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Transmission Channels of Remittance to Tradable and Non-Tradable Sectors in Nigeria

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Abstract

This study investigated transmission channels of remittances to tradable and non-tradable sectors in Nigeria using annual data ranging from 1981 to 2013. The study relied on VECM technique, with focus on variance decomposition. The basic findings were that the channels of remittance impact on tradable and non-tradable sectors in Nigeria is through demand or consumption and labour supply channels. While there was ample evidence to reject Dutch disease, phenomenon relating remittances to exchange rate, there should be conscious effort to encourage investing remittance spending rather than spending the remittances on consumption as noticed in the case of Nigeria.

Keywords: Dutch disease, Remittances and Exchange rate
JEL Classification: F40, F41, O10

Introduction

Understanding the dynamics of remittance is of crucial importance to developing countries. This becomes expedient as it has great implications for labour, financial management, monetary control and economic growth (Fayad, 2010). The importance and implications of remittance vary across countries. While the proportion of remittances to the size of the economy (Gross Domestic Products, (GDP)) of some of the countries is very high, personal remittance received dominated the external development finance of some other nations. For instance, between 1975 and 2012, personal remittances received as percentage of GDP ranged between 0.75% and 2.3% in Nigeria.

Considerate analysis of remittances received in Nigeria is important in view of the implications, especially the effect on exchange rate. Nigeria is an import dependent economy and as such, remittances could lead to increase in demand for dollar, which has the possibility of exchange rate appreciation. This, can hurt the competitiveness of the countries, this is regarded as Dutch disease in the international finance literature. In other words, overvalued exchange rate will make imports cheap in terms of domestic currency and expensive in terms of foreign currencies thereby worsening the current account position of the receiving economies. Besides, increased demand arising from remitted money raises prices in the non-tradable sector while the prices in the tradable sector is stable especially in a small open

economy because the prices of the tradable sector is often determined internationally. The implication of this is that the tradable sector becomes less competitive compared to the non-tradable sector.

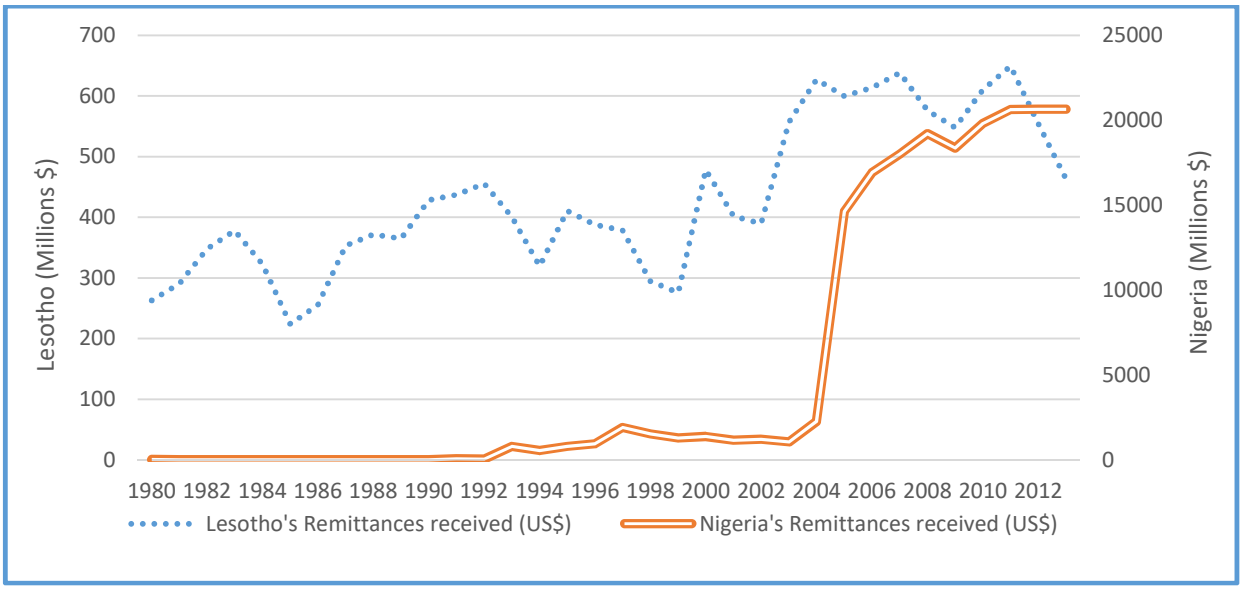
On one hand, in terms of competitiveness of the tradable sector (agricultural and manufacturing sector), there are some noticeable Dutch disease symptoms; first, agricultural raw material export as a percentage of merchandise export has been marginal, recording average of 3.1% and 1.1% in Nigeria between 1980 and 2013, respectively. However, agricultural import, especially food, has been huge in Nigeria. Second, manufacturing sector in Nigeria is losing competiveness with average manufacturing export and import as percentages of merchandise exports and imports recording 1.9% and 73.8% respectively between 1980 and 2013.

On the other hand, services sector outperformed the agricultural and manufacturing sectors. For instance, services value added as a percentage of GDP has been increasing, recording 48.8% and 29.3% respectively in Nigeria between 1980 and 2013. However, manufacturing sector contribution to GDP stood at 15.9% and 5.9% within the same period. Although these trends look like symptoms of Dutch disease; it will be empirically inadequate to conclude that remittance is responsible for the observed trend. Besides, it cannot be confirmed whether the observed trend follow Dutch disease process. This, therefore, leads to the questions this study seeks to answer, to trace the channels of transmission of remittance to tradable and nontradable sectors Nigeria.

1. Remittances, Exchange Rate and Sectoral Economic Performance

The remittances received by Nigeria depicted in Figure 1. shows that as at 1980 Nigeria had $22 million. There was monumental increase in Nigeria's remittance received between 1990 and 2014 as it increased from $10 million to $21.6 billion.

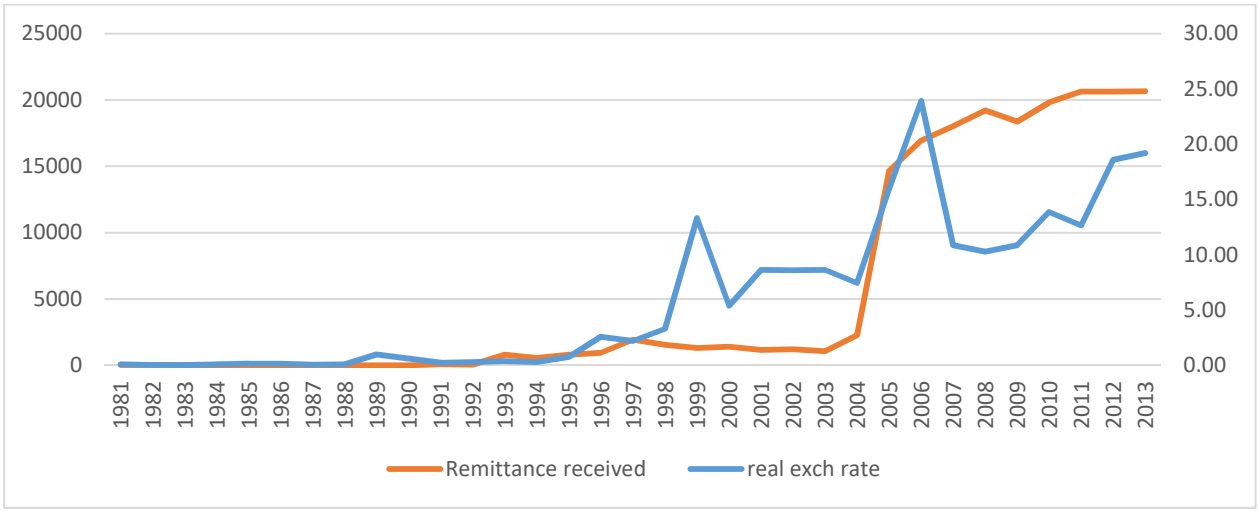
Figure 1: Remittance Received in Nigeria (Million $)



Source: World Development Indicators, 2014

Figure 2 and 3 describe the relationship between remittance and exchange rate. In the period that remittance received had monumental increase (2004 to 2013) Nigeria's real exchange rate appreciated.

Figure 2: Remittances Received and Real Exchange Rate in Nigeria



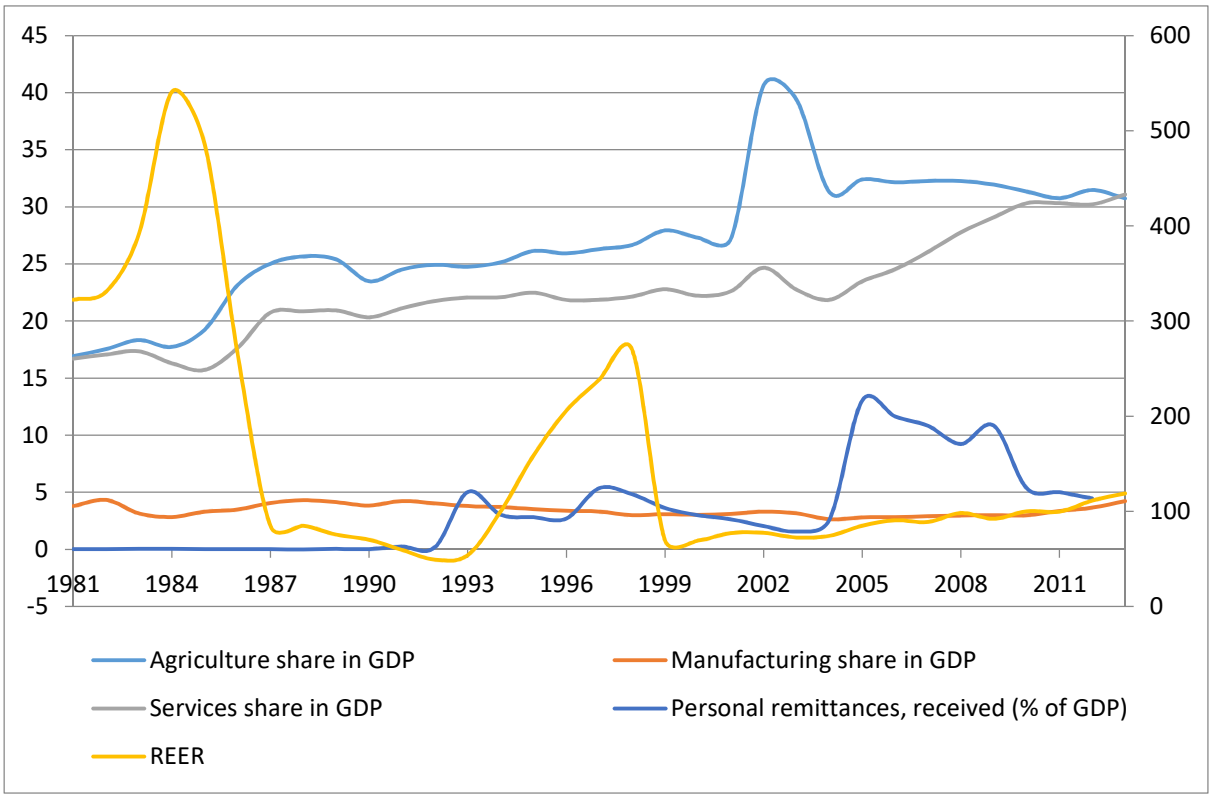
Relating remittance trend to sectoral performance, it is realised that only agricultural sector

(tradable sector) and services sector (less tradable, with huge contribution nevertheless) seems to be the contrasting sector, while manufacturing sector has improved on the average. Given that remittance has been decreasing consistently, improvement noticed in manufacturing and decline observed in services sectors are expected but decline in agricultural sector is not in line with discussion of Dutch disease. This shows that some other factors such as domestic policy on agriculture may be responsible for its performance other than Dutch disease effect.

The contribution of agricultural and services sector in Nigeria is huge with the former contributing about 27.15% between 1981 and 2013, while the latter contributed about 22.69% to GDP within the same period. However, services sector is catching up with agricultural sector and this becomes noticeable in the year 2013. The best performing time for agricultural sector was in the year 2002. Improved performance of services sector was also noticed at this time. While this could be said of agriculture and services sector, manufacturing sector performance has been low. Relating this to RER and remittance, little connection could be established. This is because some of the periods of appreciation and deprecation of RER were not associated with periods of decline in tradable sectors (agricultural and manufacturing sector) and improvement in services sector, respectively; however, services sector has been increasing which is line with the expectation in the discussion of Dutch disease.

Also, the relationship between the trend movement of remittances as a percentage of GDP and REER seems not to be in line with expectation of Dutch disease. However, there is evidence to support incidence of Dutch disease (given the trend relationship between REER and remittances) especially in the early 1980s and some part of early 1990. Hence, the applicability of Dutch disease in Nigeria is purely an empirical one.

Figure 3: Remittance, exchange rate and sectoral performance in Nigeria



Source: World Bank's *World Development Indicators* (2014)

2 Literature Review

Although remittance has been subjected to different empirical analyses such as establishing Dutch diseases, impact of remittance on tradable and nontradable sector and establishing the channel through which remittance will be transmitted to tradable and non-tradable sector. Establishing transmission mechanism from remittance into tradable and non-tradable sectors is the focus of this study, hence, papers on this are reviewed.

Cáceres and Saca (2006) analysed the impact of remittances on El Salvador's economy and the spillover effects on the other Central American countries. A vector autoregression (VAR) model is formulated, consisting of real and monetary variables. The results suggest that in, El Salvador, remittances lead to decreases in economic activity, international reserves, as well as money supply and increases in the interest rate, imports and consumer prices. This underscores the need for reorienting economic policy in El Salvador to promote the use of remittances in capital formation activities to maximise the benefit of remittances.

Acosta et al (2007) used the Bayesian techniques and estimated for El Salvador, the effects of remittances in emerging market economies. They focused on whether rising levels of remittances result in the Dutch disease phenomenon in recipient economies. They found that, whether altruistically motivated or otherwise, an increase in remittances flows leads to a decline in labour supply and an increase in consumption demand that is biased toward non-tradables. The increase in demand for nontradables, coupled with high production costs, results in an increase in the relative price of nontradables, which further causes the real exchange rate to appreciate. The high nontradable prices serve as an incentive for an expansion of that sector, culminating in reallocation of labour from the tradable sector. This resource reallocation effect eventually causes a contraction of the tradable sector. A vector autoregression analysis provides results that are consistent with the dynamics of the model.

Guha (2013) while establishing the macroeconomic effects of international remittances for the developing economies, posited that over the past few decades, international workers' remittances have significantly contributed to the foreign exchange reserves of the developing countries. While these household level remittance flows have often been associated with poverty alleviation, positive welfare gains and even as an alternate source of development finance, a detailed study of the effects of these flows on a remittance-dependent small developing economy, however shows counter-intuitive results. The paper applies the Dutch Disease theory to explain the effects of remittances on the economy and introduces a micro–macro framework to establish channels of transmission of remittances through the economy. The paper shows that international remittances, by altering the household budget constraint, have a direct impact on the micro level household decision making, primarily with respect to the consumption and labour supply decisions. These, when aggregated give rise to significant adjustments in the macro level production functions and consumption behaviours, leading to a decline in the output, particularly of the trading sector and an adverse impact on the external sector of the economy

Pilipinas (2012) laid out the nature and characteristics of remittances to the Philippines over the past decade. The study then traces the impact of large changes in remittances and the challenges they create on the Philippine monetary policy transmission mechanism from 1999 to 2011. In this study, the preliminary simulation of an increase in remittances from a complete macro econometric model estimated for the Philippines shows that it will increase consumption, investment, labour productivity and economic growth. There are indications

that the increase in remittances also leads to a change in the economic structure, in particular a decline in traded goods production and exports as well as labour market effects. Another Interesting finding of the simulation is that the monetary policy transmission continues to be relevant as it feeds through market interest rates. However, the simulation results also suggest that monetary policy pass-through tends to moderate once the impact of a surge in remittance flows is accounted for.

Fayad (2010) identifies the main transmission channel through which remittance transfers seem to exert their growth-enhancing effects: the export-led growth channel. The study uses OLS and 2SLS methodology to exploit cross-country and within-country cross-industry variation in data averaged over the 1980s and the 1990s and correcting for the endogeneity of remittances by reverting to a set of external instruments. For both decades, the study found that remittances are conducive to the relative growth of exporting industries within the manufacturing sector in a large set of remittance recipient countries. The study equally identifies the financial development channel as an alternative channel through which remittances affect growth: where remittances are found to favour growth in industries that are less in need of external financing. Besides, the findings strongly suggest an investment channel through which remittances as financial transfers are, either directly as capital investment transfers or indirectly through their economy-wide investment-enhancing effects, boosting export sector growth in recipient economies.

Jidoud (2013) investigated the correlation between business cycles volatility and the size of migrants' transfers or remittances in a set of African economies from an empirical and a theoretical perspective. Empirically, we and that remittances as a share of GDP significantly reduce output and consumption volatilities in these economies but their effect on consumption volatility is less pronounced. Further, remittances absorb a substantial amount of GDP shocks in these countries. On the theoretical side, the study shows that the stabilising effects of remittances are more substantial in economies where households' preferences exert no wealth effect on their labour supply and remittances lessen the strong financial frictions on international credit markets faced by the economy.

3 THEORETICAL FRAMEWORK AND METHODOLOGY

3.1 Theoretical Framework

Given the outcome of the literature review, the framework for this study will be a variant of Ratha (2013) which rooted on the model proposed by Corden and Neary (1982). There are several channels through which remittance influences other macroeconomic variables and the receiving economy specifically. The channels are as follows:

Spending Channel:

$$R \uparrow SP \uparrow DDT \uparrow DDNT \uparrow PNT \uparrow \bar{PT}, SST \downarrow SSNT \uparrow \quad (1)$$

When the remittance (R) is received into the country, more income is available for spending (SP) making the demands for tradable (DDT) and nontradable (DDNT) goods increase. This will make the relative price of nontradable goods (PNT) to increase relative to price of tradable goods (PT), that is, since the price of tradable goods is determined internationally and also imported competitively, the rate at which the price can increase is limited making the relative price of nontradable compared to tradable increase. This implies that the supply of tradable (SST) compared to non-tradable (SSNT) sector falls because it is more profitable (given that profit is price multiplied by quantity sold) to produce non tradables than tradables thus making tradable sector shrink, while nontradable sector expands. This is related to the popular Rybczynski effect.

Resource Movement Channel:

$$R \uparrow SP \uparrow DDT \uparrow DDNT \uparrow PNT \uparrow \bar{PT}, LNT \uparrow LT \downarrow wNT \uparrow wT \uparrow SSNT \uparrow SST \downarrow \quad (2)$$

When the residents in a country have more income through remittance, they tend to increase their spending on nontradable services such as healthcare, education, hospitality, and construction implying increase in demand of non-tradable sectors. High demand and high prices imply higher profits in the non-tradable sector, it will then be fulfilled by higher supply, thereby, the suppliers in non-tradable sector will produce more by attracting more labour with higher wages and investing more capital into this sector from the tradable sector which is less favourable. When wage rate in nontradable sector (wNT) is higher, more labour tend to work in that sector instead of in the tradable sector, hence, the wage rate of the remaining labour in tradable (wT) sector will also increase as a result of reduction in labour supply, this results in an overall increase in wage rates. That is movement of labour from

tradable to non-tradable sector will imply increase in the marginal productivity of the remaining labour in tradable sector. Given that wage is price multiplied by marginal product of labour implies high wage rate in the tradable sector, therefore, since the international price of traded goods is given, the high wage rate as one of the costs of production will burden the tradable goods sector with low profitability.

Exchange Rate Channel:

$$R \uparrow SS\$ \uparrow ER \uparrow DDNT \uparrow DDT \downarrow \quad (3)$$

Increase in inflows of remittance increases the supply of dollars (SS$) in the foreign exchange market which will lead to fall in exchange rate. This implies appreciation of exchange rate (ER). This means foreign good is cheaper in terms of domestic currency and domestic good is expensive in terms of foreign currency leading to increase in demand for imported tradable goods. The imported tradable goods therefore compete with infant domestic tradable goods leading to reduction in the tradable sector. Assuming dollar supply in the foreign exchange market is available to purchase goods and services as well as households are assumed to consume a basket of commodities covering tradable and non-tradable, it is expected that the demand for non-tradable goods will increase relative to import competing tradable sector.

Labour Supply Channel:

$$R \uparrow HHI \uparrow Leisure \uparrow \text{Pr}oductivity \downarrow DDT \downarrow DDNT \uparrow \quad (4)$$

The household receiving remittances (R) will tend to reduce their workload and increase their leisure time (*Leisure*) when they have higher income (HHI), that is, the labour market will shrink making the demand for labour higher than supply. This will make wage level increase leading to increase in the cost of production. Hence, there are tendencies for the remittance receiving households to increase non-tradable services such as healthcare, education, hospitality, and construction implying increase in demand of non-tradable sectors. This will compensate for the increase in the cost of production in the non-tradable sector. However, the tradable sector will have no compensation in this regard making it less competitive as well as facing diseconomies of scale.

Investment Channel:

$$R \uparrow ER \uparrow I \uparrow Y \uparrow SST \downarrow SSNT \uparrow \quad (5)$$

Lucas and Stark (1985) assert that if remittances (R) are mostly driven by selfish reasons including the exploitation of investment opportunities, it will tend to be procyclical since

investment itself is procyclical. This means that inflows of remittance will lead to appreciation of exchange rate (ER) through foreign exchange supply for investment purposes (I). This will increase the overall output (Y) of the economy. However, since appreciation of exchange rate makes the tradable sector less competitive through competition with goods, the investment is assumed to be biased toward the non-tradable sector facing less international competition. Hence, the reason some developing countries are having high proportion of services investment in their GDP could be rooted in this factor, that is, this could explain the reason many developing countries jump a phase (manufacturing sector development phase) in the process of their economic development.

3.2 Methodology

3.2.1 Estimation Techniques

A set of time-series variables are cointegrated if they are integrated of the same order and a linear combination of them are stationary. Such linear combinations would then point to the existence of a long-term relationship between the variables. One notable advantage of cointegration analysis is that, through building a Vector Error-Correction Model (VECM), the dynamic co-movement among variables and the adjustment process toward long-term equilibrium can be examined.

$$\Delta Y_t = \mu + \sum_{j=1}^{k-1} \Gamma j \, \Delta Y_{t-j} + \alpha\beta' Y_{t-k} + \varepsilon_t \qquad (6)$$

A long-term equilibrium relationship (stationary linear combinations of $\beta' Y_t$) is found when variables are cointegrated even if Y_t is non-stationary.

Equation (6) can be specifically represented in a vector form as follows

$$\begin{bmatrix} REM \\ REER \\ TS \\ NTS \\ MEREXP \\ CPI \\ TSVAPW \\ PCE \\ RGFCF \end{bmatrix} \begin{bmatrix} S_{11}(L)S_{12}(L)S_{13}(L)S_{14}(L)S_{15}(L)S_{16}(L) \\ S_{21}(L)S_{22}(L)S_{23}(L)S_{24}(L)S_{25}(L)S_{26}(L) \\ S_{31}(L)S_{32}(L)S_{33}(L)S_{34}(L)S_{35}(L)S_{36}(L) \\ S_{41}(L)S_{42}(L)S_{43}(L)S_{44}(L)S_{45}(L)S_{46}(L) \\ S_{51}(L)S_{52}(L)S_{53}(L)S_{54}(L)S_{55}(L)S_{56}(L) \\ S_{61}(L)S_{62}(L)S_{63}(L)S_{64}(L)S_{65}(L)S_{66}(L) \\ S_{71}(L)S_{72}(L)S_{73}(L)S_{74}(L)S_{75}(L)S_{76}(L) \\ S_{81}(L)S_{82}(L)S_{83}(L)S_{84}(L)S_{85}(L)S_{86}(L) \\ S_{91}(L)S_{92}(L)S_{93}(L)S_{94}(L)S_{95}(L)S_{96}(L) \end{bmatrix} \begin{bmatrix} V_{1t} \\ V_{2t} \\ V_{3t} \\ V_{4t} \\ V_{5t} \\ V_{6t} \\ V_{7t} \\ V_{8t} \\ V_{9t} \end{bmatrix} \quad \text{……..(7)}$$

Where V_{1t}, V_{2t}, …, V_{9t} are uncorrelated white noise disturbances and $S_{ij}(L)$ are polynomials in the lag operator, where the individual coefficients are denoted as $S_{ij}(K)$.

The equation (7) can be written as

$$X_t = S(L)V_t \text{ ……..(8)}$$

Where

$X_t = [REM_t, REER_t, TS_t, NTS_t, MEREXP_t, CPI_t, TSVAPW_t, PCE_t, RGFCF_t]$ and

$V_t = [V_{1t}V_{2t}V_{3t}V_{4t}V_{5t}V_{6t}V_{7t}, V_{8t}, V_{9t}]$. The shocks V_t are normalized, such that;

$$Var(V_{1t}) = Var(V_{2t}) = Var(V_{3t}) = Var(V_{4t}) = Var(V_{5t}) = Var(V_{6t}) = Var(V_{7t}) = Var(V_{8t}) = Var(V_{9t})$$

Where V_{1t}, V_{2t}, …, V_{9t} are remittance (REM), real effective exchange rate (REER), tradable sector (TS), non-tradable sector (NTS), merchandise export (MEREXP), Consumer price index (CPI) , tradable sector value added per worker (TSVAPW), private consumption expenditure (PCE) and real gross fixed capita formation (RGFCF) impulses. If TS and NTS impulses are unaffected by other variable, in the long run, this implies that the cumulated effects of other variables must equal to zero, i.e.

$$\sum_{k=0}^{\infty} S_{12}(k)V_{2t-k} + \sum_{k=0}^{\infty} S_{13}(k)V_{3t-k} = 0 \text{ ……(9)}$$

Equation (7) therefore represents the empirical model, while equation (9) represents the impulse response function to be estimated in this study.

Further, the fact that macroeconomic variables are not usually stationary in their levels necessitates the unit root test. Besides, estimating Vector Error Correction Model (VECM) or Vector Autoregressive Model requires the variables to be tested for stationarity property. This study relies on the Augmented Dickey-Fuller (ADF), the most frequently adopted procedure of testing unit root.

It is pertinent to examine whether long run relationship exists among the variables integrated of the same order in the models. This is because it is possible for variables to deviate from the relationship in the short run, but their association will return in the long run. There are several ways of performing cointegration tests but this study relies the Johansen method which is based on maximum likelihood estimation on a VAR system. Moreover, the presence of a cointegration relation, among variables that are I(1), forms the basis of the VECM specification in this study.

3.2.2 Data Source

The data for this study will be sourced from the World Development Indicators (WDI) and the Annual Reports of the Central Bank of Nigeria.

4 Empirical Results and Discussion

1 Pre-estimation Diagnoses

The results of the unit root test performed to check the time series property of the variables in the model is indicated in Table 1. The unit root test results show that using five critical value criterion, all the variables exhibit trend and noise in the behaviour over time and they are of integration of order I (1) in Nigeria. This implies that all the variables are stable at their first difference. The unit root test results indicate that the maximum lag length for all the variables is seven and six using Schwartz criterion.

Table 1: Unit Root Test

Intermediate ADF test results at Level				
Series	Prob.	Lag	Max Lag	Obs
REM	1.0000	7	7	24
REER	0.3482	0	7	32
TS	1.0000	0	7	32
NTS	1.0000	0	7	32
MEREXP	0.9998	2	7	30
TSVAPW	0.9999	0	7	32
CPI	1.0000	0	7	32
RGFCF	0.4131	3	7	29
PCE	0.9953	0	7	31
Intermediate ADF test results at first difference				
Series	Prob.	Lag	Max Lag	Obs
D(REM)	0.0002	0	7	30
D(REER)	0.0004	0	7	31
D(TS)	0.0069	0	7	31
D(NTS)	0.0014	1	7	30
D(MEREXP)	0.0000	0	7	31
D(TSVAPW)	0.0030	0	7	31
D(CPI)	0.0382	0	7	31
D(RGFCF)	0.0086	3	7	28
D(PCE)	0.0042	0	7	30

Source: Author's Computed

Consequently, there arises the question of whether these variables could be combined to make prediction in Nigeria. Using Johansen cointegration test, the results in Table 2 indicate that the unrestricted Trace rank test suggests there is an existence of a cointegrating vector in the model when the trace statistics is compared with the five per cent critical value. The implication of the result is that the variables of the model could be used to make long run prediction about remittances in Nigeria. Since the variables are non-stationary but cointegrated, the appropriate technique is vector error correction model with emphasis on variance decomposition component to trace the channels of remittance transmission. This is presented subsequently.

Table 2: Cointegration Tests

Series: REM REER TS NTS MEREXP TSVAPW CPI RGFCF PCE					
Lags interval (in first differences): 1 to 1					
Unrestricted Cointegration Rank Test (Trace)					
Hypothesized		Trace	0.05		
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**	
None *	0.9973	580.2387	197.3709	0.000	
At most 1 *	0.9722	402.6866	159.5297	0.000	
At most 2 *	0.9704	295.2206	125.6154	0.000	
At most 3 *	0.8795	189.6427	95.75366	0.000	
At most 4 *	0.8185	126.1500	69.81889	0.000	
At most 5 *	0.6994	74.95465	47.85613	0.000	
At most 6 *	0.5149	38.89119	29.79707	0.003	
At most 7 *	0.2883	17.18832	15.49471	0.028	
At most 8 *	0.2077	6.984735	3.841466	0.008	
Trace test indicates 9 cointegrating eqn(s) at the 0.05 level					
* denotes rejection of the hypothesis at the 0.05 level					
**MacKinnon-Haug-Michelis (1999) p-values					

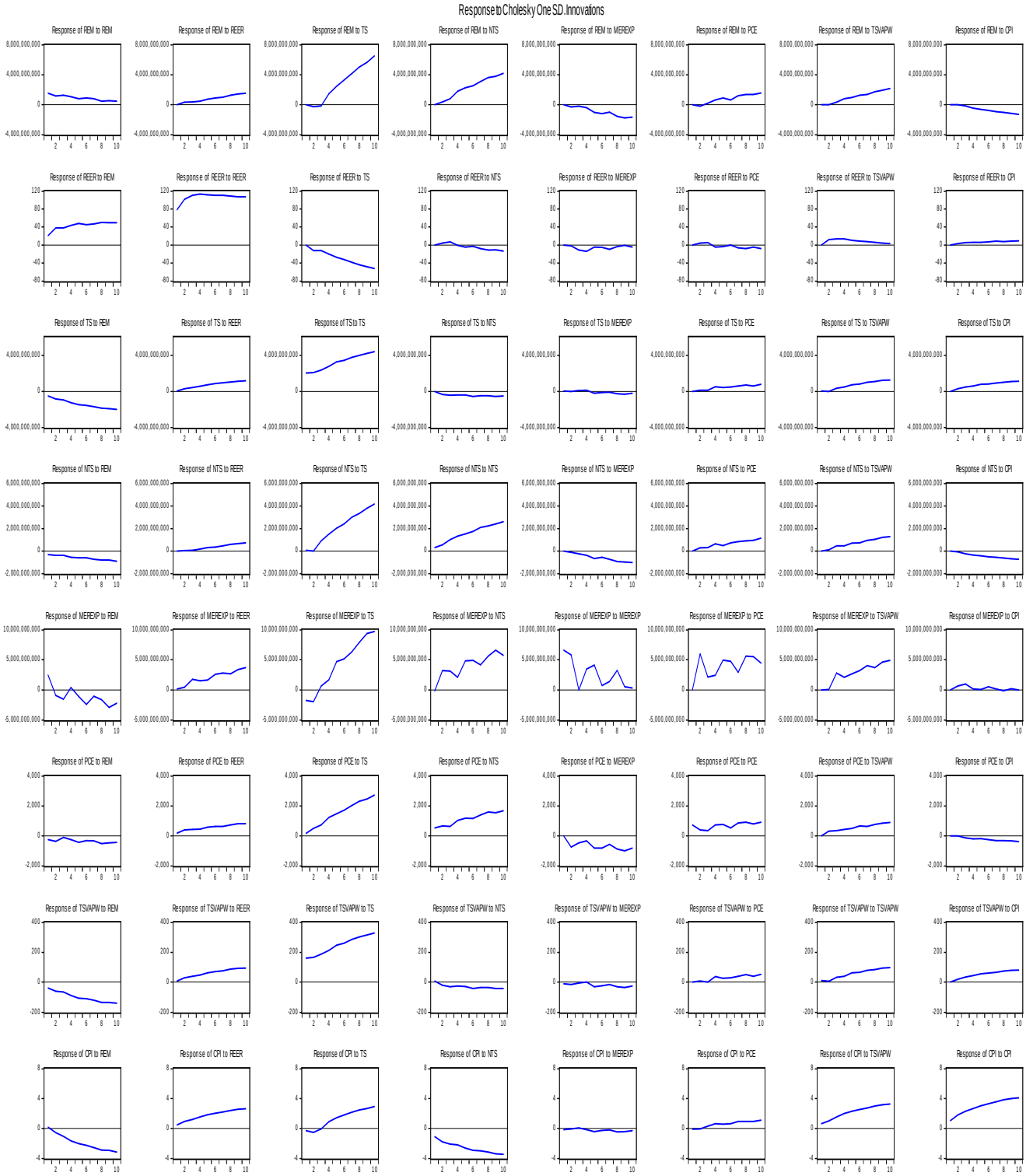
Source: Author's Computed

Nigeria: Variance Decomposition Analysis

The variance decomposition shows the proportion of the forecast error variance of a variable which can be attributed to its own shocks and the innovations of the other variables. The general picture that emerges from a deeper look at Figure 4 and Table 3 in the appendix appears to be remittance accounts for a small proportion of the forecast error variance of other variables in the short run. However, the highest impact on tradable and non-tradable sector stood at 15.4% and 26.4% in the fourth period, respectively (Table 3). The results indicate that tradable and non-tradable sector respond more to remittance than any other variables in the system. However, tradable sector respond more than non-tradable sector to negative innovations in remittance, especially from 6^{th} to 10^{th} period. During the same time, increase at a decreasing rate. This implies that non-tradable sector respond faster to shocks in remittance, the impact of remittance on tradable sector is felt in the long run.

Besides, remittance accounts for greater shocks to tradable sector than any other variable (Figure 4 and Table 3). This is logical since adjustment to long run equilibrium in most developing countries is often slow. It is important to note that remittance seems not to affect tradable and nontradable sectors through REER but through private consumption expenditure (demand channels) and tradable sector value added per worker (labour supply channel).

Figure 4: Variance decomposition



Source: Computed

Conclusion

This study investigated transmission channels of remittances tradable and non-tradable sector

Nigeria using annual data ranging from 1981 to 2013. The study relies on VECM technique, with focus on variance decomposition. The basic findings are that the channels of remittance impact on tradable and non-tradable sector in Nigeria is through demand or consumption and labour supply channels. While there was ample evidence to reject Dutch disease phenomenon relating remittances to exchange rate, there should be conscious effort at encouraging investing remittance spending rather than spending it on consumption as noticed in Nigeria.

Table 3: Nigeria, variance decomposition

Variance Decomposition of REM

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	1.55E+09	100.0000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	2.03E+09	90.11107	2.918122	1.256180	2.961063	1.974814	0.758817	0.002199	0.017733
3	2.60E+09	78.88612	4.148795	1.062123	10.98885	1.680151	1.177309	1.638741	0.417909
4	3.88E+09	42.99753	3.363631	138844	26.40218	1.877400	3.428790	029195	1.512840
5	52E+09	23.15982	3.417711	27.53223	29.73879	4.580677	4.232902	414357	1.923510
6	7.33E+09	14.70696	3.528666	36.16855	28.77081	266498	3.172706	6.141045	2.244770
7	9.34E+09	9.790755	3.359888	41.78680	28.59877	4.363836	3.708738	949995	2.441214
8	1.17E+10	6.460897	3.303726	454745	27.98463	4.572550	3.777653	6.009080	2.344011
9	1.40E+10	4.637266	3.357150	48.31544	26.89970	4.808426	3.580272	6.091631	2.310114
10	1.64E+10	3.447103	3.313722	50.72300	26.05668	4.527436	3.527113	6.118186	2.286770

Variance Decomposition of REER:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	81.24952	6.707547	93.29245	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000
2	137.3265	10.03327	88.05749	0.810007	0.116538	0.015855	0.091984	0.811445	0.063411
3	182.0684	10.16395	87.00162	0.922654	0.196039	0.399696	0.130480	1.068481	0.117077
4	220.9027	10.84924	847082	1.458629	0.136486	0.694257	0.133286	1.101899	0.155376
5	254.0245	11.83123	83.92241	2.277118	0.130968	0.551645	0.120186	0.995985	0.170461
6	282.9759	12.13206	82.95771	3.117067	0.115736	0.478598	0.096997	0.899429	0.202404
7	310.4198	12.35101	81.66797	4.157063	0.156649	0.491623	0.119225	0.817304	0.239159
8	336.1408	12.81434	80.09758	267462	0.244917	0.428360	0.159366	0.729623	0.258353
9	359.7745	13.08507	78.79652	6.359119	0.298442	0.374720	0.157414	0.648737	0.279973
10	382.7487	13.22404	77.44823	7.527026	0.380067	0.347124	0.184676	0.580965	0.307866

Variance Decomposition of TS:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI

1	2.10E+09	7.068918	0.013728	92.91735	0.000000	0.000000	0.000000	0.000000	0.000000
2	3.11E+09	10.96585	0.748178	86.01701	1.375894	0.001552	0.133589	0.004783	0.753141
3	4.11E+09	12.09939	1.484659	81.92357	2.017863	0.030814	0.125507	0.645760	1.672439
4	24E+09	13.57045	1.982274	78.11680	1.806763	0.047046	0.982349	1.159682	2.334639
5	6.49E+09	14.32532	2.555412	746854	1.608472	0.171769	1.014154	2.029523	2.826804
6	7.67E+09	14.41574	3.015514	73.89346	1.718905	0.163982	1.063424	2.559935	3.169044
7	8.90E+09	14.41448	3.314638	72.86558	1.598667	0.136463	1.224049	3.064780	3.381342
8	1.01E+10	14.65050	3.611995	71.62835	1.488438	0.178269	1.412128	3.450434	3.579879
9	1.13E+10	14.59950	3.875192	70.84930	1.449221	0.229096	1.406534	3.872058	3.719101
10	1.25E+10	14.53056	4.057259	70.32950	1.391348	0.221173	1.514175	4.150743	3.805241

Variance Decomposition of NTS:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	4.43E+08	44.84688	0.002153	2.522435	52.62854	0.000000	0.000000	0.000000	0.000000
2	8.60E+08	31.36071	0.116163	0.695012	53.34084	1.911581	10.28514	1.731431	0.559124
3	1.78E+09	12.37720	0.144072	26.78846	44.39617	2.373295	294323	6.840835	1.785643
4	2.88E+09	8.504308	0.350889	36.61020	37.82537	2.782293	6.739759	137047	2.050132
5	4.07E+09	6.320099	0.706187	43.32241	33.25237	3.983008	4.804264	555544	2.056112
6	25E+09	083523	0.901855	47.15469	30.99453	3.572529	4.765959	348327	2.178586
7	6.63E+09	4.372947	1.063017	49.79974	29.21455	3.504487	4.558835	387693	2.098726
8	8.02E+09	3.981597	1.249360	51.51470	27.70140	3.717441	4.433131	371327	2.031045
9	9.46E+09	3.584562	1.389533	53.25447	26.43006	3.714307	4.160329	479400	1.987345
10	1.09E+10	3.355478	1.494223	54.43364	252203	3.611230	4.198352	449429	1.935614

Variance Decomposition of MEREXP:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	7.24E+09	11.67917	0.016656	6.124417	0.081702	82.09806	0.000000	0.000000	0.000000
2	1.17E+10	113996	0.165391	201233	7.411845	592093	286261	0.000456	0.323538
3	1.29E+10	682315	2.008729	4.564769	11.88361	46.26294	24.18172	4.605043	0.810872
4	1.40E+10	4.848766	2.819756	330125	12.14508	44.92928	23.17536	6.063714	0.687918
5	1.72E+10	3.657892	2.783759	11.11295	190057	380820	23.85833	6.416139	0.462164
6	1.98E+10	4.296915	3.846107	112240	18.06697	27.12059	23.72899	7.409711	0.408319
7	2.20E+10	3.703689	4.741890	20.52002	18.17255	22.26761	20.89691	9.364959	0.332370
8	2.54E+10	3.191077	4.664839	214895	18.57813	18.37440	20.64057	9.148351	0.253687
9	2.91E+10	3.462954	4.903597	29.52621	19.19336	13.98782	19.26245	9.467750	0.195848
10	3.22E+10	3.320218	339642	33.19471	18.84329	11.44357	17.63837	10.06013	0.160066

Variance Decomposition of PCE:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	961.8660	6.779232	3.303381	2.961174	30.02019	0.032369	56.90366	0.000000	0.000000

2	1654.632	7.279903	7.134110	9.802284	26.33908	20.35735	210352	3.978406	0.005345
3	2080.110	4.892296	8.611544	18.51363	265240	17.97731	18.75542	214671	0.382729
4	2833.793	3.410561	7.034563	28.98382	27.24513	11.04893	16.65465	4.932624	0.689731
5	3691.314	3.523500	6.623647	32.73469	26.37308	11.16864	14.07711	4.850659	0.648677
6	444372	2.881442	6.642370	37.17175	24.89407	11.00704	11.15541	480181	0.767728
7	5273.583	2.455855	6.168718	40.94004	24.57899	8.966050	10.59888	375404	0.916065
8	6236.613	2.482240	815144	43.04147	24.10809	8.465145	9.816254	371721	0.899934
9	7123.098	2.342593	753800	44.95286	23.23424	8.468928	8.780918	546133	0.920530
10	8028.666	2.154382	560562	47.00408	22.73363	7.707454	8.253513	613873	0.972503

Variance Decomposition of TSVAPW:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	167040	407559	0.201978	93.48340	0.224897	0.297232	0.009576	0.375355	0.000000
2	246.7895	8.565658	1.440682	87.61567	0.858933	0.539794	0.096832	0.244178	0.638252
3	323.3761	9.192320	2.433672	83.89991	1.466314	0.349616	0.057133	1.154895	1.446136
4	407.1935	10.61988	2.974074	80.23415	1.321377	0.220507	0.843546	1.702979	2.083490
5	502.2103	11.62171	3.558967	77.04640	1.162434	0.502580	0.860612	2.652055	2.595251
6	590.3698	11.85223	4.036595	723266	1.335031	0.515780	0.860341	3.210479	2.956891
7	681.7829	11.96933	4.299759	74.12776	1.269664	0.440614	0.997134	3.714376	3.181369
8	773.5294	12.36541	4.569930	72.71044	1.191642	0.492390	1.190967	4.078370	3.400854
9	863.3717	12.43513	4.819460	71.75063	1.191009	0.569343	1.169083	4.502943	3.562397
10	950.4900	12.45395	4.979270	71.15889	1.169438	0.538877	1.264986	4.768479	3.666103

Variance Decomposition of CPI:

Period	S.E.	REM	REER	TS	NTS	MEREXP	PCE	TSVAPW	CPI
1	1.749884	0.890043	7.555746	3.460015	37.99520	0.632767	0.466589	12.41318	36.58646
2	3.468901	3.086075	9.529559	2.963156	36.43923	0.191051	0.127025	11.14000	36.52390
3	188483	528562	9.857422	1.338340	32.76055	0.103568	0.470418	13.85993	36.08121
4	7.022518	8.550583	10.06289	2.322366	27.82899	0.099441	1.087260	159298	34.45549
5	8.981230	10.35614	10.34890	3.858577	237420	0.264840	1.121866	16.04099	32.63448
6	10.92513	11.12905	10.49748	267607	24.20200	0.229897	1.113206	16.25643	31.30432
7	12.87112	11.99476	10.53831	6.614690	22.80343	0.191632	1.346070	16.23521	30.27590
8	14.83967	12.71403	10.59843	7.740485	21.66732	0.239095	1.416735	16.24183	29.38208
9	16.75145	13.06992	10.63979	8.642415	21.07073	0.245868	1.419085	16.23193	28.68027
10	18.61474	13.39732	10.63698	9.498199	20.45350	0.228111	1.495086	16.18395	28.10686

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