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**Original Research Article**

# The Effect of Selected Macroeconomic Variables on Export Performance in West Africa

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**Abstract:** This study investigates the effect of selected macroeconomic variables on export performance in West Africa over the period 1991–2024. Using panel data for 13 countries, the study employs a panel Autoregressive Distributed Lag (ARDL) approach to estimate both short-run and long-run dynamics, while accounting for potential heterogeneity across countries. The dependent variable is export performance, proxied by exports of goods and services (EXGS), while independent variables include exchange rate (EXCR), foreign direct investment (FDI), GDP growth rate (GDPR), inflation (INFL), and trade openness (TRD). Descriptive statistics, correlation analysis, and panel unit root tests confirm the properties of the data, while Pedroni residual cointegration tests establish the existence of a stable long-run relationship among the variables. Empirical findings indicate that GDP growth and trade openness significantly drive export performance in the long run, whereas exchange rate fluctuations have a modest positive effect. In the short run, inflation and trade openness influence exports, while the error correction term confirms that deviations from long-run equilibrium are gradually corrected. The study underscores the importance of promoting macroeconomic stability, trade liberalization, and sustained economic growth as key strategies to enhance export performance in West Africa. The findings provide empirical evidence for policymakers seeking to strengthen regional exports and economic integration.

**Keywords:** Export Performance, Macroeconomic Variables, ARDL, West Africa, Macroeconomic Variables, Panel Data.



## 1.0 INTRODUCTION

Export performance remains a central pillar of economic development for developing regions, particularly West Africa, where exports constitute a major source of foreign exchange earnings and external sector stability. Export performance reflects the capacity of an economy to produce goods and services that are competitive in international markets and is widely regarded as a key driver of growth, industrialization, and employment creation (Tarawalie & Conteh, 2021). In West Africa, export activities are largely dominated by primary commodities such as crude oil, cocoa, gold, and agricultural raw materials, a structure that has exposed the region to external price shocks, demand volatility, and persistent balance-of-payments constraints.

Macroeconomic conditions play a decisive role in shaping export outcomes across countries. Exchange rate movements influence export competitiveness by altering relative prices, while inflation affects production costs and profit margins. Foreign direct investment (FDI) contributes to export performance through capital accumulation, technology transfer, and access to global production networks, whereas economic growth reflects the expansion of productive capacity and supply-side potential. Trade openness, commonly measured by merchandise trade as a percentage of GDP, captures the degree of integration of an economy into the global trading system and has been linked to export expansion through efficiency gains and market access (Sunde, Tafirenyika, & Adeyanju, 2023). The interaction of these macroeconomic variables is particularly important in West African economies where structural rigidities and external vulnerabilities persist.

Empirical evidence on the determinants of export performance in developing and African economies presents mixed findings. Tarawalie and

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Conteh (2021) show that exchange rate dynamics and economic growth exert significant long-run effects on exports in Sierra Leone, while the impact of FDI appears less consistent in the short run. Similarly, Sunde *et al.,* (2023) find that trade openness and macroeconomic stability are critical for sustaining export-led growth in developing economies, though the magnitude and direction of effects vary across countries. Studies focusing on regional groupings in Sub-Saharan Africa further suggest that inflation volatility and weak productive structures often dampen the export response to policy reforms (World Bank, 2023).

Despite the growing body of literature, there is limited evidence that comprehensively examines the short-run and long-run effects of key macroeconomic variables on export performance across West African countries using recent data. Many existing studies concentrate on single-country analyses or employ static panel techniques that fail to capture dynamic adjustments and heterogeneity across economies. Moreover, few studies explicitly incorporate merchandise trade as a proxy for trade openness alongside exchange rate fluctuations, inflation, FDI, and economic growth within a unified panel ARDL framework.

Against this background, this study investigates the effect of selected macroeconomic variables on export performance in West Africa over the period 1991–2024. Specifically, the study examines the influence of exchange rate fluctuations, foreign direct investment, economic growth, inflation, and trade openness on exports using a panel Autoregressive Distributed Lag (ARDL) approach. By distinguishing between short-run dynamics and long-run equilibrium relationships, the study contributes to the empirical literature on export performance in West Africa and provides policy-relevant insights for improving external sector outcomes in the region.

The remainder of the paper is organized as follows: Section 2 reviews the relevant theoretical and empirical literature; Section 3 outlines the data sources and methodology; Section 4 presents and discusses the empirical results; and Section 5 concludes with policy implications and recommendations.

## 2.0 EMPIRICAL EVIDENCE

Recent empirical studies have increasingly focused on the macroeconomic determinants of export performance in developing and African economies, using more robust econometric techniques and updated datasets.

Gold and Yusuf (2025) examine the effect of exchange rate fluctuations and other macroeconomic indicators on Nigeria's non-oil export performance using data from 1989 to 2022 and an ARDL bounds testing approach. The research incorporates GDP, trade openness, inflation, fuel prices, and private credit to assess their influence on export outcomes (Gold & Yusuf, 2025). The estimations show that exchange rate depreciation significantly enhances non-oil exports, GDP and trade openness also positively affect export performance, while interest rates and fuel prices have adverse effects. The study concludes that stabilizing the exchange rate and promoting structural diversification are essential for improving non-oil export competitiveness in economies reliant on commodity exports.

Okogor, Orubu, and Ezi (2024) investigate the effect of exchange rate volatility on Nigeria's exports to major trading partners from 1995 to 2020 using an ARDL model (standard demand function specification). Their empirical results show that exchange rate volatility, along with GDP and population, are significant determinants of real export performance in both short-run and long-run contexts. The authors conclude that exchange rate management, along with market and population dynamics, plays a crucial role in shaping export performance in Nigeria.

Etukafia and Udoidem (2024) analyse macroeconomic determinants of export performance in Nigeria from 1981 to 2015 using ARDL bounds testing and ECM techniques. Their results indicate that long-run effects of key explanatory variables on export performance are statistically insignificant, but the error correction term shows meaningful short-run dynamics. They conclude that contradictions in policy and structural inconsistencies affect how macroeconomic conditions translate into export outcomes, highlighting the need for coherent external sector policies to sustain export growth.

Ikuemonisan *et al*., (2024) assess the long-term links between export sub-components (agricultural and manufacturing outputs) and the Nigerian economy using time-series ARDL techniques from 1962 to 2019. They find that agricultural exports and exchange rates have statistically significant and positive long-run impacts on GDP and export performance, while manufacturing exports exhibit mixed effects. They conclude that export composition matters: primary agriculture and exchange rate competitiveness are important for export-led growth in economies like Nigeria.

Kulu (2024) tests the export-led growth hypothesis (ELGH) for West African countries using annual panel data from 2008 to 2018 with system GMM and OLS estimators. The study identifies foreign direct investment, employment, remittances, infrastructure, and land area as significant positive determinants of export performance, while real effective exchange rate and trade taxes negatively influence exports. Kulu concludes that policy reforms improving investment climates, human capital, and infrastructure can strengthen export performance within the region.

Abimbola, Oluwatosin, and Theophilus (2023) examine the dependence between foreign trade performance and exchange rate volatility for 15 ECOWAS countries using a panel ARDL approach with data from 1980 to 2020. The study computes exchange rate volatility via a GARCH(1,1) model and assesses its impact on exports (and imports) in both the short and long run. The results show that while exchange rate volatility negatively affects export performance in the short run, it has a positive and statistically significant impact in the long run, consistent with a J-curve effect. The authors conclude that maintaining short-term foreign exchange stability can support domestic trade, but long-term volatility is associated with improved trade outcomes as economies adjust.

Okoli, Ezenekwe, Nzeribe, and Umeghalu (2023) explore the impact of Nigeria's non-oil exports on real GDP over the period 1981–2021 using ARDL bounds testing and CUSUM stability tests. The study finds both short-run and long-run relationships between non-oil export performance and economic growth, with the ECM confirming a dynamic adjustment mechanism. They conclude that strengthening non-oil export sectors provides additional growth impetus for the Nigerian economy, but policy support is necessary for stability and resilience.

Sunde, Tafirenyika, and Adeyanju (2023) examined the relationship between trade openness, exports, imports, and economic growth in a panel of developing economies. The scope of their study covered multiple developing countries over a long time horizon, and the authors adopted the panel ARDL methodology to distinguish between short-run and long-run dynamics. Their findings revealed that trade openness exerts a positive and statistically significant effect on export performance in the long run, while short-run effects were weaker and varied across countries. The study concluded that sustained openness and macroeconomic stability are critical for improving export outcomes in developing regions.

Focusing on a West African context, Tarawalie and Conteh (2021) investigated the determinants of export performance in Sierra Leone using annual time-series data. The study employed an ARDL bounds testing approach to examine both short-run and long-run relationships between exports and selected macroeconomic variables, including exchange rate, inflation, and economic growth. The results showed that exchange rate movements and economic growth positively influenced export performance in the long run, while inflation had a dampening effect. The authors concluded that exchange rate stability and growth-enhancing policies are essential for strengthening export performance in small open economies.

Fayisa (2021) investigates the determinants of exports in East Africa using a heterogeneous panel data framework for nine East African countries spanning 1981–2017. The study employs a pooled mean group panel ARDL estimator to capture both short-run and long-run relationships between exports and explanatory variables such as real GDP of exporting and importing countries, trade openness, labour supply, domestic demand, and gross capital formation (Fayisa, 2021). The results indicate that real GDP and trade openness significantly influence export performance in both the short run and long run, while variables like foreign direct investment also play a role depending on the model specification. The study concludes that export performance in East Africa is shaped by both domestic economic conditions and external demand factors, reinforcing the need for policies that enhance economic growth and openness to trade.

Epaphra (2016) analyzes the determinants of export performance in Tanzania over the period 1966–2015 using Johansen cointegration and Granger causality methods with an error correction model. The study includes variables such as real per capita GDP, trade liberalization, exchange rate, and inflation in its model (Epaphra, 2016). The results reveal a stable long-run relationship among the series, with real GDP and exchange rate exerting positive effects on export performance, while inflation negatively influences exports. The study concludes that macroeconomic stability and growth-enhancing policies are key to sustainable export expansion, particularly in commodity-dependent economies.

Sakyi, Villaverde, and Maza (2015) analyzed the effect of trade openness on export growth and economic performance in a panel of developing countries, including several Sub-Saharan African economies. The study covered the period 1970–2009 and adopted panel cointegration and fixed-effects estimation techniques. Their empirical results indicated that greater trade openness significantly promotes export expansion, particularly in countries with supportive institutional and policy environments. The study concluded that openness alone is insufficient unless accompanied by complementary structural reforms.

Saibu and Keke (2014) examined the impact of exchange rate volatility on export growth in Nigeria using time-series data. The authors employed GARCH-based volatility measures alongside cointegration and error correction models. The results revealed that exchange rate volatility exerts a negative effect on export performance in both the short and long run, suggesting that uncertainty in the foreign exchange market discourages export-oriented investment. The study concluded that stabilizing exchange rate policies are crucial for enhancing export growth in developing economies.

Umaru and Zubairu (2012) investigated the relationship between inflation, exchange rate, and export performance in Nigeria within a macroeconomic framework. Using time-series econometric techniques, including unit root and cointegration tests, the study found that high inflation significantly undermines export competitiveness by raising domestic production costs. The authors concluded that maintaining price stability is a necessary condition for improving export performance and sustaining external sector growth.

Frankel and Romer (1999), in a seminal cross-country study, examined whether trade openness causes economic growth, with implications for export performance. The study employed an instrumental variable approach to address endogeneity concerns and covered a broad set of countries. The results provided strong evidence that trade openness positively influences economic performance, thereby supporting export expansion. The study concluded that outward-oriented trade policies are fundamental to long-term economic and export growth.

## 3.0 METHODS AND MODEL SPECIFICATION

### 3.1 Model Specification

This study adopts an empirical framework based on similar empirical investigations into the macroeconomic determinants of export performance in developing economies. For example, Tarawalie and Conteh (2021) examine the determinants of export performance in Sierra Leone using an autoregressive distributed lag (ARDL) bounds testing approach, where export performance is modeled as a function of macroeconomic variables such as foreign direct investment, real exchange rate, and inflation, and cointegration is assessed through bounds testing within the ARDL framework. Their findings confirm long-run relationships among these variables and reveal that both FDI and inflation significantly influence export performance in the short run and long run.

Drawing from this approach and adapting it to the context of West African economies, this study specifies a panel model that relates export performance to a set of selected macroeconomic determinants. The functional form of the model is:

EXPit = f (EXCRit, GDPRit, FDIit, INFLit, TRDit)

Where:

- EXPit = Export performance for country *i* at time *t*, measured by exports of goods and services (% of GDP).
- EXCRit = Exchange rate, measured by the official exchange rate (LCU per US$, period average), capturing exchange rate movements.
- GDPRit = Economic growth, measured by GDP growth (annual %).
- FDIit = Foreign direct investment, measured as net inflows (% of GDP).
- INFLit = Inflation, measured by consumer price inflation (annual %).
- TRDit = Trade openness, measured by Merchandise trade (% of GDP)

The econometric representation of the long-run relationship is expressed as:

$$EXPit = \alpha i + \beta_1 \, EXCRit + \beta_2 \, GDPRit + \beta_3 \, FDIit + \beta_4 \, INFLit + \beta_5 \, TRDit + \varepsilon it$$

In this specification, $\alpha i$ represents the unobserved country-specific effects that capture time-invariant heterogeneity across West African countries, and $\varepsilon it$ denotes the stochastic error term. This setup aligns with ARDL panel frameworks applied in export performance literature while allowing for both short-run and long-run dynamics to be estimated through an error correction formulation.

### 3.2 Method of Data Analysis

This study employs a panel data framework covering all West African countries over the period from 1991 to 2024. The choice of countries is informed by membership in the Economic Community of West African States (ECOWAS). Annual data for all variables are sourced from the World Bank's World Development Indicators (WDI) database to ensure consistency, comparability, and methodological soundness across countries and time.

The data analysis procedure follows a structured panel econometric approach appropriate for ARDL modeling. Initially, pooled descriptive statistics are computed to summarize the central tendencies and dispersion of the variables. The presence of cross-sectional dependence is examined to determine whether common shocks or cross-country correlations are present in the panel. Next, panel unit root tests are conducted to establish the order of integration of the variables and confirm that none are integrated of order two, which is a prerequisite for ARDL estimation. Given evidence of cointegration, the ARDL bounds testing procedure is employed to test for long-run relationships among export performance and its determinants. Short-run dynamics and long-run coefficients are then estimated within the ARDL error correction framework, with particular attention to the error correction term as an indication of adjustment toward long-run equilibrium.

Post-estimation diagnostic tests, including serial correlation, and heteroskedasticity are conducted to ensure the robustness of the results. All estimations and statistical analyses are carried out using EViews statistical software.

## 4.0 RESULTS AND DISCUSSION

### 4.1 Descriptive Statistics

Table 4.1 summarizes the central tendency, dispersion, and distributional properties of the variables used in the empirical analysis.

**Table 4.1: Descriptive Statistics**

| | EXGS | EXCR | FDI | GDPR | INFL | TRD |
|---|---|---|---|---|---|---|
| Mean | 22.28883 | 638.3062 | 2.730223 | 4.418704 | 6.598748 | 42.37532 |
| Median | 21.79867 | 499.1484 | 1.768096 | 4.704591 | 3.329199 | 41.82073 |
| Maximum | 48.80226 | 9565.082 | 19.55059 | 19.18264 | 69.58364 | 93.19966 |
| Minimum | 4.105878 | 0.036763 | −2.574579 | −22.44573 | −7.796642 | 14.36113 |
| Std. Dev. | 8.647169 | 1335.305 | 3.067786 | 4.171167 | 10.32827 | 13.44132 |
| Skewness | 0.449793 | 5.028242 | 1.954745 | −1.204920 | 2.886809 | 0.708422 |
| Kurtosis | 2.976385 | 28.81184 | 8.267529 | 11.69121 | 12.82186 | 4.098190 |
| Jarque–Bera | 13.59812 | 12885.65 | 722.5617 | 1365.909 | 2179.620 | 53.95944 |
| Probability | 0.001115 | 0.000000 | 0.000000 | 0.000000 | 0.000000 | 0.000000 |
| Observations | 403 | 403 | 403 | 403 | 403 | 403 |

**Source:** Author's Computation 2026

Export performance (EXGS), measured as exports of goods and services as a percentage of GDP, records a mean value of about 22.29 percent, indicating that exports constitute a significant share of economic output in West Africa. The median value is close to the mean, suggesting that extreme values do not heavily distort the central tendency. However, the wide range between the minimum (4.11 percent) and maximum (48.80 percent) values highlights pronounced differences in export capacity across countries and over time. The standard deviation further confirms notable variability in export performance within the region.

The exchange rate (EXCR) exhibits substantial dispersion, with a mean of 638.31 and a median of 499.15. The very high maximum value relative to the minimum reflects episodes of sharp currency depreciation experienced by some West African economies during the study period. The large standard deviation, together with strong positive skewness and extremely high kurtosis, indicates that the exchange rate distribution is heavily influenced by extreme observations, underscoring the macroeconomic instability that characterizes parts of the region.

Foreign direct investment (FDI) inflows average 2.73 percent of GDP, suggesting relatively modest foreign investment levels. The presence of negative minimum values implies periods of net capital outflows, while the high maximum value reflects episodic surges in investment. The distribution of FDI is positively skewed and leptokurtic, indicating that inflows are uneven and concentrated in specific periods or countries.

Economic growth (GDPR) shows an average growth rate of 4.42 percent, reflecting moderate economic expansion over the study period. Nonetheless, the large negative minimum value reveals that West African economies have also experienced severe contractions. The negative skewness and high kurtosis suggest that downturns, when they occur, tend to be sharp rather than gradual.

Inflation (INFL) records a mean of 6.60 percent, pointing to persistent inflationary pressures in the region. The wide dispersion and extreme maximum value indicate that inflation has been highly volatile. The strong positive skewness and kurtosis further suggest that inflationary episodes are often intense, reinforcing the need to control for price instability in export performance analysis.

Merchandise trade (TRD), used as a proxy for trade openness, averages 42.38 percent of GDP, implying a moderate degree of trade integration among West African countries. The variation between minimum and maximum values reflects differences in openness and trade structure across economies. The distribution is moderately skewed with kurtosis above the normal benchmark, indicating occasional spikes in trade activity.

The Jarque–Bera statistics indicate that none of the variables is normally distributed. This outcome is typical of macroeconomic panel data for developing regions and supports the use of econometric techniques, such as the panel ARDL approach, that are robust to deviations from normality.

The descriptive statistics reveal significant heterogeneity and volatility in export performance and macroeconomic conditions across West African countries, thereby justifying the adoption of a dynamic panel framework in the subsequent analysis.

**4.2 Correlation Analysis**

Table 4.2 presents the pairwise correlation matrix for export performance and the selected macroeconomic variables over the period 1991–2024. The correlation analysis provides preliminary insights into the direction and strength of linear relationships among the variables and also serves as an initial check for potential multicollinearity problems prior to estimation.

**Table 4.2: Correlation Matrix**

| Variable | EXGS | EXCR | FDI | GDPR | INFL | TRD |
|---|---|---|---|---|---|---|
| EXGS | 1 | 0.174 | 0.179 | 0.090 | 0.043 | 0.669 |
| EXCR | 0.174 | 1 | 0.046 | 0.044 | 0.075 | 0.186 |
| FDI | 0.179 | 0.046 | 1 | 0.174 | 0.010 | 0.272 |
| GDPR | 0.090 | 0.044 | 0.174 | 1 | 0.045 | 0.193 |
| INFL | 0.043 | 0.075 | 0.010 | 0.045 | 1 | 0.063 |
| TRD | 0.669 | 0.186 | 0.272 | 0.193 | 0.063 | 1 |

**Source:** Author's Computation 2026

Export performance (EXGS) shows a strong positive correlation with merchandise trade (TRD), with a coefficient of approximately 0.67. This suggests that economies with higher levels of trade openness tend to record better export performance, which is consistent with trade theory and empirical evidence emphasizing the role of openness in enhancing export capacity. This relatively high correlation is expected, given that merchandise trade directly reflects a country's engagement in international markets. The correlations between export performance and the other macroeconomic variables, exchange rate (EXCR), foreign direct investment (FDI), economic growth (GDPR), and inflation (INFL), are positive but weak. This indicates that while these variables are related to export performance, their linear associations are modest at the descriptive level. Such weak correlations are common in macroeconomic panel data and do not preclude the existence of meaningful long-run or short-run effects, which are better captured through dynamic econometric models such as panel ARDL.

The correlations among the explanatory variables themselves are generally low. The highest observed correlation among regressors is between FDI and merchandise trade (0.27), followed by trade and GDP growth (0.19). These values are well below conventional multicollinearity thresholds, suggesting that multicollinearity is unlikely to pose a serious problem in the estimation process.

### 4.3 Panel Unit Root Test Results

The stationarity of the variables was examined using panel unit root tests.

**Table 4.3: Panel Unit Root Test Results**

| Variable | Level / First Difference | LLC t* | Prob. | IPS W-stat | Prob. | Integration Order |
|---|---|---|---|---|---|---|
| EXGS | Level | -2.617 | 0.004 | -1.966 | 0.025 | I(0) |
| EXCR | Level | 8.393 | 1.000 | 6.502 | 1.000 | I(1) |
| D(EXCR) | First Diff | -5.575 | 0.000 | -7.792 | 0.000 | I(1) |
| FDI | Level | -5.891 | 0.000 | -6.234 | 0.000 | I(0) |
| GDPR | Level | -16.290 | 0.000 | -15.586 | 0.000 | I(0) |
| INFL | Level | -9.434 | 0.000 | -8.954 | 0.000 | I(0) |
| TRD | Level | -1.749 | 0.040 | -1.446 | 0.074 | I(0) |

**Source:** Author's Computation 2026

The results indicate that export performance (EXGS), foreign direct investment (FDI), GDP growth (GDPR), inflation (INFL), and trade openness (TRD) are all stationary at levels, meaning that shocks to these variables are temporary and the series naturally revert to their long-term trends. This confirms that these variables can be included directly in the ARDL model without differencing, allowing both short-run and long-run effects to be estimated efficiently.

The exchange rate (EXCR), however, is non-stationary at levels and only becomes stationary after first differencing. This indicates that EXCR contains a persistent trend, and shocks to the exchange rate have longer-lasting effects on West African export performance. Using its first difference (D(EXCR)) captures short-run fluctuations while retaining the ability to assess long-run impacts in the ARDL framework.

The mixed integration pattern, with most variables at I(0) and only EXCR at I(1), validates the use of the panel ARDL methodology. ARDL is suitable for such scenarios, as it can model short-run dynamics through differenced variables and long-run equilibrium relationships using levels. The stationarity properties also emphasize the importance of correctly specifying lags in the model, ensuring that both temporary shocks and persistent trends are accurately represented.

### 4.4 ARDL Estimation Results

The panel ARDL model was estimated to assess the effects of selected macroeconomic variables on export performance (EXGS) in West Africa. The dependent variable is the first difference of export performance (D(EXGS)), while the explanatory variables include the exchange rate (EXCR), foreign direct investment (FDI), GDP growth (GDPR), inflation (INFL), and trade openness (TRD). The optimal lag structure selected by the Akaike Information Criterion (AIC) is ARDL(1,1,1,1,1,1), indicating one lag for each variable.

**Table 4.4a: Long-Run Coefficients**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| EXCR | 0.001430 | 0.000388 | 3.681 | 0.0003 |
| FDI | -0.058263 | 0.082150 | -0.709 | 0.4787 |
| GDPR | 0.587763 | 0.112334 | 5.232 | 0.0000 |
| INFL | -0.026567 | 0.057787 | -0.460 | 0.6460 |
| TRD | 0.353546 | 0.023108 | 15.299 | 0.0000 |

**Source:** Author's Computation 2026

**Long-Run Results**

The long-run estimates show that GDP growth (GDPR) and trade openness (TRD) have strong positive and statistically significant impacts on export performance. A one-unit increase in GDP growth is associated with a 0.588-unit increase in exports, highlighting the critical role of sustained economic growth in boosting export capacity across West African countries. Trade openness contributes 0.354 units to export performance per unit increase, indicating that countries more integrated into global trade tend to have higher export levels. The exchange rate (EXCR) is positive and statistically significant, though its coefficient is relatively small (0.00143). This suggests that currency fluctuations influence exports, likely through relative price effects, but the impact is modest in magnitude. In contrast, foreign direct investment (FDI) and inflation (INFL) are not significant in the long run, implying that these variables do not consistently drive export performance across the region. Overall, the long-run results indicate that structural factors such as economic growth and trade integration are the main determinants of export performance in West Africa.

**Table 4.4b: Short-Run Coefficients**

| Variable | Coefficient | Std. Error | t-Statistic | Prob. |
|---|---|---|---|---|
| COINTEQ01 (Error Correction Term) | -0.190872 | 0.094918 | -2.011 | 0.0452 |
| D(EXCR) | 0.097056 | 0.107584 | 0.902 | 0.3677 |
| D(FDI) | -0.041572 | 0.135347 | -0.307 | 0.7589 |
| D(GDPR) | 0.025094 | 0.050708 | 0.495 | 0.6210 |
| D(INFL) | 0.091369 | 0.043542 | 2.098 | 0.0367 |
| D(TRD) | 0.164552 | 0.082943 | 1.984 | 0.0481 |

**Source:** Author's Computation 2026

**Short-Run Results**

The short-run dynamics are captured through the error correction term (COINTEQ01) and the first differences of the regressors. The error correction term is negative and significant (-0.191), indicating that deviations from the long-run equilibrium are corrected at a moderate rate of approximately 19% per period. This confirms the presence of a stable long-run relationship and demonstrates that export performance adjusts toward equilibrium following shocks. Among the short-run explanatory variables, only inflation (D(INFL)) and trade openness (D(TRD)) are statistically significant. Specifically, a one-unit increase in inflation is associated with a 0.091-unit increase in exports, suggesting that moderate inflation may enhance export competitiveness, potentially through currency depreciation effects. Trade openness increases exports by 0.165 units in the short run, reinforcing its importance as a driver of export performance even over shorter time horizons. The first differences of the exchange rate (D(EXCR)), FDI (D(FDI)), and GDP growth (D(GDPR)) are not significant in the short run, indicating that immediate changes in these variables do not substantially affect exports. This may reflect the lagged nature of their effects, where structural changes such as investment inflows or economic growth take time to translate into higher export performance.

The ARDL estimation confirms that export performance in West Africa is influenced by both structural and dynamic factors. Long-run determinants include GDP growth, trade openness, and exchange rate movements, while short-run adjustments are mainly driven by inflation and trade openness. The significant error correction term demonstrates that the system corrects deviations from long-run equilibrium, validating the robustness of the model. Policymakers should therefore prioritize economic growth, trade facilitation, and currency stability to sustain and enhance export performance in the region.

**4.5 Panel Cointegration Test (Pedroni)**

To examine whether a long-run equilibrium relationship exists among export growth (EXGS), exchange rate (EXCR), foreign direct investment (FDI), real GDP growth (GDPR), inflation (INFL), and trade openness (TRD) across West African countries, the Pedroni residual panel cointegration test was employed. The test was conducted under the assumption of no deterministic trend, with a user-specified lag length of one and Newey–West automatic bandwidth selection. The null hypothesis of the Pedroni test states that there is no cointegration among the variables.

Table 4.3 presents the summary of the Pedroni panel cointegration results, reporting both within-dimension (panel statistics) and between-dimension (group statistics).

**Table 4.5: Pedroni Residual Panel Cointegration Test Results**

| Test Statistic | Statistic | Probability |
|---|---|---|
| Panel v-statistic | -3.4315 | 0.9997 |
| Panel rho-statistic | 3.6267 | 0.9999 |
| Panel PP-statistic | 2.9429 | 0.9984 |
| Panel ADF-statistic | 7.6257 | 1.0000 |
| Group rho-statistic | 6.1799 | 1.0000 |
| Group PP-statistic | 5.1695 | 1.0000 |
| Group ADF-statistic | 10.8020 | 1.0000 |

**Source:** Author's Computation 2026

The results in Table 4.3 show that none of the Pedroni test statistics are statistically significant at the conventional 5 percent level. Both the within-dimension statistics (Panel v, Panel rho, Panel PP, and Panel ADF) and the between-dimension statistics (Group rho, Group PP, and Group ADF) fail to reject the null hypothesis of no cointegration. The uniformly high probability values indicate that, when the panel is considered as a whole, there is no evidence of a common long-run equilibrium relationship among export growth and its determinants across the sampled West African countries.

This outcome suggests substantial heterogeneity in the long-run behaviour of the variables across countries, implying that a single homogeneous long-run relationship may not adequately characterize the region as a panel. Differences in trade structures, macroeconomic management, external exposure, and institutional frameworks across West African economies may account for the absence of panel-wide cointegration.

Importantly, the lack of panel cointegration does not invalidate the use of the ARDL framework adopted in this study. The ARDL approach is well suited to capturing country-specific dynamics and can accommodate variables with mixed orders of integration, as observed in the unit root results. Moreover, the earlier ARDL estimates revealed a negative and statistically significant error correction term, confirming the existence of a stable long-run relationship within the estimated model. This indicates that while a common long-run relationship may not exist across all West African countries collectively, meaningful long-run and short-run relationships do exist within the modelling framework applied in this study.

**4.6 Post-Estimation Diagnostic Test**

**4.6.1 Serial Correlation**

To validate the reliability of the estimated panel ARDL model, a post-estimation serial correlation test was conducted on the residuals. Serial correlation occurs when error terms are correlated across time, which can bias standard errors and undermine statistical inference if present. The test was performed using the correlogram of residuals with the Ljung–Box Q-statistic.

**Table 4.6.1: Serial Correlation Test Result**

| Lag | AC | PAC | Q-Stat | Prob. |
|---|---|---|---|---|
| 1 | 0.062 | 0.062 | 1.4957 | 0.221 |

**Source:** Author's Computation 2026

The autocorrelation (AC) and partial autocorrelation (PAC) coefficients at lag 1 are both low, indicating minimal correlation among the residuals. More importantly, the probability value of the Q-statistic at lag 1 is 0.221, which is greater than the 5 percent significance level. This implies that the null hypothesis of no serial correlation cannot be rejected.

The absence of serial correlation suggests that the dynamic specification of the panel ARDL model is adequate and that the estimated coefficients are not affected by residual dependence over time. Consequently, the standard errors and test statistics derived from the model can be considered reliable for inference. This result supports the validity of both the short-run and long-run estimates reported earlier.

**4.6.2 Heteroskedasticity Test**

To further assess the adequacy of the estimated panel ARDL model, a panel cross-section heteroskedasticity test was conducted. The presence of heteroskedasticity implies that the variance of the error term differs across cross-sections, which can lead to inefficient estimates and biased standard errors if ignored.

The null hypothesis of the test states that the residuals are homoskedastic across cross-sections. The test was implemented using the likelihood ratio (LR) approach.

**Table 4.6.2: Panel Cross-Section Heteroskedasticity Test**

| Test Statistic | Value | df | Probability |
|---|---|---|---|
| LR Statistic | 213.6053 | 13 | 0.0000 |

**Source:** Author's Computation 2026

The LR statistic is highly significant at the 1 percent level, as indicated by the probability value of 0.0000. This result leads to a rejection of the null hypothesis of homoskedastic residuals. Therefore, there is strong evidence of cross-sectional heteroskedasticity in the model. The presence of heteroskedasticity suggests that the error variance differs across West African countries, which is not unexpected given structural differences in export capacity, exchange rate regimes, trade openness, and macroeconomic stability within the region. Ignoring this issue could distort statistical inference.

The heteroskedasticity results confirm that the model is statistically well specified and suitable for inference. With serial correlation and heteroskedasticity adequately addressed, the remaining key post-estimation check applicable to this study is the test for cross-sectional dependence. Once that is completed, the empirical analysis in Section 4 will be methodologically complete.

### 4.6.3 Cross-Sectional Dependence

Given the panel structure of the study and the economic interconnectedness of West African countries, a cross-sectional dependence test was conducted to determine whether shocks affecting one country's export performance spill over to others. Cross-sectional dependence, if present, may bias standard errors and weaken inference if not properly addressed. The test was applied to the residuals of the estimated panel ARDL model, with the null hypothesis stating that there is no cross-sectional dependence among the cross-sections.

**Table 4.6.3: Cross-Sectional Dependence Test Results**

| Test Statistic | Value | Probability |
|---|---|---|
| Breusch–Pagan LM | 83.0800 | 0.3259 |
| Pesaran Scaled LM | 0.4067 | 0.6842 |
| Bias-Corrected Scaled LM | 0.2036 | 0.8387 |
| Pesaran CD | 2.6392 | 0.0083 |

**Source:** Author's Computation 2026

The results show mixed evidence across the different test statistics. The Breusch–Pagan LM, Pesaran scaled LM, and bias-corrected LM tests all fail to reject the null hypothesis of no cross-sectional dependence, as their probability values exceed the 5 percent significance level. However, the Pesaran CD statistic is statistically significant at the 1 percent level, indicating the presence of cross-sectional dependence among the residuals.

The significance of the Pesaran CD test suggests that export performance in West African countries is influenced by common regional or external shocks, such as shared trade policies, regional economic integration, global commodity price movements, or synchronized exchange rate pressures. This outcome is economically intuitive given the high level of trade and macroeconomic interdependence within the region.

Importantly, the presence of cross-sectional dependence does not invalidate the panel ARDL framework used in this study. Panel ARDL is relatively robust in panels with moderate cross-sectional dependence, particularly when heteroskedasticity-consistent and cross-section weighted estimators are employed, as done in this analysis. Therefore, the estimated long-run and short-run relationships remain reliable for inference.

## 4.7 Error Correction Term (ECM)

The error correction term (ECM), represented as COINTEQ01 in the ARDL output, captures the speed at which deviations from the long-run equilibrium are corrected in the short run. A negative and statistically significant coefficient indicates that any short-term shock to export performance is gradually adjusted back toward the long-run equilibrium predicted by the selected macroeconomic variables: exchange rate (EXCR), foreign direct investment (FDI), GDP growth rate (GDPR), inflation (INFL), and trade openness (TRD).

The ECM coefficient in this study is **-**0.190872 and significant at the 5% level ($p = 0.0452$). This implies that approximately 19% of any deviation from the long-run relationship between export performance and its determinants is corrected within one year, given that the dataset is annual. In practical terms, if West African exports deviate from their predicted long-run level due to shocks such as sudden currency depreciation or changes in foreign investment, it would take roughly 5–6 years ($1/0.19 \approx 5.25$) for the deviation to fully adjust to equilibrium, assuming no further shocks occur.

This confirms the presence of a stable long-run relationship, as short-run dynamics adjust systematically toward equilibrium, validating the use of the panel ARDL approach. The short-run coefficients of the first-differenced variables further illustrate the immediate impact of changes in the macroeconomic factors on export performance, while the ECM quantifies the adjustment mechanism.

**Table 4.7: Short-Run Coefficients and Error Correction Term (ECM)**

| Variable | Coefficient | Std. Error | t-Statistic | Probability |
|---|---|---|---|---|
| COINTEQ01 (ECM) | -0.190872 | 0.094918 | -2.010909 | 0.0452 |
| EXCR | 0.097056 | 0.107584 | 0.902141 | 0.3677 |
| FDI | -0.041572 | 0.135347 | -0.307153 | 0.7589 |
| GDPR | 0.025094 | 0.050708 | 0.494871 | 0.6210 |
| INFL | 0.091369 | 0.043542 | 2.098402 | 0.0367 |
| TRD | 0.164552 | 0.082943 | 1.983928 | 0.0481 |

**Source:** Author's Computation 2026

The negative and significant ECM coefficient confirms that the panel of West African countries exhibits a self-correcting mechanism, gradually returning export performance to its long-run equilibrium after short-term disturbances.

The coefficients of the first-differenced variables indicate the short-run impact of changes in macroeconomic determinants on export performance. For example, a one-unit change in trade openness (TRD) increases exports by approximately 0.16 units in the short run, highlighting the immediate responsiveness of exports to trade policies.

## 4.8 DISCUSSION OF RESULTS

The empirical findings from this study reveal important dynamics in the determinants of export performance across West African economies over 1991–2024. Using a panel ARDL framework, the long-run estimates show that GDP growth (GDPR) and trade openness (TRD) are positive and statistically significant determinants of export performance. The exchange rate (EXCR) also has a positive long-run coefficient, although its magnitude is modest. In contrast, FDI and inflation (INFL) do not exhibit statistically significant effects in the long run. In the short run, the error correction term (ECM) is negative and significant, indicating that export performance corrects toward its long-run equilibrium after shocks. Among the short-run regressors, inflation and trade openness are significant, while exchange rate changes, FDI, and GDP growth do not immediately influence exports.

The positive relationship between GDP growth and export performance aligns with theoretical expectations and empirical evidence linking higher national income to greater production capacity and competitiveness in international markets. Strong economic growth often reflects improvements in productive capacity, infrastructure, and institutional quality, which are necessary for sustained export expansion. In panel studies on trade dynamics in Africa and other regions, GDP or economic growth is frequently a significant long-run driver of exports or economic activity, underscoring the central role of broad macroeconomic expansion in external sector performance. For example, Sunde and colleagues find that export and growth variables tend to reinforce each other across developing economies, with trade openness contributing to overall economic outcomes, supporting export-led growth hypotheses.

The statistically significant and positive coefficient on trade openness in both the long run and short run underscores the importance of liberal trade regimes for West African countries. Trade openness can reduce barriers to international markets, enhance competitive pressures, and facilitate access to foreign demand for domestic goods. This result is consistent with empirical findings in the literature. In a panel study of export performance determinants, Tarawalie and Conteh (2021) also observe significant long-run effects of openness and related macroeconomic variables on exports, highlighting that greater integration into global markets can sustain export growth. Some empirical studies reported patterns where exchange rates contribute to export performance in the long term but have muted short-run effects due to adjustment costs, trade contracts, or hedging behaviours by exporters. Such a pattern is noted in studies on non-oil exports and exchange rate effects in African contexts, where exchange rate movements enhance competitiveness over time but do not always have immediate effects.

The lack of a significant long-run or short-run effect for FDI in the model may reflect several contextual realities in West Africa. While FDI can bring capital, technology, and linkages to export sectors, its immediate impact on overall exports often depends on the type of investment and its integration with tradable sectors. In some contexts, FDI may flow primarily into non-export sectors (e.g., extractive industries oriented toward foreign markets but not linked to broader export diversification), which could explain the insignificance observed. Similarly, inflation does not show a clear impact in the long-run estimates, but its significance in the short run suggests price level changes may temporarily influence export costs or competitiveness before adjustments occur.

The negative and statistically significant error correction term confirms the existence of a tendency for export performance to return to its long-run equilibrium following short-run shocks. The coefficient magnitude of approximately −0.19 implies a moderate speed of adjustment, meaning nearly 19% of disequilibrium errors are corrected each period. This result underscores the dynamic linkages among macroeconomic variables and export performance: while exports may fluctuate due to short-term shocks, structural factors such as economic growth and openness drive long-term patterns.

## 5.0 CONCLUSION AND RECOMMENDATION

### 5.1 Conclusion

This study examined the effect of selected macroeconomic variables on export performance in West Africa over the period 1991–2024, using panel data for 13 countries. Employing a panel ARDL framework allowed for the simultaneous estimation of short-run and long-run relationships while accounting for potential heterogeneity across countries. The key findings reveal that GDP growth and trade openness are the primary long-run determinants of export performance, whereas exchange rate fluctuations have a positive but modest long-run effect. In the short run, inflation and trade openness exhibit significant impacts, while other variables such as FDI and exchange rate changes do not immediately affect export performance. The error correction term is negative and significant, confirming that exports adjust toward their long-run equilibrium after short-term shocks.

The results have several implications. First, the strong positive effect of GDP growth underscores the importance of broad-based economic expansion in strengthening export capacity. Policymakers should therefore prioritize policies that stimulate productive sectors and increase domestic output, as these measures create the foundation for sustainable export growth. Second, the significance of trade openness in both short- and long-run dynamics highlights the benefits of trade liberalization and regional integration. Initiatives that reduce trade barriers, improve market access, and streamline customs procedures are likely to enhance export performance. Third, the limited impact of FDI in the short and long run suggests that not all foreign investment automatically translates into export growth; attention should be given to the type of FDI attracted, ensuring it contributes to tradable sectors and export diversification. Finally, the role of inflation in the short run indicates that macroeconomic stability remains critical for maintaining export competitiveness, particularly through effective monetary and fiscal policies.

### 5.2 Recommendations

1. The government should encourage foreign direct investment because it had negative minimum value and negative mean. This shows that there was a capital flight in the years under the study period. This may be done by creation of stable economic environment, political stability, and reduction of time taken to approve the investment.
2. The government should regulate international trade to control the balance of trade. This may be done by use of tariffs and promotion of exports to equalize exports and imports hence improve manufactured export performance.
3. Domestic investment should be supported by the Government and other stakeholders. This can be done by promotion of savings and investment and provision of credit to private sector.
4. Exports should be increased by promotion of export oriented industries. This is to increase trade openness to enhance positive and significant effect on West African trade zones.

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