debt resulting in a 0.0281424 percent slowdown in economic growth, affecting the nation's current account balance. The results are also comparable to those of Imamudin Yuliadi (2021).

Table 5: Estimated coefficients for long-run relationships

Variables	**Coefficients**	**Std. Error**	**t-Statistic**	**Prob.**
FDI inflows	-.2853571	.3836928	-0.74	0.490
Export to China	-.3497978**	.0949318	-3.68	0.014
Import from China	.9536695***	.1138005	8.38	0.000
External Debt	-.0281424**	.0081023	-3.47	0.018
C	32.90964***	4.625431	7.11	0.001

Source: The authors' own computations.

Post-estimation diagnostic tests

We checked the model's validity to ensure that it accurately matches the data at hand. The model's robustness was confirmed through various tests, including the Breusch-Godfrey LM test, Breusch-Pagan-Godfrey test, VIF, Jarque-Bera test, Ramsey RESET test, and recursive stability tests, all of which have demonstrated the model's robustness and application.

The model underwent validity testing, which confirmed the lack of serial correlation, heteroscedasticity, multi-colinearity, normality, and model specification concerns. This signifies that the model captures the desired econometric characteristics associated with the time series data. Table 6 shows results of the diagnostic test for the ARDL model.

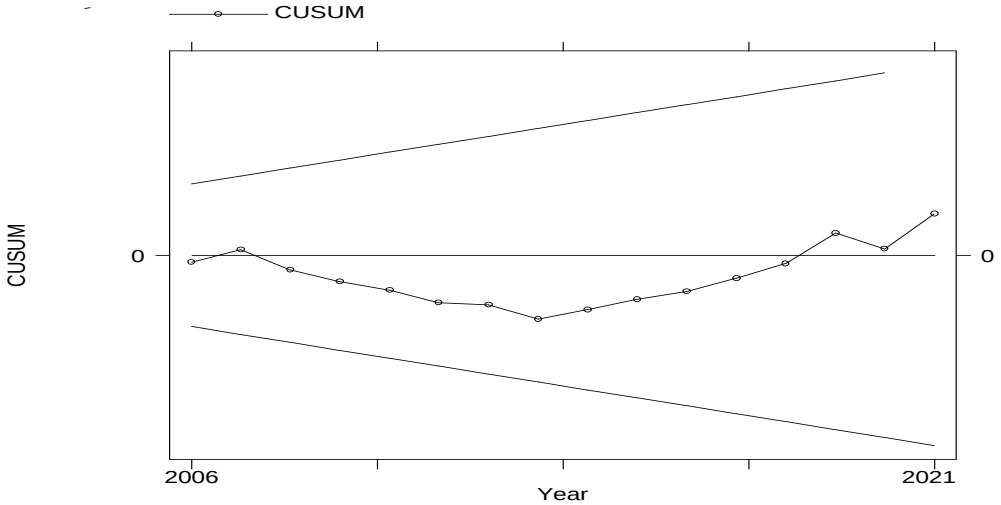
Table 6: The post-estimation diagnostic test results

Assumptions	Tests	Test results
Autocorrelation	Breusch-Godfrey LM test	Prob = 0.0621
	Durbin-Watson d-statistic	D = 2.28
Heteroscedasticity	Breusch-Pagan / Cook-Weisberg test	Prob = 0.2744
Multi-collinearity	Mean VIF	VIF = 7.09
Normality	Skewness/Kurtosis tests	Joint Prob = 0.8463
Model adequacy	Ramsey RESET test	Prob = 0.7616

Source: The authors' own computations.

Plots of the Model Stability Test

Figure 1 depicts the CUSUMSQ at the 5% significance level. We carried out the recursive testing by visually evaluating the graphs of recursive parameter estimations. The CUSUMSQ test results confirm the stability of the ARDL model, indicating its suitability for investigating the impact of economic integration on sustainable regional development.



Source: The authors' own computations.

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CONCLUSION

The primary purpose of this study is to investigate the influence of economic integration on the sustainable development of the East African countries' economies over the period 2000–2021. According to the short-run ARDL model, real GDP growth at the first lag period, foreign direct investment inflows at the first lag period, and exports at the first lag period all have a significant and positive impact on regional sustainable development, whereas imports and foreign debt have a negative impact. The long-run model indicates that imports positively impact regional economic growth, while exports and foreign debt negatively affect it over the study period.

Moving forward, the study results have some significant policy implications for the East African countries' economies. Based on ARDL results, foreign debt is significantly and negatively associated with sustainable economic development in both the short- and long-term time horizons. Hence, East Africa's governments are advised to implement effective strategies such as debt restructuring, increased revenue mobilization, and fiscal reforms to reduce further defaults. In addition, countries in the region should diversify their economies and reduce their reliance on foreign debt. Similarly, the consequences of merchandise exports to China have shown a mixed effect, with a favorable short-term effect but a negative long-term impact on East Africa's economic growth. Regional governments are advised to create policies that stimulate short-term exports while managing long-term exports. Import results indicate contradictory conclusions, with a negative impact in the short run but a beneficial influence on long-term economic growth. In this instance, it is also recommended that regional governments adopt policies that limit imports in the short term while encouraging imports in the long run. Foreign direct investment inflow has a favorable influence on short-run economic growth, but it is statistically insignificant in the long term. As a result, it is preferable that the economic strategies used in this situation include those that provide incentives to attract investment, with a focus on the adoption of labor-intensive technologies and quality-based development of human resources.

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