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The Impact of Remittances on the Exchange Rate: Empirical Analysis of The Gambia

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ABSTRACT

Remittances are crucial to The Gambian economy, providing a major source of foreign exchange and sustaining the livelihoods of numerous households. In addition, they help in offsetting trade deficit and stabilize the country's external position. However, substantial external inflows into developing economies can lead to an appreciation of the domestic currency, making exports more expensive and reducing competitiveness. This study investigates the impact of remittances on the real effective exchange rate in The Gambia using monthly data from January 2009 to December 2019. Employing the Autoregressive Distributive Lag (ARDL) model, the study finds evidence of a long run cointegrating relationship among the variables. The empirical results reveal that remittance inflows have a positive significant effect on the real effective exchange rate in the long run, indicating that higher remittances lead to an appreciation of the Gambian Dalasi.

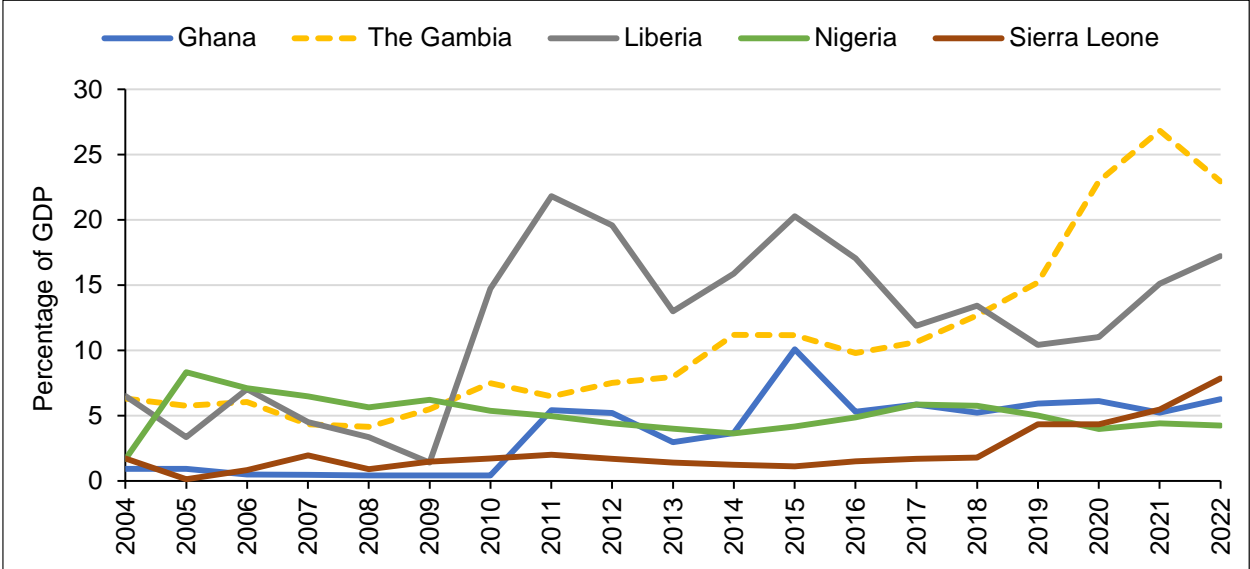
Keywords: Remittance, ARDL, the Gambia, exchange rate.

1 INTRODUCTION

Remittances play a vital role in the Gambian economy, serving as a significant source of foreign exchange and supporting the livelihoods of many households. This finding is documented by Fajnzylber & López. (2007), who conclude that "at the country level, higher remittances inflows tend to be associated with lower poverty indicators and higher growth rates." The Gambia's heavy reliance on remittances is further underscored by its

position as the leading recipient of remittances relative to GDP among the West African Monetary Zone (WAMZ) countries, a trend that has persisted in recent years. The graph illustrates the evolution of remittance inflows as a percentage of GDP for the WAMZ countries. Notably, in 2022, remittance inflows into the Gambia reached an astounding 23 percent of its GDP, solidifying its position as the top recipient among WAMZ nations. Liberia followed closely behind, with remittances of approximately 17 percent of its GDP.

Chart 1: Remittance Inflows in the West African Monetary Zone



Source: World Bank Development Indicators

In an analysis by Acosta et al. (2009) they find that substantial external inflows into developing economies tend to cause an appreciation of the domestic currency's real exchange rate, which can potentially affect other sectors. This appreciation makes exports relatively more expensive, resulting in a loss of competitiveness that damages the export sector. However, when these remittance flows become excessively large relative to the overall size of the economy of the recipient nations, it can potentially give rise to a number of unintended negative consequences such as widening current account deficit, weaker monetary control and inflationary pressure as observed in several Latin American countries, (Lopez et al., 2007).

The remittance inflow could affect The Gambian economy via two main channels, “the spending effect” and “the resource movement effect.” Lopez et al. (2007), stated that as a small open economy, an increase in income resulting from remittance inflows raises the

demand for both tradable and non-tradable goods but the higher demand does not affect the prices of tradable goods since the country is a price taker in the international market. The supply of non-tradable goods is limited by domestic production capacity, thus, the increase in demand pushes up the prices of non-tradable goods in the domestic market - a phenomenon known as the "spending effect." Furthermore, the "resource movement effect" channel is observed because, as non-tradable production becomes relatively more profitable compared to tradable sectors, resources such as labor and capital tend to shift towards the non-tradable industries. These expanding sectors increase their demand for inputs, particularly those they use intensively, leading to a reallocation of resources from other sectors to meet this higher demand. Depending on the overall factor supply conditions, this resource reallocation typically drives up the returns to factors of production in the new equilibrium (Lopez et al., 2007)

Lopez et. al. (2007) further explained that the adverse impact of remittances on export and import-competing industries could be further exacerbated if the remittance inflows simultaneously fuel inflationary price hikes. This, in turn, may prompt wage increases throughout the economy as a response to rising prices (This is observed in a typical result of economic models with labor mobility). Moreover, this unfavorable situation could be aggravated if remittance receipts also directly reduce the domestic labor supply within the economy, as some recipients may choose to work less or withdraw from the labor force altogether. These combined effects could potentially erode the competitiveness of the tradable sectors and hinder overall economic growth (Lopez et al., 2007). On the other hand, the Gambia's limited export capacity and substantial import requirements would have ordinarily led to a persistent trade deficit in the goods component of its balance of payments. However, remittance inflows have played a crucial role in improving the nation's overall current account balance (Joof & Touray, 2021). These inflows serve as a vital source of foreign exchange, helping to offset the trade deficit and stabilize the country's external position. Thus, this study investigates the impact of remittances on the real effective exchange rate in Gambia.

The literature on remittance and real effective exchange rate in the Gambia is stranded, based on my knowledge, the only paper written on this subject matter for The Gambia

was by Joof and Touray (2021) in which they used the Fully Modified Ordinary Least Square (FMOLS) and Dynamic Ordinary Least Square (DOLS) that only measure the long run relationship. This paper will contribute to the existing literature as follows, we used the Autoregressive Distributive Lag (ARDL) model which measures both the short run and long run relationship focusing on the period from January 2009 to December 2019. Moreover, unlike the FMOLS and DOLS, the ARDL also permits mixed order of integration among the series.

The rest of the paper is arranged as follows: section 2 discusses the literature review; Section 3 describes the conceptual framework that underpins the analysis. Section 4 describes data and methodology of the model. Section 5 presents the main results, and the conclusion is presented in section 6.

2 LITERATURE REVIEW

A number of authors have studied the relationship between remittances and the real exchange rate in specific countries. This includes Bourdet & Falck, (2006), Acosta et al. (2009) and Chowdhury & Rabbi, (2011) who examined the impact of remittances on real exchange rate in Cape Verde, El Salvador and Bangladesh, respectively. Their findings reveal that over time there is a real exchange rate appreciation as remittance inflows in the economy increase. They also observe that remittances are associated with expansion of the non-tradeable sector, while the tradeable sector declines. Similarly, Joof and Touray (2021) investigates the impact of remittances on real effective exchange rate in the Gambia using the fully modified ordinary least square (FMOLS) and dynamic ordinary least square (DOLS) on a monthly data from 2009M1 to 2019M12, the study reveals that remittance has a positive and significant impact on the real effective exchange rate in the Gambia.

Other studies have assessed country groups such as Amuedo-Dorantes & Pozo. (2004) who find that remittances harm a country's export competitiveness as the real exchange rate to appreciate. They employ a panel of 13 Latin American and Caribbean countries and find that a doubling of workers' remittances per capita results in a real exchange rate appreciation of about 22%. This real exchange rate appreciation makes the country's

exports more expensive and less competitive in international markets. Similarly, Hassan & Holmes. (2012) employ a panel co-integration approach, to explore the long-run relationship between remittances and the real effective exchange rate (REER) for emerging and developing economies. Their findings reveal that an increase in remittance inflows resulted in appreciation of the REER.

3 CONCEPTUAL FRAMEWORK

The impact of remittances on the real effective exchange rate in The Gambia can be examined through two theoretical frameworks: the Portfolio Balance Model and the Real-side Theory. These models provide valuable insights into how the inflow of remittances, as a significant component of the country's current account, can influence the demand and supply of foreign exchange, as well as the competitiveness of the nation's exports.

3.1 Portfolio Balance Model:

This theory suggests that remittances, as a component of the current account, can influence the demand and supply of foreign exchange, thereby affecting the real effective exchange rate. The Gambia is heavily reliant on imports, with a small export base, resulting in a recurring trade deficit in the goods account of its balance of payments. Remittances and tourism serve as the primary sources of foreign exchange inflows, with remittances accounting for 15.2 percent of GDP in 2019.¹ This excess supply of foreign currency appreciates the value of dalasi, resulting in higher demand for domestic assets, causing a rightward shift in the bond demand curve. This increased demand for the dalasi would appreciate its value against foreign currencies, assuming no intervention by the central bank.

3.2 Real-side Theory:

This theory posits that a large inflow of foreign currency, such as remittances, can lead to an appreciation of the domestic currency, potentially harming the competitiveness of the country's exports. Since the country has excess foreign currency and an appreciated exchange rate, there will be high demand for imports, and domestic non tradeable goods

¹ World Bank Development Indicators

such as real estate. Accordingly, the real exchange rate increases, and the country loses competitiveness for its few exports which are mostly primary goods, leading to a deficit in the balance of payments. Furthermore, the higher disposable income from remittances causes higher consumption spending and inflationary pressures in the economy. In our AD-AS model this can be represented by the upward right movement of the AD curve, holding all else constant.

4 DATA AND METHODOLOGY

4.1 Data

In our estimation, we used monthly data for the Gambia, between January 2009 to December 2019. Remittances have been used in their levels and not as a percentage of GDP due to the unavailability of that monthly data. We used the real effective exchange rate as the dependent variable, remittances as the independent variable while the consumer price index, monetary policy rule, gross international reserve and foreign exchange transaction are used as control variables. The description of the series is presented in Table 1:

Table 1: Data Description and Sources

Name	Variable Name	Description	Unit	Source
Real Effective Exchange Rate	REER	relation to an index or basket of other major currencies	Index	Breugel
Remittance	REMITT	Gambia's inflow of remittances from abroad	Millions of USD	Central Bank of the Gambia
Consumer Price Index	CPI	Change in the prices of a basket of goods and services in Gambia	Index	Gambia Bureau of Statistics
Monetary Policy Rate	MPR	Policy rate set by the central bank of the Gambia	Percentage	Central Bank of the Gambia
Gross International Reserves	GIR	Country's holdings of foreign currency assets, monetary gold, and special drawing rights (SDRs) at the IMF	Millions of Gambia Dalasi	Central Bank of the Gambia
Foreign Exchange Transactions	FXT	Total volume of transactions in the foreign exchange market	Millions of USD	Central Bank of the Gambia

Note: Constructed by the authors

4.2 Model Specification

To investigate the impact of remittances on the real effective exchange rate in Gambia, we employ Autoregressive Distributed Lag (ARDL) as the main model. This is because ARDL allows the combination of both stationary and non-stationary time series data in the analysis as well as measuring both the short run and long run. Furthermore, the ARDL

requires the variables to have a long run relationship. The ARDL model is specified as follows:

$$lreer_t = \beta_0 + \beta_1 lremitt_t + \beta_2 lcpi_t + \beta_3 mpr_t + \beta_4 lgir_t + \beta_5 lfx_t + \varepsilon_t$$

Where:

lreer is the log of the real effective exchange rate.

lremitt is the log of total remittances received

lcpi is the log of Gambia's consumer price index.

mpr is the monetary policy rate.

lgir is the log of gross international reserves.

lfx is the log of foreign exchange transactions.

ε is the error term

5 MAIN RESULTS

5.1 Unit Root Test

The Phillips and Perron (PP) and the Augmented Dickey-Fuller (ADF) were applied to test for unit root. All the variables were non-stationary at their levels, except for LFXT, which is stationary at the 1 percent level for both tests. However, when taken at their first differences all variables become stationary at the 1 percent significance level in both the PP and ADF tests. This implies that these variables have mixed order of integration, $I(0)$ and $I(1)$, which is a prerequisite in applying the ARDL.

Table 3: Unit Root Tests

Variables	Phillips and Peron (PP)	Augmented Dickey-Fuller (ADF)
	t-Statistic	t-Statistic
LREER	-2.35	-2.42
LREMITT	-0.48	-0.07
LGIR	-0.46	-0.30
LFXT	-4.95 ***	-3.56 ***
LCPI	4.49	4.77
MPR	-1.28	-1.62
d(LREER)	-14.13 ***	-14.08 ***
d(LREMITT)	-20.40 ***	-8.12 ***
d(LGIR)	-10.53 ***	-10.56 ***
d(LFXT)	-18.24 ***	-6.89 ***
d(LCPI)	-12.80 ***	-4.89 ***
d(MPR)	-11.89 ***	-4.96 ***

Notes: (*) Significant at the 10%; (**) Significant at the 5%; (***) Significant at the 1%.

5.2 Bounds Cointegration Test

The ARDL bounds test is used to determine whether there is a long run cointegrating relationship among the variables in the model. Results from **Table 4**, show that an F-statistic value of 3.59, is greater than the critical values of the lower and upper bound at the 5% significance level. This suggests that there is evidence of a long run relationship among the variables.

Table 4: Cointegration Bounds Test

Test Statistic	Value	Signif.	I(0)		I(1)	
			Asymptotic: n=1000			
F-statistic	3.59	10%	2.08		3	
k	5.00	5%	2.39		3.38	
		2.5%	2.70		3.73	
		1%	3.06		4.15	
Actual Sample Size	131		Finite Sample: n=80			
		10%	2.30		3.15	
		5%	2.55		3.61	
		1%	3.35		4.59	

5.3 Autoregressive Distributive Lags (ARDL) Model

The following are estimates of the ARDL model. Table 5 shows the short run effects of the explanatory variables on the dependent variable.

Table 5: Short Run Autoregressive Distributive Lag

Dependent Variable: D(LREER)				
Sample (adjusted): 2009M03 2019M12				
Included observations: 130 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Selected Model: ARDL(1, 0, 0, 0, 1, 0)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
D(LREER(-1))	-0.1723	0.0824	-2.0900	0.0387
D(LREMITT)	0.0264	0.0253	1.0435	0.2988
D(MPR)	-0.0049	0.0038	-1.2913	0.1990
D(LGIR)	-0.0568	0.0281	-2.0215	0.0454
D(LFXT)	-0.0270	0.0109	-2.4876	0.0142
D(LFXT(-1))	-0.0267	0.0105	-2.5538	0.0119
D(LCPI)	3.4361	1.1331	3.0326	0.0030
C	-0.0174	0.0062	-2.8013	0.0059
R-squared	0.2055		Mean dependent var	-0.0011
Adjusted R-squared	0.1600		S.D. dependent var	0.0340
S.E. of regression	0.0311		Akaike info criterion	-4.0408
Sum squared resid	0.1183		Schwarz criterion	-3.8643
Log likelihood	270.6509		Hannan-Quinn criter.	-3.9691
F-statistic	4.5091		Durbin-Watson stat	2.1507
Prob(F-statistic)	0.0002			

In the short run remittance inflows were found to not have a statistically significant effect on the real effective exchange. The volume of foreign exchange transactions was found to have a significant negative relationship with the real effective exchange rate. A higher volume of foreign exchange transactions may indicate an increased demand for foreign currencies relative to the domestic currency (in this case, the Gambian Dalasi). When there is a higher demand for foreign currencies, the value of the domestic currency tends to depreciate, leading to a decrease in the real effective exchange rate. Similar result was confirmed by Bourdet and Falck (2003) who stated that an increased in remittance in Cape Verde will lead to an appreciation of the real exchange rate.

Furthermore, a 1 percent increase in the gross international reserves leads to a statistically significant 0.06 percent decrease in the real effective exchange rate. This

finding suggests that as the central bank accumulates foreign reserves, it may contribute to a depreciation of the exchange rate. On the other hand, a 1 percent increase in the consumer price index is associated with a significant appreciation of the real effective exchange rate of 3.4 percent. However, the increase in the monetary policy rate did not have a significant effect on the real exchange rate. This might indicate a slow transmission mechanism of monetary policy particularly in the short run.

Table 6: Long Run Autoregressive Distributive Lag

Dependent Variable: LREER				
Sample (adjusted): 2009M02 2019M12				
Included observations: 131 after adjustments				
Maximum dependent lags: 1 (Automatic selection)				
Model selection method: Akaike info criterion (AIC)				
Selected Model: ARDL(1, 0, 0, 1, 0, 1)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LREER(-1)	0.8693	0.0443	19.6198	0.0000
LREMITT	0.0598	0.0261	2.2878	0.0239
MPR	-0.0036	0.0014	-2.5730	0.0113
LGIR	-0.0857	0.0315	-2.7207	0.0075
LGIR(-1)	0.0528	0.0285	1.8485	0.0669
LFXT	-0.0261	0.0096	-2.7152	0.0076
LCPI	3.6195	1.2171	2.9738	0.0035
LCPI(-1)	-3.6462	1.2248	-2.9771	0.0035
C	0.9678	0.2999	3.2269	0.0016
R-squared	0.8911		Mean dependent var	4.4000
Adjusted R-squared	0.8839		S.D. dependent var	0.0914
S.E. of regression	0.0311		Akaike info criterion	-4.0356
Sum squared resid	0.1182		Schwarz criterion	-3.8381
Log likelihood	273.3318		Hannan-Quinn criter.	-3.9553
F-statistic	124.7593		Durbin-Watson stat	2.2023
Prob(F-statistic)	0.0000			

The long-run coefficients show that remittances have a positive and significant effect on the real effective exchange rate, with a 1 percent increase leading to a 0.06 percent appreciation. This analysis can be attributed to the fact that remittance inflow can cause an appreciation in the real exchange rate through an increase in spending and excess demand in the non-tradable goods sector, thus pushing the price of non-tradable upwards. This is in line with the findings from a study conducted by Joof and Touray (2021) that reveals remittances has a positive significant effect on real effective exchange rate in the Gambia. Meanwhile, the monetary policy rate (MPR) had a negative and significant

impact, indicating that a 1 percentage point increase in MPR results in a 0.4 percent point depreciation of LREER.

Gross International Reserves (LGIR) and foreign exchange transactions (LFXT) had a negative and significant effect on the real effective exchange rate. Meanwhile, the consumer price index (LCPI) was found to have a positive and significant effect on the real effective exchange rate. The relationship between LCPI and LREER should be taken with caution, since LCPI is observed to be trending upwards (see Appendix 2), this might indicate a spurious association.

5.4 Robustness Check

To ensure the reliability and validity of the findings, we use the fully modified least squares (FMOLS) as an alternative model to check the robustness of the ARDL. This model also indicates the direction of the coefficients in the cointegrating vector.

Table 7: Fully Modified Least Squares

Dependent Variable: LREER				
Method: Fully Modified Least Squares (FMOLS)				
Sample (adjusted): 2009M02 2019M12				
Included observations: 131 after adjustments				
Long-run covariance estimate (Bartlett kernel, Newey-West fixed bandwidth = 5.0000)				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LREMITT	0.2300	0.0916	2.5113	0.0133
LGIR	-0.2894	0.0396	-7.3001	0.0000
LCPI	0.0284	0.0964	0.2951	0.7684
MPR	-0.0256	0.0036	-7.0526	0.0000
LFXT	-0.0478	0.0340	-1.4057	0.1623
C	6.7528	0.3915	17.2500	0.0000
R-squared	0.5021		Mean dependent var	4.4000
Adjusted R-squared	0.4822		S.D. dependent var	0.0914
S.E. of regression	0.0657		Sum squared resid	0.5401
Long-run variance	0.0125			

From the results in Table 7, the coefficient of the FMOLS is consistent with the long run ARDL results. The coefficient of the main explanatory variable (lremitt) is positive, and it has a significant effect on the real effective exchange rate, similar to the long run ARDL. The results are also consistent for the other regressors.

5.5 Diagnostic Checks

We further conducted diagnostic tests to confirm the stability of our ARDL model. The Harvey for heteroskedasticity shows an insignificant f-statistic, therefore we cannot reject the null hypothesis of presence of homoskedasticity (**Table 8**). Furthermore, the results of the Breusch-Godfrey serial correlation LM test indicate a there is no serial correlation, as we fail to reject the null hypothesis (**Table 9**). Similarly, the Durbin Watson in Table 5 and 6 also indicates the absence of serial correlation as evidence by the values of 2.1 and 2.2 respectively. In both the Cussum and Cussum square graphs, the blue line falls within the confidence intervals at 5 percent significance level (**Chart 2 and 3**). This reflects the stability of the ARDL model.

Table 8: Heteroskedasticity

Heteroskedasticity Test: Harvey			
Null hypothesis: Homoskedasticity			
F-statistic	1.12016	Prob. F(8,122)	0.35447
Obs*R-squared	8.96393	Prob. Chi-Square(8)	0.34535
Scaled explained SS	14.22581	Prob. Chi-Square(8)	0.07607

Table 9: LM serial correlation

Breusch-Godfrey Serial Correlation LM Test:			
Null hypothesis: No serial correlation at up to 1 lag			
F-statistic	1.93041	Prob. F(1,121)	0.16727
Obs*R-squared	2.05713	Prob. Chi-Square(1)	0.15150

Chart 2: Cussum

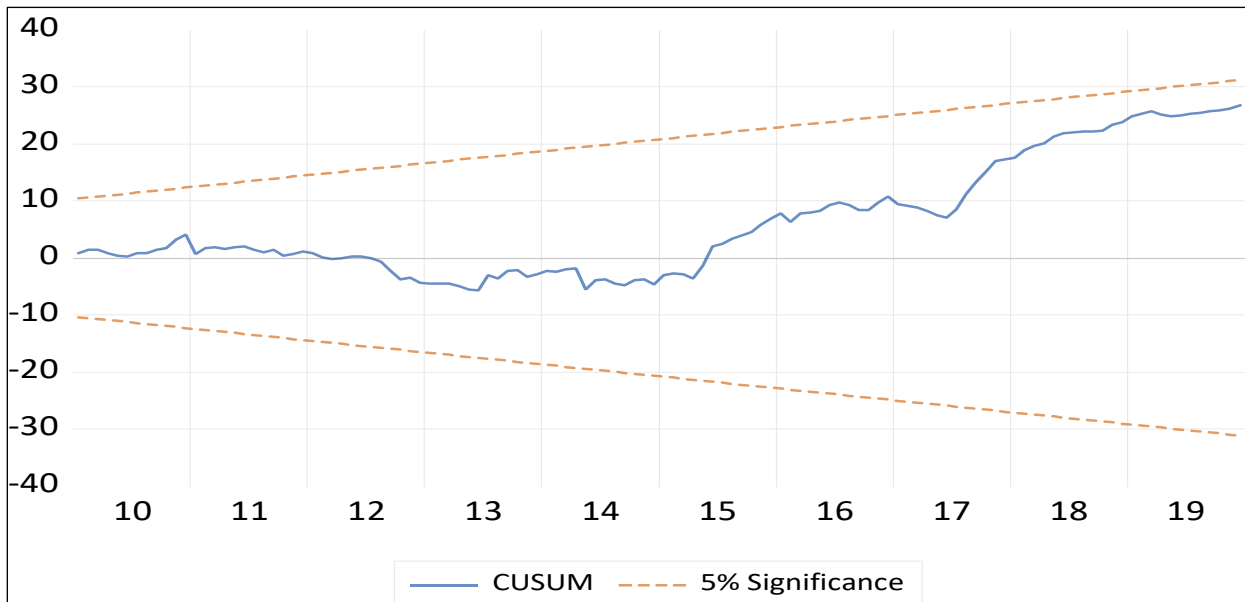
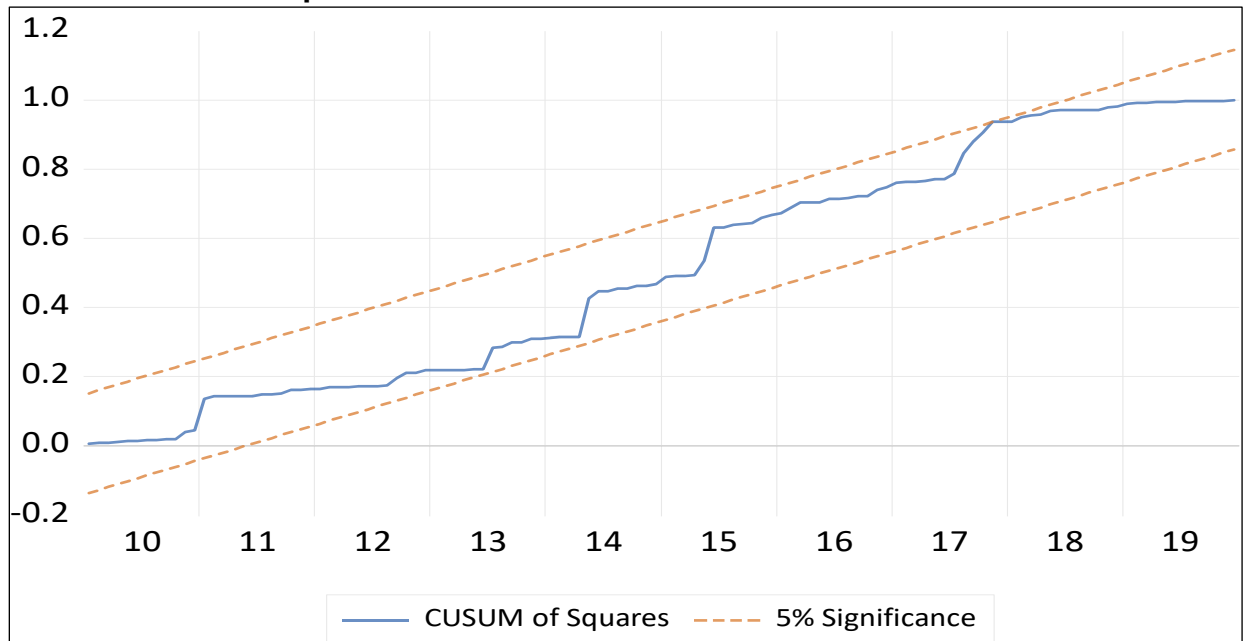


Chart 3: Cussum Square



6 CONCLUSION

In conclusion, this study investigated the impact of remittances on the real effective exchange rate in the Gambia using monthly data from January 2009 to December 2019. The ARDL bounds test confirmed the presence of a long run cointegrating relationship among the variables. The empirical results showed that remittance inflows have a significant positive effect on the real effective exchange rate in the long run, indicating that higher remittances lead to an appreciation of the Gambian Dalasi. This implies that the country loses competitiveness for its few exports, which are mostly primary goods, leading to a deficit in the balance of payments. For robustness check we use the FMOLS estimation technique, the results confirmed the consistency of the results, while the diagnostic tests validated the stability of the ARDL model. The central bank should consider sterilizing the excess foreign exchange inflows through the accumulation of international reserves, which can help mitigate the appreciation of the domestic currency.

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APPENDICES

Appendix 1: Descriptive Statistics

Variable	REER	REMITT	MPR	CPI	FXT	GIR
Mean	81.89	17.74	16.86	71.41	127.92	5432.66
Median	83.01	15.93	15.00	68.25	128.29	4855.82
Maximum	99.64	34.08	23.00	99.91	261.78	11559.79
Minimum	60.99	12.91	12.00	52.84	36.50	2179.53
Std. Dev.	7.32	4.41	3.99	13.98	41.05	2125.33
Observations	132	132	132	132	132	132

Appendix 2: Trends of Main Variables

