The macro-level determinants of Tanzania's coffee export performance to African and non-African countries

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ABSTRACT

Coffee is one of Tanzania's most important traditional export crops and a major source of foreign exchange, rural employment, and agricultural income. Despite its importance, Tanzania's coffee export performance varies considerably across destination markets, with exports largely concentrated in non-African countries while intra-African trade remains relatively limited. Understanding the macro-level factors shaping these export patterns is therefore essential for improving Tanzania's trade competitiveness and regional integration. This study examines the macro-level determinants of Tanzania's coffee exports to African and non-African countries using a structural gravity modelling framework. A panel dataset covering the period 2001–2024 is analysed using the Poisson Pseudo-Maximum Likelihood (PPML) estimator, which effectively addresses heteroskedasticity and the presence of zero trade flows commonly observed in trade data. The results show that importer Gross Domestic Product (GDP) has a strong and positive influence on Tanzania's coffee exports in both African and non-African markets, highlighting the importance of market size in determining export demand. Exchange rate depreciation significantly improves export competitiveness, while trading with landlocked countries negatively affects export performance due to higher transport and logistics costs. Institutional factors also play an important role, with World Trade Organization (WTO) membership and the African Continental Free Trade Area (AfCFTA) demonstrating significant trade-creating effects, particularly in strengthening intra-African coffee exports. The findings suggest that strengthening AfCFTA implementation, maintaining competitive exchange rate policies, and investing in transport and trade infrastructure are essential for enhancing Tanzania's coffee export diversification, regional trade integration, and long-term competitiveness in global markets.

Keywords: AfCFTA; Coffee Exports; Exchange Rate Competitiveness; Gravity Model; Tanzania

I. INTRODUCTION

Coffee is one of the most widely traded agricultural commodities in the world and plays a critical role in the export earnings, employment, and rural livelihoods of many developing economies. Globally, coffee production exceeded 11 million tonnes of green coffee beans in 2023, with Brazil, Vietnam, and Colombia accounting for the largest shares of world output and exports (Food and Agriculture Organization, 2024). International coffee trade remains robust, with global exports surpassing 10 million 60-kg bags annually, reflecting sustained demand in traditional markets such as European Union and North America, alongside emerging consumption growth in Asia and the Middle East (ICO, 2025). The expansion of coffee markets and evolving consumer preferences have further reshaped global trade patterns, intensifying competition among exporting countries (Ponte, 2022).

Within this global landscape, Africa is an important but relatively under presented player in the coffee trade. The continent contributes a modest share of global coffee exports despite its long history of coffee production and favourable agro-ecological conditions. During the 2024/2025 coffee season, African countries exported approximately 1.18 million tonnes of coffee, representing 18.6 percent increase compared to the previous season, driven largely by improved harvests in Ethiopia and Uganda (Ecofin Agency, 2025). Nevertheless, Africa captures a disproportionately small share of global coffee export value estimated at less than 1 percent of total global revenues largely due to limited value addition, quality differentiation constraints, and dependence on primary exports (African Development Bank [AfDB], 2023). These structural challenges underscore the importance of understanding export performance determinants at both continental and country levels.

Tanzania is among Africa's leading coffee producing countries and holds a strategic position in the regional and global coffee markets. Alongside Ethiopia, Uganda, Cote d'Ivoire, and Madagascar, Tanzania forms part of the

group that collectively accounts for nearly three quarters of Africa's total coffee production (FAO, 2024). Tanzania contributes approximately 1.7 percent of global coffee output, with production dominated by smallholder farmers who accounts for about 90 percent of national supply (Kalinga & Mzimbiri, 2025). The country produces both Arabica and Robusta coffee, with Arabica grown primarily in the northern and southern highlands representing roughly 60-70 percent of output, while Robusta accounts for the remainder (Tanzania Coffee Board [TCB], 2024).

Over the past decade, Tanzania's coffee sector has exhibited a generally upward trend in production and export performance, albeit with notable year to year fluctuations. Coffee production for the 2025/2026 marketing year is projected at approximately 1.45 million 60kg bags, reflecting favourable weather conditions, expanded use of improved varieties, and ongoing sector reforms (ICO, 2025). Export volumes are expected to reach 1.36-1.37 million bags, highlighting the strong export orientation of the sector (ICO, 2025). Correspondingly, coffee export revenues have increased significantly, rising from about US$237 million in 2024, an increase of roughly 45 percent, largely driven by higher export volumes and improved international prices.

In terms of destination markets, Tanzanian coffee exports are heavily concentrated in non-African countries, particularly the European Union, Japan, and the Unites States. Germany, Italy, Belgium, and Japan consistently rank among the top importers of Tanzanian coffee, reflecting strong demand for high-quality Arabica varieties, including specialty coffees such as "Kilimanjaro coffee" (Ponte, 2022; TCB, 2024). In contrast, exports to African markets, though comparatively smaller, remain strategically important for regional trade integration, with countries such as South Africa and Kenya serving as key destinations (AfDB, 2023). The divergence in market destinations suggests that export performance may respond differently to macro-level factors across African and non-African markets.

Despite positive growth trends, Tanzania's coffee export performance remains highly sensitive to macro-level determinants operating at domestic, regional, and global levels. Exchange rate movements, international coffee prices, inflation, global demand conditions, and trade policies have been shown to significantly influence export volumes and competitiveness (Kalinga & Mzimbiri, 2025). Exchange rate depreciation may enhance export competitiveness, while price volatility and weak price transmission mechanism can limit income gains for producers and exporters (Gilbert & Morgan, 2010). Furthermore, differences in standards, market access conditions, and income levels between African and non-African importing countries may lead to heterogeneous export responses to macroeconomic shocks.

Against this backdrop, a systematic examination of the macro-level determinants of Tanzania's coffee exports to African and non-African countries is essential. Understanding how these factors shape export performance across different destination markets is critical for designing evidence-based trade, macroeconomic, and agricultural policies aimed at strengthening Tanzania's position in regional and global coffee markets, enhancing export diversification, and promoting sustainable growth in the coffee sector.

1.1 Statement of the Problem

Coffee is one of Tanzania's key traditional export commodities, playing an important role in generating foreign exchange, supporting rural employment, and sustaining smallholder livelihoods (FAO, 2024; TCB, 2024). Despite steady improvements in production and export performance, Tanzania's coffee exports remain largely oriented toward non-African markets such as Europe, Japan, and the United States, while trade with African countries remains comparatively limited, even under regional integration frameworks such as the East African Community [EAC], Southern African Development Community [SADC], and African Continental Free Trade Area [AfCFTA] (AfDB, 2023; TCB, 2024). This persistent pattern suggests that regional market opportunities have not been fully utilized to diversify export destinations and strengthen intra-African trade.

Empirical literature on agricultural trade has extensively applied the gravity model to explain bilateral export flows, emphasizing the role of economic size, geographical distance, exchange rates, and trade agreements in shaping trade patterns (Anderson & van Wincoop, 2003; Leitão, 2024). However, most existing studies treat export destinations as a homogeneous group and do not explicitly distinguish between African and non-African markets. Consequently, there is limited empirical evidence on whether the determinants of Tanzania's coffee exports differ across these two categories of trading partners. This is an important gap, given that destination markets differ significantly in income levels, market structures, trade costs, and institutional environments, which may lead to heterogeneous trade responses.

The absence of such comparative evidence limits the ability of policymakers to design targeted export promotion strategies that simultaneously enhance Tanzania's competitiveness in global markets and strengthen regional trade integration. This issue is particularly relevant in the context of the African Continental Free Trade Area (AfCFTA), which aims to reduce trade barriers and expand intra-African trade flows (Fofack et al., 2021). Understanding whether macroeconomic determinants exert different effects across African and non-African markets is therefore essential for evidence-based policy formulation.

To address this gap, this study employs a structural gravity model estimated using the Poisson Pseudo-Maximum Likelihood (PPML) estimator to compare the macroeconomic determinants of Tanzania's coffee exports to

African and non-African countries over the period 2001–2024. The findings are expected to provide empirical evidence that supports export diversification, enhances regional trade integration, and improves the competitiveness of Tanzania's coffee sector.

1.2 Research Objective

i. To analyse the determinants of Tanzania's coffee exports to African countries
ii. To analyse the determinants of Tanzania's coffee exports to Non-African countries.

II. LITERATURE REVIEW

2.1. Theoretical Review

2.1.1 The Gravity Model of Trade.

The gravity model offers a more empirical approach to analysing trade flows. It posits that the volume of trade between two countries is directly proportional to their economic size (Gross Domestic Product [GDP]) and inversely proportional to the geographical distance between them (Tinbergen, 1962). Extensions of the model incorporate other factors such as trade agreements, infrastructure, exchange rates, and institutional quality. In this study, the gravity model provides a relevant framework for assessing Tanzania's underperformance in the intra-African coffee trade, despite geographic proximity to growing markets such as Kenya, Egypt, and South Africa. It also supports the empirical analysis of macroeconomic variables such as GDP, inflation, and exchange rate, as determinants of export volume and destination.

2.2 Empirical Review

Empirical analysis of bilateral trade flows has been dominated by the gravity model, which has proven to be a robust and flexible framework for examining macro-level determinants of international trade. Originating from Tinbergen's (1962) application of Newtonian physics to trade, the gravity model posits that trade between two countries is positively related to their economic size, typically measured by gross domestic product (GDP) and negatively related to the geographical distance between the countries, which proxies for trade costs. Over time, the model has been theoretically refined and empirically strengthened, particularly through the contribution of Anderson and van Wincoop (2003), who emphasized the role of multilateral resistance terms in explaining bilateral trade patterns. Contemporary empirical studies routinely augment the basic gravity specification with additional macroeconomic and institutional variables such as exchange rates, population, trade agreements, colonial ties, common language, and infrastructure quality, making the model highly suitable for sector specific export analysis, including agricultural commodities such as coffee (Leitao, 2024).

Country-specific gravity model applications further confirm the importance of macroeconomic determinants in coffee export performance. Bekele and Mersha (2019), employing a dynamic panel gravity model to analyze Ethiopia's coffee exports, demonstrate that importer income, exporter production capacity, trade openness, and institutional quality significantly influence export volumes. Their findings indicate that demand-side factors in importing countries are particularly important for coffee exports, given the commodity's income-elastic demand characteristics. Similar conclusions emerge from studies focusing on other major coffee-producing countries, where economic size, exchange rate dynamics, and distance consistently explain variations in export performance across destination markets. These results underscore the suitability of gravity models for capturing both supply- and demand-side macroeconomic forces in coffee trade.

Although empirical studies focusing exclusively on coffee exports from Tanzania are relatively limited, broader gravity-based analyses of African and Tanzanian trade provide important insights applicable to the coffee sector. Studies examining bilateral trade within Africa and between Africa and the rest of the world consistently find that GDP of trading partners, distance, and trade costs significantly influence export flows (Martínez-Zarzoso & Nowak-Lehmann, 2003; Leitão, 2024). Evidence from East African Community (EAC) and COMESA trade analyses suggests that regional integration can mitigate the negative effects of distance and enhance intra-African trade, particularly for primary agricultural commodities. However, despite regional trade agreements, African exports remain more strongly oriented toward non-African markets, reflecting structural demand differences and historical trade patterns.

Empirical gravity studies on Tanzania's overall export performance further reinforce the relevance of macro-level determinants. Research examining Tanzania's bilateral trade flows indicates that exporter and importer GDP positively affect trade, while distance and exchange rate volatility constrain export growth (Kalinga & Mzimbiri, 2025). These studies' findings suggest that Tanzania's coffee exports are likely to be influenced by similar macroeconomic forces, especially given coffee's strong dependence on international markets. The concentration of Tanzanian coffee exports in non-African destinations such as the European Union, Japan, and the United States

implies that income levels, exchange rate movements, and quality standards in these markets may exert stronger effects than in African markets.

Across the empirical gravity literature, several macro-level determinants emerge as consistently significant in explaining coffee export trade to both African and non-African countries. Economic size, measured by GDP, captures production capacity on the supply side and purchasing power on the demand side, while distance reflects transportation and transaction costs that disproportionately affect bulky and perishable agricultural commodities (Abafita et al., 2021). Exchange rate movements play a crucial role in determining export competitiveness, with depreciation generally enhancing exports, although excessive volatility may deter trade due to increased uncertainty (Gilbert & Morgan, 2010). Institutional factors, trade openness, and participation in regional or bilateral trade agreements also influence coffee exports by reducing trade barriers and facilitating market access, particularly in developing-country contexts.

Overall, the empirical literature demonstrates that gravity models provide a theoretically sound and empirically robust framework for analysing macro-level determinants of coffee export trade. However, there remains a gap in the literature regarding comparative analysis of Tanzania's coffee exports to African versus non-African markets within a unified gravity modelling framework. Addressing this gap is important for understanding how macroeconomic conditions, trade costs, and destination-specific factors differentially influence Tanzania's coffee export performance, thereby informing policies aimed at export diversification, regional integration, and sustainable growth in the coffee sector.

III. METHODOLOGY

3.1 Study Area

The study focuses on Tanzania, an East African country where agriculture plays a central economic role, contributing about 26–28 percent of GDP and providing livelihoods for nearly two-thirds of the population (World Bank, 2024). Coffee is one of Tanzania's most important traditional export crops, with the country contributing approximately 1.5–2 percent of global coffee production and ranking among Africa's leading producers (FAO, 2024; ICO, 2025). Production is dominated by smallholder farmers and consists mainly of Arabica coffee (60–70 percent) grown in the northern and southern highlands, and Robusta coffee concentrated in the Kagera region (TCB, 2024). More than 90 percent of Tanzania's coffee output is exported, primarily to non-African markets such as the European Union, Japan, and the United States, while African destinations remain important within regional integration frameworks such as the EAC and AfCFTA (AfDB, 2023). Tanzania's strong export orientation, combined with its exposure to macroeconomic factors including exchange rate movements and global price volatility, makes it a suitable case for examining the macro-level determinants of coffee exports to African and non-African countries using a gravity modelling approach (Kalinga & Mzimbiri, 2025).

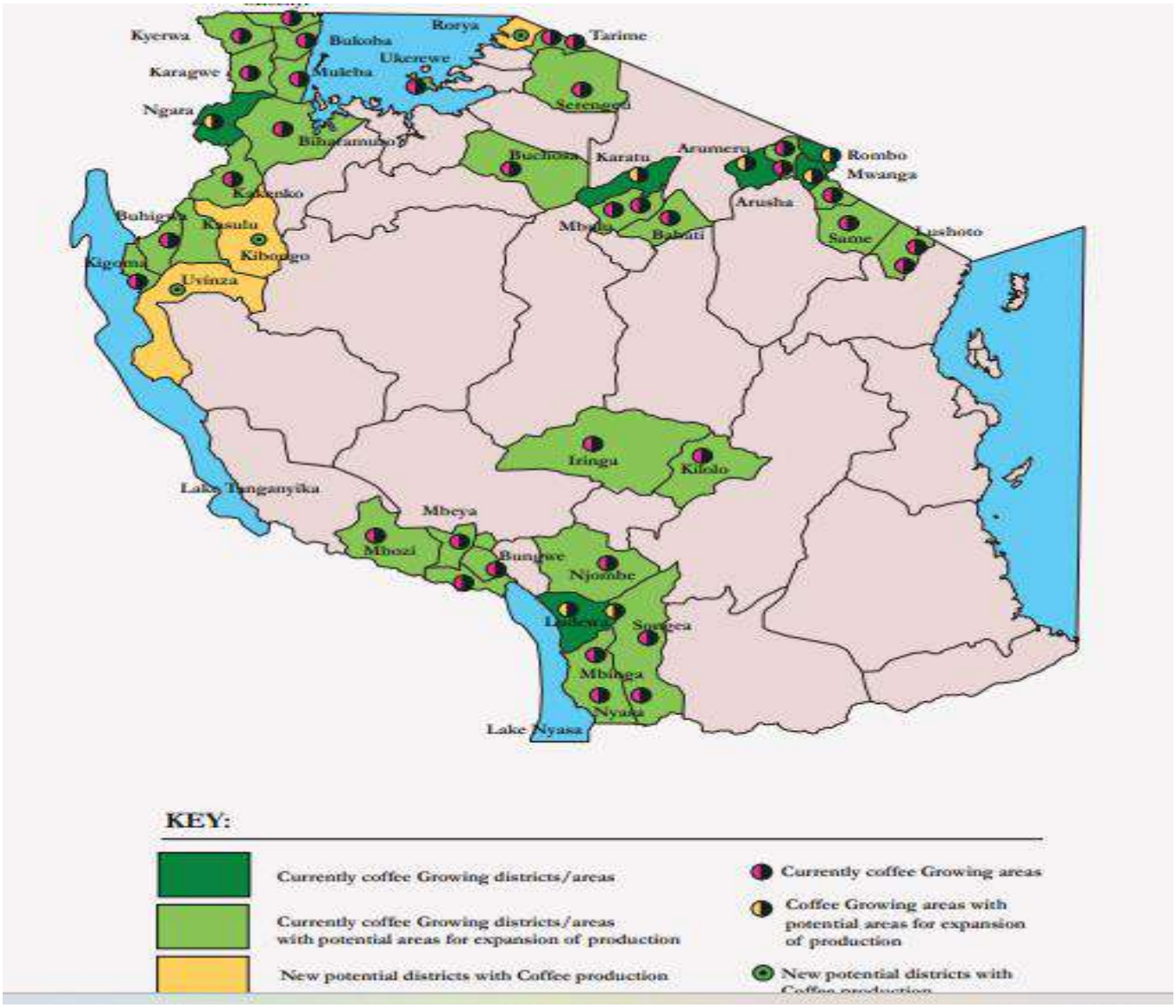

Figure 1
source (TCB, 2024)

3.2 Data and Data source

The present study used secondary data from international and national sources, including FAO STAT and ITC for trade data, the World Bank, NBS for macroeconomic indicators, WITS for trade agreements. These sources have reliable data for analysing the macro determinants of Tanzania's coffee exports.

3.3 Data Analysis

To analyse the determinants of Tanzania's coffee exports to African and non-African countries, this study applies the gravity model of international trade, which is one of the most widely used empirical frameworks for explaining bilateral trade flows. Rooted in Newton's law of gravity, the model posits that the volume of trade between two countries is positively related to their economic sizes and negatively related to the geographical distance between them (Tinbergen, 1962). In this context, the gravity model is particularly useful for distinguishing how economic, geographical, and policy-related variables influence Tanzania's trade patterns with regional and global markets. Two separate gravity equations are specified to reflect the differences in export dynamics between African and non-African markets:

3.3.1 Equation for African Countries

$$lnY_{it}=\beta_0+\beta_1 lnGDPtz_t+\beta_2\, lnGDP_{it}+\beta_3 lnGD_i+\beta_4 lnER_{it}+\beta_5 lnIR_{it}+\beta_6 lnAfCFTA_{it}+\beta_7 lnWTO_{it}+\beta_8 lnPOP_{it}+\beta_9 lnComBorder+\beta_{10} lnLandLock+\varepsilon_i \quad \text{(i)}$$

3.3.2 Equation for non-African Countries

$lnY_{it}=\beta_0+\beta_1 lnGDPtz_t+\beta_2\, lnGDP_{it}+\beta_3 lnGD_i+\beta_4 lnER_{it}+\beta_5 lnIR_{it}+\beta_6 lnWTO_{it}+\beta_7 lnPOP_{it}+\beta_8 lnLandLock+\varepsilon_i$…… …….. (ii)

The dependent variable in the model is the natural logarithm of coffee export volume from Tanzania to each destination country lnY_{it}. The explanatory variables include Tanzania's GDP per capita (a proxy for market supply) $lnGDPtz_t$, the GDP per capita of the trading partner (a proxy for market demand)$lnGDP_{it}$, the real exchange rate (reflecting price competitiveness) $lnER_{it}$, geographical distance (as a proxy for trade costs) $lnGD_i$, population size (indicating market size) $lnPOP_{it}$, a dummy variable for AfCFTA to capture the effect of regional trade integration on intra-African exports $lnAfCFTA_{it}$, a dummy variable for WTO to capture the effect of global trade on inter-African exports $lnAfCFTA_{it}$, a dummy for the countries sharing a border with Tanzania *lnComBorder*, and a dummy for the landlocked countries *lnLandLock*.The dataset was structured as panel data covering multiple countries over the last decade (2001–2024), and the model was estimated using Poisson Pseudo-Maximum Likelihood (PPML) to control for heteroscedasticity and unobserved heterogeneity.

IV. FINDINGS & DISCUSSION

4.1 Coffee Exports Trend

Figure 1, illustrates the evolution of Tanzania's export volumes (in 000 kg) from 2001 to 2024, showing both annual fluctuations and a positive linear trend. Overall, the series demonstrates a clear upward trajectory, with export volumes rising from below 50,000 (000 kg) in the early 2000s to approximately 300,000 (000 kg) by 2024. The positive linear trend confirms sustained long-term growth, consistent with Tanzania's broader trade expansion over the past two decades.

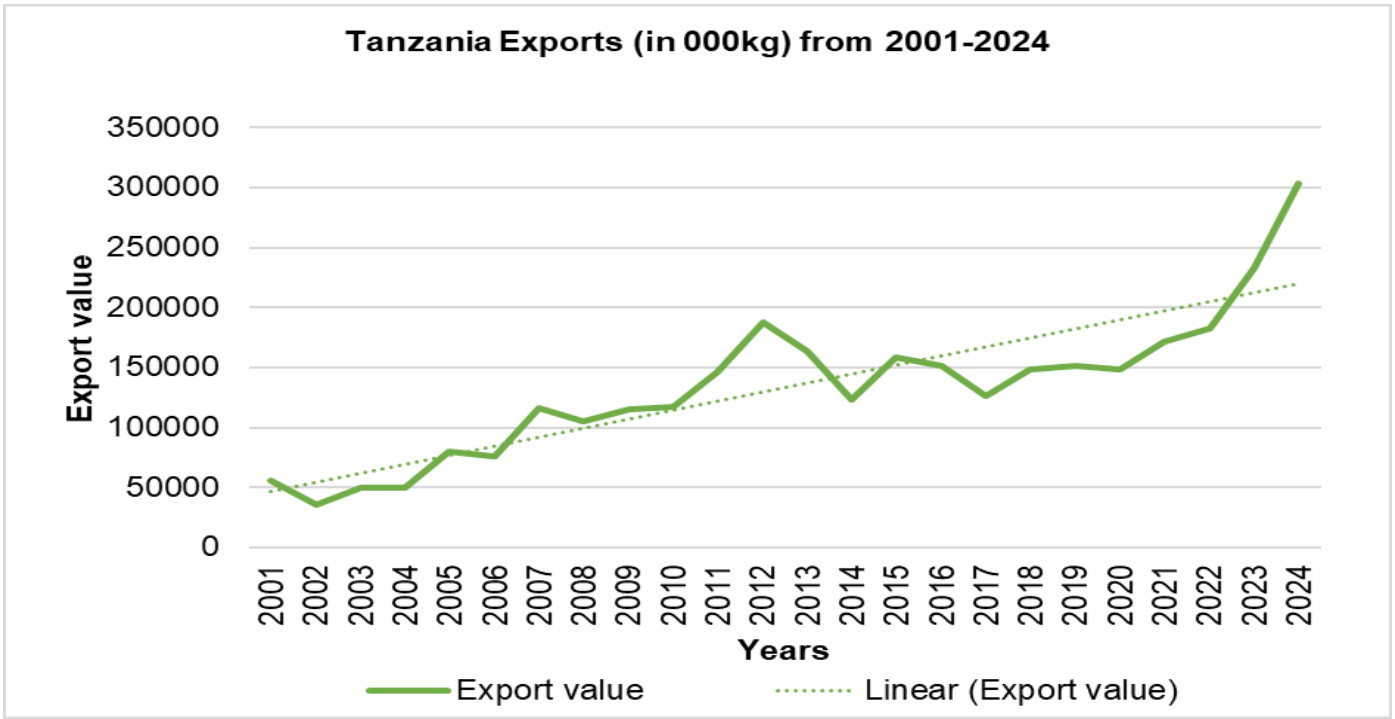

Figure 2

Tanzania Coffee export trend (2001-2024).

The early 2000s were characterized by relatively low and volatile export volumes, reflecting structural constraints in Tanzania's trade sector, including limited diversification and infrastructure bottlenecks (World Bank, 2014). From the mid-2000s onward, exports began to increase more steadily, coinciding with improvements in port infrastructure, and stronger integration into regional and global markets. Empirical evidence suggests that export growth in many Sub-Saharan African countries during this period was driven by commodity price booms and expanding global demand, particularly from emerging markets (United Nations Conference on Trade and Development [UNCTAD], 2019). The noticeable fluctuations around 2012–2014 and again between 2016 and 2018 may reflect external shocks such as global commodity price volatility and domestic supply-side constraints. Commodity-dependent economies like Tanzania are particularly vulnerable to global price cycles, which significantly

affect export volumes and revenues (International Monetary Fund [IMF], 2018). Additionally, climate variability especially in agriculture-dominated export sectors can generate year-to-year production instability, influencing trade performance (Intergovernmental Panel on Climate Change [IPCC], 2022).

From 2021 onward, the graph shows a marked acceleration in export growth, culminating in a sharp increase in 2024. This surge may reflect post-pandemic recovery in global trade flows, strengthened regional trade integration under the AfCFTA, and improved domestic trade facilitation measures. Global trade rebounded strongly after COVID-19 disruptions, with developing countries experiencing renewed export demand (World Trade Organization [WTO], 2023). The magnitude of the increase in 2024 suggests structural rather than purely cyclical factors may be at play, possibly including diversification into higher-value or higher-volume export products.

Despite short-term volatility, the long-term upward trend indicates increasing export capacity and deeper integration into international markets. According to structural trade theory, sustained export growth is often associated with improvements in productivity, infrastructure, and institutional quality (Melitz, 2008; Anderson & van Wincoop, 2003). However, the observed fluctuations highlight persistent vulnerability to external shocks and structural constraints. In summary, Tanzania's export performance over 2001–2024 exhibits strong long-term growth, intermediate volatility linked to global and domestic shocks, and a recent acceleration in export expansion. These dynamics underscore the importance of export diversification, macroeconomic stability, climate resilience, and regional trade integration in sustaining long-term trade growth.

4.2 Macroeconomic Determinants that influence Tanzanian Coffee Exports

This study employs the Poisson Pseudo-Maximum Likelihood (PPML) estimator to examine the macro-level determinants of Tanzania's export flows. The use of PPML is consistent with best practice in gravity modelling, as it addresses heteroskedasticity and accommodates zero trade flows, thereby producing consistent estimates in log-linearized trade models (Subramanian & Wei, 2007). The gravity framework further aligns with the theoretical foundations of international trade, where bilateral trade flows are positively associated with economic size and negatively related to trade costs (Anderson & van Wincoop, 2003; Head & Mayer, 2014).

Table1

Macro-level Determinants of Coffee Export to African and Non-African Countries

Variables	Coefficients	p value
Non-African Countries		
GDP of destination country	1.5046	(0.000) **
Geographical distance	-0.2192	(0.269)
Population	-0.6431	(0.000) **
Exchange rate	0.2462	(0.000) **
Inflation	-0.0629	(0.316)
Common language	1.1116	(0.051) **
WTO	0.9670	(0.012) **
Common border	0.9063	(0.176)
Landlocked country	-1.9194	(0.000) **
_Cons	-10.2814	(0.000) **
Number of Observations (N)	1693	
Adjusted R2	0.4937	
African Countries		
GDP of Destination Country	1.6924	(0.000) **
Geographical Distance	0.3107	(0.205)
Population	-0.7764	(0.000) **
Exchange rate	0.2980	(0.000) **
Inflation	0.0544	(0.373)
Common Language	1.2569	(0.026) **
AfCFTA	3.0341	(0.000) **
WTO	1.2440	(0.000) **
Common Border	-0.3822	(0.523)
Landlocked countries	-1.7797	(0.000) **
_Cons	-18.4722	(0.000) **
Number of observations (N)	1693	
Adjusted R^2	0.5295	

** denotes the statistical significance of 5%

4.2.1 Market Size Effects

Across both model specifications, importer GDP exhibits a positive and highly significant effect on Tanzania's exports. In the first specification, the elasticity of exports with respect to importer GDP is 1.505 ($p < 0.01$), while in the second specification it increases to 1.692 ($p < 0.01$). The increase in magnitude in the second model suggests improved explanatory power following the inclusion of AfCFTA. The elasticity greater than unity in both models indicates that Tanzanian exports are highly responsive to foreign market expansion, consistent with gravity theory and empirical findings in developing-country trade literature (Yotov et al., 2016). Importer population shows a negative and statistically significant effect in both models (−0.643 and −0.776, respectively; $p < 0.01$). The strengthening of the negative coefficient in the second model suggests that larger populations may reflect lower per capita income or greater domestic production capacity that substitutes for imports. This finding supports the argument that GDP captures purchasing power more effectively than population size in gravity estimations.

4.2.2 Trade Costs and Macroeconomic Variables

Exchange rate effects are positive and highly significant in both models, increasing from 0.246 to 0.298 ($p < 0.01$). This suggests that currency depreciation enhances Tanzania's export competitiveness, consistent with standard open-economy macroeconomic theory. The slightly larger coefficient in the second model indicates that exchange rate responsiveness remains robust even after controlling for regional integration. Distance and Inflation are insignificant to both models.

4.2.3 Institutional and Policy Variables

The inclusion of AfCFTA in the second specification substantially alters the institutional landscape of the model. In the first model, WTO membership shows a positive and significant effect ($\beta = 0.967$, $p < 0.05$), while in the second model its magnitude increases to 1.244 ($p < 0.01$). This reinforces the importance of multilateral trade institutions in facilitating exports through reduced trade uncertainty and harmonized trade rules (Subramanian & Wei, 2007). The AfCFTA variable itself is positive and highly significant ($\beta = 3.034$, $p < 0.01$) in the second specification. The magnitude suggests a strong trade-creating effect associated with continental integration. This aligns with theoretical expectations that regional trade agreements reduce tariff and non-tariff barriers, thereby increasing intra-regional trade flows (Baier & Bergstrand, 2007). The substantial increase in pseudo-R^2 from 0.494 in the first model to 0.529 in the second model further indicates improved explanatory power when regional integration is accounted for. The common language variable becomes statistically stronger in the second specification ($p = 0.026$ compared to $p = 0.051$), suggesting that cultural and informational proximity becomes more relevant once continental integration dynamics are incorporated. This supports the view that shared language reduces transaction costs and information asymmetries (Melitz, 2008).

4.2.4 Geographic Constraints

The landlocked variable remains negative and highly insignificant in both specifications (−1.919 and −1.780; $p < 0.01$), though its magnitude slightly decreases in the second model. This persistence underscores the structural disadvantage faced by landlocked trading partners due to higher transport and transit costs, a finding widely documented in the trade literature (Limao & Venables, 2001). The border variable remains statistically insignificant in both models.

4.3 Comparative Assessment

Comparing the two specifications reveals that the inclusion of AfCFTA improves model fit and strengthens several institutional coefficients without altering the fundamental gravity structure. Market size (GDP) and exchange rate competitiveness remain robust determinants across both models, while landlocked status consistently constrains trade. The second model demonstrates that regional integration significantly enhances Tanzania's export performance and amplifies the effects of multilateral institutional participation. Overall, the findings confirm the validity of the structural gravity model in explaining Tanzania's export flows and highlight the central role of economic size, institutional integration, and geographic accessibility. The results suggest that policies aimed at deepening regional trade integration, maintaining exchange rate competitiveness, and improving transport infrastructure particularly toward landlocked markets are likely to yield substantial export gains.

4.4 Discussion

This study examined the determinants of Tanzania's bilateral export flows using a Poisson Pseudo-Maximum Likelihood (PPML) gravity model and contextualized the findings with long-term trends in export volumes from 2001 to 2024. The PPML results revealed that economic size, exchange rate competitiveness, institutional integration, demographic factors, and geographic constraints significantly shape export performance. Specifically, importer GDP

had a strong positive elasticity, implying that larger foreign markets import more Tanzanian goods. This aligns with emerging empirical evidence that economic size remains a dominant driver of trade in gravity estimations, particularly when using PPML to address zero trade flows and heteroskedasticity (Ilomo, 2024). The significant positive effect of institutional variables such as membership in the World Trade Organization and regional integration (e.g., AfCFTA) is consistent with recent findings that African trade agreements can substantially enhance intra-continental trade flows in structural gravity estimations (Fofack et al., 2021; Ilomo, 2024).

The negative and significant coefficient on landlocked status confirms that access to maritime infrastructure remains a persistent barrier to trade. Higher transport and trade costs for landlocked economies have been repeatedly identified in the gravity literature as major impediments to trade volumes (e.g. structural gravity estimations using African data) and highlight the continued importance of trade facilitation and infrastructure investment for regional export growth. Exchange rate competitiveness also showed a robust positive effect, indicating that macroeconomic policy space can influence export competitiveness, which is particularly relevant in the context of Tanzania's exchange rate dynamics and external trade performance in recent years. The empirical results from the gravity model dovetail with the observed long-term export trend shown in the graph: Tanzania's export volumes have exhibited a pronounced upward trajectory since 2001, despite episodic short-term fluctuations. Over the past two decades, exports increased from below 50,000 (000 kg) to approximately 300,000 (000 kg) by 2024, with a clear positive linear trend reflecting overall structural gains in export capacity, diversification, and integration into global and regional markets. The acceleration in export volumes in recent years may partly be associated with expanding intra-African trade under the AfCFTA and broader regional logistics improvements, as Tanzania's intra-African trade reportedly grew by over 24% in 2024, with the Dar es Salaam port playing a central facilitating role (Afreximbank, 2025).

Taken together, the PPML results and export trend graph support the view that Tanzania's exports are increasingly responsive to external economic conditions, institutional engagement, and trade facilitation improvements. The strong role of economic size, institutional integration, and exchange rate competitiveness suggests that sustained export growth will require continued policy attention to macroeconomic stability, deepening of trade agreements such as AfCFTA, and targeted infrastructure investments to reduce trade costs especially for more distant or landlocked partners. These findings contribute to the contemporary literature by integrating structural gravity estimation with real-world export trend analysis, reflecting both the long-run growth trajectory and conditional determinants of trade. They highlight that while structural factors such as GDP and trade agreements consistently influence export patterns, non-tariff factors such as logistics performance and geographic constraints remain critical for translating potential export capacity into realized trade flows a conclusion in line with recent structural gravity and trade facilitation studies (e.g., analyses of time-to-trade and logistics indices across Africa.).

V. CONCLUSION & RECOMMENDATION

5.1 Conclusion

This study examined the macroeconomic, institutional, and structural determinants of Tanzania's export performance using a structural gravity framework estimated through Poisson Pseudo-Maximum Likelihood (PPML). The findings provide robust empirical evidence that importer economic size, exchange rate competitiveness, and regional integration significantly shape Tanzania's export flows, while geographic constraints and demographic factors continue to influence trade outcomes.

Consistent with gravity theory, importer GDP exerts a strong and statistically significant positive effect on Tanzania's exports, underscoring the importance of demand-side market expansion. Exchange rate competitiveness also positively influences export performance, highlighting the critical role of macroeconomic stability in sustaining trade growth. Institutional integration particularly under the AfCFTA and WTO membership demonstrates significant trade-enhancing effects, suggesting that rule-based trade systems and regional liberalization frameworks contribute meaningfully to export expansion. Conversely, landlocked partner status remains a significant barrier, confirming that geographic and logistical constraints continue to shape trade costs despite improvements in regional infrastructure. Population effects indicate that demographic size alone does not guarantee higher import demand when controlling for income levels, reinforcing the importance of purchasing power rather than scale.

The long-term export trend analysis complements the econometric findings by demonstrating sustained structural growth in Tanzania's exports between 2001 and 2024, despite periods of volatility associated with global shocks and domestic structural adjustments. The acceleration observed in recent years aligns with the institutional and macroeconomic drivers identified in the PPML estimations, suggesting that export growth is increasingly supported by structural trade integration and improved competitiveness. Overall, the study confirms that Tanzania's export performance is shaped by a combination of economic size effects, macroeconomic conditions, institutional frameworks, and structural trade costs. Sustained export growth will depend on continued regional integration, exchange rate management, infrastructure development, and diversification into higher-value markets. The results

contribute to the contemporary structural gravity literature and provide policy-relevant insights for strengthening Tanzania's position in regional and global trade networks.

5.2 Recommendations

The empirical findings provide clear policy-relevant insights for strengthening Tanzania's export performance. The robustness of importer GDP across both specifications confirms that market size remains the primary driver of export growth. Accordingly, Tanzania should intensify trade promotion strategies toward large and fast-growing economies, particularly within Africa and emerging markets. Strategic export diversification into higher-value products demanded by high-income markets would allow Tanzania to better capitalize on expanding foreign purchasing power. Export promotion agencies should prioritize market intelligence, standards compliance, and trade facilitation measures targeting these high-GDP destinations. The strong and statistically significant effect of the AfCFTA highlights the importance of regional integration as a catalyst for export expansion. Tanzania should accelerate the full domestication and implementation of AfCFTA protocols, including tariff schedules, rules of origin compliance, and customs harmonization. Beyond formal ratification, policy focus should shift toward reducing non-tariff barriers, improving border efficiency, and strengthening regional value chains. Supporting small and medium-sized enterprises (SMEs) to meet regional standards and certification requirements would further enhance the trade-creating effects of continental integration.

The positive and significant role of exchange rate competitiveness suggests that maintaining a stable and competitive real exchange rate is critical for export performance. Macroeconomic policy coordination between fiscal and monetary authorities should aim to prevent excessive currency appreciation while ensuring price stability. Although inflation was not statistically significant, macroeconomic stability remains essential to sustain investor confidence and export competitiveness. A predictable macroeconomic environment reduces uncertainty and enhances long-term trade contracts.

The persistent and large negative effect of landlocked status underscores the importance of transport and logistics infrastructure. While Tanzania is not landlocked, its export relationships with landlocked partner countries are significantly constrained by high transit and transport costs. Investments in port modernization, corridor development (such as the Central and Northern Corridors), and digital trade facilitation systems would reduce trade costs and improve Tanzania's role as a regional trade hub. Strengthening multimodal transport systems and reducing dwell time at ports would generate substantial export gains.

The significance of common language indicates that informational and cultural proximity facilitate trade. Tanzania could leverage this by strengthening trade diplomacy, diaspora networks, and business-to-business linkages in English-speaking and culturally aligned markets. Expanding commercial attaché services and export marketing missions may further reduce information asymmetries and transaction costs. Overall, the results suggest a three-pillar policy framework for enhancing Tanzania's exports: (i) deepening regional integration under AfCFTA, (ii) maintaining macroeconomic competitiveness particularly through exchange rate stability and (iii) investing in trade-related infrastructure and logistics systems. Complemented by institutional strengthening and export diversification strategies, these measures would position Tanzania to achieve sustained export growth and greater integration into regional and global value chains.

Declaration of Interest

The authors declare that they do not have any known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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