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Impact of Official Development Assistance on Economic Growth in the East African Community

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Abstract

This research focuses on the effect of Official Development Assistance (ODA) on the economic development of the East African Community, with Trade openness as a moderating variable. This study adopts a Vector Error Correction Model (VECM) for 1974-2022 to investigate the cointegration between ODA balance, trade openness, and economic growth in five East African countries. The findings reveal a complex dynamic relationship: whereas ODA has a positive individual impact on economic growth, as well as the interaction of ODA and Trade openness also has a positive and significant effect. This indicates that the characteristics of trade policy condition the ability of ODA to promote economic growth. This means that characteristics of the trade policy condition the ability of ODA to promote economic growth. Based on the findings, the study adds to the ever-ongoing aid inefficiency discourse by underlining the necessity of an 'enabling environment' in the form of trade openness, significantly boosting the growth impact of ODA. These outcomes have significant implications for policymakers in countries of the third world where compliance with ODA missions could be made efficient by implementing the missions of trade openness. According to the study, there is a call for the strategies of foreign

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aid and trade liberalization toward the development of economic growth in developing countries.

Keywords: Official Development Assistance; Vector Error Correction Model; Trade openness; economic growth; developing countries

Introduction

International investment has been equally considered a major determinant of economic development, especially for developing nations. In the broader sense, foreign investment includes the Official Development Assistance (ODA) in many developing countries. East African Community (EAC) comprises Burundi, Kenya, Rwanda, Uganda, South Sudan, and Tanzania, signed in 2000 and aimed at socio-economic development. Surprisingly, while these countries are highly endowed with foreign aid with which they fund their development programs, they continue to be among the poorest in the world (Liew et al., 2012).

Empirical analysis and study on the link between ODA and economic growth has been severely conducted and still is. According to the evidence, it has been found that foreign aid has a long-term impact on the gross domestic product (GDP), including some of the previous detailed studies (Martinez-Zarzoso, 2015). For example, Refaei and Sameti (2015) identified that the ODA had a statistically significant and relatively large impact on Iran's economic growth in the long-run communication. Suphian and Kim (2017) also established a substantial and positive relationship between ODA and economic growth in the selected East African countries in the long run.

Nevertheless, the impact on growth in recipient countries has been an object of intense discussion (Booth, 2012). ODA can be contingent on sound macroeconomic settings and fiscal, monetary, and trade policies (Ceesay, 2020). This conditionality is documented in works such as Chen and Singh (2016), which state that, for example, while aid volatility generally positively influences economic growth in Asian and Pacific Island countries, public investment volatility moderates this impact.

Surprisingly, other empirical works have established a non-linear relationship between ODA and economic growth. Yiew and Lau (2018) conducted a study across 95 countries. They observed a U-shaped relationship of ODA, which hurts economic growth but has a positive impact in the later period. However, they urged caution in reliance on ODA as negative impacts could be observed within receiving economies.

Regional influence might play an essential role in determining the impact of ODA on growth. According to Dedehouanou and Kane (2021), a sample of West African countries shows that ODA has a positive and significant impact on growth in the industrial and services sector. They also

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describe the broad contagion impacts of aid granted to spatially adjacent countries in the regional bloc.

However, some research has revealed that ODA has a negative or insignificant impact on economic growth, although most of the previous research work suggested a positive impact. In their study, Abdou-Razak et al. (2019) concluded that ODA has a negative though insignificant effect on Togo's economy. Another study by Veledinah (2014) revealed little and insignificant short-run effects of ODA on Kenya's economic growth, though insignificant differences were revealed in the long run. Liew et al. (2012) used panel analytics to analyze the ODA-growth link for the East African countries for the 1985-2010 period and identified negative linkage across most models. These mixed findings mean that the relationship between ODA and growth is complex and requires extensive research, especially in East Africa. Evidence shows that the East African economies have yet to attain their full economic growth performance despite policy measures to liberalize the economies to attract foreign capital. The gauged regional GDP average growth rate was 5.8 percent between 1974 and 2022; however, this was marked by a high standard deviation of 16 percent, which underlined volatility in the growth rates (Geda & Yimer, 2023). Far more worrisome, however, is the evidence that the GDP growth rates have been falling from more than 7% in the 1970s to 4-5% in the recent period (Höppner, 2020). This underperformance has implications for foreign aid's capacity to promote economic growth in the region.

Earlier works have isolated some features of foreign investment and have yet to look at how they jointly influence growth. For example, Mutwiri (2012) independently analyzed the effects of foreign debt, Foreign Direct Investment (FDI), foreign aid, and remittances on the economic development of EAC member countries. This approach creates a conceptual gap in assessing the total impact of foreign investment, inclusive of ODA, on economic growth in East Africa. This research was intended to fill these gaps by examining the relationship between Official Development Aid and Economic Growth in East African countries. The research hypothesis assumes that Official Development Aid does not significantly impact Economic Growth in East African countries. This research aims to understand the role of ODA among the other types of FDI in the region's development.

The outcome of this study will be necessary to policymakers, scholars, and the East African Community. For policymakers, particularly governments and agencies involved in attracting private capital, this study will provide objective evidence of the impact of ODA on Economic Growth. It will help design policies that would improve and make good use of the aid supplied by other countries. This paper will interest scholars because it addresses a topic with mixed empirical results, especially concerning the relationship between ODA and growth in the East African region. Lastly, for the EAC, this study

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will provide information on the utilization of ODA-induced economic growth and shape future strategies for the mobilization and efficient use of foreign aid.

This study aims to contribute to the ongoing debate on the effectiveness of foreign aid in promoting economic development in emerging economies by examining the relationship between ODA and economic growth in East Africa using robust empirical techniques. It will provide valuable insights into whether ODA can catalyze sustainable economic growth in the East African Community or if alternative strategies for development financing should be considered.

2. Materials and Methods

2.1 Research Design

This study adopted a quantitative research design. Quantitative research collects and analyzes numerical data. It is conducted in a more structured environment that often allows the researcher to control study variables, environment, and research questions. Quantitative research may be used to determine the relationship between variables and outcomes. It involves developing a hypothesis, which is a description of the anticipated result, relationship, or expected outcome from the question being researched (Rutberg & Bouikidis, 2018).

Specifically, the study adopted a descriptive research design to describe the linkage between foreign investments, trade openness, and economic growth within the East African context. A descriptive research design designates the circumstances at a particular time. It is designed to gather data about present existing situations. It, therefore, provides a systematic description that is factual and accurate concerning the nature and status of the subject under study (Cooper & Schindler, 2016). Usually, a descriptive research design model assesses the rate of occurrence or the association between variables. The model is suitable as it helps to define and contrast variables in a specific study. It, therefore, involves the utilization and investigation of numerical data using specific statistical techniques to answer questions like who, how much, what, where, when, how many, and how. The next feature of the above definition is that in quantitative research design, numerical data are collected and analyzed using statistical methods (Apuke, 2017). A correlational research design was used to identify the cointegrating and causal nexus of variables in the study.

2.2 Target Population

According to Taherdoost (2016), population refers to the entire group of people, events, or things of interest that a researcher wishes to assess. Cooper and Schindler (2016) also defined population as the total collection of

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elements about which we wish to make some inferences. The above definitions suggest that a population comprises the entire collection of elements about which some inferences can be made (Gliner et al., 2016). The target population of this study was the East African Community Member Countries. This was comprised of 6 member countries, namely: Kenya, Uganda, Tanzania, Rwanda, Burundi, and South Sudan.

Table 1: Target Population

Countries in EAC	Country's Name
1. Country 1	Burundi
2. Country 2	Kenya
3. Country 3	Rwanda
4. Country 4	South Sudan
5. Country 5	Tanzania
6. Country 6	Uganda

2.3 Sampling Technique

The study used a purposive sampling method since there are few countries involved in the study. Purposive sampling is used when the population of interest is difficult to access or the researcher experiences difficulty accessing data (Kalman, 2019). According to (Scheaffer, 2013), purposive sampling is preferred where the population is small and manageable. The sample of Kenya, Uganda, Rwanda, Burundi, and Tanzania was informed by the fact that these countries form the East African community, and their data is complete. The study duration was 1974 – 2022. For this study, Kenya, Uganda, and Tanzania were members of the EAC, with the other three countries joining later. Purposive sampling was also adopted since South Sudan had a lot of missing economic data, and a decision was made to exclude it from the study.

Table 2: Target Sample

Countries in EAC	Nation Name	Duration of study	Total observations
Country 1	Burundi	1974-2022	49
Country 2	Kenya	1974-2022	49
Country 3	Rwanda	1974-2022	49
Country 4	Tanzania	1994-2022	29
Country 5	Uganda	1990-2022	33
Total			209

2.4 Data Sources

The study relied on secondary sources for the duration of 1974 – 2022. The frequency of the data is annual for the study duration, implying that the study duration is 49 years. Data on the foreign investment and macroeconomic control variables will be sourced from contrasting sources, including the World Bank database, National Statistical Bureaus, Central Banks, and the Stock exchange of the respective country.

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2.5 Empirical Model

The study employed an econometric investigation approach to quantify the effect of foreign investments and trade openness on economic growth in Kenya, Uganda, Rwanda, Burundi, and Tanzania.

2.5.1 Regression Model Specification

The Vector Autoregressive (VAR) analysis system is the methodology used in this investigation. Changes in the variables under consideration correlate with changes in delays in the multivariate framework provided by the VAR model (Adeniran et al., 2016). Because they describe the joint generation mechanism of the relevant variables, they are employed for economic analysis even though they are natural instruments for predicting (Lütkepohl & Schlaak, 2018). The stationary test, sometimes referred to as the Unit root test, is the initial phase of VAR modeling. If, after performing a unit root test, it is discovered that a series of data is stationary at some levels, it can be estimated directly by modeling an unrestricted VAR; if not, the first difference is used to make the data stationary before modeling an unrestricted VAR, which is known as a VAR in first difference. The models are approximated equations in both instances using the least squares methods. The regression model is expressed as follows

The guiding panel model for this study was

$$Y_{It} = \alpha_{it} + \sum_{i=1}^{K} \delta'_{it} Y_{i,t-j} + \sum_{i-0}^{q} \beta'_{it} X_{i,t-j} + \varepsilon_{it} \quad (1)$$

Where ε_{it} is the error term for country i in year t

Y_{it} = Economic growth for i^{th} country in $t^{th/}$ year, X_{it} = vector representing independent variables for nation i in year t, β'= Vector of Coefficients of the independent variables, i= 1, 2… 6 (countries in East Africa region), t = 1, 2 ……21 (time indicator).

Thus,

$$\Delta Yit = \alpha_{it} + \delta'_{it} Y_{i,t-j} + \beta_1 ODA_{i,t-j} + \varepsilon_{it} \quad (2)$$

Where: Yi,t = Economic growth (Dependent variable)

α_{it}= Intercept term; $\delta'_{it} coefficients\ of\ the\ lagged\ dependent\ variable$

β_i= coefficients of the independent variables; $ODA_{i,t-j}$=official development aid, and $\varepsilon i,t$= error term.

Official Development Aid (ODA) is defined as the financial flows, technical assistance, and commodities provided by donor countries or international organizations to developing countries (Erdem, 2021). It is primarily aimed at promoting economic development and welfare. For this

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study, ODA is measured as a percentage of Gross Domestic Product (GDP) for each country. Data on ODA were sourced from the World Bank database, National Statistical Bureaus, and Central Banks of the respective countries within the study period (1974–2022). This approach ensures consistency and comparability of ODA data across the studied countries and years.

2.6 Pre - Estimation Tests

2.6.1 Normality test

A normal distribution is a function that describes the probability of events within a specific space where all events' probabilities are summed to at least one (Ghasemi & Zahediasl, 2012). If a random variable Z has a Normal (0, 1) distribution, we say it has a standard normal distribution (Guzman et al., 2024). The most common normality test procedures available in statistical software are the Shapiro-Wilk (SW) test, Kolmogorov Smirnov (KS) test, Anderson-Darling (AD) test, and Lilliefors (LF) test. Some tests can only be applied under a specific condition or assumption. Moreover, contrasting normality tests often produce contrasting outcomes, i.e., some tests reject while others fail to reject the null hypothesis of normality. The contradicting outcome should be more accurate and more apparent to practitioners. Therefore, the choice of normality test should indisputably be given tremendous attention (Razali & Wah, 2011). This study used the Shapiro-Wilk (SW) test to test normality since it is more reliable.

2.6.2 Unit Root Test

The concepts of integration and stationarity were the building blocks of this research. This concept was used since empirical literature has suggested that most economic time series data and panel data are integrated of order one $I(1)$, more significant than order zero I (0). This study will adopt a new unit root test that considers the test of stationarity among variables in a group panel setting rather than individual variables (Baltagi & Kao, 2001). Therefore, this study used ADF - Fisher Chi-square since they are the most recent advanced unit root tests and are considered the most robust. The presence of a unit root was tested by conducting tests proposed by Dickey and Fuller (1979). These tests will allow us to determine whether the panel VAR investigation may be used for all models.

2.6.3 Multicollinearity

Multicollinearity problem mainly arises when two independent variables are linearly dependent (if p-values are more significant than 0.05). Its presence inflates the variance of parameter estimates, providing the wrong magnitude of coefficient estimates and signs, hence, poor and incorrect conclusions. This study used variance inflation factor (VIF) or collinearity

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matrices to check for its presence. This is a post-estimation diagnostic test. A rule of thumb of VIF 10 was applied in testing for the multicollinearity problem whereby a VIF of less than ten will imply the absence of multicollinearity among the independent variables (Balogun, 2021)

2.6.4 Lag length selection method

Specifying the appropriate lag order to capture response time and feedback is a delicate econometric issue in time series models. Some early work by Schmidt and Sickles (1975) partly addressed this problem in the context of Autoregressive distributed lag models and suggested various solutions. In dynamic panel models, the problem is known to be even more complex in part because of a fixed effect, which means that the dimension of the parameter space expands with the sample size (Han et al., 2017).

Many lag length selection criteria have been adopted in economic studies to determine the Autoregressive (AR) lag length of time series and panel variables. An AR process of lag length p refers to a time series in which its current value is dependent on its first p lagged values and is normally denoted by AR (p). The AR lag length p is always unknown. It therefore has to be estimated via various lag length selection criteria such as Akaike's information criterion (AIC) (Akaike, 1973), Schwarz information criterion (SIC) (Schwarz, 1978) Hannan-Quinn criterion (HQC) (Hannan & Quinn, 1979), final prediction error (FPE) (Akaike, 1969), and Bayesian information criterion (BIC) (Akaike, 1979). All these criteria were used to compare and solve the lag length problem.

2.6.5 Granger Causality Test

This test was applied to examine the relationship between foreign investments, trade openness, and economic growth. Lopez and Weber (2017) describe it as a construct residual (errors) based on the static regression model. The Granger causality test assumes there can be causality for some individual income but not necessarily for all.

2.6.6 Cointegration Test

Engle and Granger (1987) assert that if each element of a vector of time or panel series first achieves stationarity after differencing. Still, a linear combination is already stationary; the time series are said to be cointegrated with cointegrating vector α. This study sought to test for cointegration in the process of coming up with the model to eliminate the spurious regression problem.

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2.7 Post-estimation Model Tests

2.7.1 Heteroscedasticity Test

Heteroscedasticity is an econometric problem where the error terms have no constant variance (variance is not the same). This is a post-estimation diagnostic test. Non-existence means that confidence levels and test statistics are biased (Greene, 2003); a severe problem in econometrics tends to affect the Ordinary Least Square (OLS) estimators. Upon estimating the empirical model, the Breusch-Pagan-Godfrey test was used to examine heteroscedasticity.

2.7.2 Autocorrelation Test

The autocorrelation problem arises from the serial correlation of the error terms among the variables. Autocorrelation exaggerates the significance of the predictor when, in fact, they are not. This is a post-estimation diagnostic test. This study applied two tests to test serial correlation within the residual from the regression models: the alternative Durbin Watson test and the Breusch-Godfrey LM (Chatterjee & Simonoff, 2013).

3. Results and Discussion

3.1 Descriptive Statistics

3.1.1 Summary Statistics

The study examined the relationship between Official Development Assistance (ODA) and Economic Growth in the East African Community. The analysis encompassed several statistical tests to understand this relationship comprehensively. As presented in Table 3, descriptive statistics offer an initial insight into the nature of the variables.

Table 3: Descriptive Statistics for Study Variables

Variable	Mean	Median	Maximum	Minimum	Std. Dev.	Coefficient of Variation
Economic Growth (%)	5.75	6.75	46.06	-161.60	16.37	284.71
Official Development Aid (% of GDP)	20.39	17.14	138.39	2.75	15.87	77.87

Economic Growth showed considerable volatility, with a mean of 5.75% and a standard deviation of 16.37%. This high variability is further emphasized by the substantial range between the minimum (-161.60%) and maximum (46.06%) values and a notably high coefficient of variation (284.71%). These figures suggest significant fluctuations in economic performance across the studied period and countries.

Official Development Assistance, measured as a percentage of GDP demonstrated less extreme but still considerable variation. With a mean of 20.39% and a median of 17.14%, ODA represents a substantial portion of these economies. The maximum value of 138.39% indicates periods or

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countries where aid inflows significantly exceeded the size of the domestic economy. The coefficient of variation for ODA (77.87%) suggests less volatility compared to economic growth but still indicates considerable inconsistency in aid flows. The normality of data distribution was assessed using the Shapiro-Wilk test.

3.1.2 Normality Test

A normal distribution is not skewed and is defined to have a coefficient of kurtosis. The study used the Shapiro-Wilk (SW) test to test normality since it is more reliable (Lasanthika et al., 2023)

Table 4: Shapiro-Wilk W Test for Normality

Variable	W	V	Z	Probability>z
Economic growth	0.64723	54.687	9.228	0.00000
Official development assistance	0.80516	30.204	7.859	0.00000

According to Table 4, Economic Growth and ODA showed significant departure from normality ($p < 0.00001$ for both variables). This non-normality is essential when interpreting further analyses and selecting appropriate statistical techniques.

3.1.3 Unit Root Test

Stationarity in a time series analysis is an essential assumption. The unit root test determines whether a series is stationary or exhibits a unit root. Applying statistical techniques and assumptions becomes challenging when a series has a unit root, leading to spurious regression results and invalid inferences (Enders & Lee, 2004). This study used ADF - Fisher Chi-square since they are the most recent advanced unit root tests and are considered to be the most robust. The presence of a unit root was tested by conducting tests proposed by Dickey and Fuller in 1979 (Glynn et al., 2007). This test determined whether the investigation required a robust modeling process.

Table 5: ADF - Fisher Chi-square Unit Root Test

Variable	**Statistic**	**Prob.****
Economic Growth	46.9225	0.0000
Official Development Aid	24.8046	0.0057

Economic Growth and ODA were stationary at level ($p < 0.01$ for both), which is favorable for subsequent analyses as it reduces the risk of spurious relationships, as shown in Table 5.

3.1.4 Correlation Analysis

Correlation analysis measures the association between two numeric variables. Table 6 presents the correlation analysis between lagged values of economic growth and official development aid (ODA), as it is essential to

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focus on the relationships over time rather than contemporaneous values, given the nature of the study.

Table 6: Correlation Matrix

Variable	Economic growth	Official Development Aid
Economic growth	1.000000	
Official Development Aid	-0.257021 (0.0023)	1.000000

The correlation coefficient of -0.257 (p = 0.0023) indicates that higher lagged levels of ODA are associated with lower economic growth rates, or vice versa. By considering the lagged values, the analysis aligns with the study's focus on understanding delayed or cumulative impacts of ODA on economic growth. This approach avoids the potential misinterpretation of contemporaneous correlations, as the research seeks to identify how past values of ODA influence current economic outcomes.

3.1.5 Multicollinearity Test

Multicollinearity is a problem in time series analysis that occurs when the independent variables are highly correlated (Brooks et al., 2016). Table 7 presents the collinearity results that were conducted to ascertain the level of association between the independent variable foreign official development assistance

Table 7: Multicollinearity Test

Variable	VIF
Official development assistance	1.091033

The VIF for ODA (1.091) is well below the threshold of 10, indicating no significant multicollinearity issues in the model.

3.1.6 Granger Causality Test

A variable x is said to granger cause a variable y, if past values of x are used to predict future values of y more than y's own past values (Granger, 1969). The study employed the pairwise Granger causality test to determine the direction of causality, as shown in Table 8.

Table 8: Pairwise Granger Causality Test

Null Hypothesis	F-Statistic	Probability
ODA flow does not granger cause economic growth	5.01817	0.0075
Economic growth does not guarantee cause ODA flow	0.25921	0.7719

The results indicate that ODA Granger causes economic growth (F = 5.018, p = 0.0075), but economic growth does not Granger cause ODA (F = 0.259, p = 0.7719). This unidirectional causality suggests that changes in ODA levels precede and potentially influence changes in economic growth but not vice versa.

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3.1.7 Cointegration Test

This test was conducted using the Johansen Fisher Panel Cointegration Test. According to Emmanuel (2015), Engle and Granger assert that if each element of a vector of time or panel series first achieves stationary after differencing, but a linear combination is already stationary, the time series are said to be cointegrated with a cointegrating vector α. This study sought to test for the existence of cointegration in the process of developing the model to eliminate the problem of spurious regression.

Table 9: Johansen Fisher Panel Cointegration Test

Variables	Hypothesized No. of CE(s)	Fisher Stat.* (from trace test)	Probability value	Fisher Stat.* (from max-eigen test)	Probability value
Economic growth	None	40.41	0.0000	30.94	0.0000
Official Development Assistance	At most 3	5.599	0.4696	4.608	0.5950

Table 9 presents the results of the Johansen Fisher Panel cointegration test for the two study variables, economic growth, and official development assistance flow. Two tests were conducted to test the number of linearly relevant equations. These were Fisher Stat.* (from trace test) and Fisher Stat.* (from max-eigen test). The presence of a cointegrating relationship means that there is a long-run relationship between the variables when economic growth is the dependent variable. The study will, therefore, use the panel VECM model, which captures the short-run and long-run dynamic equilibrium relationships and provides insights into the adjustment process following deviation from the equilibrium (Hassan et al., 2024)

3.1.8 Heteroskedasticity Test

Heteroscedasticity is an econometric problem in which the error terms have no constant variance (variance is not the same). This is a post-estimation diagnostic test. According to Yitayew (2017), Heteroscedasticity is a serious problem in econometrics that tends to affect the estimators. The Breusch-Pagan-Godfrey test was used to examine Heteroscedasticity.

Table 10: Heteroskedasticity Test

Heteroskedasticity Test: Breusch-Pagan-Godfrey			
F-statistic	0.595386	Prob. F(5,125)	0.7035
Obs*R-squared	3.047251	Prob. Chi-Square(5)	0.6927
Scaled explained SS	5.677038	Prob. Chi-Square(5)	0.3389

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Table 10 presents the Breusch-Pagan-Godfrey heteroskedasticity test results for the two study variables used in the study using Breusch-Pagan-Godfrey heteroskedasticity test. The table presents three test statistics: F-statistic 0.595386 with Prob. 0.7035, Obs*R-squared 3.047251 with Prob. 0.6927 and Scaled explained SS 5.677038 with Prob. 0.3389. These results show no heteroskedasticity problem in the data, and the variance and mean of the errors are stable, as are those of the study variables.

3.1.9 Autocorrelation Test

The autocorrelation problem arises from the serial correlation of the error terms among the variables. Autocorrelation exaggerates the significance of the predictor when, in fact, they are not. This is a post-estimation diagnostic test. In this study, Breusch-Godfrey LM (Chatterjee & Simonoff, 2013) was applied to test the presence of serial correlation, as shown in Table 11.

Table 11: Autocorrelation Test

Breusch-Godfrey Serial Correlation LM Test:			
F-statistic	0.544048	Prob. F(2,123)	0.5818
Obs*R-squared	1.148704	Prob. Chi-Square(2)	0.5631

Breusch-Godfrey Serial Correlation, LM Test table, presents three test statistics: F-statistic 0.544048 p-value 0.5818 and Obs*R-squared 1.148704 P-value 0.5631. These results show that there is no serial correlation problem in the data, and thus, the study variables' errors are also stable.

3.2 Bivariate Analysis

3.2.1 Regression Model for Official Development Aid

Table 12: Official Development Aid Regression

Variable	Coefficient	Standard error	T- statistic	p-value
Official Development Aid	0.331732	(0.10283)	[3.22597]	0.0000
C	13.63930	1.750488	7.791715	0.0000
Error Correction term	-0.459556	(2.39608)	[-2.15812]	0.0000
Fit statistics: R-squared	0.538393			
Adj. R-squared	0.502884			
F-statistic	15.16246			
Log-likelihood	-706.8946			
Akaike AIC	8.519462			
Schwarz SC	8.760224			

To analyze the effect of official development aid on the dependent variable (economic growth), a Panel-VECM regression was employed in Table 12. The following regression model was employed:

$$\Delta Y_{it} = 13.63930 + 1Y_{i,t-1} + 0.331732ODA_{i,t-1} - 0.459556\,\theta ECT_{t-1}$$

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Where Y is $ODA_{i,t-1}$ lagged official development aid, and ECT is error correction speed of adjustment. The regression results in Table 12 show that the relationship between the official development aid variable and economic growth is positive and significant, with a t-value of 3.22597 and a p-value of 0.0000. C represents the intercept term in the regression, with a coefficient of -9.738961. The error correction term coefficient is -0.459556 with a p-value of 0.0000. This means it takes approximately 0.459556 units per period to revert to equilibrium, following a deviation in the dependent variable. R-squared is 0.538393; the variables in the model cause 53% of changes in the dependent variable. The F-statistic = 15.16246, with a p-value of 0.0000, indicating that the overall model is statistically significant. Again, the results from this regression model differ from those on the correlation matrix, which found a significant negative relationship. The violation of the normality assumption could explain this, or the relationship between the two variables may be non-linear, affecting the results of the correlation matrix. The study established a positive relationship between official development aid and economic growth. The findings support Chang and Mendy (2012), who sought to find the empirical relationship between economic growth and openness in Africa. Refaei and Sameti (2015) show that in the long run, the effect of ODA on economic growth was positive and statistically significant. Suphian and Kim (2017) find that ODA has a considerable positive impact in the short and long run. Abdou-Razak et al. (2019) reveal that official development aid has had a negative effect on the economy in Togo.

3.2.2 Moderated Model for Official Development Aid

Table 13: Moderated Model Official Development Aid Regression

Variable	Coefficient	Std. error	t- statistic	p-value
Official Development Aid	0.748348	(0.21904)	[3.41654]	0.0000
Trade openness	0.028953	(0.00648)	[4.46486]	0.0000
Official Development Aid * Trade openness	0.266479	(0.03524)	[7.56284]	0.0000
Error Correction term	-0.317815	(0.51556)	[-0.61644]	0.2178
Fit statistics: R-squared 0.678807				
Adj. R-squared 0.507503				
F-statistic 3.962605				
Log-likelihood -567.5955				
Akaike AIC 8.871878				
Schwarz SC 9.906333				

Using Panel VECM, the following model was generated; $\Delta Yit = 1Y_{i,t-1} - 0.748348ODA_{i,t-1} + 0.028953OE_{i,t-1} - 0.266479OE_{i,t-1} * ODA_{t-1} - 0.317815\,\theta ECT_{t-1}$

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Where Y is $ODA_{i,t-1}$, $OE_{i,t-1}$lagged and $OE_{i,t-1} * ODA_{t-1}$ interaction official development aid and ECT is error correction speed of adjustment as shown in Table 13. The coefficient for ODA is 0.748348; the t-statistic is 3.41654, and the p-value of 0.000. This suggests that the relationship between ODA and the dependent variable is statistically significant, and a unit increase in ODA leads to an increase in economic growth by 0.748348 units. The coefficient for trade openness is 0.028953 with a p-value of 0.000, signifying a statistically significant relationship with the dependent variable. Holding other factors constant, a one-unit increase in ODA leads to an increase of 0.028953 units in the dependent variable. The moderated term has a coefficient of 0.266479, and the t-statistic is 0.04240 with a p-value of 0.0000; this signifies that the combined effect of ODA and trade openness on the dependent variable is positive.

In summary, the regression results indicate a positive relation between ODA and Economic growth. The joint effect of ODA and Trade Openness on economic growth is positive. The R-squared of the moderated model is 0.678807; approximately 67.9% of changes in the dependent variables are explained by the independent variables. The study established a positive significant relationship between official development aid and economic growth.

The findings support Chang and Mendy (2012), who sought to find the empirical relationship between economic growth and openness in Africa. Refaei and Sameti (2015) show that in the long run, the effect of ODA on economic growth was positive and statistically significant. Suphian and Kim (2017) find that ODA has a significant positive effect in the short and long run. Abdou-Razak et al. (2019) reveal that official development aid has hurt the economy in Togo.

3.2.3 Test of Hypothesis

The study used the t-test to test the hypothesis and draw inferences from the regression models. T-test is a widely used method in testing for statistical inferences by assessing the statistical significance of the estimated coefficients of the regression model (Bilon, 2023). At a 95% confidence interval, the null hypothesis is rejected in favor of the alternate hypothesis when the absolute value of t-statistics is greater than the critical value. When the absolute value of t-statistics is less than the critical value, we fail to reject the null hypothesis, concluding that the coefficient is not statistically significant.

H_0: Official Development Aid Has No Significant Effect on Economic Growth among East African Community Countries

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As presented in Table 12, the bivariate regression model between ODA and economic growth, official development aid has a significant relationship with economic growth (t-statistic 3.33597; p-value 0.0000). From the results, we reject the null hypothesis and conclude that official development aid has a significant relationship with economic growth. The study established a positive relationship between official development aid and economic growth. The findings support Chang and Mendy (2012), who sought to find the empirical relationship between economic growth and openness in Africa. Refaei and Sameti (2015) show that in the long run, the effect of ODA on economic growth was positive and statistically significant. Suphian and Kim (2017) find that ODA has a significant positive impact in the short and long run. Abdou-Razak et al. (2019) reveal that official development aid has had a negative effect on the economy in Togo.

Conclusion

This study examined the relationship between Official Development Assistance (ODA) and economic growth in the East African Community, focusing on the moderating role of trade openness. The findings reveal a complex dynamic relationship between ODA and regional economic growth. Our analysis indicates that when considered in isolation, ODA has a positive and statistically significant effect on economic growth in East African countries. This positive individual impact suggests that ODA contributes to economic growth by potentially addressing funding gaps, enhancing investment in critical infrastructure, or fostering human capital development. However, the magnitude of the positive effect might vary due to factors like the efficiency of aid utilization, the institutional capacity of recipient countries, and the alignment of aid with development priorities. While these factors can enhance ODA's contribution, inconsistencies in implementation or external economic shocks might still moderate the overall growth effect.

However, the study uncovered a crucial insight: it tested the relationship between ODA and the extent of trade openness. It determined that this relationship played a positive and significant role in economic growth. This implies that improving trade openness can significantly improve the growth effect of ODA in East Africa. The positive joint effect can be explained by the ability of aid openness to enhance the productivity with which aid is used when trade openness exerts pressure on donors to utilize aid-financed programs and investments effectively.

These observations have implications in showing a need for either primary or additional policies to be implemented to achieve the optimum results from ODA. Even though it has been claimed that aid may not cause growth on its own, there is evidence that growth will start when aid comes together with trade liberalization policies. Therefore, it will be necessary for

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policymakers in East African countries to find ways to complement the impact of ODA with trade openness instruments.

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