



An Econometric Analysis of the Influence of Trade Liberalisation on Sesame Export in Tanzania

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ABSTRACT

The main objective of this study is to examine the impact of trade liberalisation on sesame exports in Tanzania, incorporating domestic production, real exchange rate, and real-world sesame prices as control variables. Using a quantitative time-series approach, the study applies the Autoregressive Distributed Lag (ARDL) framework to analyse both short-run and long-run dynamics. After the estimation findings reveal that, in the long run, only the real-world price of sesame has a statistically significant positive effect on exports, where a 1% increase in world prices raises exports by approximately 3.54%, while domestic production, trade liberalisation, and the real exchange rate are statistically insignificant. In the short run, the real exchange rate exerts a significant negative effect on sesame exports, where a 1% increase reduces exports by about 1.09% contemporaneously and by approximately 2.43% with a one-period lag, indicating that exchange rate volatility strongly dampens export performance. Similarly, real-world prices show significant negative short-run effects, where a 1% increase reduces exports by about 2.47% in the current period and 1.68% in the first lag, with further lagged effects of -1.38% and -1.13% at the second and third lags, reflecting delayed supply responses. Trade liberalisation, on the other hand, has an insignificant immediate effect, but its lagged impacts are positive and significant, increasing exports by about 2.02% after one period and 1.97% after two periods, indicating delayed gains from policy reforms. Overall, the study concludes that sesame export in Tanzania is mainly driven by international price signals in the long run, while short-run performance is strongly influenced by exchange rate volatility, world price adjustments, and delayed effects of trade liberalisation. The study recommends strengthening market responsiveness through improved information systems, storage, and value chain efficiency, alongside structural reforms such as better infrastructure and financing to enhance the effectiveness of trade liberalisation. It also emphasises the need for exchange rate management to reduce export volatility.

1. Introduction

Over the past three decades, Tanzania has implemented broad economic reforms aimed at transforming its economy from a state-controlled system to a market-oriented one. Central to these reforms has been trade liberalisation, which sought to integrate the country into the global trading system by reducing trade barriers, promoting competition, and diversifying exports (World Bank, 2023). The liberalisation process began in the mid-1980s under the Structural Adjustment Programs (SAPs) supported by the International Monetary Fund (IMF) and the World Bank. These programmes focused on removing price controls, reducing export taxes, dismantling trade monopolies, and creating an enabling environment for private sector participation (IMF, 2020; World Bank, 2023). The agricultural sector, being the backbone of Tanzania's economy, was heavily influenced by these reforms after years of inefficiency under the socialist and self-reliance policies of the 1970s that had led to a decline in productivity and competitiveness (URT, 2022).

Before liberalisation, agricultural marketing was dominated by state-controlled parastatals that acted as sole buyers of farm produce, often offering low and uncompetitive prices that discouraged production (Kanaan, 2000). The liberalisation process dismantled these monopolies, reintroduced cooperative movements, and allowed private traders to engage in agricultural marketing (National Trade Policy [NTP], 2003). These changes enhanced market efficiency, flexibility in pricing, and increased farmers' motivation to produce for the market. After more than four decades of implementing trade liberalisation reforms, an important question remains: to what extent has trade liberalisation actually improved Tanzania's exports, particularly in agricultural commodities?

Empirical studies within and beyond Tanzania present mixed findings regarding the role of trade liberalisation on exports. While some studies suggest that trade liberalisation promotes the expansion of commodity exports by improving market access and reducing trade barriers, others argue that it may negatively affect export performance due to increased competition and structural constraints. Meanwhile, several studies found no significant relationship, indicating that trade liberalisation may have a limited or insignificant influence on export growth.

For instance, Yusuf and Omar (2019) highlight that Tanzania's trade liberalisation strengthened the export sector by increasing export volumes. Similarly, Santos-Paulino (2000) observes that liberalisation reduces exchange rate distortions and export duties, thereby enhancing non-traditional exports in developing economies. In the same vein, Odebode and Aras (2020) find that in Sub-Saharan Africa, trade liberalisation has indirectly supported sustainable export growth by reducing dependence on imports that can weaken domestic industries. Likewise, Kinfaek (2023) argues that greater openness to trade improves export performance by lowering trade barriers, enhancing

competitiveness, and expanding market access. Building on this perspective, Utouh (2024) further emphasises that well-implemented trade liberalisation is essential not only for expanding exports and attracting investment but also for fostering structural transformation and broader national development. Again, Utouh (2025) revealed a significant positive correlation between trade liberalisation and export performance in Tanzania, indicating that a more open economy is associated with a stronger export sector.

On the other hand, some studies report contrasting results, suggesting that trade liberalisation may not always translate into improved export performance. For example, Amani (2025) finds that trade liberalisation did not have a significant impact on export performance in Tanzania. Furthermore, Amani (2026) reports that in the case of oilseed export, trade liberalisation may even exert a negative long-run influence on exports. These mixed findings indicate that the impact of trade liberalisation on exports is not uniform and may depend on commodity-specific factors, market conditions, and the broader domestic economic environment. With multilateral trade liberalisation in particular, Gnanon (2019) clearly pointed out that it generates higher export performance and convergence in export performance in developing countries only when it is accompanied by higher AfT flows to developing countries.

It is worth noting that Tanzania traditionally grows sesame as its primary oilseed crop for export, and the crop has become increasingly valuable due to rising global demand for healthier and more nutritious foods (Lukurugu et al., 2023). According to the International Trade Centre (ITC, 2020), Tanzania exported about 108,861 tons of sesame worth USD 164.5 million in 2019. From 2018 to 2020, exports increased more than twofold from 71,696 tons to 167,091 tons valued at approximately USD 167.62 million (URT, 2021). By 2023, Tanzania ranked as the world's fourth-largest exporter of sesame by quantity and fifth by value, exporting 154,543 tons worth USD 225.6 million (FAO, 2025). This consistent growth indicates a strong global demand, driven largely by expanding markets, particularly in Asia and the Middle East (URT, 2021; Lunogelo & Kazi, 2021). Even at the regional level, sesame exports have generally increased over time, reflecting growing demand and production capacity (Wacal et al., 2021).

Despite the introduction of trade liberalisation policies in Tanzania, its actual impact on sesame export growth remains unclear. Given the growing importance of sesame to Tanzania's exports, rural incomes, and foreign exchange earnings (FAO, 2022), it is essential to assess whether trade liberalisation has resulted in measurable improvements in sesame exports. Therefore, the overall objective of the existing study is to examine the effects of trade liberalisation on sesame export in Tanzania, guided by the central research question: Does trade liberalisation affect sesame export in

Tanzania? The relationship between sesame exports and trade liberalisation, together with some control variables, is clearly illustrated in the conceptual framework.

In this framework, sesame exports are treated as the dependent variable, while trade liberalisation is the independent variable. The model also incorporates control variables, namely sesame production quantity, real world price, and real exchange rate, to account for their potential influence on the relationship. The analysis has included only three control variables because they represent the key economic factors that directly influence sesame export. To that, they are capturing the most important determinants of export variation while maintaining a parsimonious and efficient econometric model. The conceptual framework is presented in Figure 1.

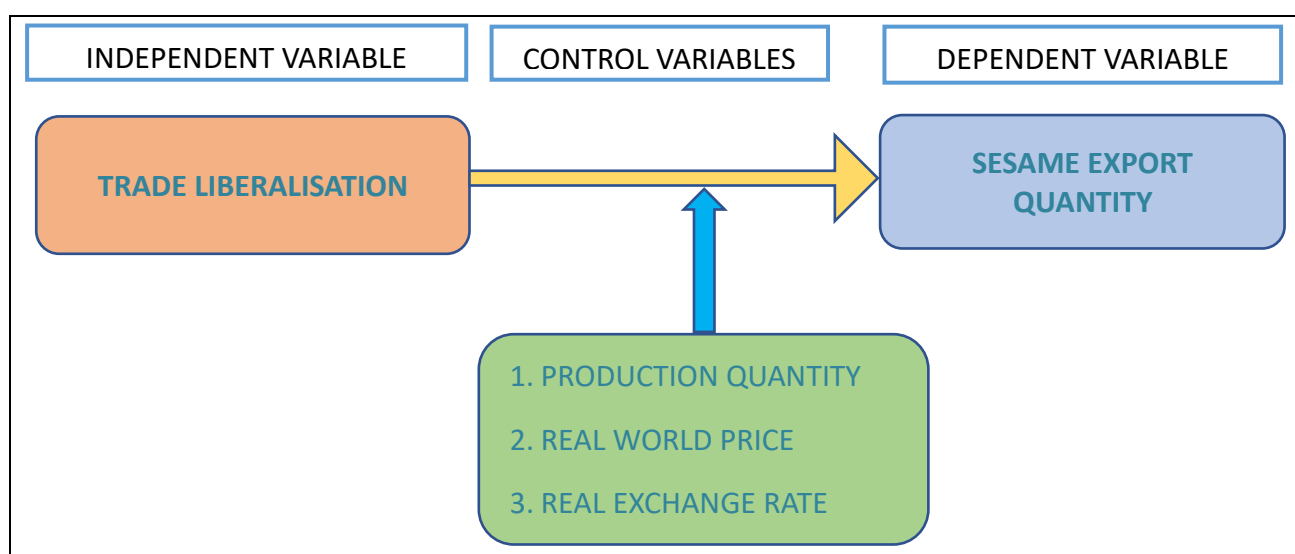


Figure 1: Conceptual Framework

Source: Researcher (2026)

The present study is guided by two complementing theories: classical and neoclassical trade theories, namely Comparative Advantage and Heckscher–Ohlin Theory. Primarily, it is grounded in the Comparative Advantage Theory, developed in 1817 by David Ricardo in his work *On the Principles of Political Economy and Taxation*. The theory argues that countries benefit from international trade by specialising in the production and export of goods they can produce at a lower opportunity cost relative to other countries. Trade liberalisation, through the removal or reduction of tariffs, quotas, and other trade barriers, enables countries to exploit their comparative advantage more efficiently. In the context of Tanzania, favourable agro-ecological conditions, availability of arable land, and relatively low labour costs provide a comparative advantage in the production of sesame. Therefore, liberalised trade policies are expected to enhance sesame export by improving competitiveness and expanding access to international markets.

The study is further supported by the Heckscher–Ohlin Theory, first introduced by Eli Heckscher in 1919 and later developed by Bertil Ohlin in 1933. This theory posits that countries export goods that intensively use their relatively abundant factors of production. As a land- and labour-abundant country, Tanzania is expected to specialise in and export agricultural commodities such as sesame. Trade liberalisation enhances this process by allowing the country to utilise its abundant resources more effectively, thereby increasing export volumes. Together, these theories suggest that reducing trade barriers promotes export growth through specialisation, efficient resource allocation, and improved market access. This theoretical foundation, therefore, provides a strong basis for examining the influence of trade liberalisation on sesame export performance in Tanzania.

The expected contribution of this study lies in its comprehensive analysis of the relationship between trade liberalisation and sesame exports in Tanzania, considering sesame production, real world price, and real exchange rate as control variables. By examining both short- and long-run dynamics within classical and neoclassical trade theory frameworks, the study provides empirical evidence and policy insights on the effectiveness of liberalisation reforms. It follows that the findings are expected to guide strategies for enhancing competitiveness, expanding market access, and strengthening Tanzania's position in the global sesame market. Without this study, policymakers may rely on assumptions rather than evidence, risking ineffective policies, misallocated resources, and missed opportunities to fully realise the benefits of trade liberalisation for export growth.

2. Methodology

2.1 Research Design

To understand the impact of trade liberalisation on sesame exports in Tanzania, this study employs a quantitative time series econometric approach. This design is suitable because it allows for the assessment of both short-run and long-run effects of trade policy changes while capturing the dynamic patterns and trends in the country's sesame export sector over time.

2.2 Study Area and Scope

The analysis focuses on Tanzania, covering the period from 1970 to 2024. This timeframe captures both the pre- and post-trade liberalisation periods, allowing for an assessment of how liberalisation policies have influenced Tanzania's sesame export performance. The choice of Tanzania reflects the country's progressive trade reforms and the need for empirical evidence on their impact on export growth and competitiveness in agricultural commodities.

2.3 Data Sources and Data Type

In this study, sesame exports serve as the dependent variable, representing Tanzania's export in tons. The main independent variable is trade liberalisation, captured through a dummy variable distinguishing the pre- and post-liberalisation periods to assess the policy's impact. It should be acknowledged that trade liberalisation in Tanzania was a process that involved several years. However, most economists and policy studies identify 1986 as the key starting year of trade liberalisation when the government launched the first Economic Recovery Programme (ERP) and began dismantling many of the restrictive trade control measures associated with the socialism and self-reliance era (Ujamaa) (Kanaan, 2000). So, the cut-off year for the creation of dummies adopted by the study was 1986.

To control for other key determinants, the model includes sesame production quantity, which reflects the domestic supply capacity; the real exchange rate, indicating the competitiveness of Tanzanian exports in international markets; and the sesame real world price, representing external demand and global price incentives influencing export behaviour.

Data for all variables were obtained from reliable sources: Tanzania export quantity, sesame production quantity, and exchange rates were gathered from FAOSTAT. On the other hand, sesame world prices were calculated by a researcher using the sesame world export volume and sesame world export values, which were also obtained from the FAOSTAT database. The calculation was necessitated by the absence of a complete data set about prices in reliable sources. FAOSTAT, for instance, shows the sesame world prices only from 2012 to 2016. To eliminate the elements of inflation in world prices and the exchange rate, they were converted into real values. The exchange rate was converted into a real exchange rate using the Tanzania DGP deflator, while the world prices were converted to real world prices using the world GDP deflator. The selection of the variables was grounded in empirical literature that links policy reforms to export and is linked to international trade theories. Clearly defining and measuring each variable is essential for ensuring consistency, comparability, and accuracy in the econometric analysis. Accordingly, each variable used in the study is carefully described to facilitate meaningful interpretation of the results, as presented in Table 1.

Table 1: Description of study variables

Variable Name	Unit	Operational Definition
Dependent Variable		
Sesame Export	Tons	The total quantity of sesame seeds shipped from Tanzania to foreign markets in a given period.
Independent Variables		
Trade Liberalisation	Dummy variable (1 and 0)	A binary (dummy) variable that takes the value 1 for years following the implementation of major trade reform policies in Tanzania, particularly from the early 1990s onward, when the country adopted market-oriented reforms, and 0 for the years before liberalisation.
Production Quantity	Tons	The total annual volume of sesame seeds produced within Tanzania during a given year. It measures the country's domestic supply capacity and is used as a proxy for export potential.
Real Exchange Rate	Index	An economic measure that shows the value of a country's currency relative to the currencies of its trading partners, after adjusting for differences in price levels (inflation) between countries.
Real World Price	Dollars per Ton (USD/Ton)	The international market price of sesame, adjusted for global inflation, is used to measure the external price incentive for Tanzanian exporters.

Source: Researchers' formulation (2026)

2.4 Pre-estimation Tests

In time series econometrics, pre-estimation tests are necessary to ensure proper model specification and to prevent misleading or spurious results. In this study, two key tests were conducted: unit root and cointegration tests.

2.4.1 Unit Root Test

Testing for a unit root is an important step in time-series econometric analysis because it helps determine whether variables are stationary or non-stationary, thereby preventing spurious regression and guiding whether the model should be estimated in levels or first differences. Several methods are commonly used to test stationarity, including the Augmented Dickey–Fuller test (ADF), the Phillips–Perron test (PP), and the Kwiatkowski–Phillips–Schmidt–Shin test (KPSS). Among these, this study employs the Phillips–Perron (PP) test because it is more robust in the presence of serial correlation and heteroskedasticity, as it uses non-parametric corrections rather than adding lagged difference terms, making it suitable for analysing macroeconomic time-series data.

2.4.2 Bounds Cointegration Test

Once the order of integration of the variables is established, testing for cointegration becomes essential to determine whether a stable long-run equilibrium relationship exists among the variables. Cointegration analysis ensures that non-stationary variables move together over time and that their

relationship is not spurious, thereby justifying the estimation of both long-run and short-run dynamics within an econometric framework. Several approaches are commonly used to test for cointegration, including the Engle–Granger cointegration test, the Johansen cointegration test, and the ARDL bounds testing approach. Among these methods, this study employs the ARDL bounds testing approach because it is flexible and suitable for small samples. Moreover, it can be applied when variables are integrated of different orders, provided they are not integrated of order two.

2.5 Lags Selection

Lag selection is essential in time series analysis because it determines the appropriate number of past observations to include in the model. Selecting the correct lag length helps capture the dynamic relationships among variables while avoiding underfitting or overfitting. Too few lags may omit important information and lead to biased results, whereas too many lags can reduce efficiency and consume degrees of freedom. Therefore, optimal lag selection, often guided by information criteria such as AIC or SIC, ensures accurate estimation, reliable inference, and well-specified models.

2.6 Theoretical Framework of the ARDL- ECM

In this study, the Autoregressive Distributed Lag (ARDL) – Error Correction Model (ARDL-ECM) bounds testing approach developed by Pesaran, Shin, and Smith (2001) is employed as the core estimation technique. The ARDL method is particularly suitable because it is applied regardless of whether the explanatory variables are purely stationary at level [I(0)], purely stationary at first difference [I(1)], or a combination of both, only that none of the variables is integrated of order two [I(2)]. This flexibility makes ARDL ideal for the time series data used in this research. In case there is cointegration in the model, which is confirmed through the cointegration bounds test, the technique also incorporates an error correction mechanism (ECM) to measure the speed at which short-run deviations adjust towards long-run equilibrium. In this scenario, the method becomes the ARDL-ECM. Moreover, ARDL-ECM allows for different optimal lags for each variable, which helps capture both the short-run dynamics and the long-run equilibrium relationship between export performance and its determinants. This makes it a strong and efficient choice for analysing the dynamic nature of export performance determinants over the study period.

The ARDL model with ECM can be expressed in a general form as follows: for a dependent variable Y_t and independent variables $X_{1t}, X_{2t}, \dots, X_{kt}$, an ARDL (p, q_1, q_2, \dots, q_k) is written as:

$$Y_t = \beta_0 + \sum_{i=1}^p \phi_i Y_{t-i} + \sum_{j=1}^{q_1} \beta_{1j} X_{1,t-j} + \sum_{j=1}^{q_2} \beta_{2j} X_{2,t-j} + \dots + \sum_{j=1}^{q_k} \beta_{kj} X_{k,t-j} + \varepsilon_t \dots \dots \dots (1)$$

Where p is the lag length for the dependent variable, q_1 is the lag length for each independent variable, and ε_t is an error term.

Once cointegration is established, equation (1) is rewritten to accommodate the Error Correction Term (ECT) in the form of:

$$\Delta Y_t = \beta_0 + \sum_{i=1}^{p-1} \phi_i \Delta_{t-i} + \sum_{j=0}^{q_1-1} \beta_{1j} \Delta X_{1,t-j} + \dots + \sum_{j=0}^{q_k-1} \beta_{kj} \Delta X_{k,t-j} + \lambda ECT_{t-1} + \varepsilon_t \dots \dots \dots (2)$$

Where Δ is a first difference operator, ECT_{t-1} is the lagged coefficient, indicating how quickly deviations from long-run equilibrium are corrected, and λ represents the speed of adjustment coefficient, indicating how quickly deviations from long-run equilibrium are corrected.

2.7 Model Specification

Model specifications in this study attempt to investigate the effect of trade liberalisation on sesame export in Tanzania using multiple regression analysis from 1970 to 2024. Although some control variables have been included to avoid the model from suffering from omitted variable bias. The regression equation is the first difference in reducing the problem of autocorrelation, which may affect the precision of estimation by overstating the estimates.

The research model specification takes into account the demand conditions in importing countries. For Tanzanian sesame, demand is highly price elastic because importers have alternative sources of supply, primarily from other sesame-producing countries around the world. Moreover, this price sensitivity arises from the fact that Tanzania does not hold a dominant position in the international sesame market, which limits its ability to influence world prices. In this context, the study estimates export equations within a supply-side framework. The modelling of export trade therefore follows the imperfect substitutes model, which assumes that neither exports nor imports are perfect substitutes for domestically produced goods, in this case, sesame.

Mathematically, the function is given as;

$$SEXP = F(TL, RWP, PQ, RER) \dots \dots \dots (3)$$

Where $SEXP$ is the sesame export, RWP is real world prices, PQ is production quantities, REX is the real exchange rate, TL is trade liberalisation, and F stand for a function. However, for easy interpretation, the variables were transformed to natural logarithm (\ln). Since the study applies time series econometrics analysis as the data analysis method and ARDL as an estimation technique, equation (3) was then transformed to form equation (4). This is an econometrics equation with

Breusch–Pagan test because it is superior compared to other techniques. Principally, its simplicity, direct linkage to the regression model, and ability to explicitly test whether the variance of the residuals is systematically related to the explanatory variables, thereby providing clear and reliable results for empirical analysis.

2.8.3 Stability Test

The structural stability test assesses whether the model parameters remain stable throughout the sample period, ensuring that the estimated relationships are consistent and not influenced by structural breaks. In this study, both the CUSUM and CUSUM of Squares (CUSUM²) tests were employed because they provide a visual and statistical method to detect gradual and sudden parameter shifts over time. The CUSUM test is particularly useful for identifying systematic changes in the regression coefficients, while the CUSUM² test is more sensitive to variance changes in the residuals. Together, these tests allow for a robust evaluation of the model's stability, confirming that the estimated relationships in the export model are reliable across the entire study period.

3. Results Presentation and Discussion

3.1 Results Presentation

3.1.1 Descriptive Statistics

Table 2 shows that the descriptive statistics have considerable variation in the degree of dispersion across the variables. To begin with, sesame exports (lnSEXP) recorded a mean of 9.5415 and a variance of 2.7834, indicating a moderate level of fluctuation in exports throughout the study period. Similarly, sesame production quantity (lnPQ) exhibited a variance of 1.8801, suggesting moderate variability in production levels over time. In contrast, trade liberalisation (TL), which is measured as a dummy variable, displayed a relatively low variance of 0.2101, implying limited dispersion around its mean value of 0.7091. More importantly, the real exchange rate (lnRER) registered the highest variance of 6.9404 among all variables, highlighting substantial volatility and significant fluctuations in exchange rate movements during the study period. On the other hand, the real-world prices (lnRPW) recorded the lowest variance of 0.0489, indicating that world prices remained relatively stable compared to the other variables.

Turning to the distributional properties of the variables, the skewness statistics show that sesame exports (lnSEXP), trade liberalisation (TL), the real exchange rate (lnRER), and the real-world price (lnRPW) are negatively skewed, indicating a tendency for observations to cluster toward higher values. In contrast, sesame production quantity (lnPQ) is positively skewed, suggesting a greater concentration of observations at lower values. Moreover, all variables have kurtosis values below 3,

ranging from 1.6267 to 2.3977, indicating platykurtic distributions. This suggests that the variables are relatively flat, have lighter tails, and contain fewer extreme observations. Overall, the results imply that the dataset is not heavily influenced by outliers and exhibits only mild departures from normality.

Table 2: Descriptive analysis results

Variables	Mean	Std. dev.	Variance	Min	Max	Skew	Kurtosis
lnSEXP	9.5415	1.6684	2.7834	5.7038	12.1897	-0.2699	2.3977
TL	0.7091	0.4584	0.2101	0.0000	1.0000	-0.9207	1.8478
lnRER	5.2613	2.6345	6.9404	1.1941	8.1061	-0.6209	1.6267
lnPQ	10.8707	1.3712	1.8801	8.6672	13.5008	0.6087	2.1794
lnRPW	2.5467	0.2212	0.0489	2.0931	2.9533	-0.0511	2.0847

Source: FAOSTAT, Researcher's computations

3.1.2 Unit Root Test

The unit root test results presented in Table 3 indicate that the variables are integrated of mixed orders, namely I(0) and I(1). Specifically, sesame exports (lnSEXP), trade liberalisation (TL), the real exchange rate (lnRER), and the real-world price (lnRPW) were found to be non-stationary at levels, as shown by their insignificant p-values of 0.7790, 0.5056, 0.7631, and 0.0874, respectively. However, after first differencing, all these variables became stationary, with highly significant test statistics and p-values below 0.05, confirming that they are integrated of order one, I(1). In contrast, sesame production quantity (lnPQ) was stationary at level, with a test statistic of -3.873 and a p-value of 0.0022, indicating that it is integrated of order zero, I(0). Overall, the results in Table 3 show that none of the variables is integrated of order two, I(2), and the mixture of I(0) and I(1) variables justifies the application of the Autoregressive Distributed Lag (ARDL) approach.

Table 3: Stationarity test results

Variable	Level I(0) Test Statistic		First Difference I(1) Test Statistic		Order of Integration
	Coeff.	P-value	Coeff.	P-value	
lnSEXP	-0.927	0.7790	-7.794	0.0000	I(1)
TL	-1.556	0.5056	-7.281	0.0000	I(1)
lnRER	-0.973	0.7631	-3.685	0.0043	I(1)
lnPQ	-3.873	0.0022			I(0)
lnRPW	-2.628	0.0874	-7.142	0.0000	I(1)

Source: STATA Output (2026)

3.1.3 Cointegration Test

The bounds test results presented in Table 4 indicate the existence of a long-run relationship among the variables in the model. Specifically, the calculated F-statistic of 6.372 is higher than the upper bound critical values at all conventional significance levels (1%, 5%, and 10%), which are 5.06, 4.01, and 3.52, respectively. Since the F-statistic exceeds the upper bounds in all cases, the null hypothesis of no cointegration is rejected. This implies that there is a statistically significant long-run equilibrium relationship among the variables included in the model. Therefore, the results in Table 4 confirm that the variables move together in the long run, justifying the estimation of both long-run and short-run dynamics within a cointegration framework such as the ARDL model.

Table 4: Bound cointegration test results

F-Statistic	Significance Level	Lower Bounds	Upper Bounds	Conclusion
6.37	1%	3.74	5.06	Cointegrated
	5%	2.86	4.01	Cointegrated
	10%	2.45	3.52	Cointegrated

Source: Researchers (2026)

3.1.4 Lag Selection

The lag selection results presented in Table 5 indicate that lag length determination was based on a combination of likelihood ratio (LR) tests and information criteria, including FPE, AIC, HQIC, and SBIC. Overall, lag 3 emerges as the optimal lag length for the model since it records the lowest Final Prediction Error (FPE = 6.5e-07) and the lowest Akaike Information Criterion (AIC = -0.165795), while also showing a strong likelihood ratio improvement (LR = 56.568), indicating superior model fit and forecasting efficiency compared to other lag structures. Although lag 1 performs relatively well under HQIC and SBIC criteria, lag 3 provides a more balanced and robust fit across most selection criteria. In contrast, lag 0 shows poor model performance with very high AIC (7.39269) and FPE (1.12E-03), while lag 4 indicates a slight deterioration in fit, as reflected by a higher AIC (0.09033) and a marginally insignificant LR test (p = 0.059). Therefore, based on the overall evidence in Table 5, lag 3 is selected as the most appropriate lag length due to its ability to minimise information loss and prediction error while maximising model stability and goodness of fit.

Table 5: Lag selection results

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	-183.51				1.12E-03	7.39269	7.46506	7.58208
1	26.3915	102.696	25	0.000	8.00E-07	0.14151	.575748*	1.27788*
2	55.9439	59.105	25	0.000	6.90E-07	-0.037	0.75909	2.04633
3	84.2278	56.568*	25	0.000	6.5e-07*	-.165795*	0.99218	2.86452
4	102.696	36.937	25	0.059	9.80E-07	0.09033	1.61017	4.06762

Source: STATA Output (2026)

3.1.5 ARDL-ECM Estimation

The ARDL estimation results in Table 6 indicate a reasonably good fit of the model. The coefficient of the error correction term (EPL1) is negative and statistically significant (coefficient = -0.6368, $p = 0.000$), confirming the existence of a long-run equilibrium relationship among the variables. The magnitude of the coefficient suggests that approximately 63.68% of any short-run disequilibrium in sesame exports is corrected within one period, implying a relatively rapid adjustment toward the long-run equilibrium path. The model explains about 58.06% of the variation in sesame exports, as indicated by the R-squared value of 0.5806. After adjusting for the number of explanatory variables, the adjusted R-squared declines to 0.4174, implying that about 41.74% of the variation in exports is explained by the model.

The long-run estimates reveal that the real-world price of sesame (lnRWP) is the only variable that exerts a statistically significant influence on sesame exports. Specifically, the coefficient of lnRWP is positive and significant (coefficient = 3.5394, $p = 0.035$), implying that a 1% increase in the real-world price of sesame increases sesame exports by approximately 3.54% in the long run. In contrast, the real exchange rate (lnRER) has a positive but statistically insignificant effect on exports (coefficient = 0.2215, $p = 0.488$). Similarly, production quantity (lnPQ) is positive but insignificant (coefficient = 0.2333, $p = 0.336$), indicating that production increases do not significantly translate into higher exports in the long run. Trade liberalisation (TL) also has a positive but statistically insignificant coefficient (coefficient = 2.5665, $p = 0.146$), suggesting insufficient evidence of a long-run effect on sesame exports.

The short-run dynamics indicate that changes in the real exchange rate have a negative effect on sesame exports. The contemporaneous change in the real exchange rate (lnRER-D1) is negative and marginally significant at the 10% level (coefficient = -1.0879, $p = 0.090$), implying that a 1% increase in the real exchange rate reduces sesame exports by about 1.09% in the short run. Moreover, the lagged first difference of the real exchange rate (lnRER-LD) has a stronger negative and statistically significant effect (coefficient = -2.4298, $p = 0.001$), suggesting that exchange rate movements in the

previous period continue to depress export performance. Changes in the real-world price also exert significant short-run effects. The first difference of the real-world price (lnRWP-D1) is negative and significant (coefficient = -2.4656, $p = 0.018$), while its first lag (lnRWP-LD) is also negative and significant (coefficient = -1.6848, $p = 0.044$). Furthermore, the second lag (lnRWP-L2D) and third lag (lnRWP-L3D) are negative and marginally significant at the 10% level, with coefficients of -1.3772 ($p = 0.063$) and -1.1327 ($p = 0.087$), respectively. These results suggest that short-run increases in world prices may initially reduce export quantities, possibly reflecting supply constraints or delayed production responses.

With regard to trade liberalisation, the contemporaneous effect (TL-D1) is negative but statistically insignificant (coefficient = -1.5318, $p = 0.127$), indicating that immediate changes in trade policy do not significantly influence sesame exports. However, the lagged effects are positive and statistically significant. The first lag of trade liberalisation (TL-LD) has a coefficient of 2.0151 ($p = 0.018$), while the second lag (TL-L2D) has a coefficient of 1.9740 ($p = 0.020$). These findings imply that the benefits of trade liberalisation emerge with a time lag, increasing sesame exports by approximately 2.02% and 1.97%, respectively. The positive lagged effects suggest that exporters and producers require time to adjust to policy changes and take advantage of improved market access conditions.

Table 6: ARDL-ECM estimation results

D.EP		Coeff.	Std. Error	T-Statistic	P-value
ADJ: EPL1		-0.63677	0.13538	-4.70	0.000
LR	lnRER	0.221481	0.31577	0.70	0.488
	lnPQ	0.233297	0.23929	0.97	0.336
	lnRWP	3.539436	1.6122	2.20	0.035
	TL	2.566478	1.72508	1.49	0.146
SR	lnRER- D1	-1.08789	0.62369	-1.74	0.090
	lnRER- LD	-2.42981	0.67397	-3.61	0.001
	lnRWP- D1	-2.46555	0.99701	-2.47	0.018
	lnRWP- LD	-1.68484	0.80871	-2.08	0.044
	lnRWP- L2D	-1.37719	0.7169	-1.92	0.063
	lnWP-L3D	-1.13265	0.64285	-1.76	0.087
	TL -D1	-1.53176	0.97934	-1.56	0.127
	TL-LD	2.01512	0.81609	2.47	0.018
	TL-L2D	1.973953	0.81101	2.43	0.020
	Cons.	-2.85286	1.94068	-1.47	0.150
	R-Squared		0.5806		
	Adj. R-Squared		0.4174		
	Root MSE		0.5299		

Source: Researchers (2026)

3.1.6 Autocorrelation Test

The Breusch–Godfrey LM test results ($\chi^2 = 3.652$, $p = 0.4551$) indicate that there is no evidence of serial correlation in the model's residuals. Since the p-value is greater than the conventional significance levels of 5%, we fail to reject the null hypothesis of no autocorrelation. This suggests that the residuals are independently distributed over time, implying that the model is correctly specified with respect to dynamic structure and that the estimated coefficients are reliable and not biased due to serial dependence. Consequently, the model satisfies one of the key classical regression assumptions, supporting the validity of statistical inference from the estimated results.

3.1.7 Heteroskedasticity Test

The Breusch–Pagan/Cook–Weisberg test for heteroskedasticity yields a chi-square statistic of 3.06 with a p-value of 0.0801. Since the p-value is greater than the conventional 5% significance level (0.05), we fail to reject the null hypothesis of homoskedasticity. This implies that there is no strong statistical evidence of heteroskedasticity in the residuals at the 5% level, suggesting that the variance of the error terms is constant across observations. Therefore, the classical OLS assumption of homoskedasticity appears to hold, and the estimated standard errors and test statistics can be considered reliable for inference at the 5% significance level.

3.1.8 Stability Test (Structural Stability)

The CUSUM-squared plot indicates the stability of the model over the period 1976–2024. The cumulative sum of squared residuals follows a steady upward trend but remains within the two critical bounds throughout the entire period, suggesting that there is no significant structural instability in the model. Minor fluctuations are visible, indicating small variations in the residuals over time, but none of these deviations breaches the confidence limits, confirming the overall adequacy and robustness of the model in capturing the underlying dynamics without evidence of parameter instability. It is clearly noted that, although the study period spans 1970 to 2024, the CUSUM and CUSUMSQ tests begin in 1976 because these tests are based on recursive residuals and require an initial estimation period. So, the observations from 1970 to 1975 were used to obtain the initial parameter estimates, after which the recursive stability statistics were computed.

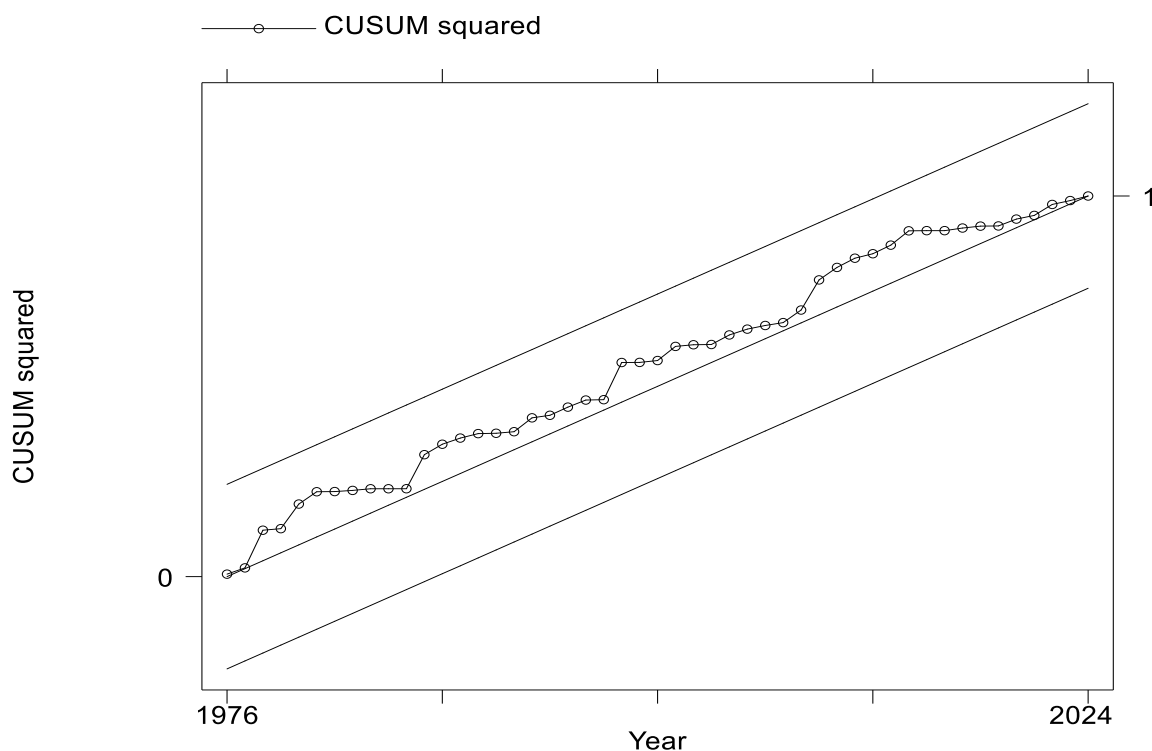


Figure 2: Stability test results

Source: Stata Output (2026)

3.2 Discussion of Results

The empirical results from this study show both similarities and differences when compared with existing literature on trade liberalisation and export performance. Consistent with studies such as Yusuf and Omar (2019), Santos-Paulino (2000), Odebode and Aras (2020), Kinck (2023), Utouh (2024), and Utouh (2025), the findings suggest a generally positive relationship between trade liberalisation and sesame exports, particularly through lagged short-run effects where liberalisation significantly boosts export performance. This supports the view that greater openness improves market access, reduces trade distortions, and enhances competitiveness over time. Similarly, the strong role of international prices in the long run aligns with broader evidence that external demand conditions are key drivers of agricultural export performance in developing economies like Tanzania.

However, the study also departs from some optimistic findings in the literature, particularly those reporting a strong long-run effect of trade liberalisation on exports, such as Utouh (2025). In contrast, this study finds no statistically significant long-run impact of trade liberalisation on sesame exports, a result that is consistent with Amani (2025, 2026), who report weak or even negative long-run effects in Tanzania. These mixed outcomes suggest that the effectiveness of trade liberalisation is not automatic and may depend on structural factors such as production capacity, infrastructure, and the

ability of producers to respond to policy changes. Overall, the results imply that while liberalisation can enhance exports in the short run, its long-run impact is conditional on broader economic and sector-specific constraints.

4. Conclusion and Recommendations

4.1 Conclusion

The findings of this study reveal that sesame exports are primarily driven by international price dynamics in the long run, while short-run fluctuations are significantly influenced by exchange rate movements, world prices, and trade liberalisation with lagged effects. The presence of a significant and negative error correction term confirms a stable long-run equilibrium relationship among the variables, with relatively fast adjustment toward equilibrium. Although trade liberalisation shows positive and significant short-run effects, its long-run impact is not statistically significant, indicating that policy reforms alone are insufficient to sustain export growth without supportive structural conditions. Overall, the results highlight the dominance of external market forces, particularly global prices, in shaping Tanzania's sesame export performance, while domestic policy variables exert more limited and time-dependent influence.

4.2 Recommendations

Based on the findings, several policy recommendations are proposed. First, there is a need to strengthen farmers' and exporters' responsiveness to global price signals by improving access to market information, storage facilities, and value chain efficiency, so that favourable international prices translate into sustained export growth. Second, since trade liberalisation effects are more pronounced in the short run, policymakers should complement liberalisation policies with long-term structural interventions such as improving transport infrastructure, reducing production constraints, and enhancing access to finance for producers. Third, stabilising exchange rate volatility through sound macroeconomic management could help reduce short-run export instability. Finally, investment in productivity-enhancing technologies and institutional support for the sesame sector is essential to ensure that Tanzania fully benefits from growing global demand sustainably and competitively.

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