



# THE IMPACT OF REMITTANCES ON EXCHANGE RATES IN WEST AFRICAN MONETARY ZONE (WAMZ)

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## **Abstract**

*The study investigates the impact of remittances on the real exchange rate of West African Monetary Zone (WAMZ) member countries by using annual data from six countries from 1960 to 2022. The WAMZ member countries are Ghana, The Gambia, Nigeria, Guinea, Liberia and Sierra Leone. Remittances are important sources of foreign capital for developing countries including WAMZ. The study is unique because it examines three periods namely: Pre-WAMZ (1960-2000), During WAMZ (2001-2022) and the entire period (1960-2022); captures and compares how the increase in receipt of migrant remittances have affected the real exchange rate for the different periods given the huge increase in remittances in the last two decades; use updated data for longer period; shows how the different explanatory variables changes in the three periods examined. Multicollinearity tests, results reveal no multicollinearity among the variables.*

**Keywords:** Remittance; Real exchange rate; Panel data; West African Monetary Zone.

## **INTRODUCTION**

Remittances from migrants pose an important source of income for households in many developing countries. The value is rising and its role in promoting better living conditions and economic performance are very important and visible. Acosta et al., (2006) posit that migrant remittances are driven by increased international migration, technological advancement and financial competitiveness and these result in the fall in the cost of transmitting funds from one part of the world to another part. Migrant remittance is ranked second most important source of external funding for developing countries after foreign direct investment (Mallick & Mahallick, 2005; World Bank, 2014; Zouhaier, 2019).

Capital inflows have shown to be very important in the economies of developing countries, especially in the form of private capital inflow which is composed of foreign

direct investment, employee remittance, and portfolio investment. The countries have witnessed a massive rise in these flows in the recent decades and the composition and magnitude have witnessed a significant change. Remittances remain one of the major components of capital flows. The continents of North Africa, South Asia and Middle East have witnessed a constant increase in the level of remittances in recent years. According to the World Bank, Nigeria accounted for the highest remittances flow into Sub-Saharan Africa in 2022. Remittance flow into the Sub-Saharan Africa was \$ 53 billion, with Nigeria having 38% (\$ 20.1 billion), next is Ghana and Kenya with \$ 4.7 and \$ 4.1 billion respectively (World Bank, 2023). Growth in remittances to Middle East and North Africa declined by 3.8% to \$ 64 billion in 2022 despite strong growth of 12.2% in 2021. The World Bank report asserts that the overall rise in remittances to the Sub-Saharan African region have helped several struggling African countries that are grappling with drought, flood, and debt servicing issues.

Further, governments of many developing countries including WAMZ have since realized the important role that migrant remittance plays as a source of external finance. Remittances emanate from migrants when they send money back home to their families; this serves as an important lifeline for the countries and comprise a share of the gross domestic product (GDP) for the recipient developing countries.

### ***Research problem***

In recent decades, developing countries have received a lot of cross-border remittance flows. The WAMZ member countries have benefitted from remittances inflow in the form of transfers to embassies, churches, non-governmental organization which have received billions of dollars. Although remittances have contributed to the WAMZ member countries' economies, these suppositions have not been backed by funding from any rigorous macro-econometric study (Adenutsi & Ahorator, 2008). The Central banks have not shown leadership by providing adequate monetary policy formulation to attract maximum remittances to these countries.

Further, remittances appear to be a challenge in the understanding of the influence of global finance on national policy choices in the developing countries. Remittance is a form of capital inflow and has some unusual characteristics such as they are 'unrequited' and hence do not result in claims on assets, debt services obligation or contractual obligations (Brown, 2006; Kapur, 2005).

On the other hand, since purchases of financial or productive assets can be liquidated, remittances cannot be withdrawn from a country expose and not lumped together with other capital flows that cause household insecurity or income volatility e.g FDI and portfolio flows (Ahlquist, 2006; Garrett, 1998; Scheve & Slaughter, 2004). Migrants tend to increase remittances they send to their countries when their home countries experience



wars, famine or any economic difficulties as these remittances help smooth the income of families and protect them from the uncertainty and inconsistencies of the global economy. Financial transfers and inflows from migrants can serve as a form of insurance for developing countries against exogeneous shocks (Kapur, 2005; Lopez-Cordova & Olmedo, 2006; Lucas & Stark, 1985).

### *Motivation of study*

The main Objective of this study is to determine the impact of Remittances on the exchange rates of WAMZ member countries. There is widespread general belief that remittances have contributed to the economy of WAMZ member countries, but this assertion has not been backed by many macro-econometric studies. The role played by the Central bank in monetary policy formulation to attract maximum cross-border remittances to member countries still lacks some perspectives. Remittances have assisted receiving countries in poverty and inequality reduction, enhancement of human capital and financial development, reduction of labor supply, appreciation of real exchange rate and weaken the tradeable sector of receiving countries.

The research question of this study is to assess the impact of remittances on the currencies and exchange rate of the WAMZ countries. Remittances flows are largely influenced by migrants who depart their home countries and community in search of greener pastures in advanced countries. The continuous increase in migrants to advanced regions also comes from WAMZ member countries which have contributed significantly to the upward trend within Sub-Saharan Africa and to continuous increase in remittances inflows to these countries.

WAMZ is a monetary union. The presence of WAMZ has influenced the flow of remittances has on the exchange rate. The pre WAMZ period (1960-2000), the during the WAMZ period (2000-2022) and the entire period (1960-2022) shows how WAMZ has exhibited different effects of remittances on the exchange rate. Theories such as altruism, self-interest portfolio management e.t.c have motivated remittances flow and driven by need to cater for the welfare of relatives back in their home countries and communities.

### *Contributions of the study*

The formation of WAMZ in 2000 has shown some significant effects in the exchange rate policies of member countries of the WAMZ. Studies reveal that prior to WAMZ formation, member countries had divergent real exchange rates. After WAMZ formation, a growing convergence in real exchange rate was observed among four countries namely:

Nigeria, Sierra Leone, the Gambia, and Liberia (Nketiah et al., 2019). The WAMZ member countries have three exchange rate policy regimes namely fixed exchange rate regime; the intermediate; and the flexible or free-floating regime. The appropriate exchange rate regime is a key factor in achieving the proposed single currency (ECO). Given that WAMZ has the intention of deepening economic integration in the Economic Community of West African States (ECOWAS), the economic cost include the associated nominal exchange rate flexibility which serves as a policy instrument and buffer for adjusting asymmetric shocks.

Exchange rate is considered the most important price in an open economy and arguably the most important macroeconomic policy domain for governments in developing countries (Cooper, 1999). Remittances are important in influencing exchange rate policy making in WAMZ member countries, they also influence political institutions, interest groups and other aspects of the political economy. Remittances alleviate the political costs of lost monetary policy autonomy especially as they react in a countercyclical way to economic downturn and then insulate policy makers from economic uncertainty and volatility.

Remittances contribute in a positive way to the implementation of fixed exchange rates and have the capacity to act as a surrogate for domestic monetary policy autonomy in the WAMZ and other developing countries. Using Robert Mundell's (1961) optimum currency area framework, Singer (2010) posits that migrant remittances have a similar function as cross-border government transfers in the way they allow domestic economy to adjust to fixed exchange rate.

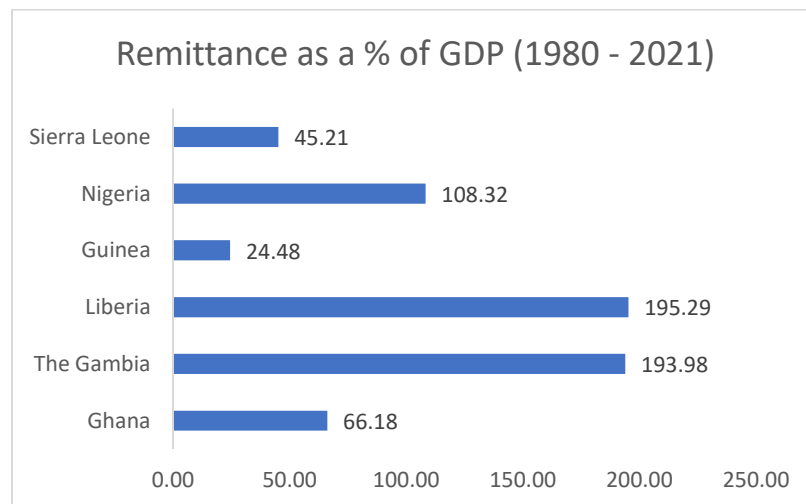


FIG. 1. REMITTANCE AS A % OF GDP (1980-2021)

Source: World Development Indicator

Remittance contributes significantly to the GDP of many WAMZ countries (Fig. 1). Data from World Development Indicator (WDI) show that Liberia received remittances and it



contributes the highest to its' GDP compared to other WAMZ member countries. This shows the huge efforts and altruism of their immigrants towards giving back to their families back home and their country. The study contributes to existing literature and knowledge on how remittances inflows can be controlled or promoted because it makes significant contribution to productivity and the economy of WAMZ. Trade is promoted and economic activities are sustained with remittance inflows.

### *Hypothesis*

Null Hypothesis:  $H_0$ : Remittances have no significant impact on the Exchange rate in WAMZ.

Alternative Hypothesis:  $H_A$ : Remittances have significant impact on the Exchange rate in WAMZ.

## **LITERATURE REVIEW**

### *Theoretical review*

Several studies capture the effect of remittances on the exchange rate. Hassan and Holmes (2013), Lartey et al (2012) and Maklouhf and Mughal (2013) assert that persistent inflows of remittances exercise upward pressure on the long run real exchange rate, which then results in Dutch disease effects related to a decline in the competitiveness of receipts' countries tradeable sectors. Given the interests in Fiscal Policy, Abdih et al (2012a) place emphasis on the impact of remittances on government revenues, then estimate for several recipient countries, the fiscal implications of the cut back in worldwide remittances in 2009 emanating from the global financial crisis. Abdih et al (2012b) investigate the adverse impact that remittances have on the quality of institutions through two main channels namely: the expansion in the revenue base distorts government incentive which lowers the cost of appropriating resources for its own purpose; and the supplemental income available to households increases their ability to purchase goods and substitutes for government services.

Furthermore, Amuedo-Dorantes and Pozo (2004) examine the impact of workers' remittances on real exchange rate using a panel of 13 Latin America and Caribbean countries. Using instrumenting for remittances leads to a conclusion that remittances appreciate real exchange rate in remittance-receiving countries. Hence, remittances have the potential to enforce economic costs on the export sector of receiving countries by reducing their ability to compete internationally. They utilize a set of variables that are related to remittance -receiving countries as instruments for remittances. Ball et al, (2013)

utilize a panel consisting of 21 countries and show theoretically and empirically that remittances appreciate real exchange rate under both flexible exchange rate regime and fixed exchange rate.

### *Empirical Review*

Edwards (1989) attempts to explain exchange rate volatility by using a theoretical model to capture the long run and short run fluctuations that exist in the exchange rate of developing countries. He displayed a dynamic small open economy model to explain the effect of nominal and real variables on the real exchange rate. The theoretical model posited that equilibrium real exchange rate is determined by real variables which can affect the long run equilibrium real exchange rate and the model was tested using 12 developing countries with data from 1962 to 1985. The results reveal that nominal variables affect the real exchange rate only in the short run while in the long run, the real exchange rate is affected by only real variables. Ahmed (2009) affirmed the Dutch disease hypothesis for Pakistan by estimating a linear regression model using variables namely Terms of trade, government spending, degree of openness, workers remittances, Foreign direct Investment (FDI) and real exchange rate.

## **METHODOLOGY**

### *Theoretical model*

Mundell (1963) and Fleming (1962) provide a framework for how macroeconomic policies are conducted in the presence of capital flows. The Mundell-Fleming model is an extension of the IS-LM model in an open economy setting with the hallmark assumption of sticky prices (Mark, 2001). Traditionally, the Mundell – Fleming models generally deal with fiscal and monetary policy effectiveness in the presence of global capital mobility that exist within the regimes of flexible or fixed exchange rate. These models could predict the impact of domestic and external shocks and the co-movement of macroeconomic variables at home and abroad.

The modification and incorporation have produced two types of models namely (Adenutsi & Ahorator, 2008):

- 1) Deterministic Dynamic Mundell-Fleming models, and
- 2) Stochastic Dynamic Mundell-Fleming models.

### *Empirical model*

To examine the impact of remittance inflows on exchange rate, a model takes cognizance of various theories and outcome of previous empirical research such as Gapen & Montiel (2008), Quartey (2006), Vargas-Lundius (2004), Rapport & Docquier (2006) were specified. The empirical model takes insights from the theoretical model in the choice of variables



for the model and shows the relevance of the variables in explaining the theoretical framework and relationship. The justification for the variables is backed by economic theory on how the variables individually influence the personal remittances and it expresses the functional relationship between the dependent variable and these independent variables.

In the light of the above and drawing insights from Nketiah et al., (2019), Loto and Alao (2016), and McMahon(1998) models, this model posits that real exchange rate is a function of per capital remittances received, per capita income, trade openness, ratio of government expenditure to GDP and capita flow.

$$ERR = f(PCR, PCI, TOP, GEX, CI)$$

### *Method of analysis*

The nature of the study entails the use of panel data for the period 1960 – 2022. Panel data is apt because it can identify parameters in the occurrence of measurement error and have robustness to omitted variables and the capture the efficiency of parameter estimates. The panel robust least squares (Panel RLS) estimator would be used to estimate the model for impact of remittance on exchange rate in WAMZ. The variables would be tested for unit root and cointegration test would be performed to determine if there is a long-run relationship among variables of the model or not.

The study captures three periods to enable us to explain the effect of WAMZ. The three periods are:

- Pre-WAMZ period (1960-2000)
- During WAMZ period (2000-2022)
- Entire Period (1960-2022).

### *Data description*

The data type is secondary data, and it uses a panel data set for the six countries of WAMZ. The countries comprise Nigeria, the Gambia, Guinea, Sierra Leone, Ghana and Liberia. WAMZ is our focus because it is an important monetary union that is instrumental in the promotion of regional integration and development of sub-Saharan Africa and provides an institutional framework that policy discussion and implementation. The period of study is 1960-2022 based on availability of data.

### *Research Question*

How does remittance impact the exchange rate and currencies of the WAMZ countries?

Remittances can propel the growth of new small-scale businesses and then foster entrepreneurship by relaxing credit constraint for receiving countries. Remittances can mitigate the exchange rate volatility derived from the outflow and export by providing an indirect stabilizing effect of exchange rate volatility in times when other kinds of capital flows experience fluctuations and then offer regular source of foreign currency into the receiving country economy.

Data from six WAMZ countries from 1960 to 2021 would be used to investigate the impact of remittances on real exchange rates and net exports.

Net exports will require the instruments to address endogeneity of worker's remittances and the instrumental variables are: weighted average per capita GNI, unemployment rate and real interest rate of remittance sending countries

### **Model**

We use a panel of 6 countries in WAMZ to analyze how workers' remittances affect real exchange rate and net exports. We estimate the relationship and can be written as:

$$E_{it} = \beta_0 + \beta_1 R_{it} + \beta_2 I_{it} + \beta_3 OP_{it} + \beta_4 X_{it} + \beta_5 CF_{it} + \alpha_i + \delta_t + \epsilon_t$$

Where:

$E_{it}$  = real exchange rate

$R_{it}$  = per capita remittances received by country I at year t

$I_{it}$  = Per capita income

$TOP_{it}$  = Trade Openness = (import + export/GDP)

$X_{it}$  = ratio of government expenditure to GDP

$CF_{it}$  = Capital flow (FDI + foreign aid)

$\delta_t$  = time fixed effect

$\alpha_i$  = country fixed effect

$\epsilon_{it}$  = Error term

$\epsilon$  = Error term

Based on apriori expectations, we expect that:

$$\beta_1 > 0, \beta_2 > 0, \beta_3 > 0, \beta_4 < /> 0, \beta_5 > 0$$

The real exchange rate for the country I at time t is defined as

$$E_{it} = e_{it} \times P_{us}/P_{it}$$

Where:





$e_{it}$ =nominal exchange rate

$P_{it}$  = price index

$P_{us}$  = US price

Price index can be the GDP deflator or CPI.

*Estimation techniques*

The OLS regression technique will be used to analyze the data. Stationary tests, heteroskedasticity, Augmented Dickey-Fuller unit root tests will be applied. Additionally, Fixed effect, cointegration and stability tests will be applied. Descriptive statistics and diagnostic testing such as the Multicollinearity and Pearson correlation test will be implemented in this study.

**ANALYSIS, INTERPRETATION AND DISCUSSION OF RESULTS**

*Real exchange rate descriptive statistics*

TABLE 1. REAL EXCHANGE RATE DESCRIPTIVE STATISTICS

	Sierra Leone	Nigeria	Liberia	Guinea	Ghana	The Gambia
Mean	169.0279	147.3131	360.3637	265.9615	358.8717	170.8867
Median	142.6261	133.1625	356.9780	268.7895	141.7449	201.2114
Maximum	561.1871	536.9107	414.8943	301.6783	3053.589	269.8880
Minimum	91.35220	49.77631	304.7840	213.8970	68.18191	72.75780
Standard Deviation	92.86049	94.80168	40.06086	33.39289	474.2842	57.61883
Skewness	2.531822	2.327921	0.273207	-0.503789	3.631547	-0.358573
Kurtosis	9.589486	8.644007	1.693035	1.680806	19.26431	1.838800
Jarque-Bera	181.2873	140.5206	5.267653	7.233154	832.8608	4.889546
Probability	0.000000	0.000000	0.071803	0.026875	0.000000	0.086746
Sum	10648.76	9280.723	22702.91	16755.58	22608.92	10765.86
Sum Sq Dev	534630.4	557216.3	99502.11	69135.29	13946619	205835.6
Observations	63	63	63	63	63	63

Source: Researcher’s computation from WDI data

The average real exchange rate of Liberia is the highest among the six countries of WAMZ for the 63-year period while Nigeria recorded the lowest average real exchange rate among the WAMZ countries for the same period (Table 1). Ghana recorded the highest maximum value for the real exchange rate while Nigeria recorded the least minimum value for the real exchange rate. The kurtosis and skewness statistics measure the departure from symmetry and peaked ness of the distribution respectively. The data collected show that the positive skewness is quantitatively high, and this justifies the high

level of the peak value. Additionally, the high real exchange rate for Liberia implies that Liberia is losing its competitive edge more and the exports are more expensive while the imports are less expensive. The increase in productivity tend to lead to lower production costs and lead to a rise in the real exchange rate. On the other hand, Nigeria with the lowest real exchange rate implies that it gains some competitive edge, the exports are cheaper while the imports are more expensive. Nketiah et al (2019) posit that increase in capital flows is a function of stock of assets and liabilities in the economy and increase in net foreign assets leads to changes in the real equilibrium exchange rate. Remittance affects the real exchange rate through their impact on growth. Even though the impact on growth is uncertain from our results, Lopez et al., (2007) assert that remittances lead to a significant appreciation in real exchange rate.

### *Panel data regression*

The panel data regression involves five explanatory variables and the dependent variable of real exchange rate. Regression was done for three periods to enable us to compare the impact on the variable during the various changing times. The first period is the pre-WAMZ period (1960-2000), the second period is during the WAMZ (2001-2022) and the third period is the entire period of study (1960-2022).

$$RER_{it} = \alpha + \beta_1 PCI_{it} + \beta_2 PCR_{it} + \beta_3 GFCE_{it} + \beta_4 CF_{it} + \beta_5 TOP_{it} + \delta_t + \alpha_i + \mu_t$$

### *Pre-WAMZ period*

TABLE 2. PRE-WAMZ PERIOD

Variable	Coefficient (Standard Error)	P-value
Dependent Variable: Real Exchange rate		
Per capita Income	0.070543 (0.077099)	0.3611
Per capita Remittance received	9.659054 (3.644316)	0.0086
Government Consumption Expenditure	-0.823915 (2.516104)	0.7436
Capital Inflow	-2.25E-07 (6.80E-08)	0.0011
Trade Openness	-0.466055 (0.292587)	0.1125
Constant	302.1122	
R-squared	0.064075	
Adjusted R-squared	0.044577	

$$RER_{it} = 302.1122 + \beta_1 0.070543 + \beta_2 9.659054 + \beta_3 -0.823915 + \beta_4 -2.25E-07 + \beta_5 -0.466055 + \delta_t + \alpha_i + \mu_t$$



In the pre-WAMZ era, the variables per capita remittance and capital inflow were statistically significant while the variables per capita income, Gross final consumption expenditure and trade openness were not significant (Table 2). This implies that we reject the null hypothesis and conclude that Remittances have significant impact on real exchange rate for the variables per capita remittance and capital flow while we fail to reject the null hypothesis and conclude that remittances have no effect on exchange rate for the variables Per capita income, Gross final consumption expenditure and Trade. Also, for per capita remittance, one unit increase will result in an increase in the real exchange rate by 9.65905 while holding other variables constant. From the result, the positive relationship between per capita remittance and real exchange rate is in consonance with Economic theory. An increase in remittance causes an appreciation of the exchange rate, increase in the capital account and external imbalance. Giving the increasing population to explain the per capita remittance, the remittances received will lead to appreciation of the real exchange rate. For the capital inflow, the negative relationship in the result is not in consonance with economic theory. This means that if the capital inflow increases by one unit, then the real exchange rate decreases by 2.25E - 07 while holding other variables constant. An increase in capital inflow leads to currency appreciation, but a decrease in net exports and aggregate demand. Capital inflow produces high demand for both tradeable and non-tradeable goods which leads to higher relative prices of non- tradeable goods and appreciation of the real exchange rate.

During WAMZ

TABLE 3. DURING WAMZ

Table with 3 columns: Variables, Coefficient (Standard Error), P-value. Rows include Per capita Income, Per capita remittances received, Government Consumption Expenditure, Capital Inflow, Trade Openness, Constant, R-squared, and Adjusted R-squared.

$$RER_{it} = 43.94366 + \beta_1 - 0.017728 + \beta_2 0.035792 + \beta_3 13.00792 + \beta_4 - 2.35E-09 + \beta_5 0.010748 + \delta_t + \alpha_i + \mu_t$$

The five explanatory variables are per capita income, per capita remittance, Government final consumption expenditure, capital inflow and trade openness (Table 3). Among these, only the Government final consumption expenditure is statistically significant while the remaining four variables are not significant. The Government final consumption expenditure is highly statistically significant; hence we reject the null hypothesis and conclude that the variable has a significant impact on the real exchange rate. Since the variables per capita income, per capita remittance, capital inflow and trade openness are not significant, we conclude that they do not have impact on the real exchange rate during WAMZ. If the Government consumption expenditure increases by one unit, we expect the real exchange rate to increase by 13.00792 while holding other variables constant. While Government purchases and expenditure causes the real exchange rate to appreciate, increase in consumption in developing countries especially WAMZ leads to depreciation of the real exchange rate.

### *Entire period*

TABLE 4. ENTIRE PERIOD

Variable	Coefficient (Standard Error)	P-value
Dependent variable: Real Exchange rate		
Per Capita Income	-0.025783 (0.037833)	0.4960
Per capita remittance received	-0.454901 (0.434583)	0.2959
Government consumption Expenditure	1.476916 (1.866428)	0.4293
Capital Flow	-1.71E -08 (1.42E-08)	0.2285
Trade Openness	0.143473 (0.150347)	0.3406
Constant	248.7431	
R-Squared	0.057581	
Adjusted R-squared	0.044914	

$$RER_{it} = 43.94366 + \beta_1 - 0.036001 + \beta_2 - 0.621258 + \beta_3 0.372466 + \beta_4 - 1.46E-08 + \beta_5 - 0.131158 + \delta_t + \alpha_i + \mu_t$$

The five independent variables witnessed changes in the three periods of study (Table 4). For the per capita income, the coefficient was negative in the entire period, positive in the



pre-WAMZ period and negative in the during the WAMZ period. For the per capita remittance, the coefficient was negative for the entire period, positive for the pre-WAMZ period and positive for the during the WAMZ period. For the Government consumption expenditure, the coefficient is positive during the entire period, negative during the pre-WAMZ period and positive during the WAMZ period. For the Capital flow, the coefficient was negative for the entire period, pre-WAMZ and during WAMZ period, but statistically significant for only the pre-WAMZ period. For the Trade openness, the coefficient was positive in the entire period, negative in the pre-WAMZ period and positive in the during the WAMZ period.

Further, from the regression result for the entire period, none of the five explanatory variables were statistically significant, hence we fail to reject the null hypothesis and conclude that all of them do not have significant impact on the real exchange rate. For the per capita income, if it increases by one unit of the dollar, this leads to a decrease in the real exchange rate by 0.0225783 while holding other variables constant. Per capita income is a measure of economic growth, and a high real exchange rate stimulates economic growth. For the per capita remittance, a one unit increase in the per capita remittance received leads to a decrease in the real exchange rate by 0.454901 while holding other variables constant. Economic theory posits that an increase in per capita remittances lead appreciation of the real exchange rate, increase in capital account and external imbalance. For the Gross final consumption expenditure, an increase of one unit is expected to increase the real exchange rate by 1.476916 while holding other variables constant. Increase in government spending stimulates the aggregate demand and causes some real GDP growth and real exchange rate appreciation. The Government expenditure can influence the real exchange rate potentially through the resource withdrawal channel and the consumption tilting channel.

The capital flow has a negative relationship with the real exchange rate for the entire period. If the capital inflow increases by one unit, then the real exchange rate decreases by  $1.71E-08$  while holding other variables constant. An increase in capital inflow leads to real exchange rate appreciation and a reduction in net exports and aggregate demand. Capital inflow produces a higher demand for both tradeable and non-tradeable goods and then higher relative price for non-tradeable goods. Capital inflow increases the domestic resources needed to produce non-tradeable goods needed to meet the increase in demand. Also, the trade openness has a positive relationship with the real exchange rate and a one unit increase in the trade openness is expected to increase the real exchange rate by 0.143473 while holding other variables constant. An increase in the trade openness

leads to absorption of more real shocks by the currency market which affects nominal shocks. In an open economy, fluctuations in the exchange rate leads to expectations of a depreciation on the national currency.

### **Correlations**

The Pearson correlation test is important because it measures the strength and direction of linear relationship between two variables. It is used to evaluate the strength of association between data and variables. The variables have positive and negative association present among the six variables including real exchange rate.

TABLE 5. CORRELATIONS

		Real Exchange rate	Per capita remittance	Per capita Income	Trade Openness	Government final consumption expenditure	Capital Inflow
Real Exchange rate	Pearson Correlation	1	-.183	-.215	.081	.104*	-.210**
	Sig (2-tailed)		<.001	<.001	.115	.044	<.001
Per capita remittance	Pearson Correlation	-.183**	1	.707*	.108*	-.090	.621**
	Sig (2-tailed)	<.001		<.001	.036	.082	<.001
Per capita Income	Pearson Correlation	-.215**	.707**	1	-.158**	-.252**	.775*
	Sig (2-tailed)	<.001	<.001		.002	<.001	<.001
Trade Openness	Pearson Correlation	.081	.108*	-.158*	1	.345**	-.114*
	Sig (2-tailed)	.115	.036	.002		<.001	.026
Government final consumption expenditure	Pearson Correlation	.104*	-.090	-.252**	.345**	1	-.189**
	Sig (2-tailed)	.044	.082	<.001	<.001		<.001
Capital Inflow	Pearson Correlation	-.210**	.621**	.775**	-.114*	-.189**	1
	Sig (2-tailed)	<.001	<.001	<.001	.026	<.001	
	N	378	378	378	378	378	378

Real exchange rate has relationship with all the variables (Table 5). Real exchange rate has perfect positive relationship with itself, the relationship with per capita remittance is considered as negligible correlation, negative and there is insufficient statistical evidence that the correlation between two variables is significant. Given that there exists a negative correlation between real exchange rate and per capita remittance, it implies that both variables move in opposite direction and do not move in tandem. When the real exchange rate increases, the per capita remittances decreases and vice versa. Similarly, the real exchange rate has a negative relationship with the per capita income, shows negligible



correlation and there is insufficient statistical evidence that the correlation between two variables is significant. The negative relationship implies that when the real exchange rate increases, then the per capita income decreases and vice versa.

Additionally, the trade openness has a positive relationship with the real exchange rate. It has negligible correlation and there is insufficient statistical evidence that correlation between two variables is significant. The positive relationship implies that the real exchange rate and trade openness move in tandem; if the real exchange rate increases, then the trade openness also increases and if it decreases, the trade openness also decreases. The real exchange rate has a positive relationship with the Government final consumption expenditure. The correlation is negligible and there is insufficient statistical evidence that the correlation between the two variables is significant. The positive relationship between the real exchange rate and Government final consumption expenditure implies that both variables move in tandem with each other and as one variable decreases, the other variable also decreases.

For the capital flow, it has a negative correlation with the real exchange rate. The correlation is negligible and there is insufficient statistical evidence that the correlation between the two variables is significant. The negative correlation implies a negative relation between the capital flow and the real exchange rate, and they do not move in tandem. If the capital flow increases, then the real exchange rate decreases and if the real exchange rate increases, then the capital flow decreases.

Overall, the variables have 36 points of correlation with one another, and the correlations are either positive or negative. Apart from the perfect correlations present, the highest is the correlation between capital inflow and per capita income. The correlation coefficient is 0.775 and it suggests that there is a high positive correlation between the capital inflow and per capital income for the 63-year period in WAMZ. Both variables move in tandem and have a high positive association. In the entire correlation result, there is no multicollinearity. This is because the correlation coefficients are less than 0.8.

**Model summary**

TABLE 6. MODEL SUMMARY

Model	R	R Square	Adjusted R Square	Std Error of the Estimate
1	.240	.058	.045	215.94319096

From the model (Table 6), it shows that the model does not have good fitness for the entire period. The low R square of 0.058 means that only 5.8% of the variations in the real

exchange rate is explained by per capita income, per capita remittance, Government final consumption expenditure, capital inflow and trade openness while the remaining 94.2% of the variation is unaccounted for. The standard error of 215.943 is high. The standard error is intuitively the standard deviation of a sampling distribution, and it depicts how much disparity there is likely to be between the point of estimates obtained from a sample relative to the true population of the mean. From the high value, it is obvious that that the disparity is quite large.

## ANOVA

TABLE 7. ANOVA

Model		Sum Squares	df	Mean Square	F	Sig
1	Regression	1059873.262	5	211974.652	4.546	<.001
	Residual	17346903.760	372	46631.462		
	Total	18406777.022	377			

Note:

1. Dependent Variable: Real Exchange rate
2. Predictors: (Constant), Trade openness, per capita remittance, Government final consumption expenditure, capital inflow, Per capita income

The regression shows that there exists a relationship between real exchange rate and per capita remittance, real exchange rate and per capita income, real exchange rate and Government final consumption expenditure, real exchange rate and capital inflow, and real exchange rate and trade openness. The ANOVA result (Table 7) is important because it informs us that there are significant differences between the means of three or more groups. Also, the test result is statistically significant, and it implies that at least one group's mean differs from others. The 'between' variance is much larger than the 'within' variance and the factor level impacts the mean of the distribution of the variables. The test shows that F-test and adjusted R-squared in the model specification provided evidence that the explanatory variables are jointly not equal to zero, but not a good fit of the model.

## *Coefficients*

The coefficients and their values tell us the relationship each value has with the dependent variable, the real exchange rate (Table 8). There is a negative relationship between the real exchange rate and per capita remittance, capital inflow and per capita income. There is a positive relationship between real exchange rate and the Government final consumption expenditure and trade openness. From the result, none of the variables is statistically significant. This means that none of the variables is a useful predictor of the real exchange rate. Also, the VIF statistics is an indicator to inform us of the presence of multicollinearity or not. Since (Variance Inflation Factor) VIF of 5-10 signifies





multicollinearity, there is NO multicollinearity in the results. This is because all the VIF statistics are less than 5.

TABLE 8. COEFFICIENTS

Model	Unstandardized B	Coefficients Std Error	Standardized Coefficient Beta	t	Sig	Statistics VIF
Constant	248.743	29.980		8.297	<.001	
Per capita remittance	-.455	.435	-.080	-1.047	.296	2.286
Government consumption expenditure	1.477	1.866	.043	.791	.429	1.190
Capital Inflow	-1.714E-8	.000	-.097	-1.206	.229	2.573
Per capita Income	-.026	.038	-.064	-.681	.496	3.431
Trade Openness	.143	.150	.054	.954	.341	1.250

Note: Dependent Variable: Real Exchange rate

The no multicollinearity in the results means that the independent variables are not highly correlated with each other. This means that each predictor makes some important contributions in explaining the outcome. A significant amount of information present in one predictor is not contained in other predictors. The statistical significance of independent variables is NOT undermined.

How has the remittances impacted the exchange rate and economy of WAMZ?

From the results, the correlation coefficient between the predictors and the Variance Inflation Factor (VIF) is considered the most used method by statisticians to test multicollinearity. The values range between 1.19 and 3.43 leads to the conclusion where we fail to reject the null hypothesis of no multicollinearity. There is no multicollinearity, hence the statistical inferences are reliable, and the independent variables interact and affect each other. The Pearson correlation test did show that there exist relationships between real exchange rate and all five independent variables chosen in the model. The relationship was either positive or negative. Per capita remittance variable is proxy for the remittance, and it shows a negative relationship with the real exchange rate. There is negligible correlation, and both variables move in opposite direction. An increase in per capita remittance leads to a decrease in the real exchange rate.

Since the creation of WAMZ in 2000, exchange rate stability has been one of the major goals of the monetary union. Many WAMZ and Sub-Saharan African countries have

exchange rate stability as one of their monetary policy objectives. The creation of WAMZ has led to better coordination and more inflow of FDI and remittances from migrants who are citizens but live abroad. The remittances and capital inflow has led to the appreciation of the real exchange rate in the member countries. Hence, there has been a huge increase in remittance to member countries which have served as sources of livelihood for many families and an important component of the GDP of these countries. The increase in remittances has been driven by having many WAMZ citizens abroad, increased interest/request by home governments, altruism from migrants who live and work abroad. The increase in remittance, which is a component of inflows into the economy has increased consumption in the economy, led to the appreciation of the real exchange, increased the domestic economy, but have not achieved exchange rate stability.

## **CONCLUSION**

International migrants are assiduous in their host countries and save a portion of their income in savings which they remit a part of their savings to their families back home for either support or investment. Remittances are expected to help improve the economy of remittance-receiving countries, but it is not always true. Remittances have the potential of appreciating the real exchange rate of the remittance-receiving countries, hence weakening the competitiveness of their economy, and reducing their exports. We discover that for all the WAMZ countries, an average of 10% increase in per capita remittance will lead to 4.54% reduction (appreciation) in the real exchange rate. The total per capita remittance received by WAMZ countries rose from \$ 115 million in 1960 to \$ 26.5 billion in 2022.

Moreover, the study examined the impact of remittances on the exchange rate of the WAMZ countries. To analyze the impact of remittances, the ordinary least square method was chosen. The study used time series data and panel data regression for the five explanatory variables that influenced the exchange rate over the 63-year period. Correlation, Multicollinearity and ANOVA tests were done, and we found that many of the variables possessed negligible correlation. Among the explanatory variables, some have a positive relationship with the real exchange rate while others have a negative relationship. The correlation result shows that many were negligible correlation except for per capita income/capital flow, per-capita remittance/per capita income which recorded a high positive correlation, and few others have moderate and low correlation. The F test and adjusted R squared in the model specification show evidence that the explanatory variables are jointly not equal to zero and does not have goodness of fit for the entire period.

Further, the study analyzed the impact using three periods namely: Pre-WAMZ era (1960-2000), during WAMZ era (2001-2022) and the entire period (1960-2022). The



regression results of the variables in the three period differ. In the pre-WAMZ period, the per capita remittance and capital inflow had significant impact on the real exchange rate. In the during the WAMZ era, the Government final consumption expenditure was statistically significant and had an impact on the real exchange rate. In the entire period, none of the variables were significant. The analysis shows that a long run relationship (co-integration) exists among the variables in the entire period. The pre-WAMZ period does not show long run relationship while the during the WAMZ period shows long run relationship for some of the variables.

The research further real that in the entire period, the per capita income, per capita remittance, and capital inflow result in the appreciation of the real exchange rate in WAMZ. The negative relationship with the real exchange rate shows that the variables move in the opposite direction with the real exchange rate and such leads to appreciation. In the pre-WAMZ period, the government consumption expenditure and capital inflow are the variables that propelled the real exchange rate appreciation while in the during the WAMZ period, the per capita income and capital inflow caused the appreciation of the real exchange rate. The Granger causality tests, the Vector Autoregressive (VAR) and the Unit root tests reveal that some variables were significant in their impact on the real exchange rate.

## **RECOMMENDATIONS**

The analysis reveal important issues and we recommend the following:

- 1) Need for more understanding and emphasis on the economic importance of remittances in the WAMZ member countries' economies.
- 2) Need to study the consequences of remittance on the export sector because of real exchange rate appreciation that emanates from increasing flows of remittances.
- 3) The increasing level of remittances has attracted a lot of consideration in WAMZ especially in the last two decades, therefore this calls for new opportunities. More opportunities for investment expenditure on capital goods which will boost income, stimulate production, and increase exports.
- 4) Need for governments of WAMZ member countries to create investment vehicles such as diaspora bond to encourage the citizens of WAMZ member countries who are immigrants working abroad to contribute towards national development.

**REFERENCES**

- Abdih, Y., Barajas, A., Chami, R., & Ebeke, C. (2012a). Remittances Channel and Fiscal Impact in the Middle East, North Africa and Central Asia. IMF Working Paper No. 12/104. Washington, DC. International Monetary Fund.
- Abdih, Y., Chami, R., Dagher, J., & Montiel, P. (2012b). Remittances and Institutions: Are Remittances a Curse? *World Development*, 40(4), 657-666.
- Acosta, P.A., Baerg, N.R., & Mandelman, F.S. (2009a). Financial development, remittances and real exchange rate appreciation, *Economic Review*, 94, 1-12.
- Acosta, P.A., Lartey, E.K., & Mandelman, F.S. (2009b). Remittances and the Dutch disease, *Journal of International Economics*, 79(1), 102-116.
- Acosta, P.A., Lartey, E.K.K., & Mandelman, F.S. (2009). Remittances and the Dutch Disease, *Journal of International Economics*, 79, 102-116.
- Acosta, P.A., Fajnzylber, P., & Lopez, J.H. (2008). "Remittances and Household Behaviour: Evidence for Latin America", In: *Remittance and Development: Lessons from Latin America* (Eds. Pablo Fajnzylber & J. Humberto Lopez). Washington DC: The World Bank, 133-170.
- Adenutsi, D.E., & Christian, R.K. Ahoritor (2008). Remittances, Exchange Rate and Monetary Policy in Ghana, *West African Journal of Monetary and Economic Integration*, 8(2), 1-42.
- Ahlquist, J.S. (2006). Economic Policy, Institutions and Capital Flows: Portfolio and Direct Investment Flows in Developing Countries, *International Studies Quarterly*, 50(3), 687-710.
- Ahmed, H. (2009). Capital Flows and Real Exchange Rate Overvaluation – A Chronic Ailment: Evidence from Pakistan, *Lahore Journal of Economics*, 14, 51-81.
- Aigheyisi, O.S. (2016). Dynamic OLS Estimation of the Effect of Trade on Economic Growth in Nigeria, *West African Financial and Economic Review*, 14(1), 157-182.
- Akande, E., & Oluyomi, O. (2010). The two-gap model of economic growth in Nigeria: Vector Autoregressive (VAR) Approach. Paper presented at the 13<sup>th</sup> Annual Conference on Global Economic Analysis. GI, Penang, Malaysia.
- Alonso Gonzalez, L.A., & Sovilla, B. (2014). A Kaleckian model for understanding and responding to the economic policy challenges of remittances, *International Review of Applied Economics*, 28(6), 832-848.
- Amuedo-Dorantes, C., & Pozo, S. (2004). Workers' remittances and the real exchange rate: A paradox of gifts, *World Development*, 32(8), 1407-1417.



- Ball, C.P., Lopez, C., & Reyes, J. (2013). Remittances, Inflation and Exchange rate regimes in small open economies, *The World Economy*, 36(4), 487-507.
- Bank of Ghana. (2009). Annual Report and Statistics, Accra: Bank of Ghana
- Barajas, A. (2010). Workers' Remittance and the Equilibrium Real Exchange Rate: Theory and Evidence. International Monetary Fund.
- Barajas, A., Chami, R., Hakura, D., Montiel, P., & Tressel, T. (2011). Workers' remittances and the equilibrium real exchange rate: Theory and Evidence, *Economia*, 11(2), 45-99.
- Beja Jr., E.L. (2011). Do international remittances cause Dutch disease? *Migration Letters*, 8(2), 132-140.
- Benmamoun, M., & Lehnert, K. (2013). Financing Growth: Comparing the Effects of FDI, ODA, and International Remittances, *Journal of Economic Development*, 38(2), 43-65.
- Bernhard, W., & Leblang, D. (1999). Democratic Institutions and Exchange Rate Commitments, *International Organization*, 53(1), 71-97.
- Bourdet, Y., & Falck, H. (2006). Emigrants' remittances and Dutch disease in Cape Verde, *International Economic Journal*, 20(3), 267-284.
- Brown, S. (2006). Can Remittances Spur Development? A Critical Survey, *International Studies Review*, 8, 55-75.
- Broz, J.L. (2002). Political System Transparency and Monetary Commitment Regime, *International Organization*, 56(4), 861 -887.
- Clemens, M.A., & Mckenzie, D.J. (2014). Why don't remittances appear to affect growth? Center for Global Development.
- Cohen, B.J. (1993). "The Triad and the Unholy Trinity: Lessons for the Pacific Region", In: *Pacific Economic Relations in the 1990s* (Eds. Richard Higgot, Richard Leaner, & John Ravenhill), Boulder, CO Lynne Rinner, 133-158.
- Cooper, R.N. (1999). Exchange Rate Choices Manuscript. Harvard University.
- Edwards, S. (1989). Real Exchange Rates, Devaluation and Adjustment: Exchange Rate Policy in Developing Countries. MIT Press Cambridge, MA.
- El Sakka, M.I.T., & McNabb, R. (1999). The macroeconomic determinants of emigrant remittances, *World Development*, 27(8), 1493-1502.

Elbadawi, A.I., & Rocha, R.R. (1992). Determinants of Expatriate Workers' Remittance in North Africa and Europe. Policy Research Working Papers. Country Economics Department. The World Bank.

Englama, B. (2007). Impact of Remittance on Economic Development. CBN Bullion. Publication of the CBN: Oct-Dec 2007.

Faini, R. (1994). Workers remittances and the real exchange rate, *Journal of Population Economics*, 7(2), 235-245.

Fayad, G. (2010). Remittances and Dutch Disease: A Dynamic Heterogeneous Panel Analysis on the Middle East and North Africa Region. CSAE.

Fleming, M.J. (1962). Domestic Financial Policies under Fixed and under Floating Exchange Rates, *IMF Staff Papers*, 9, 369-379.

Frankel, J. (2009). Are Bilateral Remittance, Countercyclical? Manuscript Harvard Kennedy School.

Frieden, J. (1991). Invested Interests: The Politics of National Economic Policies in a World of Global Finance, *International Organization*, 45(4), 425-451.

Garrett, G. (1998). Global Markets and National Politics: Collision Course or Virtuous Circle, *International Organization*, 52(4), 787-824.

Giuliano, P., & Ruiz-Arranz, M. (2009). Remittances, Financial Development and Growth, *Journal of Development Economics*, 90, 144-152.

Goodman, J., & Pauly, L. (1993). The Obsolescence of Capital Controls? Economic Management in an Age of Global Markets, *World Politics*, 46(1), 50-82.

Gupta, S., Patillo, C.A., & Wagh, S. (2009). Effects of remittances on poverty and financial development Sub-Saharan Africa (SSA), *World Development*, 37(1), 104-115.

Hassan, G. M., & Holmes, M.J. (2013). Remittances and the Real Effective Exchange Rate, *Applied Economics*, 45(35), 4959-4970.

International Monetary Fund (IMF). (2005). *World Economic Outlook, Globalization and External balances* Washington D.C, IMF.