Okeke, F.C.; Olisaemeka, C.B.; Agu, A.; Maduka, A. & Ekesiobi, C. (2023); Remittances and Price Level Nexus in Nigeria: Post-COVID Economic Agenda, ANSU Journal of Arts and Social Sciences (ANSUJASS), 10 (1): 79-100

Remittances and Price Level Nexus in Nigeria: Post-Covid Economic Agenda

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Abstract
Inflation and remittances affect the economic activity of the recipient's economy and are especially of great importance for developing countries. Remittance inflows accelerate economic activity by increasing personal income, improving living standards, and ultimately enhancing the aggregate demand for goods and services. However, it could put upward pressure on prices. Remittance inflow could lead to an increase in consumption patterns with no increment in output growth, thereby boosting the prices of the commodities in the recipient economy. Although the growth and welfare effect of remittance inflow has been extensively investigated in Nigeria, the impact of remittance inflow on inflation has been rarely investigated in Nigeria. This study, therefore, is an attempt to examine the impact of remittance on inflation in Nigeria. The study utilized an exogenized VAR (VAR-X) model on time series spanning from 1982 to 2019. The results of the VAR estimation show that remittance inflow has a significant negative impact on producer prices. The results also show that remittance inflow has a significant positive impact on consumer prices and the inflation rate. The study recommends among other things that households should endeavor to invest remittance

received on productive ventures. Remittance inflows could be used to drive entrepreneurship in terms of setting up new business or expansion of existing ones.

Keywords: *Price level, Remittance inflow, Nigeria*

Introduction

In recent years, workers' remittances received by several developing countries have exceeded the inflow of official development aid and other private capital (World Bank, 2019). By 1990 flows to sub-Saharan Africa (SSA) stood at $1.79 billion but galloped to $29 billion and $41 billion in the years 2012 and 2014 respectively (World Bank, 2019). The figure stands at $38 billion and $42 billion in 2016 and 2017 respectively. Currently, it is forecasted that the figure would be $48 billion and $51 billion in 2019 and 2020 respectively (World Bank, 2019). Analytical arguments supporting private capital flows revolve around the fact that access to workers' remittances capital allows countries to borrow to smoothen consumption in the face of adverse shocks, and that the potential growth and welfare gains resulting from such international risk sharing can be large and permanent (Beja, 2011; Sambira, 2013; Williams, 2016). Guilino and Ruiz-Arranz (2006) and Osabuohien and Efobi (2013) observe that remittances boost economic growth in countries with a less developed financial system. Beja (2011) argues that remittances increase disposable income and help fuel expansion of aggregate demand and, in some cases, steer the economy away from the balance of payments problems. At the same time, however, the magnitudes of remittances have raised critical questions with respect to the undesirable effects on the recipient economies (Acosta *et al.*, 2009).

The negative effect of remittances on the receiving economy may occur in the form of Dutch disease, reduced incentive for recipients to work and moral hazard problems. Remittances by increasing the supply of foreign exchange can cause the domestic currency to appreciate. This decreases the competitiveness of the traded goods sector leading to stagnation in the economy (Javaid, 2009). More importantly, remittances can cause inflation in the economy through the channel of aggregate demand. The increased money supply through the inflow of remittances stimulates the demand for goods and services and increases consumption expenditure on goods and services. The increase in demand puts upward pressure on prices and results in demand-pull inflation (Iqbal & Abdus, 2005). Inflation, on the other hand, has always been one of the major macroeconomic goals of stabilization policies due to its adverse consequences for the economy. It increases the cost of business and thus

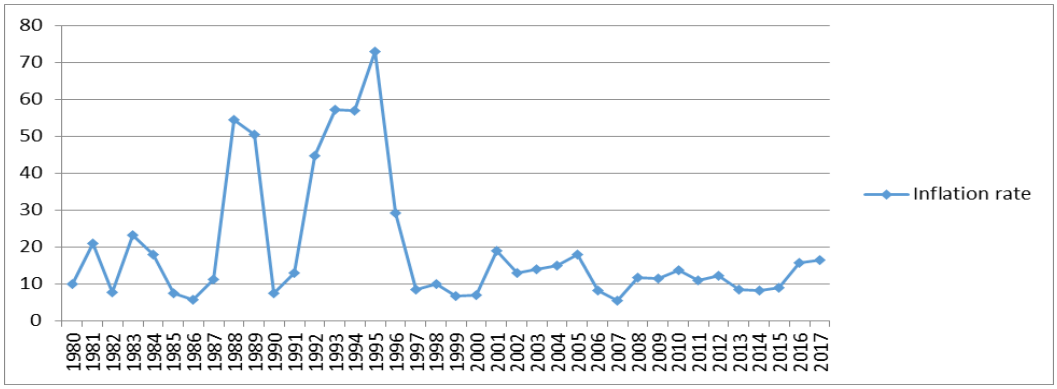
discourages savings and investment. It also adversely affects the consumption and harms the low and fixed income groups by reducing their purchasing power.

Given this effect of remittances on inflation which is in contradiction with the policy objective of price stability, it has become increasingly important to explore the nature of the relationship between these two variables. The issue becomes even more pertinent for countries like Nigeria where inflation has become a serious concern on one hand, while on the other; the importance of remittances cannot be ignored.

One of the core objectives of central banks is to ensure price stability. However, experience has shown over time that the goal of low and stable inflation is rather daunting (Kapur, 2013). Similar to the mandate of most central banks, price stability has remained one of the core mandates of the Central Bank of Nigeria (CBN). The interest in price stability emanates not only from the need to maintain overall macroeconomic balance but also from the fact that price stability promotes investment, output, and employment. However, despite several government policies and programs in Nigeria, the economy has consistently experienced high inflation with attendant consequences on the most vulnerable. Nigeria is witnessing high inflation with economic and social implications. As real income falls, due to the eroded purchasing power of the currency, there is a reduction in the amount of goods and services each unit of the currency can buy. Confronted with an already diminished disposable income, consumers are now faced with higher prices owing to higher production costs. The high inflation trend in the country has also led to increased demand by workers, especially those in the public sector, for higher wages.

Furthermore, the desire to save and invest has been on the decline, adversely affecting economic growth. Nigeria was confronted with severe inflationary pressures due to high monetary growth and fiscal expansion in the 1990s. As shown in the figure in figure 1.1, inflation reaches a peak of about 72.8% in 1995. In an effort to reduce the surging inflation rate, the government implemented measures to ensure effective monetary policy, fiscal prudence and stabilization of the exchange rate. These measures resulted in a reduction in the inflation rate from its peak in 1995 to 6.6% in 1999. Similarly, Nigeria witnessed a sharp increase in inflation from 6.9% in 2000 to about 17.8% in 2005. The inflation rate declined to 5.4% in 2007 due to the implementation of sound monetary and fiscal policies. The inflation rate moderated substantially from 11.6% in 2008 to 9% in 2015 due to increased agricultural output and sound macroeconomic policies. In 2016 and 2017, the Nigeria inflation figures stand at 15.6% and 16.5%

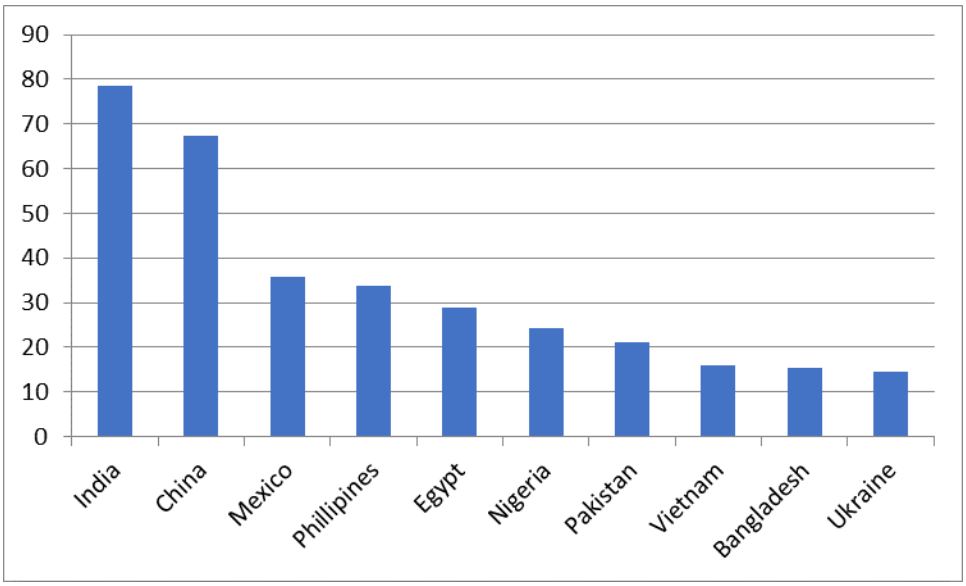
respectively. This increase is not unrelated to change in government and subsequent policy changes.



Source: World Bank (2018)

Figure 1.1: Nigeria's inflation rate

From the foregoing analysis, it is obvious that inflation remains a serious macroeconomic challenge in Nigeria. While an increase in inflation is undesirable in any economy, remittance inflow is acknowledged as a key source of income for an improved standard of living and poverty alleviation as well as productive purposes (Maduka, Madichie & Ekesiobi, 2019). Data from World Bank (2019) indicates that Nigeria is sub-Saharan Africa's biggest remittance receiver. For instance, remittance inflow in sub-Saharan Africa and Nigeria stood at US$46 billion and US$24.3 billion respectively (See Figure 1.2) in 2018 with Nigeria receiving 51.5% of total remittance to sub-Saharan Africa. The share of Nigeria's remittance also represents 4.2% and 3.8% of total remittance to LICs and global remittance respectively (World Bank, 2019). This places Nigeria the largest remittance-recipient country in Sub-Saharan Africa and the sixth-largest in the world



Source: World Bank (2019)

Figure 1.2: Top Remittance Recipients in 2018 ($ billions)

The Nigerian diaspora sent an estimated US$24.3 billion in remittances to the country in 2018, representing 6.1% of GDP. Nigeria's migrant remittance inflows were also seven times larger than the net official development assistance (foreign aid) received in 2017 of US$3.359 billion. Nigeria's migrant remittance inflows were also seven times larger than the net official development assistance (foreign aid) received in 2017 of US$3.359 billion.

The Salter-Swan-Corden-Dornbusch paradigm provides an avenue for understanding the theoretical linkages between remittances and inflation in developing economies. The paradigm suggests that an increase in remittance inflows can appreciate the real exchange rate through raising the domestic prices while the extent of the effect on domestic prices depends on the country's exchange rate regime. Remittance inflow could be a source of a substantial increase in the money supply. When large inflows of foreign exchange are remitted by immigrant workers to their home country, the conversion of this foreign exchange into domestic currency raises the money supply. If this is not absorbed into productive sectors (or capital investment), then it goes into consumption expenditure, thereby fueling price inflation (Solimano, 2003; Bussolo & Medvedev, 2008; Giuliano, & Ruiz-Arranz, 2009). This argument shows that the impact of remittance would be contingent on the use of remittance. If the remittance is

used for productive activities, it would moderate the inflationary effect of money growth through productivity increase. On the other hand, if remittance goes into household consumption, it would put pressure on aggregate supply thereby aggravating the inflationary effect of money growth.

However, despite the significance of these two variables, there is no study to the best of our knowledge that attempts to evaluate the impact of remittance inflows on inflation in Nigeria. From the policy perspective, there are several reasons for studying remittance-inflation nexus in a post-COVID Nigeria. First, the stability of the Nigerian economy is directly linked to price stability given the structure of its economy which is largely consumption-oriented. However, the ability of the government to achieve price stability in the country rests on the quality of policies undertaken by the Central Bank of Nigeria. Therefore, any research undertaken to identify potential predictors of price ability is expected to strengthen evidence-based decisions of the Bank. Second, inflation plays an important role in encouraging both domestic and foreign investments and for a country like Nigeria with a low production base, promoting price stability is even more critical. For instance, returns must first keep up with the rate of inflation in order to increase real purchasing power. In essence, to maximize returns, the rate of inflation must be kept relatively low and stable and doing so will require robust analyses that offer guidance to the relevant monetary policy authority to achieve the same. Thirdly, the ability of financial institutions to raise capital for investment purposes in a regime of high inflation rates may become daunting as lower real interest rates will lower consumer's incentives to save. In the same vein, raising nominal interest rates due to higher inflation rates may discourage investments. All these reasons offer compelling need to undertake research on inflation forecasting for Nigeria in a post-COVID era. This study therefore investigates remittance inflow-inflation level nexus in Nigeria spanning from 1982 to 2019.

Literature Review

Conceptual Clarifications

The basic concepts of our study are remittance and inflations. Attempts are made in this sub-section to conceptualize these basic concepts that are germane to the study

The Concept of Remittances

There are different definitions of international remittances but the following definition makes the relevant points: migrant-related assets transferred across international borders from the migrant’s country of residence, usually to his/her native or adopted country of citizenship. Some definitions of international remittances which have been advanced in

contemporary studies are: (i). Kapur (2004) defines remittances broadly as financial resource flows arising from the cross-border movement of nationals of a country. In the narrowest sense, remittances as "unrequited transfers refer primarily to money sent by migrants to family and friends on whom there are no claims by the sender unlike other financial flows such as debt or equity flows". (ii). "Remittances are person-to-person flows (from migrants to their friends and families), well-targeted to the needs of the recipients, who are often poor. Such remittances do not typically suffer from the governance problems that may be associated with official aid flows" (Ratha & Mohapatra, 2007).

From the definitions provided above, it is understandable that international remittances can be defined from a narrow or a broad viewpoint. From a narrow perspective, international remittances are typically monetary transfers from international migrants to their countries of origin or nationality where their families or other relatives are residing. With regard to the broader definition, international remittances are financial flows mainly occasioned by migration, from a person (the migrant) or an international benevolent organisation (such as the migrant association of a particular ethnic group) to persons and/or social institutions (such as orphanages, refugees, or the physically challenged) in poorer countries. Thus, international remittances should be seen to include the narrow definition plus other non-debt transfers in the form of money or materials sent by migrants (either as individuals or as a group) and organisations (often specialised non-governmental organisations (NGOs) serving households notably migrant associations) to individuals or charitable social institutions in poorer nations (Adenutsi, 2014).

The Concept of Inflation

In economics, inflation is defined as a persistent increase in the overall level of prices of goods and services in an economy over a period of time. It is a situation where too much money chases fewer goods and services (CBN, 2011). It emanates in an economy when the community has an increase in money supply but without a corresponding increase in productivity. When the general price level rises, each unit of currency buys fewer goods and services, erodes savings, discourages investment, stimulates capital flight (as domestic investors put their funds into foreign assets, precious metals, or unproductive real estate), inhibits growth, makes economic planning a nightmare and in its extreme form, provokes social and political unrest. A former President of America, Gerald Ford stated that "when inflation approaches double-digit, it is "public enemy number one" while Ronald Reagan described it as "cruelest tax". It is on this premise that governments in several economies have adopted several measures to squelch inflation through the adoption

of conservative and sustainable fiscal and monetary policies (CBN, 2011).

Theoretical Literature Review

The 1970s were characterized by falling output and employment coupled with falling prices, the phenomenon referred to as 'stagflation'. This led to the failure of the then ruling Keynesian theories which purported that, an increase in output is usually accompanied by rising prices, at least in the short-run. This failure of the Keynesians to explain stagflation culminated in the birth of 'monetarism'. Monetarism refers to the followers of Milton Friedman (1912-2006) who hold that "only money matters", and as such, monetary policy is a more effective instrument than fiscal policy in economic stabilization. According to Monetarists, money supply is the dominant, though not exclusive determinant of both the level of output and prices in the short-run and of the level of prices in the long-run; hence, long-run level of output is not influenced by the money supply (Totonchi, 2011). Monetarists put emphasis on the role of money in the economy. Friedman (1956) restated the quantity theory of money into what became the modern quantity theory and propounded a dictum that "inflation is always and everywhere a monetary phenomenon" that arises from a more rapid expansion in the quantity of money than in total output. Friedman (1956) contends that when money supply is increased in the economy, then there emerges an excess supply of real money balances with the public over the demand for money and this, in turn, disturbs the equilibrium. In order to restore equilibrium, the public will reduce money balances by increasing expenditure on goods and services. Hence, Friedman and other modern quantity theorists attribute excess supply of real money balances as a cause of an increase in aggregate demand for goods and services by the public. If there is no proportionate increase in output, then the extra money supply will lead to excess demand for goods and services which will cause inflation.

Empirical Insights

Utilizing data from 1988 to 2005, Balderas and Hiranya (2005) estimated the direct impact of remittances on the allocation of relative price changes and inflation in Mexico. Based on the vector autoregressive model, the findings revealed that remittances have a positive and significant effect on relative price variability and inflation in Mexico. The results suggest that most of the funds remitted are used mainly for consumption which puts upward pressure on the prices of goods through the aggregate demand channel. In Bangladesh, Khan and Islam (2013) appraise the relationship between remittances and inflation using the Vector Autoregressive (VAR) method. They found no link between remittance and inflation in the short run but in the long run, a

significant relationship was found between the two variables.

Nisar and Tufail (2013) conclude among other things a positive impact of remittance on inflation using the Vector Error Correction Method (VECM) in Pakistan. Using Pakistan data, Iqbal, Nosheen, and Javed (2013) use VECM to test the link between remittance and inflation and the study showed that inflation is positively influenced by remittances. Roy and Rahman (2014) applied the VECM to estimate remittance-inflation nexus in Bangladesh and they found that remittance inflows generate inflationary pressure. Kawira (2017) obtained similar findings in Kenya using Error Correction Model. Hung and Minh (2014) using VAR obtained the same conclusion in Vietnam based on data from 1996 to 2012. Likewise, Hai and Doan (2017) employed Vector Autoregression (VAR) model to study the remittance-inflation nexus in Vietnam and they found that remittance positively influences Vietnam's inflation rate.

Adhikari and Guru-Gharana (2013) investigated the impact of remittances have on the Indian price level and they suggested that in as much as remittance does enhance domestic price level but this increase is not significant in India. In Ghana, Abdul-Mumuni and Quaidoo (2016) adopted the bounds testing method and conclude that the relationship between remittances and inflation is insignificant in the short run while the reverse is the case in the long run. Gashaw (2016) focused on how the inflation rate in Ethiopia is affected by remittances using the Vector Autoregressive technique. The study reports that inflation is positively affected by remittance only in the short run

Evidence on the subject matter also exists across multiple countries. For instance, Termos, Naufal, and Genc (2013) applied ordinary least square, fixed effect, and Anderson–Hsiao estimator to appraise the effect of outflows of remittance on inflation in the Gulf Corporation Council (GCC) countries. They found that remittance outflows reduce inflation in GCC countries. In a similar study, Al Kaabi (2016) assessed the relationship between remittance outflow and inflation from 2004 to 2014 in GCC countries. The study finds that aside from Bahrain, inflation is not affected by remittance outflows. Sbia, Hamdi, and Comelli (2017) utilized the "bias-corrected least-squares dummy variable (CLSDV) estimator" and data from fourteen OPEC nations from 1980 to 2010 to estimate the effect of remittances outflows on inflation. The study found that the inflation rate is not influenced by remittance outflows. Narayan, Narayan, and Mishra (2011) use data from fifty-four developing countries from 1995 to 2004 and the generalized method of moments to examine the effect of remittances on the inflation rate. The study reports that remittance has a positive significant impact on developing the country's inflation.

Tung, Ly, Nhu, Thanh, Anh and Phung (2015) applied Panel Generalized Method of Moment (PGMM), Two-Stage Least Squares (2-SLS) and Ordinary Least Squares (OLS) to appraise the effect of remittances on inflation in selected developing countries using data from 1985 to 2013. The study revealed that during the period studied, inflation was significantly increased by remittances inflows. Using a sample of thirty sub-Saharan Africa countries and "instrumental variable system generalized method of moment", Ojapinwa and Nwokoma (2018) found an insignificant effect of remittances on the general price level.

As seen in the literature, evidence on the subject matter is scarce in Nigeria. Nigeria is the highest remittance-receiving country in African and the six largest in the world so it is essential to study how this remittance affects the country's inflation. Again unlike previous studies, we disaggregated price level (namely, consumer and producer price levels).

Summary of Literature

According to the quantity theory of money, under the monetarist model, Milton Friedman (1969) the father of monetarism and Nobel laureate in economics aver that excess supply of money in an economy leads to domestic inflation. He stated that inflation is always and everywhere a monetary phenomenon and argued that the changes in the overall price level are only brought about by the changes in monetary stock or money supply. This means that, when the money supply increases by a certain percentage, it will affect the price level to be increased by the same percentage respectively. This theory also mentioned that the inflation rate caused by the rise in the money supply, but it is not followed by an increase in output in the economy.

Empirically, previous studies in both developed and developing countries revealed two main categories of views concerning the impact of remittances on inflation. The first view considers remittance to have a positive and significant impact on inflation and these studies includes Balderas and Hiranya (2005); Khan and Islam (2013); Iqbal, Nosheen, and Javed (2013); Roy and Rahman (2014); Gashaw (2016); Kawira (2017) Hai and Doan (2017). The second view considers remittance as having a negative and insignificant effect on inflation and these include studies such as Adhikari and Guru-Gharana (2013); Abdul-Mumuni and Quaidoo (2016); Ojapinwa and Nwokoma (2018).

This study becomes paramount to literature in two aspects. First, literature on remittance-inflation nexus in Nigeria is scarce (as far as we know); our study presents the first comprehensive study on this subject matter using the appropriate methodology. Given the persistent increase in the inflows of workers' remittances in the labor-exporting country like Nigeria and the

recognitions attached to them by policy-makers as a potential source of external funding for developing countries, it has become critical to evaluate whether domestic macroeconomic conditions are affected by their persistent inflows. Moreover, it also becomes pertinent to empirically examine their likely impact on Nigeria's price level. Secondly, contrary to former studies, this study also disaggregates price level into consumer prices and producer prices and their interaction effects with workers' remittances in accessing the long-term impact of workers' remittances on price level. Findings from this study will not only help in resolving the conflicting findings in the literature on the price level effects of remittances but will also provide will provide a better underpinning for the development of policies to boost and manage inflows of workers' remittances.

Theoretical Framework

The theoretical framework adopted for this study is the monetary theory of inflation. The monetary theory of inflation was advanced Friedman (1968) cited in Friedman (1982). Friedman (1968) in explaining the phenomenon of inflation says that a persistent increase in general price level is caused by too much money chasing too few goods. Friedman has asserted that 'inflation is always and everywhere a monetary phenomenon'. The monetarists' approach is based on the quantity theory of money, which relates changes in price level as, always, and everywhere, a monetary phenomenon which originates from an increase in money supply. The quantity theory is given by:

$$MV = PY \qquad 3.1$$

Where M = nominal quantity of money supplied, P = the price level, V= the velocity of circulation of money, Y= volume of total real output.

Predicated on the assumption that V is constant and Y is at full employment, monetary theory predicts that changes in money supply translate proportionally to changes in the price level. The assumption of constant V is based on the monetarist believe that V is determined by institutional factors (eg how often workers are paid does not change very much).

Rewriting Equation 3.1, we have:

$$M = (y/v)\,P \qquad 3.2$$

Equation 3.2 shows that the change in M yields a fractional effect on the price level. Intuitively, the effect of the increase in money supply on the price level would be contingent on *y/v:* the output level and the spending behavior of economic agents. Thus, monetarists believe that changes in price levels reflect fluctuating volumes of money available, usually defined as currency demand deposits. They argued that to create stable prices, the money supply should increase at a stable rate commensurate with the economy's real output capacity.

Anchored on the theoretical framework of monetary theory of inflation, Ball, Lopez & Reyes (2012) investigated remittance-inflation-exchange rate nexus using vector autoregressive framework modeled as follows:

$INF_t = \alpha + \beta_1 INF_{t-1} + \beta_2 M_{t-1} + \beta_3 REM_{t-1} + \beta_4 REER_{t-1} + \beta_5 GDP_{t-1} + \mu$ 3.3

Where INF = inflation, M = money supply, REM = remittance, REER = real effective exchange rate and GDP = gross domestic product

Remittance inflow could be a source of a substantial increase in the money supply. When large inflows of foreign exchange are remitted by immigrant workers to their home country, the conversion of this foreign exchange into domestic currency raises the money supply. If this is not absorbed into productive sectors (or capital investment), then it goes into consumption expenditure, thereby fueling price inflation (Solimano, 2003; Bussolo & Medvedev, 2008; Giuliano, & Ruiz-Arranz, 2009). This argument shows that the impact of remittance would be contingent on the use of remittance. If the remittance is used for productive activities, it would moderate the inflationary effect of money growth through productivity increase. On the other hand, if remittance goes into household consumption, it would put pressure on aggregate supply thereby aggravating the inflationary effect of money growth.

Model Specification

Following Ball *et al.* (2012) and Obi and Igbanugo (2016) we specify an exogenised VAR (VAR-X) model as follows:

$Y = \delta_j + \sum_{j=1}^{q} \prod_j Y_{t-j} + \sum_{i=1}^{p} \Phi_j X_{t-j} + \varepsilon_t$

Where

Y = endogenous VAR variables such that Y = producer prices (PROP), consumer price (CONP), $\Delta M2$ = change in broad money, real effective exchange rate (REER), gross domestic product (GDP), oil price (OILP).

X = exogenous VAR variable such that X = remittance (REM).

δ = intercept paramer, Π and Φ are slope parameters and ε = error terms or innovations in VAR language.

On apriori, we expect that $\Pi > 0$ and $\Phi > 0$

Model Justification

Given the inadequacy of the structural model, the VAR approach sidesteps the need for structural modeling by treating every endogenous variable in the system as a function of the lagged values of all the endogenous variables in the system. The vector autoregression (VAR) model is used for analyzing the interrelation of time series and the dynamic impacts of random disturbances (or innovations) on the system of variables. With vector autoregressive models, it is possible to approximate the actual process by arbitrarily choosing lagged variables.

Following Obi and Igbanugo (2016) argument that traditional VAR is not appropriate for studying exogenous processes but a version of the VAR model known as exogenised VAR (VAR-X), we estimated equation 3.4 using VAR-X procedure. This extension of VAR (that is, VAR-X) estimates the

VAR model with the assumption that remittance (REM) is weakly exogenous. This assumption is cogent and proximate to real-life situations since remittance is determined largely by external factors. Thus, in our model, remittance rather entered the model as exogenous shock instead of the conventional endogeneity processes.

Description of variables

Change in Money Supply ($\Delta M2$ ***):*** $\Delta M2$ is the annualized percentage change in broad money supply (M2). This is computed as follows:

$$(\frac{M_2^2 - M_2^1}{M_2^1})100\%$$

Where M_2^2 *=Broad money supply in year 2,* M_2^1 *=Broad money supply in year 1.*

Inflation (infr): This is the annualized percentage change in consumer price index as recorded by the CBN.

Real Effective Exchange Rate (REER): The effective exchange rate is an index that describes the strength of a currency relative to a basket of other currencies. A real effective exchange rate (REER) adjusts the nominal exchange rate by the appropriate foreign price level and deflates by the home country price level. Exchange rate depreciation is expected to reduce cash balances given that agents would prefer to hold money in non-spendable alternative currencies.

Consumer Price (CONP): CONP is the average price for consumer goods. It is proxied using the consumer price index. A consumer price index (CPI) measures changes in the price level of the market basket of consumer goods and services purchased by households.

Producer Price (PROP): POPP was proxied using producer price index. A producer price index (PPI) is a price index that measures the average changes in prices received by domestic producers for their output.

Estimation Technique and Procedure

The researcher employed a number of statistical as well as econometric techniques of analysis which include VARX, Stationarity test and Cointegration Test. Some of these techniques are briefly explained below. This study employed secondary time series data which were obtained from the Central Bank of Nigeria (CBN) statistical bulletin various issues and data from the World Bank database. It covered the period from 1982 – 2019. The study utilized the time series for the period under study.

Presentation of Results

Stationarity Test

The test of stationarity was conducted using the ADF unit root test procedure. The null hypothesis that the time series has unit root was evaluated at 5% significance level. The null hypothesis was accepted in each if and only if ADF statistic is less than critical statistic, otherwise reject the null hypotheses. Table 4.1 indicates that all the time series, except $\Delta M2$ and CONP, are integrated of order one (I[1]). $\Delta M2$ and CONP are integrated of order zero (I[0]). The result presented in table 4.1 corroborates Eze and Igbanugo (2017) and Kim and Schmidt (1993) assertion that time series is the realization of stochastic processes.

Table 4.1: Result of Stationarity Test

Series	Test statistics at level		ADF statistics at difference		Order of integration	Remark
	ADF	critical	ADF	critical		
Producer price (PROP)	3.42	-1.94	-6.75	-1.94	I(1)	Integrated of Order One
Consumer price (CONP)	-7.26	-3.55	-	-	I(0)	Integrated of Order Zero
Change in money supply $\Delta M2$	-3.94	-2.95	-	-	I(0)	Integrated of Order Zero
Real effective exchnage rate (REER)	-2.74	-3.54	-6.75	-3.55	1(1)	Integrated of Order One
Gross domestic product (GDP),	-2.16	-3.54	-4.90	-3.55	I(1)	Integrated of Order One
Oil price (OILP)	-2.10	-3.59	-5.43	-3.59	I(1)	Integrated of Order One
Inflation rate (INFR)	-1.36	-3.54	-4.48	-3.56	I(1)	Integrated of Order One
Remittance inflow (REM)	2.25	-1.94	-6.75	-1.94	I(1)	Integrated of Order One

Source: Authors Compilation using result from EVIEW 10.1

Cointegration Result

Given that the time series are not integrated of the same order Johansen maximum likelihood procedure and Engel Granger residual-based cointegration may not generate efficient outcome (Kim & Schmidt, 1993). Consequently, ARDL procedure was employed. The result of the ARDL bound test for producer price, consumer price and inflation rate equations are shown in Table 4.2. As shown in Table 4.2, the F-statistic are 8.8, 15.7 and 13.1 for producer price, consumer price, and inflation rate respectively. All the model F-statistics are above the upper bound 3.2 at 5% significant level. This suggests that the time series are cointegrated. That is, there is a long-run relationship among the variables hypothesized in all three equations.

Table 4.2: Summary of ARDL Bound Tests Results for model 1 and 2

F-Bounds Test			Null Hypothesis: No levels relationship		
	Test Statistic		Signif.	I(0)	I(1)
	K	F-statistic			
Producer price equation	7	8.786996		Asymptotic: n=1000	
Consumer price equation	7	15.74257	10%	1.92	2.89
Inflation rate equation	7	13.13439	5%	2.17	3.21
			2.5%	2.43	3.51
			1%	2.73	3.9
Actual Sample Size		35		Finite Sample: n=35	

		10%	2.196	3.37
		5%	2.597	3.907
		1%	3.599	5.23

Source: Authors Compilation using result from E VIEW 10.1

Impact of Remittance on Inflation and Prices

The VAR estimates on the impact of remittance on inflation rate, consumer prices, and producer prices are presented in Table 4.3. On the columns are the regression equations of interest and the explanatory variables are reported on the rows. The standard errors of the estimates are reported in brackets immediately beneath the estimates. As shown in Table 4.3, remittance inflow (REM) is negatively related to producer price and positively related to consumer price and inflation rate. To be precise, the result shows that a 1 unit increase in remittance inflow could lead to a 0.06 unit decrease in consumer price and 0.15 unit and 0.01 unit increase in consumer price and inflation respectively. The estimates of change in money supply are 0.15 units, 0.65 units, and 1.58 units for producer price, consumer price, and inflation rate respectively. In the same vein, the estimates of REER are 0.21 units, 0.21 unit and 0.22 unit for producer price, consumer price and inflation rate respectively

Table 4.3: Summary of VAR estimates for Impact of Remittance on Inflation and Prices

	Producer price equation (PROP)	Consumer price equation (CONP)	Inflation rate equation (INFR)
Change in money supply CM2(-1)	0.146981 (0.05122)	0.654467 (0.09057)	1.578048 (0.76980)
Real effective exchange rate REER(-1)	0.213850 (0.08147)	0.206178 (0.04296)	0.223321 (0.10234)
PROP(-1)	0.590951 (0.13255)	0.812920 (0.23435)	-0.000107 (0.00382)
GDP(-1)	0.020478 (0.00645)	0.075782 (0.01140)	5.65E-05 (0.00019)
INFR(-1)	8.318307 (5.54258)	-9.592341 (9.79933)	0.489675 (0.15974)
CONP(-1)	0.000863 (0.00662)	-0.111588 (0.18094)	-0.000152 (0.00295)
OILP(-1)	0.015568 (0.02430)	0.206178 (0.04296)	-0.000646 (0.00070)
C	-34.47160 (77.2293)	42.71092 (136.542)	7.503438 (2.22584)
REM	-0.061215 (0.00460)	0.145194 (0.00814)	0.013050 (0.00133)
R-squared	0.946480	0.960200	0.779207
F-statistic	57.47528	78.40820	29.90477

*standard errors are in the bracket

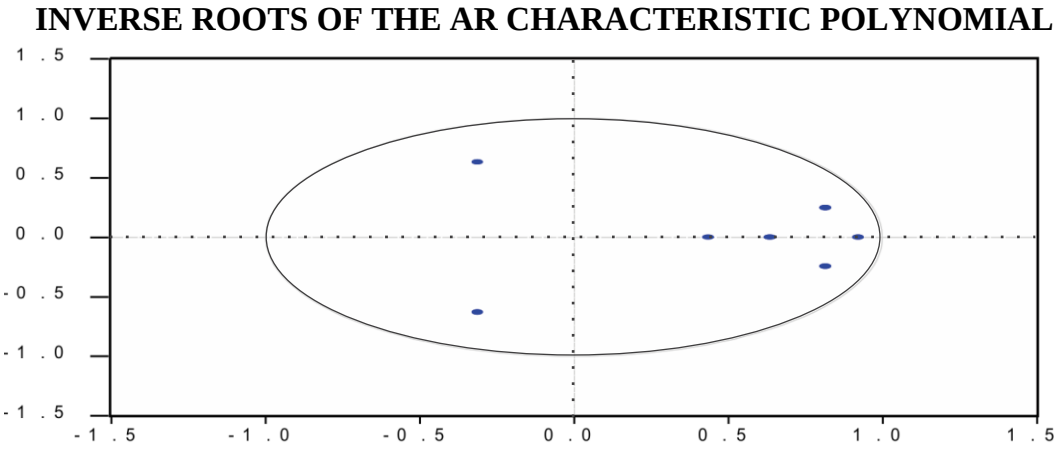
Source: Authors Compilation using result from E VIEW 10.1

Evaluation of Research Estimates

The research estimates are evaluated based on economic, statistical and econometric criteria. Based on apriori expectation, remittance is expected to be positively related to producer price, consumer price, and inflation rate. The results reported in Table 4.3 indicates that while consumer price and inflation rate conform to expectation, producer price does not conform to expectations. The negative sign of producer price suggests that remittance could rather engender deflation in producer price.

Table 4.3 also shows that statistically, the models are robust. The R-square for producer price, consumer price, and inflation rate equations are 0.95, 0.96 and 78 respectively. In other words, explanatory variables in producer price, consumer price, and inflation rate equations explain 95%, 96% and 78% of the variations in producer price, consumer price, and inflation rate. This implies that the regression equations have good fits. On the other hand, the f-statistics are 57.5, 78.4 and 29.9 for producer price, consumer price, and inflation rate equations respectively. Given the critical f-statistics of about 2.53, the result shows that all the estimates in the three equations are jointly significant. In other words, they can be used for inferences.

Based on econometric criteria, the validity of the VAR estimates is evaluated using the inverse roots of the characteristic AR polynomial of the VAR processes. The estimated VAR is considered stable if all roots have modulus less than one and lie inside the unit circle. Figure 4.1 shows that all the roots lie inside the unit circle. This implies that the VAR estimates are stable. Thus, inferences made from the VAR estimates are valid.



Source: Authors Compilation using result from E VIEW 10.1

Figure 4.1: Inverse roots of the AR polynomial of the VAR

Test of Hypotheses

The hypotheses are tested using T-test of significance. All test of hypotheses is implemented at 5% significance level. The test statistic is the t-stat (t_a^R) reported in the VAR output. The critical t-stat (t_a^C) as reported by Gujarati (2004) is 2.021.

Decision Rule: Reject H_0 if $(t_a^R) \geq (t_a^C)$, otherwise accept H_0.
The test of hypotheses is summarized in Table 4.4.

As shown in Table 4.4, all three hypotheses are rejected. Thus, we conclude as follows:

i. Remittance inflow has a significant negative impact on producer prices. This implies that remittance inflow reduces inflationary pressure on producer prices.
ii. Remittance inflow has a significant positive impact on consumer prices. This indicates that remittance inflow could increase inflationary pressure on consumer prices
iii. Remittance inflow has a significant positive impact on the inflation rate. In other words, remittance inflow has a net increase in inflation in Nigeria.

Table 4.4 Summary Hypotheses Test

	Estimates	T-stat	Outcome	Remark
Hypothesis One: Remittance inflow does not have a significant impact on producer price in Nigeria				
REM ⇔PROP	-0.061215	-13.2826	$(t_a^R) \geq (t_a^C)$	Reject H_0
Hypothesis Two: Remittance inflow does not have a significant impact on consumer price in Nigeria				
REM ⇔ CONP	0.145194	17.8191	$(t_a^R) \geq (t_a^C)$	Reject H_0
Hypothesis Three: Remittance inflow does not have a significant impact on inflation in Nigeria				
REM ⇔ INFR	0.013050	9.82230	$(t_a^R) \geq (t_a^C)$	Reject H_0

Source: Authors Compilation using result from E VIEW 10.1

Discussion of Finding

The main finding of this study is that remittance inflow could be a source of inflationary pressure on the domestic economy. This finding corroborates Roy and Rahman (2014) and Tung *et al*. (2015). Roy and Rahman (2014) and Tung *et al.* (2015) obtained evidence that remittance inflow is a major source of inflation in Bangladesh and Asian developing countries respectively. Remittance is a major source of foreign exchange and external financing. Remittance inflow is a source of liquidity and could fuel spending spree in the domestic economy. According to Tung *et al*. (2015), remittance could trigger inflation through its influence on money growth and household spending. As money stock increases in hands of household, a situation of 'too much money chasing too few goods' may arise thereby complicating the consumer prices. This is also indicated by the positive and significant effect of remittance inflow on consumer prices.

The result also indicates that remittance inflow has a negative and significant impact on producer prices. In other words, remittance inflow can be a source of price reduction in the production sector. Although the result does not follow the apriori expectation, it is quite intuitive. An increase in remittance inflow can lead to exchange rate appreciation. As exchange appreciates, import prices fall. The fall in import prices reflects a fall in the prices of imported intermediate inputs. As prices of intermediate inputs fall, producer prices could also fall. Another source of substantial fall in producer price is channeling of remittance received to production activities. If remittance received is invested in the production of goods and services, domestic production will become competitive and this could lead to a decline in producer prices. The decline in producer price can also result from an increase in the supply of producer goods due to increased investment of remittance receipt in production activities. The implication of this finding is that the overall effect of remittance on the general price level is the offsetting effect of remittance on consumer and producer prices.

Conclusion and Recommendations

Price level and remittances affect the economic activity of the recipient's economy and are especially of great importance for developing countries (Cáceres & Saca, 2006; Thang, 2013). Remittance inflow accelerates economic activity by increasing personal income, improving living standards, and ultimately enhancing the aggregate demand for goods and services. However, it could put upward pressure on prices. Remittance inflow could lead to an increase in consumption patterns with no increment in output growth, thereby boosting the prices of the commodities in the recipient economy. Although the growth and welfare effect of remittance inflow has been extensively investigated in Nigeria, the impact of remittance inflow on disaggregated

price levels (namely, consumer and producer price levels) has been rarely investigated, especially in Nigeria. This study, therefore, is an attempt to examine the impact of remittance on the price level in Nigeria. The theoretical framework was anchored on the monetary theory of inflation. The monetary theory of inflation predicts that since remittance is a source of money growth, it could be a substantial source of inflationary pressures.

Predicated on the theoretical framework, an exogenized VAR (VAR-X) model was utilized for estimating the impact of remittance inflow on inflation and prices. Time series spanning from 1980 to 2017 were fed to the VAR framework with the assumption that remittance inflow is weakly exogenous. Before estimating the VAR system, stationary and cointegration test were conducted using ADF and ARDL bound tests. The stationarity test indicates that the time series are largely difference stationary. The cointegration test also shows that the time series are cointegrated processes. The results of the VAR estimation show that remittance inflow has a significant negative impact on producer prices. The results also show that remittance inflow has a significant positive impact on consumer prices and the inflation rate.

Based on the findings obtained in this study, the following recommendation is proffered. First, a key finding of this study is that remittance inflow could be a source of price stabilization rather than inflationary pressure in the production sector, this is favourable given the economic effects of COVID-19. We, therefore, recommend that households should endeavor to invest remittance received on productive ventures. Remittance inflows could be used to drive entrepreneurship in terms of setting up new business or expansion of existing ones.

Second, the effect of remittance on consumer prices and general inflation suggests that remittance inflow may not be sterilized by the monetary authorities. Remittance inflow increases the money supply by changing the foreign exchange to local currency. The CBN can sterilize remittance inflow by offsetting the increase in the domestic currency by selling domestic government securities, which decreases the money supply by the amount of the securities. By so doing, the inflationary pressure on consumer prices would be doused.

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