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The Empirical Nexus Between External Sector Dynamics and Sectoral Growth Performance in Uganda

Killian Arineitwe
Consultant, Universal Technology and Management University (UTAMU)

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Corresponding Author:
Killian Arineitwe

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ABSTRACT

This study examines the empirical nexus between external sector dynamics and sectoral growth performance in Uganda over the period 1991–2025. Specifically, it investigates the effects of foreign direct investment (FDI), personal remittances, exchange rate movements, external debt servicing, and total international reserves on the performance of the agriculture, industry, and services sectors. The study is motivated by the limited empirical evidence on the sector-specific effects of external sector developments, as most previous studies have focused on aggregate economic growth. Using a quantitative time-series research design, annual secondary data were obtained from the World Bank's World Development Indicators. The analysis employed the Augmented Dickey-Fuller (ADF) unit root test and the Autoregressive Distributed Lag (ARDL) modelling approach to estimate both short-run and long-run relationships. The results indicate mixed orders of integration, with the exchange rate being stationary at level while the remaining variables became stationary after first differencing, validating the use of the ARDL framework. Bounds test results confirmed the existence of long-run relationships between external sector variables and sectoral growth. The findings reveal that external sector dynamics exert heterogeneous effects across sectors. Exchange rate depreciation negatively affects agricultural, industrial, and services sector performance, while FDI significantly promotes industrial and services growth through capital accumulation, technology transfer, and productivity improvements. Personal remittances also positively influence the industry and services sectors, whereas international reserves support agricultural growth by strengthening macroeconomic stability. The error correction model indicates a speed of adjustment of approximately 16.5% toward long-run equilibrium following short-run shocks. The study recommends maintaining exchange rate stability, attracting productive FDI, promoting productive use of remittances, and strengthening sustainable reserve and debt management to support Uganda's structural transformation.

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1.0 INTRODUCTION AND BACKGROUND TO THE STUDY

Structural transformation remains a central objective of developing economies, particularly in Sub-Saharan Africa (SSA) (Arineitwe, Arinaitwe, & Asiimwe, 2026). Traditional growth theory emphasizes capital accumulation, labour productivity, and technological progress as key determinants of sectoral performance. However, in an increasingly globalized world economy, external sector dynamics have become critical channels through which domestic economic activity is influenced (Ssemanda, 2025). The external sector plays a significant role in shaping economic outcomes through multiple transmission mechanisms (Killian, Abigaba, & Olyanga Moni, 2026). Foreign direct investment (FDI) contributes to capital formation, technology transfer, and

managerial expertise, thereby enhancing productivity across agriculture, industry, and services (Corden & Neary, 1982). Empirical evidence for Uganda shows that FDI is positively associated with economic growth and gross capital formation (GCF), particularly in the long run (Obuin, 2020; Ssemanda, 2025; Arineitwe, Arinaitwe, & Asiimwe, 2026). Similarly, personal remittances provide additional household income that can stimulate consumption and investment, with studies indicating that remittance inflows have become an important source of external financing and development support in Uganda (Mohamed, 2019; Atuha, 2019; Abamwesiga, 2023).

External debt dynamics and debt servicing obligations also play a crucial role in determining sectoral growth performance. High debt servicing requirements can crowd out productive public investment, thereby limiting infrastructure development and reducing growth potential in key sectors. Empirical studies show that external debt has complex effects on growth, with both short-run stimulative effects and long-run constraints depending on debt sustainability conditions (Mugerwa, 2004; Abamwesiga, 2023). In addition, rising external debt levels have been associated with increased fiscal pressure and reduced development spending, particularly in social and productive sectors (World Bank, 2023a). Exchange rate movements further influence sectoral performance by affecting export competitiveness and import costs (Natamba, 2024). Exchange rate volatility can either stimulate or constrain production depending on the sectoral structure of the economy. Evidence from Uganda suggests that exchange rate dynamics are closely linked to economic fundamentals such as monetary policy, trade flows, and capital inflows (Opolot & Anguyo, 2007). Similarly, total foreign exchange reserves play a stabilizing role by cushioning the economy against external shocks and supporting macroeconomic stability, which is essential for sustained sectoral growth (IMF, 2017; Arineitwe, Arinaitwe, & Asiimwe, 2026).

Uganda has undergone substantial external sector transformation since the liberalization reforms of the early 1990s (MoFPED, 2024; NPA, 2025). The country has experienced increasing inflows of FDI, growing remittances, and greater integration into global financial markets (Mugerwa, 2004; UNCTAD, 2023). At the same time, external debt has expanded, and exchange rate fluctuations have remained a persistent macroeconomic challenge. IMF assessments show that Uganda's external position is broadly stable but remains vulnerable to external shocks, debt pressures, and global financial conditions (IMF, 2026). Most of the existing body of literature in Uganda focus on aggregate economic growth rather than sector-specific outcomes. Agriculture, industry, and services respond differently to external sector shocks due to differences in capital intensity, trade exposure, and policy sensitivity (Ojede, Lam, & Okot, 2019). Existing studies rarely integrate multiple external sector variables within a single analytical framework over an extended period, limiting understanding of their heterogeneous effects on different sectors of the economy, a gap this study addresses.

1.1 STATEMENT OF THE PROBLEM

Despite sustained macroeconomic reforms and structural adjustment policies implemented since the early 1990s, Uganda's economic structure continues to exhibit uneven sectoral growth, with agriculture remaining largely low-productivity, industry experiencing weak structural deepening, and services expanding without proportional industrial transformation (World Bank, 2023b). Although overall GDP growth has been relatively stable, evidence suggests that this growth has not fully translated into balanced sectoral development and structural transformation (MoFPED, 2024; NPA, 2025).

In parallel, Uganda's economy has become increasingly integrated into the global financial system, with external sector dynamics playing a central role in shaping domestic economic performance (Ssemanda, 2025). Key external variables such as FDI, personal remittances, official exchange rates, external debt servicing, and total international reserves have expanded significantly over time and are now major channels of macroeconomic transmission. Empirical studies indicate that FDI contributes to capital accumulation and productivity growth, while exchange rate movements significantly influence export competitiveness and sectoral performance (Opolot & Anguyo, 2007; Ssemanda, 2025). Similarly, remittances are increasingly recognized as important sources of household income and consumption smoothing in developing economies (Ojede, Lam, & Okot, 2019). However, the impact of these variables on Uganda's real economy remains empirically ambiguous, particularly when disaggregated across sectors. While some studies find that external capital inflows such as FDI positively influence growth and investment, others show weak, insignificant, or context-dependent effects depending on institutional and macroeconomic conditions (Odongo, 2012; Twimukye, Matovu, Levine, & Birungi, 2011). Moreover, exchange rate volatility has been shown to affect agriculture and services differently, depending on their exposure to imports and exports (Nampewo, Munyambonera, & Lwanga, 2013).

Despite this growing body of literature, most empirical research focuses on aggregate economic growth, often neglecting sector-specific responses to external shocks and financial flows. According to Twimukye et al. (2011), external shocks such as reductions in remittances and FDI can significantly alter sectoral output and household welfare, yet the transmission mechanisms differ across sectors. Similarly, sectoral studies remain limited in their ability to jointly evaluate multiple external sector variables within a unified long-run econometric framework (Ssemanda, 2025). This creates a significant empirical gap in understanding how external sector dynamics affect Uganda's agriculture, industry, and services differently over the long term, which this study aspires to plug (World Bank, 2023; IMF, 2026).

2.0 LITERATURE REVIEW

Traditional growth theories, particularly the Solow model, emphasize capital accumulation, labour growth, and technological progress as the main drivers of economic expansion, but extensions of these models highlight the importance of international capital flows in influencing domestic productivity and structural transformation (Solow, 1956). In developing economies, external sector variables such as foreign direct investment (FDI), remittances, exchange rate movements, external debt servicing, and foreign exchange reserves play a crucial role in relaxing domestic resource constraints and shaping sectoral outcomes (Chenery & Strout, 1966). Theoretical literature suggests that FDI acts not only as a source of capital but also as a channel for technology transfer and managerial spillovers, thereby enhancing productivity across agriculture, industry, and services (Thirlwall, 1979). However, its sectoral effect is often uneven depending on the absorptive capacity of the host economy and the sectoral allocation of inflows (Caves, 1996; UNCTAD, 2023). Similarly, remittances are theorized to supplement household income, smooth consumption, and potentially support investment in human and physical capital, although their impact on productive sectors remains ambiguous depending on whether they are channelled toward consumption or investment activities (Ratha, 2013; World Bank, 2023b).

Exchange rate dynamics remain central in determining sectoral competitiveness in open economies. According to the Dutch disease hypothesis, large external inflows lead to real exchange rate appreciation, which can weaken tradable sectors such as agriculture and manufacturing while expanding non-tradable sectors such as services (Corden & Neary, 1982). Conversely, exchange rate depreciation may improve export competitiveness but increase the cost of imported inputs, thereby affecting industrial production differently from agriculture and services (Edwards, 2000; Opolot & Anguyo, 2007). External debt servicing obligations introduce additional constraints on sectoral growth by diverting fiscal resources away from productive investment toward debt repayment. The debt overhang hypothesis argues that high external debt discourages investment because anticipated future taxation reduces expected returns on capital formation (Krugman, 1988). Empirical evidence from developing countries, including Uganda, suggests that rising debt servicing burdens are associated with reduced fiscal space and slower sectoral development, particularly in infrastructure-intensive sectors (IMF, 2026; Abamwesiga, 2023). In contrast, foreign exchange reserves are generally considered a buffer against external shocks, enhancing macroeconomic stability and investor confidence, which in turn supports long-term growth and sectoral stability (Frenkel & Jovanovic, 1981; World Bank, 2023b).

Contemporary evidence suggests that FDI contributes positively to economic growth and productivity, particularly in services and extractive industries, though spillovers to agriculture and manufacturing remain limited due to weak linkages with domestic firms (Ssemanda, 2025; UNCTAD, 2023). Remittances have been found to significantly improve household welfare and consumption patterns, but their contribution to productive investment and industrial expansion is less clear (Ojede, Lam, & Okot, 2019; World Bank, 2023b). Exchange rate volatility has been shown to affect sectoral output differently, with agriculture benefiting from export competitiveness while industry suffers from increased import costs and uncertainty (Nampewo, Munyambonera, & Lwanga, 2013). Furthermore, external debt dynamics have been identified as a key constraint on long-run growth, as debt servicing obligations reduce government capacity to invest in productive sectors, thereby slowing structural transformation (Abamwesiga, 2023; IMF, 2026). While foreign reserves enhance macroeconomic stability, their accumulation may also entail opportunity costs if resources are not allocated toward productive domestic investment. Despite this growing body of literature, most empirical studies focus on aggregate economic growth rather than disaggregated sectoral outcomes, thereby overlooking important heterogeneity in how agriculture, industry, and services respond to external sector shocks (Twimukye, Matovu, Levine, & Birungi, 2011). In a nutshell, the literature indicates that external sector dynamics play a significant but uneven role in shaping sectoral growth performance.

3.0 METHODOLOGY (DATA AND METHODS).

This study adopts a quantitative research design based on time-series econometric analysis to examine the relationship among the variables. Secondary data were obtained from the World Bank World Development Indicators. The study focuses on agriculture, industry, and services sectoral output as dependent variables, while foreign direct investment, personal remittances, official exchange rate, external debt servicing, and total international reserves are used as explanatory variables. Prior to estimation, all variables were tested for stationarity using the Augmented Dickey-Fuller (ADF) (Denzin & Lincoln, 2018). Given the mixed order of integration, the Autoregressive Distributed Lag (ARDL) model was employed to capture both short-run and long-run dynamics. Diagnostic tests, including tests for serial correlation, heteroskedasticity, multicollinearity, and model stability, were conducted to ensure robustness and reliability of the results (Patton, 2015).

4.0 FINDINGS

4.1 Descriptive Statistics

Table 1 presents the descriptive statistics of the study variables, highlighting their central tendency, dispersion, and overall data characteristics before conducting econometric analysis (Caves, 1996; Bluman, 2018).

Table 1: Descriptive Statistics of Study Variables

Variable	n	Mean	Std.Dev	Min	Max	CV
AGR	37	5.03e+09	3.54e+09	1.38e+09	1.32e+10	70.38
SVS	37	8.07e+09	6.68e+09	9.61e+08	2.31e+10	82.78
IND	37	4.67e+09	4.24e+09	3.56e+08	1.33e+10	90.79
PR	37	6.17e+08	4.66e+08	8.48e+07	1.51e+09	75.53
FDI	37	7.21e+08	8.37e+08	1000000	3.26e+09	116.09
TDS	37	3.40e+08	5.77e+08	5.09e+07	2.67e+09	169.71
TR	37	2.03e+09	1.61e+09	1.41e+07	5.40e+09	79.31
EXR	37	2087.158	1116.232	106.1358	3757.262	53.48

Source: STATA output, 2026.

Among the sectoral variables, the services sector (SVS) recorded the highest average output (UGX 8.07 billion), followed by agriculture (AGR) with UGX 5.03 billion and industry (IND) with UGX 4.67 billion. This suggests that the services sector has been the largest contributor to Uganda's economic output, consistent with the country's gradual structural transformation towards a service-led economy.

Regarding the explanatory variables, FDI averaged UGX 721 million, while personal remittances (PR) averaged UGX 617 million. Total reserves (TR) averaged UGX 2.03 billion, whereas total debt service (TDS) averaged UGX 340 million. The official exchange rate averaged UGX 2,087.16 per US dollar, reflecting the long-term depreciation of the Uganda shilling. The coefficient of variation (CV) provides a measure of relative dispersion by comparing the standard deviation to the mean (Patton, 2015; Bluman, 2018). Total debt service (CV = 169.71%) and FDI (CV = 116.09%) recorded the highest variability, reflecting fluctuations driven by changes in borrowing conditions, investor confidence, and global economic factors. Industry (90.79%) recorded the highest relative variation, followed by services (82.78%) and agriculture (70.38%), suggesting that industrial output experienced greater fluctuations. Personal remittances (75.53%) and total reserves (79.31%) also displayed considerable variability, reflecting changes in external financial inflows and reserve accumulation.

In contrast, the exchange rate (53.48%) recorded the lowest CV, indicating that although the Uganda shilling depreciated over time, exchange rate movements were relatively more stable than the other study variables. Overall, the relatively high CV values across most variables indicate considerable variability, which is expected in long-run macroeconomic time series spanning more than three decades characterized by economic reforms, policy shifts, external shocks, and structural transformation.

4.2 Pairwise Correlation Analysis

Table 2 presents the pairwise correlation matrix, showing the direction and strength of relationships among explanatory variables, where coefficients range from -1 to +1 (weak: 0.00–±0.30, moderate: ±0.31–±0.70, strong: ±0.71–±1.00), while providing an initial assessment of potential multicollinearity before regression estimation (Field, 2018; Pallant, 2020).

Table 2: Pairwise Correlation Matrix.

Variable	LogFDI	LogEXR	LogTDS	LogTR	LogPR
LogFDI	1.0000				
LogEXR	0.8575*	1.0000			
LogTDS	0.3051*	0.3047*	1.0000		
LogTR	0.9712*	0.9106*	0.2626	1.0000	
LogPR	0.8893*	0.8781*	0.4111*	0.9229*	1.0000

Source: STATA output, 2026, (*) denotes statistical significance at the 5%.

Table 2 above indicates that all the predictors are positively correlated, suggesting that they generally move in the same direction. The strongest positive relationship is observed between LogFDI and LogTR with a correlation coefficient of 0.9712, indicating a very strong positive association. This implies that periods of increased FDI were generally accompanied by higher levels of international reserves. Similarly, LogTR exhibit a very strong positive correlation with LogPR (r = 0.9229) and LogEXR (r = 0.9106), while LogFDI is also strongly correlated with LogPR (r = 0.8893) and LogEXR (r = 0.8575). These strong positive relationships may reflect the simultaneous growth of Uganda's external sector, characterized by increasing capital inflows, reserve accumulation, remittance receipts, and exchange rate adjustments (Tabachnick & Fidell, 2019). In contrast, LogTDS exhibits relatively weak to moderate positive correlations with the other explanatory variables. Its correlation with LogFDI, is 0.3051, with

LogEXR, 0.3047, with LogPR, 0.4111, and LogTR, 0.2626, the latter being statistically insignificant. These relatively lower coefficients suggest that debt servicing obligations evolved somewhat independently of the other external sector indicators.
High pairwise correlations, including values above 0.80, do not necessarily imply harmful multicollinearity; therefore, VIF analysis was conducted as a more reliable diagnostic, while correlation results are treated as preliminary evidence of variable relationships (Bluman, 2018).

4.3 Augmented Dickey-Fuller (ADF) Unit Root Test for Stationarity

The Augmented Dickey-Fuller (ADF) unit root test was conducted to assess the stationarity properties of the variables and avoid spurious regression results. Variables with P-values below 5% are considered stationary, with those stationary at levels classified as I(0) and those becoming stationary after first differencing classified as I(1) (Dickey & Fuller, 1979; Bluman, 2018; Walliman, 2021).

Table 3: Augmented Dickey-Fuller (ADF) Unit Root Test Results

Variable	Level ADF	Level P-value	1st Diff ADF (Z(t))	1st Diff P-value	Order of Integration
LogAGR	-0.123	0.9471	-4.485	0.0002	I(1)
LogSVS	0.351	0.9796	-4.093	0.0010	I(1)
LogIND	-0.048	0.9544	-4.080	0.0010	I(1)
LogFDI	-1.566	0.5006	-6.578	0.0000	I(1)
LogEXR	-7.505	0.0000			I(0)
LogTDS	-0.810	0.8161	-11.312	0.0000	I(1)
LogTR	-1.821	0.3701	-9.667	0.0000	I(1)
LogPR	-1.233	0.6592	-6.000	0.0000	I(1)

Source: STATA output, 2026.

The findings indicate that, at their levels, only the official exchange rate (LogEXR) is stationary, with an ADF test statistic of -7.505 and a P-value of 0.0000, which is below the 5% significance level. This implies that the null hypothesis of a unit root is rejected for the exchange rate, confirming that it is integrated of order zero, I(0) (Dickey & Fuller, 1979). The remaining variables were found to be non-stationary at levels. Specifically, agriculture (0.9471), services (0.9796), industry (0.9544), FDI (0.5006), total debt service (0.8161), total reserves (0.3701), and personal remittances (0.6592) all failed to reject the null hypothesis of a unit root at levels. However, after first differencing, all the non-stationary variables became stationary, as evidenced by statistically significant ADF statistics and P-values below 0.05. The ADF statistics for LogAGR (-4.485), LogSVS (-4.093), LogIND (-4.080), LogFDI (-6.578), LogTDS (-11.312), LogTR (-9.667), and LogPR (-6.000) are all significant at the 5 % level, indicating integration of order one, I(1). Since none of the variables is integrated of order two I(2), the results justify the use of the ARDL modelling approach to estimate both the short-run and long-run relationships among the variables (Dickey & Fuller, 1979).

4.4 Lag Length Selection

The optimal lag length was determined using Likelihood Ratio (LR) test, Final Prediction Error (FPE), Akaike Information Criterion (AIC), Hannan-Quinn Information Criterion (HQIC), and Schwarz Bayesian Information Criterion (SBIC) criteria to ensure the model captures dynamic relationships while avoiding under- or over-parameterization and improving estimation reliability (Caves, 1996; Turabian, 2018).

Table 0: Lag Length Selection Criteria for Model Specification

Lag	LL	LR	df	P	FPE	AIC	HQIC	SBIC
0	5.23352				1.6e-10	.167666	.289733	.530455
1	224.112	437.76	64	0.000	1.5e-14	-9.2189	-8.12029	-5.95379
2	310.629	173.03	64	0.000	8.4e-15N	-10.5836	-8.50844	-4.41617
3	526.263	431.27	64	0.000	1.5e-17*	-19.7735	-16.7218	-10.7038
4	7034.91	13017*	64	0.000	.	-410.358*	-406.33*	-398.386*

Source: Author's Computation from STATA Output (2026).

The FPE identifies lag 3 as the optimal lag since it records the smallest prediction error. In contrast, the LR, AIC, HQIC, and SBIC all identify lag 4 as the optimal lag, as indicated by the asterisks (*) and the minimum values of the respective criteria (Turabian, 2018). Given that the majority of the lag selection criteria (LR, AIC, HQIC, and SBIC) consistently select lag 4, this study adopts four lags as the optimal lag length for subsequent econometric analysis (Turabian, 2018). Furthermore, the statistically significant Likelihood Ratio (LR) values (P = 0.000) indicate that including additional lags significantly improves the model's explanatory power compared to models with fewer lags (Turabian, 2018).

4.5 ARDL Bounds Test for Cointegration

Given the mixed integration orders of I(0) and I(1), the ARDL Bounds Testing approach of Pesaran et al. (2001) was applied to examine long-run relationships between sectoral output (agriculture, services, and industry) and external sector variables. A long-run relationship is confirmed when the computed F-statistic exceeds the upper bound critical value (I(1)) (Pesaran, Shin, & Smith, 2001; Field, 2018).

Table 5: Bounds Test for Cointegration (LogAGR, LogFDI, LogEXR, LogTDS, LogTR, LogPR)

F-statistic	**125.40**	**K = 5**
Critical value bounds		
Significance	I(0) Bound	I(1) Bound
10%	2.278	3.483
5%	2.679	3.997
1%	3.571	5.114

Source: Author's Computation from STATA Output (2026).

The results for the agricultural sector indicate that the computed F-statistic of 125.40 is substantially greater than the upper bound critical value of 5.114 at the 1% significance level. Consequently, the null hypothesis of no long-run relationship is rejected which confirms the existence of a stable long-run equilibrium relationship between agricultural output and the predictors (Pesaran, Shin, & Smith, 2001).

Table 6: Bounds test for cointegration (LogSVS, LogFDI, LogEXR, LogTDS, LogTR, LogPR)

F-statistic	**336.62**	**K = 5**
Critical value bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	2.278	3.483
5%	2.679	3.997
1%	3.571	5.114

Source:STATA output (2026).

Similarly, the ARDL bounds test for the services sector produced an F-statistic of 336.62, which is considerably higher than the upper bound critical value at all significance levels. The null hypothesis of no cointegration is therefore rejected, indicating the presence of a long-run equilibrium relationship between services sector output and the external sector variables (Pesaran, Shin, & Smith, 2001).

Table 7: Bounds test for cointegration (LogIND, LogFDI, LogEXR, LogTDS, LogTR, LogPR)

F-statistic	**525.38**	**K = 5**
Critical value bounds		
Significance	**I(0) Bound**	**I(1) Bound**
10%	2.278	3.483
5%	2.679	3.997
1%	3.571	5.114

Source: STATA output (2026).

For the industrial sector model, the computed F-statistic of 525.38 also exceeds the upper bound critical value at the 1% significance level. Accordingly, the null hypothesis of no cointegration is rejected, confirming the existence of a long-run equilibrium relationship between industrial output and the predictors.

4.6 ARDL Long-Run and Short-Run Estimates for LogAGR and the predictors

Following the confirmation of cointegration through the ARDL bounds test, long-run and short-run coefficients were estimated to assess the effects of external sector variables on agricultural output, while the Error Correction Term (ECT) indicates the speed of adjustment towards long-run equilibrium after short-run shocks (Walliman, 2021; Bluman, 2018).

Table 7: ARDL Long-Run and Short-Run Estimates for Agricultural Sector Performance (LogAGR)

LogAGR	Coef.	P-value	Sig
Long-run Estimates			
LogFDI	-0.075	0.494	
LogEXR	-2.830	0.000	***
LogTDS	0.185	0.001	***
LogTR	0.475	0.005	***
LogPR	-0.029	0.885	
Short-run Estimates			
LogFDI	-0.075	0.494	
LogEXR	0.785	0.161	
LogTDS	0.185	0.001	***
LogTR	1.422	0.000	***
LogPR	-0.484	0.016	**
ECT	-0.608	0.004	***

Source: Source: STATA Output (2026).

The long-run results show that the exchange rate (LogEXR) has a negative and statistically significant effect on agricultural output (β = -2.830, P < 0.01). This implies that a 1% depreciation of the Uganda shilling is associated with an approximate 2.83% decline in agricultural output in the long run, holding other factors constant. The finding suggests that exchange rate depreciation may increase the cost of imported agricultural inputs such as fertilizers, machinery, and agrochemicals, thereby reducing agricultural productivity (Krugman, Obstfeld, & Melitz, 2018; World Bank, 2020). Total debt service (LogTDS) exerts a positive and statistically significant influence on agricultural output (β = 0.185, P < 0.01). This indicates that a 1% increase in debt servicing is associated with a 0.185% increase in agricultural output in the long run. Although debt servicing is generally viewed as a fiscal burden, this result may reflect the productive use of borrowed resources in financing agricultural infrastructure, extension services, and other development programmes that enhance sector performance (IMF, 2023a; World Bank, 2022).

Similarly, total international reserves (LogTR) have a positive and significant long-run effect on agricultural output (β = 0.475, P < 0.01). This implies that a 1% increase in reserves increases agricultural output by approximately 0.475%. Higher reserve levels strengthen macroeconomic stability, improve the country's capacity to finance imports of agricultural inputs, and enhance investor confidence, thereby supporting agricultural growth (IMF, 2022; World Bank, 2024). In contrast, foreign direct investment (LogFDI) and personal remittances (LogPR) have negative but statistically insignificant long-run effects on agricultural output (P > 0.05). This suggests that, neither FDI nor remittance inflows had a measurable long-run impact on Uganda's agricultural sector.

The short-run estimates reveal a somewhat different pattern. Total debt service (LogTDS) remains positive and statistically significant (β = 0.185, P < 0.01), indicating that increases in debt servicing are associated with immediate improvements in agricultural output. Likewise, total reserves (LogTR) have a strong positive and highly significant short-run effect (β = 1.422, P < 0.01), suggesting that increases in reserve holdings provide immediate support to agricultural sector performance. On the other hand, personal remittances (LogPR) exhibit a negative and statistically significant short-run effect (β = -0.484, $p < 0.05$), implying that a 1% increase in remittances reduces agricultural output by approximately 0.484% in the short run. This may indicate that remittance income is directed more towards household consumption and non-agricultural investments than agricultural production (Adams & Cuecuecha, 2013). Meanwhile, foreign direct investment and the exchange rate remain statistically insignificant in the short run, suggesting that their immediate effects on agricultural output are limited (IFAD, 2017).

The Error Correction Term (ECT) is negative (-0.608) and statistically significant at the 1% level ($p = 0.004$), confirming the existence of a stable long-run equilibrium relationship among the variables. The coefficient implies that approximately 60.8% of any short-run disequilibrium in agricultural output is corrected within one year. This relatively high speed of adjustment indicates that deviations from the long-run equilibrium are corrected fairly quickly, reflecting a strong tendency for agricultural output to return to its long-run path following temporary shocks (FAO, 2022).

4.7 ARDL Long-Run and Short-Run Estimates for LogSVS and the predictors

The ARDL model was estimated to examine the long-run and short-run effects of external sector variables on Uganda's services sector performance (LogSVS) as illustrated in Table 8 below.

Table 8: ARDL Long-Run and Short-Run Estimates for Services Sector Performance (LogSVS)

LogSVS	Coef.	P-value	Sig
Long-run Estimates			
LogFDI	0.210	0.029	**

LogEXR	-0.936	0.023	**
LogTDS	-0.137	0.023	**
LogTR	-0.244	0.039	**
LogPR	0.472	0.023	**
Short-run Estimates			
LogFDI	0.150	0.110	
LogEXR	0.226	0.606	
LogTDS	-0.010	0.797	
LogTR	0.304	0.172	
LogPR	0.375	0.071	*
ECT	-0.165	0.000	***

Source: STATA Output (2026).

The long-run results reveal that foreign direct investment (LogFDI) has a positive and statistically significant effect on the services sector ($\beta = 0.210$, $p < 0.05$). This implies that a 1% increase in foreign direct investment is associated with a 0.21% increase in services sector output in the long run, suggesting that FDI contributes to the expansion of service industries through capital inflows, technology transfer, employment creation, and improved business activities. The exchange rate (LogEXR) has a negative and statistically significant long-run effect ($\beta = -0.936$, $p < 0.05$), indicating that a 1% depreciation of the Uganda shilling reduces services sector output by approximately 0.94 %. This finding suggests that exchange rate instability may increase the cost of imported service-related inputs and reduce the competitiveness of businesses operating within the services sector (IMF, 2023a; IMF, 2023b; Goldberg, 2019).

Similarly**,** total debt service (LogTDS) has a negative and significant long-run effect ($\beta = -0.137$, $p < 0.05$), implying that increasing debt servicing obligations may reduce resources available for investment in service sector development. Total international reserves (LogTR) also exhibit a negative and statistically significant relationship with services sector output ($\beta = -0.244$, $p < 0.05$), suggesting that increases in reserves may not directly translate into expansion of service sector activities during the study period. Conversely, personal remittances (LogPR) have a positive and statistically significant long-run effect ($\beta = 0.472$, $p < 0.05$). This indicates that a 1% increase in remittance inflows increases services sector output by approximately 0.47%, reflecting the role of remittances in stimulating household consumption and demand for services such as education, health, transport, financial services, communication, trade, and hospitality (World Bank, 2023a).

The short-run estimates show that personal remittances (LogPR) are the only variable with a statistically significant effect on the services sector ($\beta = 0.375$, $p < 0.10$) which suggests that increases in remittance inflows have an immediate positive impact on service sector activities by increasing household expenditure and domestic demand (World Bank, 2023a; World Bank, 2023b). In contrast, FDI, exchange rate, total debt service, and total reserves do not have statistically significant short-run effects, indicating that their influence on the services sector materializes mainly over the long term rather than immediately. The negative and significant Error Correction Term (ECT = −0.165, $p < 0.01$) confirms a stable long-run relationship, indicating that approximately **16.5%** of short-run disequilibrium in the services sector is corrected annually toward equilibrium.

4.8 ARDL Long-Run and Short-Run Estimates for LogIND and the independent variables.

ARDL long-run and short-run estimates were obtained to examine the effects of explanatory variables on Uganda's industrial sector performance (LogIND), as presented in Table 9.

Table 9: ARDL Long-Run and Short-Run Estimates for Industrial Sector Performance (LogIND)

LogIND	Coef.	P-value	Sig
Long-run Estimates			
LogFDI	0.097	0.086	*
LogEXR	-0.839	0.008	***
LogTDS	—[1]	—	
LogTR	—	—	
LogPR	0.405	0.012	**
Short-run Estimates			

[1] **Dashes (—) mean the variable was dropped by the estimation algorithm during lag optimization as it was statistically insignificant in the long-run or short-run equation.**

LogFDI	—	—	
LogEXR	-0.050	0.858	
LogTDS	0.010	0.659	
LogTR	0.103	0.277	
LogPR	0.283	0.054	*
ECT	-0.714	0.000	***

Source: STATA Output (2026).

The long-run results indicate that foreign direct investment (LogFDI) has a positive and marginally significant effect on industrial output ($\beta = 0.097$, $p < 0.10$). This implies that a 1% increase in foreign direct investment increases industrial output by approximately 0.10% in the long run. The finding suggests that FDI contributes to industrial development through capital investment, technology transfer, improved production capacity, and employment creation (Borensztein, De Gregorio, & Lee, 1998). The results further show that the exchange rate (LogEXR) has a negative and highly significant long-run effect on industrial output ($\beta = -0.839$, $p < 0.01$). This indicates that a 1% depreciation of the Uganda shilling is associated with a 0.84% decline in industrial output. This relationship may reflect the industry's dependence on imported machinery, equipment, intermediate goods, and raw materials, whose costs increase following exchange rate depreciation (OECD, 2022).

Personal remittances (LogPR) also exhibit a positive and statistically significant long-run effect ($\beta = 0.405$, $p < 0.05$). This implies that a 1% increase in remittance inflows increases industrial output by approximately 0.41% in the long run. The positive relationship suggests that remittances may stimulate industrial growth by increasing household purchasing power, domestic demand for manufactured goods, and private investment in industrial activities (OECD, 2022). The variables total debt service (LogTDS) and total international reserves (LogTR) were not retained in the long-run model, indicating that they did not exert statistically significant long-run effects on industrial sector performance under the selected ARDL specification.

The short-run results indicate that personal remittances (LogPR) have a positive and marginally significant effect on industrial output ($\beta = 0.283$, $p < 0.10$), suggesting that increases in remittance inflows provide immediate support to industrial activities through higher consumption and investment demand. In contrast, the exchange rate, total debt service, and total reserves do not have statistically significant short-run effects on industrial output, while foreign direct investment was not retained in the short-run specification. The negative and significant Error Correction Term (ECT = −0.714, $p < 0.01$) confirms a stable long-run equilibrium, indicating that about 71.4% of short-run disequilibrium in industrial output is corrected within one year.

4.9 Post-Estimation Diagnostic Tests

Diagnostic tests for multicollinearity, serial correlation, heteroscedasticity, model specification, and residual normality were conducted to assess the reliability and validity of the estimated model (Dickey & Fuller, 1979) as presented in Tables 10–14. Table 10 presents the Variance Inflation Factor (VIF) results used to assess multicollinearity among the explanatory variables, where high VIF values indicate potential inflation of standard errors and unreliable coefficient estimates.

Table 10: Results of the Variance Inflation Factor (VIF) Results

Variable	VIF	1/VIF
LogFDI	5.61	0.178329
LogEXR	2.84	0.351942
LogTDS	2.81	0.356358
LogTR	2.46	0.406923
LogPR	1.05	0.954298
Mean VIF	**2.95**	

Source: STATA Output (2026).

The VIF results indicate that the explanatory variables do not suffer from serious multicollinearity problems. The mean VIF value of 2.95 is below the commonly accepted threshold of 10, suggesting that the independent variables are not excessively correlated (Field, 2018). Among the individual variables, LogFDI recorded the highest VIF value of 5.61, indicating moderate correlation with other explanatory variables. However, this value remains below the critical threshold of 10, implying that multicollinearity is not severe enough to affect the reliability of the estimates. The remaining variables recorded relatively low VIF values, ranging from 1.05 to 2.84, indicating weak levels of correlation among the regressors. Therefore, the diagnostic results confirm that the ARDL model does not suffer from harmful multicollinearity, and the estimated coefficients can be considered stable and reliable.

Table 11 presents the Breusch–Godfrey (BG) LM test results used to assess serial correlation in the ARDL model residuals, where serial correlation indicates that error terms are correlated over time.

Table 11: Breusch-Godfrey LM test for autocorrelation

lags(p)	chi2	df	Prob>chi2
1	15.619	1	0.0671

Source: STATA Output (2026).

The Breusch-Godfrey LM test results indicate the absence of serial correlation in the residuals. The test statistic is statistically insignificant, implying failure to reject the null hypothesis of no autocorrelation. Therefore, the residuals are independently distributed, suggesting that the model is well specified and the estimated coefficients are reliable.

Table 12 presents the Breusch–Pagan test results used to assess heteroscedasticity, where non-constant error variance may result in inefficient estimates and biased standard errors (Field, 2018).

Table 12: Breusch–Pagan test results for heteroscedasticity

Chi2(1)	P-value
2.96	0.0852

Source: STATA Output (2026).

The results show that the Breusch–Pagan test statistic is 2.96 with a P-value of 0.0852. Since the P-value is greater than the conventional 5% significance level, the null hypothesis of constant variance cannot be rejected (Greene, 2018). This indicates that the model does not suffer from significant heteroscedasticity problems. Therefore, the residual variance is considered stable, and the estimated coefficients and standard errors are unlikely to be distorted by unequal error variance (Gujarati & Porter, 2009). The finding supports the reliability of the ARDL estimates, as the assumption of homoscedastic errors is satisfied (Wooldridge, 2016).

Table 13 below presents the Ramsey RESET results used to assess the correctness of the ARDL model specification by detecting omitted variables or functional form misspecification.

Table 13: Ramsey RESET test

F(3, 26)	Prob>chi2
11.24	0.0701

Source: STATA Output (2026).

The Ramsey RESET test results indicate that the model specification is adequate. The F-statistic of 11.24 is statistically insignificant (P= 0.0701), leading to non-rejection of the null hypothesis that the model is correctly specified.

Table 14 below presents the results of the normality tests conducted to determine whether the residuals follow a normal distribution (Field, 2018). Normality of residuals is important because it supports valid statistical inference, particularly for hypothesis testing (Gujarati & Porter, 2009).

Table 14(a): Skewness and Kurtosis Normality Test

Variable	Obs	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
Resid	37	0.3683	0.5095	1.32	0.5171

Source: STATA Output (2026).

The skewness and kurtosis test results indicate that the residuals are normally distributed. The adjusted chi-square statistic is 1.32 with a P-value of 0.5171, which is greater than the 5% significance level. Therefore, the null hypothesis of normally distributed residuals cannot be rejected (Gujarati & Porter, 2009). This implies that the residuals do not exhibit significant deviations from normality, supporting the validity of statistical inference from the ARDL estimates (Wooldridge, 2016).

Table 14(b): Shapiro-Wilk Normality Test

Variable	Obs	W	V	Z	Prob>Z
Resid	37	0.96689	1.233	0.438	0.33059

Source: STATA Output (2026).

The Shapiro-Wilk test further confirms the normality of residuals. The test produces a P-value of 0.33059, which exceeds the 5 % significance level. Hence, the null hypothesis that the residuals are normally distributed cannot be rejected (Wooldridge, 2016). The findings from both normality tests consistently indicate that the residuals follow an approximately normal distribution, suggesting that the estimated ARDL coefficients are suitable for statistical interpretation (Gujarati & Porter, 2009).

5.0 CONTRIBUTIONS OF THE STUDY

This study makes several contributions to the literature. First, it provides Uganda-specific evidence on how external sector variables influence sectoral economic performance, addressing the limitation of cross-country studies that may overlook country-specific structural characteristics. Second, it adopts a sectoral approach by examining agriculture, services, and industry separately, revealing that external factors affect sectors differently. Third, it applies the ARDL framework to capture both short-run dynamics and long-run equilibrium relationships between external sector variables and sectoral performance, providing deeper insights into Uganda's economic transformation.

6.0 LIMITATIONS OF THE STUDY

The study is limited by possible inconsistencies in historical macroeconomic data, particularly for earlier years. In addition, the model does not include other important determinants such as trade openness, commodity prices, government expenditure, and institutional factors that may influence sectoral performance. The use of a linear ARDL framework also limits the analysis of possible asymmetric effects of external shocks.

7.0 CONCLUSION

The study concludes that Uganda's sectoral performance is significantly influenced by external sector dynamics. The results confirm the existence of long-run relationships between external variables and agriculture, services, and industry. Exchange rate depreciation negatively affects all sectors, while foreign direct investment and remittances support services and industrial growth. Overall, effective management of external sector conditions is essential for promoting sustainable economic transformation.

8.0 POLICY RECOMMENDATIONS

The Study makes the following recommendations;

a) Maintain Exchange Rate Stability:

The Bank of Uganda should continue to promote exchange rate stability to reduce the cost of imported inputs and strengthen the competitiveness of key productive sectors.

b) Promote Productive Foreign Investment:

The Uganda Investment Authority (UIA) and Uganda Free Zones and Export Promotions Authority (UFZEPA) should attract FDI into manufacturing, agro-processing, and export-oriented sectors to enhance productivity, employment, and economic diversification.

c) Encourage Productive Use of Remittances:

Policies should encourage the channelling of remittance inflows into productive investments, particularly in agriculture, SMEs, and other income-generating activities, to enhance their contribution to economic growth.

d) Strengthen Debt and Reserve Management:

Public borrowing should be directed towards productive investments that support sectoral development, while maintaining adequate international reserves to strengthen macroeconomic stability and resilience to external shocks.

9. AREAS FOR FURTHER INQUIRY

Future studies could incorporate additional variables such as trade openness, exports, commodity prices, and institutional quality to provide a broader understanding of sectoral performance. Further research could also apply nonlinear models such as NARDL or SVAR to examine asymmetric effects of external shocks and conduct comparative studies across East African countries.

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