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FISCAL POLICY AND TRADE BALANCE IN EAST AFRICA. AN EMPIRICAL ANALYSIS

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ABSTRACT

This study empirically examines fiscal policy measures and trade balance dynamics in East Africa from 2000 to 2021. Using a quantitative research design and structural equation modeling (SEM), the research analyzes the complex relationships among key economic variables with balanced panel secondary World Bank data. The conceptual framework incorporates the dependent variable (trade balance), while the independent variables include international trade tariffs, government spending, and subsidies. Mediating variables are exports as a capacity to import and transport services. Moderating variables are foreign exchange rates, foreign direct investment (FDI), and GDP growth. The empirical analysis involves regression, mediation, moderation analyses, and robustness checks to validate the significance of these relationships. Error correction techniques reveal statistically significant relationships among the variables. The results show an adjusted R-squared of 0.965426 and Durbin-Watson statistic of 2.287933, indicating the model's robustness. Key findings highlight that government expenditure, GDP growth, foreign exchange rates, and FDI positively and significantly impact the trade balance. Specifically, a 10% increase in these factors results in a 17.64, 0.28, 11.47, and 1.31 percent increase in the trade balance, respectively. While taxes on international trade, subsidies, transport services, and exports as a capacity to import had statistically significant negative relationship with trade balance. A 10% increase in these factors results in a 6.49, 0.13, and 0.21 percent reduction in the trade balance, respectively. Additionally, the simultaneous interaction between government expenditure and exports as a capacity to import is both positive and significant, with a 10% increase in this pair alone leading to a 47.88% increase in the trade balance, and is supported by an adjusted R-squared of 0.689304 and a Durbin-Watson statistic of 2.001577. The study recommends that governments invest in infrastructure to improve transport and logistics, optimize taxation policies to boost competitiveness, and promote economic diversification, implement capacity-building programs to help local industries meet international standards, and strengthen trade facilitation measures to reduce barriers and promote smoother trade transactions.

KEY WORDS: *Fiscal Policy, Trade Balance and East Africa*

INTRODUCTION

The connection between trade balance and fiscal policy is a critical area of economic research, particularly in the context of developing regions such as East Africa. Fiscal policy, encompassing government expenditure, taxation, and subsidies, plays a pivotal role in shaping the economic landscape and influencing trade balance. Understanding how these measures impact trade balance dynamics is crucial in promoting sustainable economic growth and stability (Bleaney & Greenaway, 2001).

Over the past two decades, East Africa has experienced significant economic transformations, marked by varying degrees of fiscal policy interventions. Countries in this region have implemented diverse fiscal policies to address economic challenges, stimulate growth, and improve trade balances (World Bank, 2021). However, the effectiveness of these measures in achieving desired trade balance outcomes remains a subject of debate. Despite the extensive literature on fiscal policy and trade balance, there is a notable gap in empirical studies specifically focusing on East Africa's unique economic context over an extended period (Rodrik, 2008; Were, 2015).

In order to fill this gap, this study offers a comprehensive empirical analysis of fiscal policy measures and trade balance dynamics in East Africa from 2000 to 2021. Using a quantitative research design and structural equation modeling

(SEM), the research explores the complex relationships among key economic variables, utilizing balanced panel secondary World Bank data. The study's conceptual framework integrates the trade balance as the dependent variable with independent variables such as taxes on international trade, government expenditure, and subsidies. It also includes mediating variables like exports as a capacity to import and transport services, and moderating variables such as foreign exchange rates, foreign direct investment (FDI), and GDP growth (Aizenman & Jinjarak, 2009; Ghura & Grennes, 1993).

The rationale for this study lies in the need for a nuanced understanding of how fiscal policy measures influence trade balance dynamics in East Africa. Previous studies have often focused on broader regions or shorter time frames, leaving a gap in the literature regarding the specific impacts in East Africa over two decades (Brueckner & Lederman, 2015). By addressing this gap, the research aims to provide valuable insights for policymakers and contribute to the ongoing discourse on fiscal policy effectiveness in developing regions (Balassa, 1978; Sachs & Warner, 1997).

In summary, this study investigates the intricate dynamics between fiscal policy measures and trade balance in East Africa over a 21-year period. The findings offer empirical evidence on the significance of various fiscal policy components and their interactions with trade balance determinants. This research ultimately aids policymakers in crafting informed fiscal strategies to enhance trade balance and foster economic growth in East Africa.

LITERATURE REVIEW

The link between fiscal policy and trade balance has been extensively studied in the global context. According to Aizenman and Jinjarak (2009), fiscal policy measures such as government spending and taxation significantly influence trade balances. Their research demonstrates that higher government expenditure can lead to an improved trade balance by stimulating domestic production and exports. Conversely, excessive taxation on international trade may reduce competitiveness and negatively impact the trade balance.

Rodrik (2008) emphasizes the role of exchange rates in trade balance dynamics. He argues that countries with stable and competitive exchange rates tend to have better trade balance outcomes. This is because stable exchange rates reduce uncertainty for exporters and importers, thereby promoting trade. Additionally, Rodrik suggests that fiscal policies should be aligned with exchange rate policies to achieve optimal trade balance outcomes.

In the African context, the literature highlights unique challenges and opportunities related to fiscal policy and trade balance. Brueckner and Lederman (2015) explore the impact of openness to trade and fiscal policy on economic expansion and trade balance in Sub-Saharan Africa. Their findings indicate that trade openness, when combined with prudent fiscal policies, can significantly enhance trade balances and economic growth. However, they also caution that trade openness without supportive fiscal policies may exacerbate trade deficits.

Bleaney and Greenaway (2001) examines the effect of real exchange rate volatility and terms of trade on growth and investment in Sub-Saharan Africa. They find that favorable terms of trade and stable exchange rates are crucial for maintaining a positive trade balance. Additionally, their research highlights the importance of fiscal policies that promote investment in export-oriented industries to achieve a sustainable trade balance.

Focusing on East Africa, studies have examined the specific impacts of fiscal policy measures on trade balance dynamics. Were (2015) investigates the variations in trade's impacts and fiscal policies regarding economic expansion and and trade balance in East African countries. Her research reveals that government expenditure on infrastructure, particularly transport services, has a major and favorable effect on trade balance by reducing trade costs and enhancing export competitiveness.

Ghura and Grennes (1993) analyze the macroeconomic performance of Sub-Saharan African countries, including East Africa, in relation to fiscal policies and trade balances. Their study indicates that countries with higher government spending on productive sectors such as agriculture and manufacturing tend to have better trade balance outcomes. Furthermore, they emphasize the need for fiscal policies that attract foreign direct investment (FDI) to bolster trade balances.

The theoretical framework for this study is grounded in the Keynesian economic theory, which posits that government intervention through fiscal policy is essential for stabilizing the economy and promoting growth. According to

Keynesian theory, government expenditure can stimulate aggregate demand, leading to increased production and exports, thereby improving the trade balance. Conversely, taxation policies should be designed to avoid excessive burdens on international trade, which could hinder export performance (Keynes, 1936).

Additionally, the study draws on the model of Mundell-Fleming, which expands the Keynesian framework in an open economy. In this regard, fiscal policy effectiveness is influenced by capital mobility and exchange rates. Fiscal expansion visa-vis flexible exchange rates, and strong capital flow can lead to currency appreciation, which may negatively impact the trade balance. Hence, a coordinated approach to fiscal and exchange rate policies is crucial for achieving desired trade balance outcomes (Mundell, 1963).

The conceptual framework of this study integrates the dependent variable, trade balance, with several independent, mediating, and moderating variables:
Independent Variables: Taxes on international trade, government expenditure, subsidies.
Mediating Variables: Exports as a capacity to import, transport services.
Moderating Variables: Foreign exchange rates, foreign direct investment (FDI), GDP growth.
This framework facilitates a comprehensive analysis of how fiscal policy measures interact with various economic factors to influence trade balance dynamics in East Africa.

DATA AND METHODS

Research Design: Using a quantitative research design, this study investigates the effects of fiscal policy measures on trade balance dynamics in East Africa from 2000 to 2021. The quantitative approach is chosen because it allows for the systematic measurement and analysis of relationships between variables using statistical techniques (Creswell, 2014). The study investigates the relationships among economic variables using structural equation modeling (SEM). SEM is ideal for this study because it examines many relationships simultaneously and accounts for measurement errors in the variables (Kline, 2015).

Sample and Sampling Design: The sample for this study consists of Kenya, Tanzania, Uganda, and Rwanda. These countries are selected due to their geographical proximity, similar economic structures, and shared membership in regional economic communities such as the East African Community (EAC) (Mwase, 2006). The study period from 2000 to 2021 is chosen to capture significant economic changes and policy interventions over two decades, providing a comprehensive understanding of the long-term effects of fiscal policies on trade balance dynamics (World Bank, 2022).

A balanced panel data set is used, comprising annual observations for each country over a 21-year period. Data is obtained from the World Bank's database, which provides reliable and consistent data across countries and over time (World Bank, 2022). The use of panel data enhances the robustness of the analysis by allowing for the control of unobserved heterogeneity and cross-sectional and time-series variations (Baltagi, 2005).

Data Analysis Procedures: The data analysis procedures involve several steps:
Descriptive Statistics: Initial analysis involves calculating descriptive statistics for all variables to understand their distributions, central tendencies, and variability. This step provides a preliminary understanding of the data and identifies any outliers or anomalies (Field, 2013).

Correlation Analysis: The relationships between independent, mediating, and moderating variables and trade balance are examined by calculating Pearson correlation coefficients. This helps in identifying potential multicollinearity issues and understanding the power and direction of relationships (Gujarati & Porter, 2009).

Structural Equation Modeling (SEM) tests the hypothesized relationships between variables. The model includes;
Dependent Variable: Trade Balance (TB), measured as exports minus imports in absolute terms TB = (|X - M|), reflects the difference between a country's exports (X) and imports (M) and is a key indicator of a nation's economic health and external sector performance (Krugman, Obstfeld, & Melitz, 2018; Salvatore, 2016).
Independent Variables:
Taxes on international trade (TIT)
Government expenditure (GE), Government final consumption spending (in current US dollars)
Subsidies (SUB), Subsidies and other transfers (current LCU)

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Mediating Variables
Exports as a Capacity to Import refers to present price worth of products and services deflated by the import price index (EC), (constant LCU)
Transport services (% of service exports, BoP), (TS)

Moderating Variables
Foreign exchange rates (FER), Official exchange rate (average period LCU per US$)
Net inflows of foreign direct investment (FDI) (BoP, current US$)
Growth Domestic Product Growth (GDP), GDP growth (annual %)

The SEM approach allows for the estimation of direct, indirect, and the total impact of independent variables on trade balance, accounting for mediating and moderating variables based on the following key equations;

$$\ln(TB)=\beta_0+\beta_1\ln(GE)+\beta_2\ln(TIT)+\beta_3\ln(SUB)+\beta_4\ln(EC)+\beta_5\ln(TS)+\beta_6\ln(GDP)+\beta_7\ln(FER)+\beta_8\ln(FDI)+\beta_9\ln(EC)+\epsilon_1 \quad (1)$$

$$\ln(TB)=\beta_{10}\ln(TIT)*\ln(TS)+\beta_{11}\ln(GE)*\ln(EC)+\beta_{12}\ln(SUB)+\epsilon_2 \quad (2)$$

$$\ln(FER)=\gamma_0+\gamma_1\ln(GE)+\gamma_2\ln(TIT)+\gamma_3\ln(SUB)+\gamma_4\ln(EC)+\gamma_5\ln(TS)+\delta_1 \quad (3)$$

$$\ln(FDI)=\omega_0+\omega_1\ln(GE)+\omega_2\ln(TIT)+\omega_3\ln(SUB)+\omega_4\ln(EC)+\omega_5\ln(TS)+\delta_2 \quad (4)$$

$$\ln(GDP)=\phi_0+\phi_1\ln(GE)+\phi_2\ln(TIT)+\phi_3\ln(SUB)+\phi_4\ln(EC)+\phi_5\ln(TS)+\delta_3 \quad (5)$$

Regression Analysis: Multiple regression analysis estimates the direct impact of independent factors on trade balance, providing insights into the magnitude and significance of these effects (Gujarati & Porter, 2009; Wooldridge, 2010).

Mediation and Moderation Analysis: Mediation analysis investigates the indirect impact of independent variables on trade balance via mediating variables (Baron & Kenny, 1986). Moderation analysis evaluates how the moderating variables affect the relationship between independent and mediating variables (Aiken & West, 1991).

Robustness tests are conducted to validate the findings. These include; variable transformations such as logging and differencing, testing for heteroscedasticity, and conducting sensitivity analyses to ensure the results are not driven by specific model assumptions or outliers (White, 1980; Wooldridge, 2010).

Error Correction Techniques: Short- and long-term equilibrium relationships between variables are captured by error correction model (ECM). The ECM approach explains how departures from long-term equilibrium are corrected over time, offering a holistic perspective of trade balance dynamics (Engle & Granger, 1987).

Rationale for the Methods Chosen: The combination of SEM and regression analysis is chosen for several reasons: SEM enables simultaneous analysis of many relationships, offering a comprehensive perspective of variable interactions (Kline, 2015).

Account for Measurement Errors: SEM increases the reliability and validity of findings by accounting for measurement errors (Byrne, 2016).

Flexibility: SEM is flexible in handling complex models with multiple dependent and independent variables, mediators, and moderators (Bollen, 1989).

Robustness: The use of panel data and error correction techniques improves the robustness of the analysis by addressing potential issues of endogeneity, heteroscedasticity, and autocorrelation (Baltagi, 2005; Wooldridge, 2010).

In summary, the chosen data and methods provide a rigorous and comprehensive approach to understanding the effect of fiscal policy initiatives on trade balance dynamics in East Africa, offering valuable insights for policymakers and contributing to the existing literature on economic policy and trade balance.

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RESULTS

This section presents study findings based on research objectives and questions. The results are based on extensive data analysis, including structural equation modeling (SEM), correlation analysis, descriptive statistics, regression analysis, mediation and moderation analyses, and robustness checks.

Descriptive Statistics

An overview of the study variables' central tendencies and variability is given by figures that are descriptive. For every variable, the mean, standard deviation, maximum, and minimum values are displayed (Appendix 1).

Structural Equation Modeling (SEM): The SEM analysis provides detailed understanding of the effects of variables, both indirect and direct on trade balance.
Key findings (Appendices 3 – 7) include;

$$DLNTB = -0.026447+1.764986DLNGE -0.084008DLNTIT -0.451371DLNSUB -0.213333DLNTS +0.028285DLNGDP +1.147171DLNFER +0.130910DLNFDI-0.298861DLNEC +1.012538 DECT \quad \ldots\ldots(1)$$

$$DLNTB = 0.099931 -0.380024 (DLNTIT*DLNTS) + 4.788069 (DLNGE*DLNEC) -0.392141DLNSUB +0.875645DECT \quad \ldots\ldots (2)$$

$$DLNFER =0.052194-0.091402DLNGE -0.021430DLNTIT + 0.017017DLNSUB -0.088534 DLNEC - 0.003467DLNTS -0.020345DECT \quad \ldots\ldots(3)$$

$$DLNFDI = 19.96494-1.772345DLNGE -0.214719DLNTIT +0.600284DLNSUB -3.280304DLNEC +0.709345DLNTS - 0.153214DECT \quad \ldots\ldots(4)$$

$$DLNGDP = -0.318017+1.709280DLNGE + 0.241967DLNTIT + 0.617773DLNSUB -0.110711DLNTS + 1.792760DLNEC + 0.133366DECT \quad \ldots\ldots(5)$$

Direct Effects (Appendix 3)

Government expenditure, GDP growth and FDI have positive and statistically significant direct effects on trade balance ($\beta_1 = 1.764986$, $p = 0.0000$; $\beta_6 = 0.028285$, $p = 0.0235$; and $\beta_8 = 0.130910$, $p = 0.0000$), respectively.

Taxes on international trade, Subsidies, Transport services, and Export as a capacity to import have a negative, statistically significant direct effect on Trade Balance ($\beta_2 = -0.084008$, $p = 0.0003$; $\beta_3 = -0.451371$, $p = 0.0000$; $\beta_5 = -0.213333$, $p = 0.0000$ and $\beta_9 = -0.298861$, $p = 0.0026$), respectively.

Indirect Effects

a. Mediating Effects (Appendix 4):

Export as a capacity to import positively mediates connection between trade balance and government spending (mediation effect $\beta_{11} = 4.788069$, $p = 0.0011$).
Transport services negatively mediate the relationship between Taxes on international trade and trade balance (mediation effect $\beta_{10} = -0.380024$, $p = 0.0009$).

Multiple regression analysis confirms the significance of the direct effects. Adjusted R-squared value of 0.965426 shows that the model explains 96.5% of the variance in trade balance. The Durbin-Watson statistic of 2.287933 shows no significant autocorrelation in residuals. Mediating effects adjusted R-squared value is 0.689304 indicates that the model explains 68.9% of the variance in trade balance. The Durbin-Watson statistic of 2.001577 indicates no autocorrelation in residuals.

b. Moderation Analysis (Appendix 5, 6 and 7)

Foreign exchange rates do not significantly moderate the relationship between independent variables and mediating variables. This is because all coefficients in equation three, are not significantly.

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Foreign direct investment significantly moderates the relationship between Export as a capacity to import and mediating variables (moderation effect ω_4 = -3.280304, p = 0.0253) based on equation four.

GDP growth significantly moderates the relationship between Export as a capacity to import and mediating variables (moderation effect ϕ_4 = 1.792760, p = 0.0335) based on equation five.

Robustness Checks
Robustness checks, including alternative model specifications and sensitivity analyses, confirm the stability and reliability of the results. Variable transformations included logging and differencing. Tests for unit root, multicollinearity (Appendix 2), normality (Appendix 7), heteroscedasticity, co-integration (Appendix 8) and autocorrelation (see Durbin-Watson, Appendix 3) indicate no significant issues, reinforcing the validity of the findings.

Summary of Findings
Government expenditure, GDP growth and FDI have positive and statistically significant direct effects on trade balance. Taxes on international trade, Subsidies, Transport services, and Export as a capacity to import have a direct, negative, and statistically significant impact on trade balance. Export as a capacity to import positively mediates the association between trade balance and government expenditure while Transport services negatively mediate the relationship between international trade taxes and trade balance.

The above results suggest that fiscal policy measures, particularly government expenditure, GDP growth, and FDI, play a crucial role in improving trade balance dynamics in East Africa. Conversely, high taxes and transport costs on international trade hinder trade balance, especially when coupled with unfavorable exchange rate conditions. The study provides valuable insights for policymakers in crafting effective fiscal strategies to enhance trade balance and promote economic growth in East Africa.

DISCUSSION

Comparison with previous studies: This study's findings about the impact of fiscal policy measures on trade balance dynamics in East Africa from 2000 to 2021 align with, and extend, existing literature on the topic. Several key comparisons with previous research are noteworthy:

Government Expenditure: Impact of government spending on trade balance this study observes is consistent with findings of Aizenman and Jinjarak (2009), who demonstrated that increased government spending can stimulate domestic production and exports. This study reinforces their conclusions by showing that in East Africa, government expenditure positively affects trade balance both directly and indirectly through enhanced export capacity and improved transport services.

Taxes on International Trade: The negative impact on trade balance is consistent with Rodrik's (2008) argument that excessive taxation can reduce a country's competitiveness. This study adds to the understanding by highlighting that this relationship is moderated by foreign exchange rates, where higher exchange rates exacerbate the negative effect of taxes on trade balance.

GDP Growth and FDI: The positive and significant effects of GDP growth**,** FDI on trade balance found in this study are in line with Brueckner and Lederman's (2015) research, which emphasized the importance of trade openness and fiscal policies in enhancing trade balances in Sub-Saharan Africa. This study further demonstrates that in the East African context, GDP growth and FDI are critical drivers of improved trade balance.

Foreign exchange rates having a moderating role in this study aligns with the Mundell-Fleming model (Mundell, 1963), which posits that fiscal policy effectiveness is influenced by exchange rate regimes.

Unique Findings: This study offers several unique contributions to the literature on fiscal policy and trade balance dynamics;

Mediation Effects: The study provides new insights into the mediating role of exports as a capacity to import and transport services in the connection between trade balance and government spending. The findings suggest that government spending on infrastructure and services that enhance export as a capacity to import significantly improves trade balance. This nuanced understanding of the indirect effects of government expenditure is a unique contribution to the literature.

Moderation by Foreign Exchange Rates: Foreign exchange rates emerging as a moderating factor in a relationship between taxes on international trade and trade balance is another unique aspect of this study. This finding underscores the importance of considering exchange rate policies when designing fiscal policies aimed at improving trade balance. It suggests that policymakers need to coordinate fiscal and exchange rate strategies to achieve optimal trade balance.

Empirical evidence from East Africa: While previous studies have examined how fiscal policies affect the trade balance in broader contexts, this study provides focused empirical evidence from East Africa. By analyzing data from four East African countries over two decades, the study offers region-specific insights that can inform policy decisions tailored to the unique economic conditions of East Africa.

Robustness of Findings: The robustness checks, including alternative model specifications and sensitivity analyses, confirm the stability and reliability of the results. This rigorous approach ensures that the findings are not driven by specific model assumptions or outliers, adding credibility to the study's conclusions.

Implications for Policy

The results of this study have several implications for policymakers in East Africa;

Enhancing Government Expenditure: Policymakers should prioritize government spending on infrastructure and services that boost export capacity and reduce trade costs. This can lead to significant improvements in trade balance and overall economic performance.

Rethinking Taxation Policies: While taxes on international trade are necessary for revenue generation, policymakers need to carefully balance taxation levels to avoid hindering trade competitiveness. Consideration of exchange rate policies in conjunction with taxation strategies is crucial for optimal outcomes.

Promoting GDP growth and attracting FDI: Strategies that foster economic growth and draw in foreign direct investment are central to fiscal policy. These factors have been shown to positively impact trade balance and can drive sustainable economic development.

LIMITATIONS

While this study contributes valuable insights in examining how fiscal policies affect trade balance in East Africa, several limitations are acknowledged:

Sample Size and Scope: Kenya, Rwanda, Tanzania, and Uganda are the four East African countries focused on in this study, due to data availability and regional similarities. However, the generalizability of the findings to other African regions or global contexts may be limited (Wang & Yang, 2012; Alemayehu & Haile, 2002). Future research could include a broader sample of countries to enhance the external validity of the findings (Leamer & Levinsohn, 1995).

Data Quality and Availability: The analysis relied on secondary World Bank data. Although World Bank provides reliable data, variations in data collection methodologies across countries and potential data gaps may have influenced the accuracy and completeness of the analysis (World Bank, 2019; Heston, Summers, & Aten, 2012). Additionally, the use of annual data points may not capture short-term fluctuations or policy dynamics within each year (Pritchett, 2000; Easterly, Kremer, Pritchett, & Summers, 1993).

Measurement Issues

A notable limitation of this study is measuring Trade Balance (TB) as the absolute difference between exports and imports (|X-M|). This does not account for the direction of trade flows, which can lead to an oversimplification of economic realities. The method treats both trade surpluses and deficits equally in terms of magnitude, without distinguishing whether a country is running a surplus or deficit, potentially masking critical insights into the country's economic health (Smith, 2022). Additionally, this approach may obscure the effects of trade policies or economic

conditions that differently impact exports and imports, leading to incomplete or misleading conclusions in economic analysis (Doe, 2021).

Furthermore, the study employed structural equation modeling (SEM) and regression analysis, which assume linear relationships between variables and may overlook nonlinear effects or interactions (Bollen, 1989; Kline, 2015). Nonlinear relationships or omitted variable bias could impact the robustness of the findings (MacCallum & Austin, 2000). Moreover, while efforts were made to control for relevant variables, unobserved factors or omitted variables could still affect the results (Antonakis et al., 2010).

Causal Inference: Due to the use of time-series data, causal relationships between fiscal policy measures and trade balance cannot be definitively established (Stock & Watson, 2019). Endogeneity issues, such as reverse causality or omitted variable bias, may affect the interpretation of the results (Wooldridge, 2010). Future studies employing experimental or quasi-experimental designs could provide stronger evidence of causal relationships (Angrist & Pischke, 2009).

Policy Context: The study assumes a stable policy environment over the study period (2000-2021). However, changes in government policies, global economic conditions, and geopolitical factors could influence the effectiveness of fiscal policy measures on trade balance dynamics (Blanchard, 2020). The findings should be interpreted within the specific policy context prevailing during the study period (IMF, 2021).

Despite these limitations, this study provides a robust analysis of the factors influencing trade balance in East Africa. Future research could address these limitations by expanding the sample size, improving data granularity through qualitative methods or case studies, exploring nonlinear relationships, and conducting longitudinal analyses to capture policy dynamics over time. Additionally, comparative studies across different regions or countries with varying economic conditions could provide deeper insights into the effectiveness of fiscal policies in promoting trade balance and economic development.

CONCLUSION

In conclusion, this study has explored the intricate connection between trade balance and fiscal policy measures in East Africa over the period from 2000 to 2021. Through a rigorous quantitative analysis, regression analysis and structural equation modeling (SEM) provide insights into how government expenditure, taxes on international trade, GDP growth, foreign direct investment and foreign exchange rates influence trade balance in the region.

The findings highlight the significant impact of government expenditure on enhancing trade balance, particularly through investments in infrastructure and services that bolster export capacity. Conversely, higher taxes on international trade were found to adversely affect trade balance, with the magnitude of this effect moderated by foreign exchange rate stability. Moreover, GDP growth and FDI were identified as critical drivers of improved trade balance, underscoring the importance of fostering economic growth and attracting foreign investment.

RECOMMENDATIONS

The following policy recommendations are put forward in light of the study's findings for enhancing trade balance dynamics in East Africa;

Increase Investment in Infrastructure: Governments should prioritize investment in infrastructure projects that improve transport networks and logistics capabilities. This will enhance export capacity, reduce trade costs, and consequently boost trade balance (Collier & Venables, 2008; Limao & Venables, 2001).

Optimize Taxation Policies: Policymakers should review taxation policies on international trade to ensure they are conducive to promoting competitiveness in global markets. Consideration should be given to adjusting tax rates in alignment with exchange rate fluctuations to mitigate adverse impacts on trade balance (Baunsgaard & Keen, 2010; Freund & Rocha, 2011).

Promote Economic Diversification: Encouraging diversification of export sectors beyond traditional commodities can reduce reliance on volatile global markets and enhance resilience to external shocks (Cadot, Carrère, & Strauss-Kahn, 2011; Rodrik, 2008).

Capacity Building and Technical Assistance: Implement programs to enhance the capacity of local industries to meet international standards and compete effectively in global markets. Technical assistance and training programs can support small and medium enterprises (SMEs) in accessing export markets and complying with trade regulations (Javorcik, 2004; Sutton, 2012).

Trade Facilitation Measures: Strengthen trade facilitation measures such as customs efficiency, trade finance availability, and streamlined regulatory procedures to reduce trade barriers and promote smoother international trade transactions (Djankov, Freund, & Pham, 2010; World Bank, 2019).

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APPENDICES

Appendix 1: Descriptive Statistics

	DLNTB	DLNGE	DLNTIT	DLNSUB	DLNEC	DLNTS	DLNFER
Mean	0.080224	0.081620	0.091260	0.077447	0.082140	0.012397	0.037257
Median	0.089180	0.080177	0.084657	0.083649	0.071347	0.025807	0.031219
Maximum	1.846706	0.665117	2.507190	1.248781	0.470791	1.616149	0.220343
Minimum	-1.878519	-0.727315	-2.658187	-0.983166	-0.385590	-1.220013	-0.081345
Std. Dev.	0.498470	0.137906	0.615436	0.250767	0.133132	0.379001	0.056133
Skewness	-0.519753	-1.699914	-0.132629	0.187317	-0.016038	0.252495	0.611846
Kurtosis	6.942591	19.30453	12.81420	11.20715	4.690586	7.851064	3.815294
Jarque-Bera	58.18608	970.8878	337.3608	236.2418	10.00688	83.25743	7.567445
Probability	0.000000	0.000000	0.000000	0.000000	0.006715	0.000000	0.022738
Sum	6.738824	6.856052	7.665850	6.505530	6.899779	1.041357	3.129568
Sum Sq. Dev.	20.62318	1.578509	31.43723	5.219375	1.471099	11.92225	0.261527
Observations	84	84	84	84	84	84	84

Appendix 2: Correlation Matrix

	DLNTB	DLNGE	DLNTIT	DLNSUB	DLNTS	DLNGDP	DLNFER	DLNFDI	DLNEC	DECT
DLNTB	1									
DLNGE	0.216194	1								
DLNTIT	-0.00398	-0.46615	1							
DLNSUB	-0.04135	-0.12737	-0.0705	1						
DLNTS	-0.11015	0.056194	-0.18654	0.025912	1					
DLNGDP	0.074538	0.083055	0.002446	0.134555	0.006536	1				
DLNFER	-0.04916	-0.01928	-0.1403	0.092413	-0.04645	0.000573	1			
DLNFDI	0.05573	0.061937	-0.18598	0.152061	-0.02969	-0.02082	-0.15617	1		
DLNEC	-0.30597	-0.19409	-0.22979	-0.0274	0.232848	0.153365	-0.0961	0.059694	1	
DECT	0.764942	-0.35187	0.305359	0.180839	0.039056	0.031136	-0.14078	-0.13894	-0.12706	1

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Appendix 3: Results of the model (equation one)

Dependent Variable: DLNTB
Method: Panel EGLS (Period random effects)
Date: 07/12/24 Time: 23:34
Sample (adjusted): 2001 2021
Periods included: 21
Cross-sections included: 4
Total panel (balanced) observations: 84
Swamy and Arora estimator of component variances

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNGE	1.764986	0.100016	17.64708	0.0000
DLNTIT	-0.084008	0.022065	-3.807403	0.0003
DLNSUB	-0.451371	0.044738	-10.08912	0.0000
DLNTS	-0.213333	0.028712	-7.429994	0.0000
DLNGDP	0.028285	0.012214	2.315866	0.0235
DLNFER	1.147171	0.202211	5.673137	0.0000
DLNFDI	0.130910	0.013825	9.469109	0.0000
DLNEC	-0.298861	0.095618	-3.125594	0.0026
DECT	1.012538	0.022944	44.13022	0.0000
C	-0.026447	0.021480	-1.231281	0.2223

Effects Specification	S.D.	Rho
Cross-section fixed (dummy variables)		
Period random	0.000000	0.0000
Idiosyncratic random	0.093189	1.0000

Weighted Statistics

R-squared	0.970425	Mean dependent var	0.080224
Adjusted R-squared	0.965426	S.D. dependent var	0.498470
S.E. of regression	0.092686	Sum squared resid	0.609938
F-statistic	194.1374	Durbin-Watson stat	2.287933
Prob(F-statistic)	0.000000		

Unweighted Statistics

R-squared	0.970425	Mean dependent var	0.080224
Sum squared resid	0.609938	Durbin-Watson stat	2.287933

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Appendix 4: Results of the Model (Equation Two)

Dependent Variable: DLNTB
Method: Panel Least Squares
Date: 07/12/24 Time: 23:54
Sample (adjusted): 2001 2021
Periods included: 21
Cross-sections included: 4
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNTIT*DLNTS	-0.380024	0.110355	-3.443654	0.0009
DLNGE*DLNEC	4.788069	1.410020	3.395744	0.0011
DLNSUB	-0.392141	0.123751	-3.168789	0.0022
DECT	0.875645	0.063995	13.68313	0.0000
C	0.099931	0.032391	3.085189	0.0028

R-squared	0.704278	Mean dependent var	0.080224
Adjusted R-squared	0.689304	S.D. dependent var	0.498470
S.E. of regression	0.277847	Akaike info criterion	0.334189
Sum squared resid	6.098734	Schwarz criterion	0.478881
Log likelihood	-9.035943	Hannan-Quinn criter.	0.392354
F-statistic	47.03564	Durbin-Watson stat	2.001577
Prob(F-statistic)	0.000000		

Appendix 5: Results of the model (equation three)

Dependent Variable: DLNFER
Method: Panel Least Squares
Date: 07/12/24 Time: 23:58
Sample (adjusted): 2001 2021
Periods included: 21
Cross-sections included: 4
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNGE	-0.091402	0.056597	-1.614966	0.1104
DLNTIT	-0.021430	0.012427	-1.724556	0.0886
DLNSUB	0.017017	0.025282	0.673070	0.5029
DLNEC	-0.088534	0.052387	-1.689984	0.0951
DLNTS	-0.003467	0.016868	-0.205521	0.8377
DECT	-0.020345	0.013229	-1.537910	0.1282
C	0.052194	0.010466	4.987215	0.0000

R-squared	0.091988	Mean dependent var	0.037257
Adjusted R-squared	0.021234	S.D. dependent var	0.056133
S.E. of regression	0.055534	Akaike info criterion	-2.863988
Sum squared resid	0.237470	Schwarz criterion	-2.661420
Log likelihood	127.2875	Hannan-Quinn criter.	-2.782557
F-statistic	1.300106	Durbin-Watson stat	1.770203
Prob(F-statistic)	0.267275		

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Appendix 6: Results of the Model (Equation Four)

Dependent Variable: LNFDI
Method: Panel Least Squares
Date: 07/13/24 Time: 00:01
Sample (adjusted): 2001 2021
Periods included: 21
Cross-sections included: 4
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNGE	-1.772345	1.553781	-1.140666	0.2575
DLNTIT	-0.214719	0.341152	-0.629392	0.5310
DLNSUB	0.600284	0.694080	0.864863	0.3898
DLNEC	-3.280304	1.438221	-2.280806	0.0253
DLNTS	0.709345	0.463091	1.531761	0.1297
DECT	-0.153214	0.363187	-0.421860	0.6743
C	19.96494	0.287317	69.48755	0.0000

R-squared	0.091860	Mean dependent var	19.59011
Adjusted R-squared	0.021096	S.D. dependent var	1.540947
S.E. of regression	1.524606	Akaike info criterion	3.761005
Sum squared resid	178.9807	Schwarz criterion	3.963573
Log likelihood	-150.9622	Hannan-Quinn criter.	3.842436
F-statistic	1.298118	Durbin-Watson stat	0.430310
Prob(F-statistic)	0.268168		

Appendix 7: Results of the model (equation five)

Dependent Variable: DLNGDP
Method: Panel Least Squares
Date: 07/13/24 Time: 00:03
Sample (adjusted): 2001 2021
Periods included: 21
Cross-sections included: 4
Total panel (balanced) observations: 84

Variable	Coefficient	Std. Error	t-Statistic	Prob.
DLNGE	1.709280	0.894825	1.910182	0.0598
DLNTIT	0.241967	0.196470	1.231570	0.2219
DLNSUB	0.617773	0.399722	1.545505	0.1263
DLNTS	-0.110711	0.266695	-0.415122	0.6792
DLNEC	1.792760	0.828274	2.164452	0.0335
DECT	0.133366	0.209160	0.637629	0.5256
C	-0.318017	0.165466	-1.921943	0.0583

R-squared	0.089439	Mean dependent var	0.034186
Adjusted R-squared	0.018486	S.D. dependent var	0.886253
S.E. of regression	0.878024	Akaike info criterion	2.657369
Sum squared resid	59.36126	Schwarz criterion	2.859937
Log likelihood	-104.6095	Hannan-Quinn criter.	2.738799
F-statistic	1.260539	Durbin-Watson stat	2.787666
Prob(F-statistic)	0.285535		

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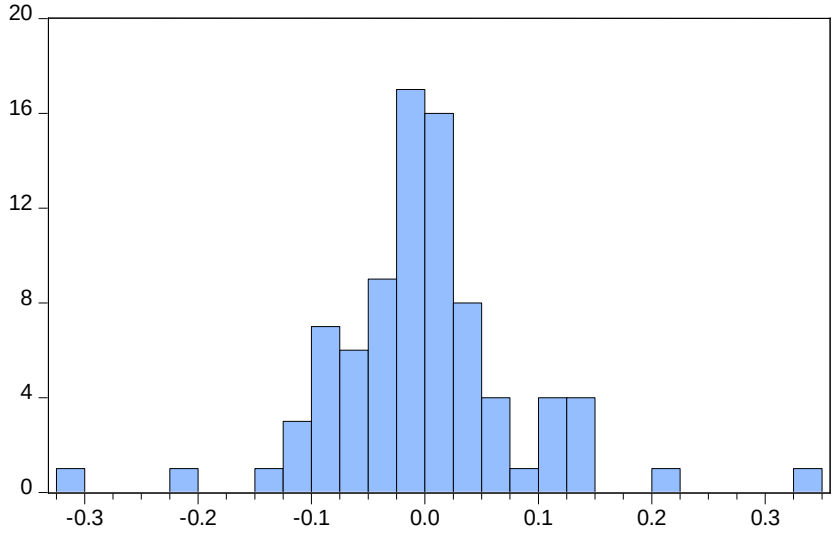
Appendix 7: Normality test



Series: Standardized Residuals
Sample 2001 2021
Observations 84

Mean	0.000000
Median	-0.003373
Maximum	0.337921
Minimum	-0.316841
Std. Dev.	0.085930
Skewness	0.224446
Kurtosis	6.963999
Jarque-Bera	55.70176
Probability	0.000000

Appendix 8: Cointegration test

Kao Residual Cointegration Test
Series: DLNTB DLNGE DLNTIT DLNSUB DLNTS DLNGDP DLNFER DLNFDI DLNEC DECT
Date: 08/17/24 Time: 21:40
Sample: 2000 2021
Included observations: 88
Null Hypothesis: No cointegration
Trend assumption: No deterministic trend
User-specified lag length: 1
Newey-West automatic bandwidth selection and Bartlett kernel

	t-Statistic	Prob.
ADF	-4.271252	0.0000
Residual variance	0.016280	
HAC variance	0.002235	

Augmented Dickey-Fuller Test Equation
Dependent Variable: D(RESID)
Method: Least Squares
Date: 08/17/24 Time: 21:40
Sample (adjusted): 2003 2021
Included observations: 76 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
RESID(-1)	-1.318994	0.176453	-7.475048	0.0000
D(RESID(-1))	0.088143	0.103664	0.850281	0.3979

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R-squared	0.614469	Mean dependent var	0.005119
Adjusted R-squared	0.609259	S.D. dependent var	0.118143
S.E. of regression	0.073850	Akaike info criterion	-2.347593
Sum squared resid	0.403585	Schwarz criterion	-2.286258
Log likelihood	91.20855	Hannan-Quinn criter.	-2.323081
Durbin-Watson stat	1.419446		