THE EFFECTS OF REMITTANCES ON POVERTY IN NIGERIA

Babajide Fowowe

Mohammed Shuaibu

Working Paper 084-2026

Bringing Rigour and Evidence to Economic Policy Making in Africa

CONSORTIUM POUR LA RECHERCHE ÉCONOMIQUE EN AFRIQUE

The Effects of Remittances on Poverty in Nigeria

By

Babajide Fowowe
Department of Economics
University of Ibadan, Ibadan, Nigeria
Email: babafowowe@hotmail.com

Mohammed Shuaibu
Department of Economics
Ahmadu Bello University, Zaria, Nigeria
Email: mohammed_shuaibu@yahoo.com

AERC Research Paper 084-2026
African Economic Research Consortium,
Nairobi July 2026

Published by: The African Economic Research Consortium

P.O. Box 62882 - City Square
Nairobi 00200, Kenya

Abstract

This study conducts an empirical investigation of the effects of remittances on poverty in Nigeria. We rely on a computable general equilibrium (CGE) model where policy scenarios that reflect changes in remittances are simulated, thereby making it possible to identify the impact of remittances on poverty. The results revealed that a negative remittance shock occasioned by the launching of the $300 million diaspora bonds by the Federal Government led to an increase in the level of poverty. Also, our results showed that the impact of a positive remittance shock through the reduction of remittance transaction costs led to a reduction in poverty. The effect was primarily transmitted through the income and consumption channels. The results underscore the crucial role of remittances in helping to smooth consumption and ameliorating poverty in Nigeria. Design appropriate policies that seek to facilitate the flow of remittances more reliably and at the lowest cost, develop remittances-related products (i.e., savings, insurance contributing to social protection for households), and foster access to financial and business services, thus stimulating the local economies. Thus, a set of key features that lead to cost-related inefficiencies, such as weak infrastructure, low competition, and financial regulation constraints, needs to be addressed. The study concludes that remittances cannot be exclusively relied upon for ameliorating poverty, rather it should be used to complement other programmes.

1. Introduction

The 21st century has ushered in an era where increased attention has been focused on remittances and their effects on, especially, the economies of emerging and developing countries. Despite the positive trend of remittances in Nigeria [US$20.77 billion (World Bank, 2016)], this has not translated to the expected benefit on household poverty, as the incidence of poverty has remained high over the years. Recent studies show that the number of Nigerians living in extreme poverty increases by six people every minute (Brookings Institute, 2018). The report notes that "Nigeria has already overtaken India as the country with the largest number of extremely poor people in 2018" (ibid.)[1] Digging further, the report suggests that as of the end of May 2018, poverty trajectories indicate that about 87 million people in Nigeria are in extreme poverty compared with India's 73 million people.

With remittances assuming a prominent role in recent times, attention has increased on identifying their benefits, especially for developing and emerging countries. Remittances can affect development outcomes in several ways. Firstly, remittances can help alleviate poverty by enabling recipients to have more cash for the consumption of goods and services (Ratha and Mohapatra, 2012). Secondly, remittances can also improve human capital by making more funds available for expenditure on health care and education (Ratha and Mohapatra, 2012; IMF, 2005). In addition, remittances can lead to an increase in investment and entrepreneurial activities by households, which could come in the form of small businesses or investment in real estate (IMF, 2005; Ratha & Mohapatra, 2012).[2]

Also, remittances can have a positive effect on development by reducing poverty and inequality, because of poorer households being empowered in their consumption needs and the multiplicative effect of such spending on the macroeconomy (Ratha and Mohapatra, 2012). On the macroeconomic front, remittances could have a positive effect on economic growth because of increased investment by households benefiting from remittances. This is particularly so if the financial system is well developed, as this ensures efficient identification and allocation of credit to the most productive investments (IMF, 2005).

While considerable research has examined the effects of remittances on welfare and poverty in developing countries, there is a dearth of research on this issue for the Nigerian case. Thus, this study departs from other studies in examining the effects of remittances on poverty in Nigeria. Nigeria represents an interesting case study because, in addition to being the most populous country in Africa, it also has the largest economy on the continent. Also, Nigeria receives the largest share of remittances in Africa. In addition, remittances accounted for a high proportion of GDP, averaging 5.64% between 2000 and 2016. Thus, understanding the interactions between remittances and poverty will go a long

[1] https://www.brookings.edu/blog/future-development/2018/06/19/the-start-of-a-new-poverty-narrative/

[2] This was reinforced by Odior (2014) who presented evidence that supports the growing view that remittances can help increase the level of investment in human and physical capital in remittance-receiving countries.

way in understanding this nexus in Nigeria. We use a computable general equilibrium (CGE) model to conduct policy experiments, thereby enabling us to identify the direct and indirect impacts of remittances on poverty.

This study is important for several reasons. Firstly, remittances are a crucial source of foreign exchange earnings and income for low-income households. Remittances have been shown to affect key human development indicators, such as education and health, with implications for poverty. It would, therefore, be insightful to empirically examine how remittances have affected poverty in Nigeria. Secondly, incomes and welfare in many African countries since the 1980s have been very low, and many authors have described development in Africa as 'dismal' or 'stagnant' or 'tragic'. In light of this, it has become imperative to identify factors that could help stimulate incomes and alleviate poverty, and remittances are among them.

Following the above, this study conducts an empirical investigation of the effects of remittances on poverty in Nigeria. To achieve this aim, an economy-wide CGE model that captures the direct and indirect effects of remittances on poverty is utilised. The CGE model is better suited to tracing the specific poverty effects of policy changes, and it is also characterised by conceptual and accounting consistency compared with the use of econometric techniques. Endogeneity issues associated with decisions surrounding migration and remittances require more advanced techniques that deal with this issue explicitly. Finally, the CGE model facilitates policy simulations that reflect increases in remittance inflows due to lower remittance costs or decreases due to subscriptions to diaspora funds. These scenarios enable identification of the effects of remittances on household consumption and income, with a view to assessing their impact on poverty.

The sequence of this paper is clear. Section 2 explores stylised facts on remittances and poverty in Nigeria, while Section 2 interrogates related theoretical and empirical literature. The empirical strategy is presented thereafter in Section 4. This is followed by a discussion of findings in Section 5. The concluding remarks and policy considerations are presented in Section 6.

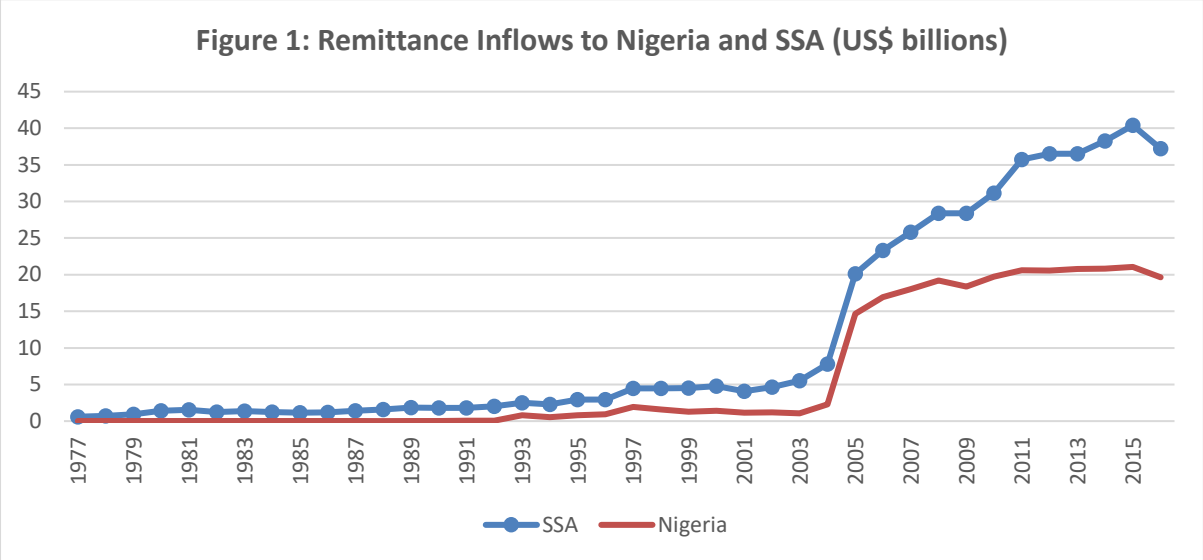
2. Stylized Facts on Remittances and Poverty in Nigeria

Capital flows have risen remarkably in the last 25 years, and remittances have assumed a greater role than ever before. Remittances have become a dominant source of external finance for developing countries. For instance, remittance flows were below all other sources of external finance to developing countries (Figure A1). Evidently, the 21st century has witnessed a tremendous surge in remittance flows, with remittances rising by almost 300 per cent between 2000 and 2009 to US$307 billion (World Bank, 2016). This figure is more than twice the amount of Official Development Assistance (ODA) and almost three times the amount of private equity flows. Only FDI exceeded remittances, totalling US$359 billion (ibid.).

Total remittance inflows to Sub-Saharan Africa (SSA) were US$34.8 billion in 2015, out of which Nigeria alone received US$20.77 billion (World Bank, 2016). Nigeria alone received 72% of remittance flows to SSA in 2006 (Figure 1). Although this had dropped to 59.6% in 2015, Nigeria still clearly ranks as the highest remittance recipient in SSA. Figure 1 shows that remittance inflows to Nigeria were US$22 million in 1980, and this had fallen to US$10 million in 1990 (World Bank, 2016). Remittances experienced an upsurge from 1991, when they rose to US$66 million, and this increase continued over the years; by 1999, remittances had reached US$1.3 billion.

The next decade brought even further increases in remittances, rising from US$1.3 billion in 2000 to US$10 billion in 2010 (World Bank, 2016). Nigeria's importance in the global remittances market has increased substantially, ranking as the 6th-largest remittance-receiving country in the world in 2014 (Figure A2). According to the World Bank (2018), in 2017 the top remittance-receiving countries were India, China, the Philippines, Mexico, Nigeria, and Egypt, with Nigeria recording US$22 billion in remittances.

This trend may explain why average poverty in SSA remains quite high, as nearly half of the population in the region lives below the poverty line. As of 2013, 48.5% of the population is living on less than $1.25 per day, and 69.9% on less than $2.00 per day. With a little over 910 million people living in the region, this places around 637 million Africans below the poverty line in 2013.[3] The latest estimates from a World Bank African Poverty Report show that the share of Africans who are poor fell from 57% in 1990 to 43% in 2012, and this may be traced to the rapid population growth, which increased from about 280 million in 1990 to 330 million in 2012.



Source: World Bank (2016)

[3] https://borgenproject.org/5-poverty-statistics-on-sub-saharan-africa/

Indeed, while quantitative evidence shows that remittance inflows to Nigeria have increased, there is less consensus concerning their beneficial effects. The reasons for this lack of consensus are evident in Nigeria's poverty. Nigeria's population has been growing at an annual average rate of over 2% for the past 2 decades, and the country's population is now estimated to be 170 million. Poverty in the country seems to be following this upward trend in population. Table 1 reveals that in 1980, the proportion of the population living on less than a dollar a day in Nigeria was 27.2%, indicating that 17.1 million people were poor.

The proportion of the population who were poor increased to 46.3% in 1985, and by 1996 this figure had risen further to 65.6%. Thus, in 1996, 67.1 million Nigerians were in poverty. The poverty incidence fell to 54.4% in 2004 but then rose to 69% in 2010. The decline in poverty between 1996 and 2004 was followed immediately by a surge in remittance inflows from 2003 onwards. Plausible explanations for these striking developments may be traced to domestic policy reforms such as the bank consolidation exercise, which led to a recapitalisation of Nigerian banks and enhanced flexibility of receiving remittances; while the aggressive poverty alleviation programmes embarked upon from 1999 by the new democratic administration may have contributed to the decline in poverty between 1996 and 2004.

Nevertheless, Table 1 shows that poverty in Nigeria has generally been on the rise since the 1980s, which may be explained by a rapidly growing population, declining food supply, and rising food prices. This was corroborated by a recent study that estimated poverty had increased (IMF, 2018).

Table 1: Trends in Poverty Levels in Nigeria, 1980 – 2010

Year	Poverty incidence (%)	Estimated population (million)	Population in poverty (million)
1980	27.2	65	17.1
1985	46.3	75	34.7
1992	42.7	91.5	39.2
1996	65.6	102.3	67.1
2004	54.4	126.3	68.7
2010	69.0	163.0	112.47

Source: National Bureau of Statistics

In view of the fact that remittances do not suffer from wild fluctuations as other forms of external finance, they do not cause shocks or volatility to output or investment during periods of booms or busts in the global economy, but rather, act as a form of insurance against such shocks and natural disasters (Ratha and Mohapatra, 2012). On the negative side, remittances can have Dutch disease effects, leading to an appreciation of the exchange rate and a fall in exports of tradable goods and services. Remittances can also reduce recipients' motivation to work, potentially adversely affecting productivity and output due to constrained labour supply. Finally, some remittance channels could be misused for money laundering and to finance terrorism (Ratha and Mohapatra, 2012). This may affect poverty depending on the extent to which households rely on remittances as a source of income.

The surge in remittance inflows in Nigeria may have constrained labour supply, thereby reducing rural and urban household incomes. This impact is relatively larger on rural households compared with their urban counterparts. Table 2 presents additional information about poverty in Nigeria. It is seen from Table 2 that poverty incidence in rural and urban areas has been increasing, with the latter dominating the former in terms of magnitude. In 1980, poverty incidence in urban areas was 17.2%, while it was 28.3% in rural areas. By 1992, the poverty incidence had risen to 37.5% in urban areas and 46% in rural areas.

This trend continued, and by 2010, 61.8% of urban dwellers were poor, while 73.2% of rural people were poor. This stark difference in poverty between rural and urban areas explains the high rate of rural-urban migration in Nigeria, and also shows why the incentive to migrate abroad is higher with rural dwellers. Examining poverty by geopolitical zones, the incidence of poverty has generally been higher in the northern parts of the country than in the southern parts (Table A1). Poverty has generally been highest in the North-Eastern part of the country. This is closely followed by the North West and then the North Central part of the country, while the South-Eastern part of Nigeria has the lowest poverty incidence.

Table 2: Relative Poverty Incidence by Area, 1980-2010 (%)

Year	Urban	Rural
1980	17.2	28.3
1985	37.8	51.4
1992	37.5	46.0
1996	58.2	69.3
2004	43.2	63.3
2010	61.8	73.2

Source: National Bureau of Statistics

From the foregoing, remittances have increased rapidly over the past two decades, and while there are many advocates proclaiming their benefits, there are concerns regarding their detrimental effects on developing countries. Furthermore, poverty is a crucial problem for Nigeria, and while the country's population has been steadily rising over time, poverty has also been increasing in the country. The high poverty levels have contributed to emigration from Nigeria, and the country ranks as the 6th largest emigration country in SSA (World Bank, 2018). An important motive for emigration is to send remittances home to alleviate poverty.

The factors that prompt increases or decreases in remittance inflows are important, as they form the basis of the simulations carried out in the study. In the former case, for instance, the Federal Government of Nigeria's $300 million diaspora bond offering on June 7, 2017, can lead to a reduction in remittance inflows. Diaspora bonds are government debt instruments issued by a country to its own diaspora to tap into their wealth (Ketkar and Ratha, 2007). Diaspora bonds operate like traditional bonds and provide governments with predictable financing sourced from their diaspora communities. It is an important

financial instrument for mobilizing diaspora savings to finance government projects. The Nigerian government seeks to harness and redirect diaspora resources toward investment in critical infrastructure projects in the recent Economic Recovery and Growth Plan (ERGP) (2017).

This suggests that remittance inflows may be reduced. However, there is a caveat to this overly strong assumption. First, if the purpose of remittances is investment, one would expect diaspora nationals to be motivated by patriotism to contribute to national development. This is particularly the case when remitted funds sent back home for investment are misused. Secondly, if the motive for sending money is primarily to support family and relatives back home, then floating diaspora bonds may not affect the incentive to remit. In this case, remittance sent to support family and relatives will be constant. Thus, the policy simulations considered in the study draw from the first assumption.

On the other hand, an important factor that can increase remittance inflows is the cost of remitting. Over the last decade, attention has focused on the "sending side" of remittances, particularly the aggregate volumes and transaction costs of sending family remittances, essentially from developed to developing countries (IFAD, 2017, p.13). This is because higher transaction costs of remitting inhibit diaspora inflows with a negative effect on remittance-dependent households. The United Nations Sustainable Development Goal (SDG) number 10 seeks to reduce inequality between and within countries. An important strategy towards achieving this goal is reducing remittance transaction costs by 3%. This is, in turn, expected to increase household income and consumption.[4] However, some assumptions warrant note. For instance, an increase in the cost of remitting may not change the amount remitted, particularly in the case of high-earning migrants. However, for low-earning migrants, the increase in remittance costs is likely to reduce the amount remitted back home.

The efficiency of the financial system is important, especially in managing the large inflows of diaspora funds. Indicators of financial sector development trended largely downwards in 2017. Financial sector development, measured by the M2-to-GDP ratio, was 21.1%, down from 23.3% in 2016. Similarly, the banking system's capacity to finance economic activities, measured by the ratio of aggregate credit to GDP, was 22.7%, compared with 26.5% in 2016. Total money market assets outstanding fell by 61.1% below the 2016 level, largely due to declines in Nigeria Treasury Bills and FGN Bonds outstanding. The monetary authority has made significant efforts to modernise the payments system by reinforcing the implementation of existing and new initiatives to enhance its credibility, reliability, and efficiency. This is expected to contribute towards better management of remittance inflows.

In terms of poverty-related policy developments, the government has taken several steps towards ameliorating poverty, which is a key priority in its Economic Recovery and Growth Plan (ERGP) by

[4] Africa remains significantly far from this target as average cost of remitting $200 is about $20, indicating that costs are 10% of amounts remitted (IFAD, 2017, p.23).

investing in people. The specific interventions include the Home Grown School Feeding Programme, the conditional cash transfer programme, the government enterprise and empowerment programme, and the N-Power scheme, which seeks to address youth unemployment. To address hunger and achieve food security, capital provision for agriculture increased from N8.8 billion in 2015 to about N149.2 billion in 2018. Furthermore, the Anchor Borrower's programme has led to significant credit disbursements to support farmers.[5]

In sum, quantitative evidence on remittances and poverty would suggest that the increase in remittances has not been able to stem the high incidence of poverty. Ultimately, knowing the exact effects of remittances on poverty is an empirical issue. This necessitates an empirical study of the effects of remittances on poverty.

3. Literature Review

3.1 Theory: Impact of Remittances on Poverty

The theoretical links between remittances and macroeconomic outcomes can be examined from either the international trade theory or socioeconomic perspectives. The trade theory perspective examines the impacts of remittances on trade, prices, and welfare. With the new growth theory, authors have increasingly examined the effects of remittances on relative prices and welfare using two-sector general equilibrium models (Rapoport and Docquier, 2006). The socioeconomic perspective examines the impacts of remittances on socioeconomic outcomes, depending on their use for consumption or investment.

3.1.1 Trade theory approach

The trade theory approach examines the impact of international transfers on relative prices and welfare using international trade theory (Rapoport and Docquier, 2006). These models start by assuming homogenous agents, but who have different identities – recipients and non-recipients. It is the recipients of remittances whose welfare improves because of migration.

An early model by Rivera-Batiz (1982) starts by assuming a small, open economy with capital and labour as the two factors of production and two sectors: traded (T) and non-traded goods (N). Perfect mobility of the factors of production is assumed between the two sectors. It is also assumed that agents have identical homothetic preferences. With zero remittances, and when the capital-labour ratio changes, emigration has an adverse effect on the welfare of all residents in the source country (Rivera-Batiz, 1982). This is because, after emigration, the residents who remain are denied trading opportunities with the migrants in the market for non-traded goods.

[5] https://www.vanguardngr.com/2018/09/we-have-moved-10m-nigerians-out-of-poverty-fg/

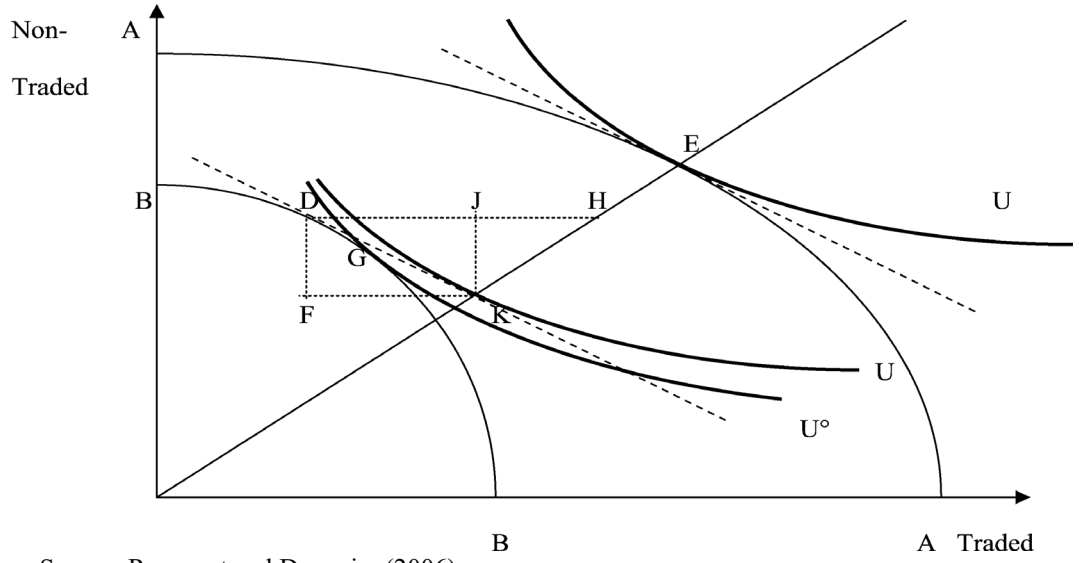
Quibria (1997) developed a model that showed that emigration is not detrimental to all remaining residents but has positive and negative effects. The composite impact on welfare depends on specific welfare functions. According to Quibria (1997), factors that determine whether agents are winners or losers from emigration are the volume of remittances, the distribution of factor endowments, and the type of migration. Regarding the volume of remittances, if remittances are sufficiently large, emigration always has a positive impact on welfare, independently of the specific welfare function. Regarding the distribution of factor endowments, workers gain from emigration due to higher real wages, while capitalists lose from a reduction in the return to capital.

Djajic (1986) developed a model that also recognises that some residents gain and some lose as a result of remittances. Djajic (1986) classifies remaining residents into 2: related remaining residents (RRR) and unrelated remaining residents (URR). Then, irrespective of volume, remittances will always improve the welfare of the RRR. However, the URR can also benefit when remittances are sufficiently large to stimulate excess demand for non-traded goods by the RRR. In this case, the purchasing power of the URR increases because of the higher relative price of non-traded goods.

Figure 2 presents the workings of these models. The URR is a net supplier of non-traded goods. Then, before migration, the production possibilities frontier (PPF) is given by AA. Equilibrium in the economy is given by point E, where AA, the PPF, is tangential to the social indifference curve U. Following emigration, the PPF shifts inwards to say BB. Then, at constant prices, point D would give the new production solution while point K would give the optimal consumption bundle. It is assumed that consumption and utility remain constant for the remaining residents. However, at point K, DF units of non-traded goods are offered up for sale against FK units of traded goods. There is an excess demand for traded goods, implying that point K is not an equilibrium. Consequently, there is a decrease in the relative price of non-traded goods and the welfare of remaining residents, at a new equilibrium, say G.

Assume that migrants send remittances to the RRRs, in the form of say, DH units of traded goods. At constant prices, the RRR can maintain consumption at the pre-migration proportion by exchanging DJ units of traded goods for JK units of non-traded goods with the URR. This can be achieved at the pre-migration price system and gives the optimal bundle K. If the remittances are small, the price of non-traded goods will fall, and consequently, the welfare of the URR will fall. This is because the URR is the net supplier of non-traded goods. The RRRs will have an increase in welfare owing to their increased income and lower prices. On the other hand, if remittances are large, there will be an increase in the relative price of non-traded goods. Then, the URR will experience an improvement in welfare – brought about by the positive price effect. For the RRR, they will experience an increase in income (income effect) but higher prices for non-traded goods (price effect). However, RRRs experience an improvement in welfare, as the positive income effect is likely to dominate the negative price effect. Thus, the net effect of remittances on residents' welfare depends on their size.

Figure 2: Remittances and Welfare in a Static Trade Model



Source: Rapoport and Docquier (2006)

3.1.2 Socio-economic approach

The socio-economic perspective of the impact of remittances has gained prominence in recent times. Considerable emphasis has been placed on understanding the impact of remittances on growth, poverty, and inequality in recipient countries. A lot of this attention derives from the peculiar characteristics such as their size in relation to other external flows; their stability and apparent independence from shocks and cyclical swings; and their tendency to increase during tough periods in the source country (periods of economic uncertainty and instability), such as high inflation, high debt levels, and exchange rate appreciation. Several variables have been identified as motivating factors for remittances. These include altruism, self-interest, family agreements, savings, and portfolio management (OECD, 2006). However, irrespective of the motivations for remittances, their effects on welfare largely depend on whether they are used for consumption or investment. Such consumption and investment decisions then play a crucial role in the ability of such remittances to alleviate poverty and create economic security (Chimhowu et al, 2005). Remittances can have a long-term impact on reducing poverty if they are used for investment, leading to reductions in vulnerabilities and inequalities (Chimhowu et al., 2005, p.89). When remittances are used for consumption, their effects are more often for the short run, with the danger of increasing inequality (Chimhowu et al., 2005).

3.1.3 Remittances and household consumption

Remittance plays a vital role in smoothing the consumption path of households. This is more important for poor rural households that face adverse income shocks due to limited access to credit and insurance. For instance, in cases where these households rely primarily on agricultural income, they are also exposed to agro-climatic shocks. This implies that household members can migrate to areas (countries or regions) less prone to these shocks to raise earnings to support consumption. Clarke and Wallsten

(2004) note that additional hurricane costs in Jamaica led to an increase in remittances by $0.25, while Yang and Choi (2007) report that remittances substituted about 60% of income loss that arose from weather-related shocks amongst households in the Philippines. Yang (2004) presents similar evidence to the latter study using cross-country evidence.

The literature generally supports the notion that remittance serves as insurance that smooths the consumption of households that face adverse shocks. However, as noted earlier, the methodological issues that arise relate to endogeneity, such as reverse causation and omitted-variable bias. The inability of econometric-based studies to account for household heterogeneity is also an important issue that can lead to misleading inferences. These issues are better addressed using a CGE model and household survey data.

3.1.4 Remittances and household income

Remittances may affect household income indirectly through changes in labour supply, as they reduce the incentive to work due to additional income from remittances. The availability of diaspora funds may alter the return to supplying labour if, for instance, the migrant conditions remittances on low household income; such a substitution effect will reduce the welfare gain from remittances by distorting household labour decisions (World Bank, 2006, p. 124).

In addition, it reduces the binding constraints on working capital available for investment due to a relatively stable income stream from remittances. This tends to improve households' creditworthiness in the eyes of formal financial institutions (World Bank, 2006). This is particularly true for households that are susceptible to domestic and external shocks. Finally, remittances affect households indirectly through the multiplier effect. In this case, an increase in household income stems from higher remittance inflows, which, in turn, boost household consumption. This holds in cases where the output is constrained by domestic demand. However, in many developing countries, sustained underemployment is likely to have supply-side causes, for example, government policies that increase the cost of hiring and firing workers, so that increased demand will ultimately result in higher inflation rather than increased output (World Bank, 2006).

Domestic spending from remittance income stimulates earnings for other households, which may, in turn, lead to a rise in domestic prices. This may become a source of concern as the government responds to the price increase by tightening monetary policy, which inevitably affects aggregate demand. Notably, the net effects through the multiplier may only be beneficial to recipients of remittances at the expense of households that do not receive remittances and thus must bear the brunt of monetary tightening. The multiplier effects may also be viewed in terms of output expansion in some sectors driven by intersectoral linkages. This means that output-expanding sectors can absorb more labour and capital from other regions or sectors that are contracting and experiencing excess labour supply. Despite its importance, the remittance-induced multiplier has received limited empirical attention, especially

within the context of an economy-wide model, because the focus has primarily been on distribution issues. This serves as another important value addition to this study.

3.1.5 Remittances, savings, and investment

Households that receive remittances often face the choice of allocating resources to consumption or saving. If the household decides to save more through allocation to financial assets, this tends to affect the level of aggregate investment. This also explains migrants' tendency to invest at home through diaspora bonds. However, when viewed against current consumption, an extra dollar of investment is only better than an extra dollar of present consumption if the marginal social value of the investment is greater than its marginal private value (World Bank, 2006, p. 125). Therefore, the rate of the investment using remittance funds by households will be significant only if (i) remittance inflows are transitory and not permanent, thus making a case for saving, and (ii) the remittance sender conditions the funds on certain investments (ibid.). However, this may not hold in households , face acute credit shortages, or experience adverse consumption shocks. In such cases, consumption needs to overshadow the desire to save and invest.

Diaspora funds can also be targeted at human capital investments. This implies that households use foreign transfers to improve health outcomes and boost educational attainment. Cox and Ureta (2003) opine that remittances reduce the probability of children leaving school by 10 times the effect of other sources of income in urban areas and by 2.6 times in rural areas in El Salvador. De and Ratha (2005) find that in Sri Lanka, remittance income has a positive and significant impact on the weight of children under five; this result is especially strong for female-headed households. In a survey of 6,000 small firms in 44 urban areas in Mexico, Woodruff and Zenteno (2001) found that remittances accounted for almost 20% of total capital in urban microenterprises. This issue provides an important basis for remittances, especially in developing countries like Nigeria, where health outcomes and education remain poor and exacerbate poverty.

2.2 Empirics: Impact of Remittances on Poverty

Considerable research has examined the effects of remittances on welfare and poverty in developing countries. These studies can broadly be categorised into two groups: single-country studies and cross-country studies. We provide a brief review of these studies below.

2.2.1 Cross-country studies

Some studies, such as Adams and Page (2003) and Adams and Page (2005) have used data over a broad range of developing countries to examine the impacts of remittances on poverty.

Adams and Page (2003) used a broad cross-section of 74 developing countries to examine the impact of international migration and remittances on poverty. The results revealed that international remittances have a negative and statistically significant effect on all three measures of poverty. On average, a 10% increase in remittances as a share of the country’s GDP will lead to a 1.6% decline in

the poverty rate.

Adams and Page (2005) used the results of household surveys in 71 developing countries to analyse the impact of international migration and remittances on poverty in the developing world. The use of the instrumental variables approach was employed using the distance between remittance-sending and receiving countries to instrument for remittances results suggest that a 10% increase in per capita international remittances in a developing country will lead, on average, to a 3.5% decline in the share of people living in poverty ($1.00/person/day). Findings, therefore, revealed that both international migration and remittances significantly reduce the level, depth, and severity of poverty in the developing world.

Some other studies, such as Acosta et al. (2008), Acharya and Leon-Gonzalez (2012), and McKay and Deshingkar (2014) used data for countries in specific regions to examine this issue.

Acosta et al. (2008) investigated the links between remittances, poverty, and inequality using household survey data for 11 Latin American Countries and estimated cross-country regressions for a large sample of countries using balance-of-payments statistics on aggregate remittance flows. Using the household survey based on observed total household income and non-remittance income, the results suggest large reductions in poverty headcounts driven by remittances, especially in countries where migrants tend to come from the lower quintiles of the income distribution. Similar results were obtained using cross-regression analysis, which considers that remittances vary by region and captures the impact that it has on poverty due to increases in per capita income, therefore suggesting that remittances tend to reduce poverty to a larger extent in Latin America than elsewhere in the developing world.

Digging further, Acharya and Leon-Gonzalez (2012) use a microsimulation model to assess the effects of remittances on poverty and inequality in Nepal. Unlike previous studies, they focus on how this impact varies across regional incidence and migration magnitude, and by country of origin of remittances. The study found that remittance inflows led to a decline in poverty levels, and the impact depends on the extent of participation, the incidence of migration, and the maturity of the migration process.

Mckay and Deshingkar (2014) used analysis of remittance data from a large, nationally representative sample survey complemented by migration data from secondary sources and other household surveys to show the significance of internal remittances as well as the characteristics of the receiving areas and households for six countries in Africa and Asia (Nigeria, Rwanda, South Africa, Uganda, Bangladesh, and Vietnam). The results showed that all six country cases experienced high levels of international migration, and both domestic and international migrants frequently remit to their households of origin. Domestic remittances are more likely to be received by poor households, while international

remittances tend to be received by richer households. Hence, the bulk of remittance-induced poverty reduction in all countries stems from domestic transfers.

Another strand of the literature has focused on the use of panel data. For instance, Yoshino et al. (2017) examine the impact of international remittances on poverty reduction using a panel data set of 10 developing Asian countries. The results from panel ordinary least squares and random effect estimates show that remittances exert a statistically significant impact on poverty. This was corroborated by Tsaurai (2018), who examined the effect of remittances on poverty in selected emerging market economies. The results from the fixed effect panel data approach show that remittances led to a fall in poverty, while the pooled ordinary least squares estimates showed that remittances led to an increase in poverty.

2.2.2 Single-country studies

The single-country studies conducted to examine how remittances have affected poverty can be broadly grouped by regions. A considerable number of studies have been conducted for Asian countries. These include Zhu and Lou (2008) for China, Adams and Cuecuecha (2010) for Indonesia, Siddiqui and Kemal (2006), Mughal and Diawara (2010), Irfan (2011), and Mughal and Anwar (2012) for Pakistan.

Zhu and Lou (2008) examined the impacts of rural-urban migration on rural poverty and inequality. Remittances were considered a "Potential Substitute" for household earnings and an Exogenous transfer, simulating the counterfactual of how rural household incomes, rural poverty, and rural inequality would have been in the absence of migration. Findings revealed that remittances from migrants, considered as "potential substitute" for home income, tend to have an egalitarian effect on earnings in rural China. Also, participation in migration noticeably reduced rural poverty. Adams and Cuecuecha (2010) used a large, panel household budget survey from the Indonesian Family Life Survey (IFLS) to analyse the impact of international remittances on poverty and household consumption and investment. The results showed that international remittances have a large, statistical effect on reducing poverty in Indonesia. Also, comparing households receiving remittances in 2007 and those not receiving in a counterfactual situation, it was revealed that households receiving increase their marginal expenditures on a key consumption good-food-by 8.5% and a key investment good-housing-by 39.1%.

Mughal and Diawara (2010) examined the macro and micro-economic relations between remittances and poverty/inequality in Pakistan. The results showed that the remittances from the Middle East have a negative and significant impact on poverty and inequality in Pakistan. Findings revealed that individuals receiving international and domestic remittances are less likely to be poor and more likely to belong to higher income quintiles. Irfan (2011) examined the effects of remittances on poverty in Pakistan using Ordinary Least Squares. The dependent variable, poverty (headcount ratio), for all years under analysis is based on estimates from national household surveys. It was observed that GDP, as

well as remittances as a fraction of GDP or as a total, emerged as significant explanatory variables for poverty alleviation.

Siddiqui and Kemal (2006) used the Computable General Equilibrium (CGE) framework to assess the impact of trade liberalisation and a decline in remittances on welfare and poverty in Pakistan. The results showed that a decline in remittances reduces the gains from trade liberalisation. The negative impact of the decline in remittances dominates the positive impact of trade liberalisation in urban areas. But the positive impact of trade liberalisation dominates the negative impact of a decline in remittances in the case of rural areas. Poverty, because of the decline in remittances, rises in Pakistan as a whole.

Mughal and Anwar (2012) used the 2005/06 and 2007/08 Household Integrated Economic Survey data to examine the impact of remittance incidence on inequality and poverty in Pakistan. The official poverty lines for three binary variables for poverty2005/06 and 2007/08, respectively, were used to construct three binary poverty. The poverty headcount rate, the poverty gap, and the squared poverty gap were constructed from these variables. Among other explanatory variables, household size appears to be positively associated with poverty, while the number of workers and the person's education status show a significant negative relationship. It was found out that foreign remittances resulting from a rise in income arising because of migration significantly improve Pakistan's poverty situation.

Some other countries, such as Quartey (2006), Adams et al. (2008) and Chukwuone et al. (2012), have been studied for African countries.

Quartey (2006) used the Ghana Living Standard Survey to investigate the impact of migrant remittances on household welfare in Ghana. The results revealed that migrant remittances improve household welfare; a 1% increase in remittance flows will lead to a 0.23% improvement in household welfare. Adams et al. (2008) used data from the 2005/06 Ghana Living Standard Survey (GLSS 5) to analyse the impact of internal and international remittances on poverty and inequality in Ghana. The results of the two-stage model revealed that both internal and international remittances reduce the level, depth and severity of poverty in Ghana. However, the extent of poverty reduction depends on the type of remittances received. In general, international remittances have a greater impact on reducing poverty than internal remittances.

Another important dimension of the remittance-poverty nexus is the issue of internal remittances. Campbell (2008) examines this in the context of internal migration in Botswana, using odds-ratio logistic regression. The study revealed that migrants maintain strong ties with home-based households through remittances in goods and money, but this has not led to a significant reduction in poverty in Botswana. Gyimah-Brempong and Asiedu (2011), on the other hand, investigate the effect of international remittances on poverty incidence and severity in Ghana using bivariate probit and GMM pseudo-panel data constructed from the Ghana Living Standard Survey standard wave 5. The study

found that remittances decrease the probability of a family being poor in Ghana, and the effect of international remittances is more effective than that of domestic remittances in ameliorating poverty. These findings lend support to the crucial role of international remittances in poverty reduction.

2.2.3 Evidence from Nigeria

Several studies on the impact of remittances on households in Nigeria have been explored using different approaches to focus on various issues (Fonta et al., 2011; Chukwuone, 2012; Waheed et al. 2013; Odior, 2014; Okodua et al. 2015; Fonta, 2015; Ogunwole, 2016; Ajaero et al. 2017).

Fonta et al. (2011) simulate the impact of an increase in remittance on poverty and inequality in Nigeria. The study revealed that poverty inequality decreased across Nigeria's geographical zones as a result of increases in remittance inflows. The reduction in inequality was higher in urban areas (0.1%) than in rural areas (0.02%) following a 10% increase in remittances. Similarly, Chukwuone et al (2012) analysed the impact of remittances on poverty in Nigeria, using data from the 2004 Nigerian National Living Standard Survey (NLSS). A Multinomial Logit model with instrumental variables and the Propensity Score Matching (PSM) method was used to estimate the impact of remittances on poverty. The study found that both internal and international remittances reduce the incidence, depth, and severity of poverty in Nigeria. These studies are mainly micro-based and fail to account for the multiplier effect of remittances on the economy.

Waheed et al. (2013) rely on a large nationally representative household survey to analyse the impact of domestic and foreign remittances on rural poverty in Nigeria. The findings showed that both domestic and foreign remittances reduce the level, depth, and severity of poverty in Nigeria. Specifically, the study showed that a 10% increase in domestic remittances has a more significant poverty-reducing impact than a 10% increase in foreign remittances. This is quite similar to the analysis carried out by Fonta et al. (2011) in terms of the simulation design and database used, but departs markedly from Chukwuone et al. (2012).

Odior (2014) departs from the aforementioned studies by analysing the effect of remittances on household disposable income in Nigeria using a time-series dynamic forecasting model. The results show that remittance exerts a significant impact on household disposable income in the short- and long-run. Notably, this study fails to account for household heterogeneity, which may bias the results and yield misleading inferences. Similarly, Ogunwole (2016) uses time-series data from 1981 to 2012 to analyse the effects of remittances and economic growth on poverty in Nigeria. Using cointegration, causality, and two-stage least squares techniques, findings showed that remittances exert a positive and significant effect on poverty and economic growth in Nigeria.

Okodua et al. (2015) examine the nexus between remittance spending patterns and their human development implications in migrant-sending communities of Nigeria, utilising survey data from the

World Bank Migration and Remittances Household Surveys in SSA (2009/2010). Based on descriptive statistics, the study found that remittance spending patterns in Nigeria are quite high and similar across regions, thus making a case for channelling these funds towards more efficient, productive uses.

Fonta et al. (2015) rely on a dataset comprising 697 end-users of remittances collected at money-operating facilities in Nigeria between March 2011 and December 2012. The study reveals that a significant share (about 74%) of remittances inflows to the country are primarily used to subsidise household consumption, education, and health expenditure. Digging further, the study also reveals that remittances from Africa are driven by altruistic motives while diaspora funds emanating from the rest of the world are driven primarily by selfish motives.

Ajaero et al. (2017) investigate the nexus among migration, remittances, and household welfare in Nigeria using data on household consumption and durable assets from the 2009 World Bank migration survey. The data were analysed using descriptive statistics, asset index approach, quintile estimation, ordinary least squares, and probit regressions. The study observed that the dominant size of the migrants was single, male, had a primary education, and had an average age of 30 years before migrating. The result showed that remittances inflows significantly increase household welfare in Nigeria.

2.3 Review of Methodologies

The literature has been dominated using partial equilibrium models (econometrics to analyse the nexus between remittances and poverty. A striking limitation of this approach is endogeneity bias associated with decisions surrounding migration and remittances, and this would require the use of a CGE model, which overcomes this limitation because it is more appropriate for capturing complex interactions within the economy. While the econometric models used in the literature capture marginal effects, the CGE model is preferred because it makes it easier to capture policy-oriented shocks. In addition, the direct and indirect impacts are more visible in a general equilibrium model.

The use of CGE models for analysing the impact of policies and shocks that entail structural changes in the economy has been widely utilised. The application of this model is quite extensive, spanning tax policy, environmental issues such as climate change, and trade policy, amongst others. In addition to its analytical convenience, the model explicitly models the behaviour of economic agents and their interaction with markets. The model accounts for demand and supply dynamics and how prices adjust to these changes in factor and product markets. The core of this model is the Social Accounting Matrix (SAM), which provides a snapshot of the economy in a given year. This means the data requirements are relatively small given the model's size. This is particularly advantageous for developing countries where insufficient or unavailable data inhibits detailed analysis.

The use of CGE models is often motivated by the fact that they ensure data consistency in accounting. In addition, all underlying relationships are specified in mathematical form, enabling predictions of

household responses to policy changes. The regional variant allows for considering interactions among several countries and regions, as well as among sectors within the same framework. This makes it possible to assess how regional integration and innovation affect households. Using CGE models, researchers can simulate the economy-wide effects of policy changes associated with RIAs (Schiff and Winters, 2003; Ivus and Strong, 2007). As pointed out by Cury et al. (2005), the CGE model allows for the analysis of distributive impacts of macro shocks with complex and systematic propagation methods. The comparative-static variant of the model applied in this study separates the factors of production from economic agents.

Although the CGE model remains a valuable tool for analysing the impact of regional integration and distribution, it is important to note that it has some limitations, as noted by Schiff and Winters. First, CGE models of regional integration are not unconditional predictions but rather thought experiments about what the world will be like in an RTA. Second, although CGE models are quantitative, they are not empirical. In other words, they are almost wholly theoretical with no possibility of rigorous testing against experience. Third, the assumption of product heterogeneity tilts the model towards revealing benefits from trade preferences. Finally, conclusions drawn about trade policy are sensitive to the values chosen for trade restrictions and elasticities. Another drawback of CGE models is that the one-year reference period of the data provided is a limitation, as the model's parameters are calibrated on the basis of a single reference year. This means that parameters may be extremely sensitive to the choice of reference period. This makes it difficult to capture the dynamics of economies characterised by significant fluctuations.

In sum, the preceding discussion has highlighted the interest of many researchers in understanding the relationship between remittances and poverty. Although Nigeria is the largest recipient of remittances in Africa and has the largest poor population in Africa, there is a dearth of empirical research on the effects of remittances on poverty in the country within a general equilibrium framework. The use of a general equilibrium approach is preferred compared with the partial equilibrium models that have dominated some of the aforementioned studies because it accounts for heterogeneities, sectoral, and agent interactions. Moreover, it addresses the endogeneity bias observed in econometric studies and accounts for household heterogeneity. Thus, this study adds to knowledge by conducting an empirical investigation of the economy-wide impact of remittances on poverty in Nigeria. This is because the CGE model makes it easy to identify and trace the transmission channels of the direct and indirect impacts of macroeconomic shocks on households.

4. Empirical Strategy

4.1 The Data

This paper relies on two databases: The 2006 Social Accounting Matrix (SAM) by the International Food Policy Research Institute (IFPRI), which was used to calibrate the parameters of the CGE model,

and the 2013/2014 General Household Survey (GHS) by the National Bureau of Statistics (NBS), used for the poverty analysis. Although the database periods differ, the household component of the SAM is reconciled to reflect the household survey data used for the poverty analysis. These datasets generally come from diverse sources and correspond to different periods. Nevertheless, it is possible to disaggregate the socio-economic groups further by income distribution and thereby show within-group changes in poverty (Round, 2001).

4.1.1 Structure of the Social Accounting Matrix

For analytical convenience and in line with the objective of the study, the SAM was re-aggregated to six production and commodity sectors: rice, cereals, other agriculture, industry, services, non-tradable; three factors of production: labour, capital and land; two household groups: rural and urban; three tax accounts: direct, indirect and import; government, saving and investment; and rest of the world accounts. Each cell in the SAM denotes a flow of monetary value between activities, commodities, and agents, from a column account (expenditure) to a row account (income). Each cell entry in the SAM is valued in billions of naira. (See Table A2 for a snapshot and salient features of the SAM)

The activity sectors employ factors of production while firms, households, government, and the rest of the world receive returns. The SAM also considers intermediate inputs used in production. Firms pay production tax to the government. Thus, gross output is the sum of intermediate inputs, factor incomes, and production taxes.

The commodity accounts represent total domestic output and foreign imports of goods available in the country; the domestic output supply captures the flow of domestic production from the commodity accounts to the activity accounts, and its value equals total output; and the import vector describes the value of imports. Import and consumption-related taxes are also captured in the SAM. In addition to their use as intermediate inputs, commodities also form part of total household expenditure, government expenditure, and export demand.

The SAM also accounts for the activity sectors and interactions of economic agents (households, firms, government, and the rest of the world). Because households are the owners of factors, they receive income from the use of labour (wages), capital (returns to capital), profit from firms, a transfer from the government and the rest of the world (remittance). Households use most of their income to purchase goods and services across sectors and to pay taxes to the government. The remaining income is saved (or dissaved).

Government revenue comes from direct and indirect taxes, capital, and the rest of the world. The government spends on services, provision of non-tradable goods, transfers to households, and investments. In the SAM, the firm is treated as an intermediate agent. This implies that firms transfer profits to other agents, and their total profit constitutes part of total expenditure. Finally, the rest of the world account summarises the interactions between Nigeria and other economies. The SAM captures

import payment and export earnings. Foreign exchange inflows include export earnings, transfers to households from the rest of the world, foreign investment, and the current account balance.

The savings and investment vector shows how savings in the economy are channelled to investments, and how households and the government save. Notably, the current account balance is the difference between total domestic savings and investment demand. Notably, savings are allocated to investment in goods and services.

4.1.2 Household Survey

In addition to the SAM, household expenditure data from a General Household Survey (GHS) for Nigeria, comprising 5,000 nationally representative households, were used to conduct the poverty analysis.[6] Two household groups are considered in line with the SAM aggregation with the following sample sizes: 1469 for urban and 3112 for rural.

4.2 Transmission Channel of Remittances to Poverty

The last two decades have brought new tools and approaches to the analysis of international transfers, such as remittances. The distributional and poverty impact in developing economies like Nigeria remains a source of concern. This is because remittance flows serve as a major source of income for households, easing liquidity constraints and smoothing consumption. In addition, remittances impinge on households' decisions in terms of labour supply, investment, education, migration choice, fertility, occupational choice, etc, with potentially important aggregated effects (Rapoport and Docquier, 2006, p. 1142). This implies that the effect of remittances could be direct or indirect.

The direct channel works through the impact of remittances on household income and expenditure. Remittances can be an important source of growth, welfare enhancement, and poverty alleviation in a developing country like Nigeria, where poverty remains high. It can directly improve recipient household or individual income, smoothing consumption and facilitating human capital development. The indirect impact of remittances on poverty is felt through GDP growth, enhanced fiscal space, and access to foreign exchange (Irfan, 2011). This means that international transfers in the form of remittances create wealth through the multiplier effect arising from aggregate macroeconomic activity. An increase in household income that arises from aggregate output expansion is expected to increase savings, thereby easing liquidity constraints on the one hand, and increasing per capita consumption in the case of net consumers.

Poverty reduction is an important component of socioeconomic development, and this makes it imperative to recognize the role and effects of remittance flow in view of its transmission channel to poverty through household incomes and expenditure. To better understand the ramifications of this

[6] This is based on the third wave of the GHS panel conducted in 2015/2016 and aids comprehensive analysis of welfare indicators and socioeconomic characteristics.

interaction between the sending and receiving countries, we use an economy-wide framework that accounts for the three primary motives of remittance: altruism, insurance, and investment.[7] Following Baas and Melzer (2016), we assume that the utility of all household/family members that remain in the home country is included in the migrant's utility function. This implies that an altruism coefficient weights the utility generated by household members who remain in foreign countries.

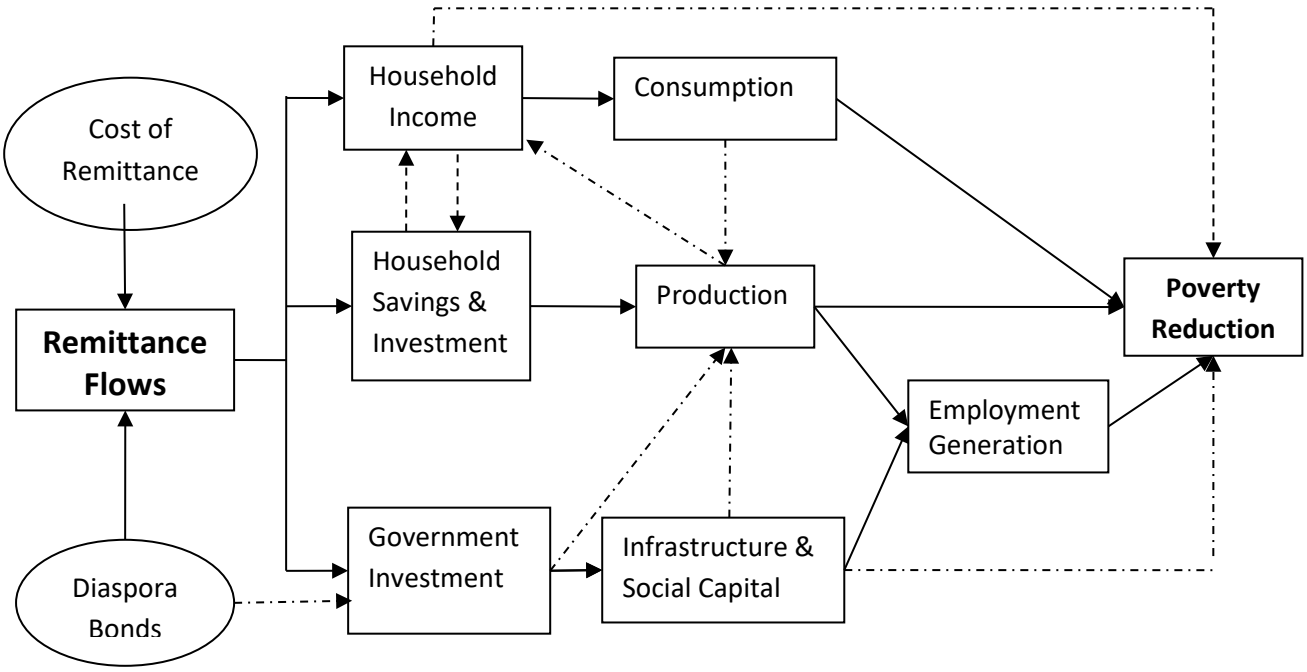
In this scenario, the various agents- households, firms, government, and the rest of the world- will optimize their respective functions as owners and consumers of factors of production. This is expected to stimulate output expansion, occasioned by the positive microeconomic effects of trade and finance on economic agents. Despite these potential benefits, negative impacts such as a fall in labour supply as a result of remittance inflow may arise. Also, in view of the observed tendency towards convergence in prices of goods and services in the market, attainment of equilibrium in the factor market may be constrained by sectoral immobility of labour. Notably, such structural rigidities may be absorbed and offset by increased financial inflows, such as remittances from the rest of the world.

Figure 3 depicts the transmission channels through which remittances affect poverty. The direct channel is when households rely on remittances as a major source of income and consumption. This implies that remittance can help low-income households cope with the risks and uncertainties associated with poverty. The increase in consumption that arises from higher remittance inflows can affect productivity. This stems from households' increased demand, which in turn drives production to meet it. This, in turn, stimulates more investments by my firm and creates jobs. Consequently, household income rises, thereby reducing poverty, provided that household labour supply remains constant and is not affected by the additional income from remittances.

When remittances are used for investment, they have visible impacts on poverty. For instance, human capital investment requires spending on health and education, which, in turn, are expected to stimulate productivity. The output expansion improves income and helps alleviate poverty. Increased income helps smooth consumption and leads to higher savings. This, in turn, provides ample opportunity to boost aggregate investment in social capital and infrastructure, which have multiplier effects on the economy. Remittances are welfare-improving because private external flows directly alleviate poverty and inequality by raising the standard of living through the consumption of durable and non-durable products, and a part is saved (Ogunwole, 2016). In addition to the multiplier effect through the investment and consumption channel, at the macro level, remittance serves as a stabiliser by providing a foreign currency that increases capital formation, employment, and output (ibid.).

[7] Where altruisim captures the willingness of a migrant to help family members in his country of origin. The insurance perspective captures the desire of a migrant to remit in order to buffer family against adverse risks and shocks in the home country. Last is the investment motive where migrants remit either to invest at home or to receive family bequests (2011, p. 813)

Figure 3: Channels of Impact of Remittances on Poverty



4.3 The CGE Model and Assumptions

This study adopts a standard PEP 1-1 static CGE model (version 2.1) developed by Decaluwe, Lemelin, Robichaud and Maisonnave (2013). The specification differs from the standard model because all accounts are disaggregated through the Nigerian SAM to capture the economy-wide effect of remittances on poverty in Nigeria. The model leans on standard assumptions as follows:

i. producers maximize profit subject to production technology;
ii. households maximize utility subject to budget constraints;
iii. Factors of production are mobile across activities and available in fixed supplies.
iv. demand for factors by producers is set at market-clearing prices;
v. The model satisfies Walras' law in that the set of commodity market equilibrium conditions is functionally dependent and homogeneous of degree zero in prices; and
vi. The model has seven blocks as follows: Production, Income and Saving; Demand; Supply and International Trade; Prices; Gross Domestic Product; and Equilibrium blocks (See appendix for detailed specification and variable definition).

4.3.1 Salient Features of the Model

The factors of production generate value-added through a Constant Elasticity of Substitution (CES) function due to producers' profit-maximising behaviour. Because the production function is a nested structure, sectoral output is a fixed-coefficient Leontief-type combination of value-added and intermediate inputs. Value added is modelled as a CES function of factors of production, while

intermediate inputs are modelled based on a Leontief-type production function. Household spending is based on a Linear Expenditure System (LES). This demand system is better suited to poverty analysis because it allows us to differentiate between minimum (subsistence) consumption and discretionary consumption (Nkang et al., 2013). An Armington function is assumed to distinguish between domestic and imported goods consumed in the domestic market (i.e., composite demand). From the CGE model, domestic producers allocate output between exports and domestic markets using a Constant Elasticity of Transformation (CET) function.

The choice of the CGE modelling approach is that it best captures the direct effects of remittances and poverty, as well as their multipliers. Remittance is expected to have a significant influence on poverty and income of households in Nigeria because it accounts for about 10% of household income (See IFPRI, 2006 SAM for Nigeria). Therefore, it is expected that the use of an economy-wide model will shed more light on the macro-micro effects. In addition, while it is better suited to tracing the specific inclusive growth impact of policy changes, as noted by Ghadimi (2007), the CGE modelling approach is also characterised by conceptual and accounting consistency compared with the use of partial equilibrium models. For instance, endogeneity issues often associated with using econometric techniques to model decisions surrounding migration and remittances require an approach that deals with endogeneity explicitly (McKenzie and Sasin, 2007).

It is pertinent to note that the neoclassical assumption of homogeneity is modified to reflect the Nigerian economy. There is considerable interconnectedness in production as every sector is directly or indirectly dependent on inputs from other sectors, as well as imported inputs. In addition, prices are primarily driven by costs, predominantly returns to factors of production. Also, formal and informal unions characterise most markets, and therefore, price fixing is a common phenomenon. In the absence of heterogeneities, inconclusive or incorrect inferences may be drawn from a model that fails to account for variations in market and agent behaviour. The model ensures equilibrium in the product and factor markets as well as trade balance.

Nigeria is a small, open economy with little influence on international markets; therefore, the model treats world prices as given. The nominal exchange rate is used as the *numeraire* in the model, while the current account and government spending on goods and services are fixed. Likewise, the supply of labour and capital, government savings and transfers to households, current account balance, as well as inventory changes, are also treated as exogenous in the model. The model follows the classical closure that has been extensively applied in the literature for Nigeria, where savings are investment-driven (See Nwafor et al., 2007; Ajaikaiye, 2009; and Nkang et al., 2013). This is also motivated by the fact that Nigeria is a small open economy dominated by oil, thus making the external sector vulnerable to exogenous shocks.

The export demand, labour-capital substitution, CET (export and domestic demand), and CES (import

and domestic demand) elasticities used were obtained from Nwafor et al. (2007). As noted by Dawkins, Srinivasan, Whalley, and Heckman (2001), elasticities are key parameters for CGE models, as they determine comparative static behaviour and thereby strongly influence the results of any policy experiments. The model is solved using the General Algebraic Modelling System (GAMS).

4.4 Poverty Analysis

The behavioural responses of households obtained from the CGE model are linked to a household's per capita expenditure extracted from the household budget survey. This is with a view to analysing the impact of changes in remittances on poverty. Specifically, the Foster-Greer-Thorbecke (FGT) P_α measures (headcount, gap, and severity) are used to assess the level of poverty before and after the simulations. The FGT poverty measures is relied upon because it is additively decomposable. This means that it aids in segregating the entire population into various strata with a view to making comparisons. The FGT P_α measure for the i^{th} strata is expressed as follows:

$$P_{\alpha i} = \frac{1}{n_i}\sum_{i=1}^{q_i}\left(\frac{z-y_i}{z}\right)^{\alpha} \quad (1)$$

Where: α is a poverty aversion parameter, z is the poverty line, n_i is the total population per household strata, q_i denotes the number of poor in a particular household group and y_i is the ith household's expenditure. The poverty gap ratio is represented by $\frac{z-y_i}{z}$. The poverty aversion parameter can take the value of 0, 1, or 2.[8]

4.4 Policy Scenarios

Diaspora Bonds

Kektar and Ratha (2007) define 'diaspora bonds' as debt instruments issued by a state, a sub-sovereign entity, or a private corporation to raise funds from the diaspora. Plaza and Ratha (2011) and Wenner (2015) suggest that diaspora bonds can tap into the emotional ties of the diaspora and their desire to give back, offering to poor or/and wealthier migrants a means to invest in their country of origin. Using examples from Israel and India, Plaza and Ratha (2011) argue that diaspora bonds could be a viable source of income to finance national infrastructures.

There is evidence suggesting that there are about 23 million migrants around the globe who together have an annual savings of more than USD30 billion that can be tapped through diaspora bonds to support long-term growth and poverty reduction.[9] Although return on investment is a primary

[8] When $\alpha = 0$ (poverty headcount), P_α yields the proportion of the population whose consumption falls below the poverty line. This index is not sensitive to changes in welfare of the poor. The poverty gap ($\alpha = 1$) measure is the ratio of the poverty line required to lift the poor out of poverty. This measure is sensitive to the welfare among the poor unlike the head count index. The severity of poverty ($\alpha = 2$) index considers the distance separating the poor from the poverty line as well as inequality among the poor. As α increases, more importance is given to the shortfalls of the poorest households and the measures become more distribution-sensitive (Nkang et al. 2013).

[9] https://www.nytimes.com/2011/03/12/opinion/12ratha.html

determinant of investment decisions, emigrants are also moved by patriotism and the desire to contribute to the development of their home countries. In other words, maintaining substantive relationships to their countries of origin, migrants and diaspora citizens are becoming more involved in socioeconomic and/or political activities in their home countries (Lubambu, 2014).

Therefore, the first simulation is motivated by the Federal Government of Nigeria's global diaspora bond offering of $300 million on June 7, 2017. Diaspora bonds are government debt instruments issued by a country to its own diaspora to tap into their wealth (Ketkar and Ratha, 2007). Therefore, we expect the global offering of diaspora bonds to reduce remittance inflows by 6.7%. This value is obtained by dividing the total share of diaspora bonds by the total remittances. This serves as the basis for the first simulation. It is expected that this simulation will worsen poverty due to a decline in income and consumption. The household income channel is the primary means through which this shock affects poverty. This is because lower income inflows, driven by a fall in remittances, affect household consumption, which, in turn, moves households close to or below the poverty line.

Cost of Remittances

Globalization has led to *inter alia* an increase in the mobility of high-skilled labour across regions, normally from developing to developed countries. This means that the diaspora community remains committed to supporting their families back home, and this is evidenced by the increased remittance inflows to SSA and other regions. Remittances serve as an important social safety net, helping buffer domestic income shocks and alleviating poverty. However, a significant share of remittances is sent through informal channels due to the convenience and the often cumbersome processes involved in formal remittances. In addition, the high cost of remittances, which stood at 9.8% and 9.4% for every USD200 remitted in 2017 and 2018, respectively (World Bank, 2018, p. 7). In addition, operational and policy constraints hinder the functioning of transfer markets in developing countries (Lubambu, 2014).

UNCTAD (2012) indicated that for the whole of Sub-Saharan Africa, 65% of all remittance payout locations are controlled by only two money transfer operators MTOs, namely MoneyGram and Western Union. As pointed out by Lubambu (2014), these market conditions hinder nonbank institutions from engaging in the remittance market, leading to a lack of competition and rising costs. In addition to the money transfer operators, government taxes on remittances also raise transaction costs and incentivise informal channels (See UNCTAD, 2013). This is because of the migrant's earnings. In fact, taxation at the migrant's workplace and at the recipient's location for the same remittance flows may lead to double taxation, which can deeply undermine the socioeconomic insurance strategy of migrants and their families to overcome poverty and underdevelopment (Lubambu, 2014).

Technology plays a vital role in the provision of financial services and transaction costs. Modern transaction technologies have increased the affordability and accessibility of remittances, thus fostering

a broader inclusion in financial services (Porter, 2009). Although the volume of remittances flows through formal channels has increased (Aker, 2010), challenges such as weak financial and technological infrastructures to develop electronic payment services remain pervasive.

Therefore, the second scenario is driven by the high cost of remittances. Over the last decade, attention has focused on the "sending side" of remittances, particularly the aggregate volumes and transaction costs of sending family remittances, essentially from developed to developing countries (IFAD, 2017, p.13). This is because higher transaction costs of remitting inhibit diaspora inflows with a negative effect on remittance-dependent households. The United Nations Sustainable Development Goal (SDG) number 10 seeks to reduce inequality between and within countries. An important strategy towards achieving this goal is SDG Target 10c which seeks to reduce to less than 3 per cent the transaction costs of migrant remittances and eliminate remittance corridors with costs higher than 5 per cent[10]. This is, in turn, expected to increase household income and consumption.[11]

Some assumptions are used to motivate this scenario. For instance, an increase in the cost of remitting may not change the amount remitted, particularly in the case of high-earning migrants. However, in the case of low-earning migrants, the increase in the cost of remitting is likely to lead to a reduction in the amount of funds remitted back home. Therefore, in line with the latter assumption, we simulate a 3% reduction in remittance costs to assess its effect on poverty. The simulation value is obtained by calculating the total cost of remittance inflows in the SAM and applying a 3% reduction, with a view to assessing the effect of this change on poverty. If remittance costs are reduced, households can receive more, assuming that these costs are a determinant of the amount remitted by diaspora citizens.

The foregoing suggests that the extent of remittance inflows can be affected by remittance costs as well as the issuance of diaspora bonds. However, understanding the nature of impact is an empirical issue and thus serves as the basis for the simulations carried out in this study. The policy scenarios considered making it possible to explicitly identify and trace the transmission of remittances to households through the income and consumption channels, and the subsequent impacts on poverty. This departs from previous studies on Nigeria, which focused only on trade and other policy issues[12] as the basis of their simulations.

5 Discussion of Findings

This section discusses the results of the CGE model and the simulations' outcomes for the economy and poverty. Scenario 1 results from a negative shock arising from the government's floating of diaspora bonds and a concomitant increase in government investment, while scenario 2 shows the outcome of a

[10] https://unstats.un.org/sdgs/metadata/files/Metadata-10-0C-01.pdf
[11] Africa remains significantly far from this target as average cost of remitting $200 is about $20, indicating that costs are 10% of amounts remitted (IFAD, 2017, p.23).
[12] See Adenikinju and African Economic Research Consortium, 2009 for a summary of CGE studies for Nigeria

reduction in remittance costs. The first scenario assumes that diaspora bonds reduce transfers to households and concomitantly increase the level of government investment. This is because the government's primary purpose in raising funds through diaspora bonds is to finance infrastructure investments. The second scenario is informed by the high cost of remittances, which has inhibited the volume of remittance inflows. The remittance shocks are imposed as a one-time adjustment in the level of international remittances and are completely exogenous (Bussolo and Medvedev, 2008). The outcome of both scenarios is presented as follows.

4.1 Scenario 1: Effects of $300 million diaspora bonds offered by the Nigerian Government

Table 3 summarises the impact of a negative remittance shock on selected macroeconomic variables. The results suggest that remittance shock due to the launch of diaspora bonds leads to a reduction in some macroeconomic variables. For instance, the value of GDP records a 0.02% contraction, which is consistent with the findings of Bussolo and Medvedev (2008) for Jamaica and Raihan et al. (2009) for Bangladesh. Likewise, the shock reduces government spending by 0.042%, perhaps due to the reduction in government income. The fall in government revenue is traced to the reduction in government tax receipts. The results also indicate a 0.024% decline in the consumer price index, which is a result of a decline in domestic demand driven by a fall in household income. In terms of the government fiscal profile, tax revenue falls following a negative remittance shock (Scenario 1) due to diaspora bonds. The effect of the simulation on wages is also presented in Table 3, and the negative effect recorded is due to the increase in labour supply occasioned by the fall in income.

Table 3: Impact on selected macroeconomic variables

	Baseline	Scenario 1: $300mill. diaspora bonds offered by the federal government	variation
Gross domestic product	20,053,620.20	19,611,861.50	-0.022
Government spending	3,716,689.71	3,559,092.64	-0.042
Investment spending	976,108.98	1,010,464.13	0.035
Gross fixed capital formation	976,107.98	1,010,463.13	0.035
Consumer price index	1.00	0.98	-0.024
Government Income	5,767,877.01	5,732,015.00	-0.006
Imports	4,967,063.56	4,824,752.94	-0.029
Exports	7836670.85	7,917,011.49	0.010
Labour supply	9,099,655.22	17,840,223.32	0.961
Wages	9,099,655.22	8,773,696.26	-0.072

Note: All values excluding consumer price index in million naira

The effect of a reduction in remittance flows was mixed for domestic sectoral output, as shown in Table B3 in the appendix. The negative shock led to an increase in domestic food production and manufacturing, while declines were recorded for the services and non-tradable sectors. An opposing

impact was recorded following an increase in remittance flows (scenario 2). The changes recorded from the supply side are viewed as responses to changes in income. For instance, in Nigeria, rice and cereals are major staples produced and consumed domestically; therefore, a negative remittance shock may not have a retrogressive effect on income.

4.1.1 Effect on Households: consumption, transfers, income, savings, and taxes

Next, we examine how remittance shocks are distributed across households. From Table 4, we find that a reduction in diaspora transfers leads to a decline in household consumption. As expected, the effect of a negative remittance shock was a larger effect on rural households compared with their urban counterparts. This is because remittance shocks have a larger impact on the poor due to their relatively narrow sources of income. This finding conforms to that of Raihan and Khondker (2008), who recorded a 3% decline in household consumption following a negative remittance shock in Bangladesh. Remittances are direct transfers from Nigerians living abroad; therefore, reduced inflows exert an instantaneous negative effect on household consumption and income. Generally, while the negative remittance shock (scenario 1) is expected to worsen poverty incidence, the second scenario (an increase in remittances) is expected to alleviate poverty primarily through the consumption channel.

Table 4: Impact on household consumption

	Baseline	Scenario 1: $300 mill. diaspora bonds offered by federal government	variation
Rural households	6,230,168.27	5,951,226.33	-0.045
Urban households	6,557,845.90	6,322,778.49	-0.036

Note: All values in million naira

Table 5 depicts the effects of a negative remittance shock on domestic transfers to households. The shock led to a decline in household transfers, and the impact is more pronounced on urban households, given their larger share of total remittance inflows. A similar outcome is observed in domestic transfers from government to households. These findings are in line with the results of Adam (2006, 2011) and Adam and Page (2003) in similar studies for Ghana, Guatemala, and a group of developing countries.

Table 5: Effect on transfers to households

	Baseline	Scenario 1: $300mill. diaspora bonds offered by federal government	variation
Remittance to rural households	661,776.38	587,090.83	-0.113
Remittance to urban households	697,465.34	587,090.83	-0.158
Transfer from government to rural households	171,781.10	167,595.94	-0.024

Note: All values in million naira

The changes in household consumption are attributed to changes in recorded income. The effect of the simulation on the various sources of household income is presented in Table 6. The response of household income to the shock mirrors that of consumption. Aggregate income of rural households falls

by a larger magnitude than that of urban households. This is because rural households generally earn less than their urban counterparts. A reduction in remittance inflows due to investment in diaspora bonds negatively affects household wages and other sources of income. The fall in income led to a decline in household savings and tax revenue. Due to lower economic activities (GDP) because of the negative remittance shock, returns to factors are expected to be adversely affected (Raihan et al., 2009), and the impact is more pronounced in rural households. Table 7 shows that a negative remittance shock reduces household savings.

Table 6: Impact on Household Income

	Baseline	Scenario 1: $300mill. diaspora bonds offered by federal government	variation
Total income			
Rural households	6,289,097.0	6,007,516.67	-0.045
Urban households	9,164,102.6	8,835,613.32	-0.036
Capital income			
Rural households	2,190,044.0	2,102,323.95	-0.04
Labour income			
Rural households	3,317,904.8	3,199,054.02	-0.036
Urban households	5,781,750.5	5,574,642.23	-0.036
Income from transfers			
Rural households	781,148.25	706,138.69	-0.096
Urban households	3,382,352.1	3,260,971.09	-0.036

Note: All values in million naira

Table 7: Household saving effect

	Baseline	Scenario 1: $300mill. diaspora bonds offered by federal government	variation
Household savings			
Rural households	58,928.74	56,290.33	-0.045
Urban households	2,480,851.5	2,391,924.8	-0.036

Note: All values in million naira

4.1.2 Effect on Poverty: Incidence, depth, and severity

Table 8 shows the baseline poverty status of households and the effect of a negative remittance policy shock considered based on the FGT poverty measures (incidence, depth, and severity). The 2012/2013 General Household Survey data show that about 61.1% of Nigerian households are poor in terms of headcount, while the urban and rural areas recorded 38% and 69.9%. This suggests that poverty in Nigeria is primarily driven by rural areas. In terms of depth and severity of poverty, the rural households dominate and drive the indices at the national level. These results are in line with existing evidence, such as the 2010 National Bureau of Statistics poverty profile. This implies that addressing poverty in

Nigeria would require deploying more resources to rural areas and perhaps providing additional incentives to encourage households to migrate.

Table 8 shows the effects of a negative remittance shock that arises from higher subscription by Nigerians living abroad to the Federal Government's diaspora bonds. A reduction in remittance inflows leads to an increase in poverty incidence by about 3.1% for rural households and 10.5% for urban households. The variation observed can be traced to the relatively higher share of remittances in total urban household income receipts compared with rural households, which rely more on returns to land. In addition, the fall in consumption and income also explains the worsening incidence of poverty. Djiofack et al. (2013) observe that more remittance flows to urban households induce more inequality since urban dwellers have more income than their rural counterparts.

Table 8: Impact of remittance shocks on poverty

FGT Indices	Baseline	Scenario 1: $300mill. diaspora bonds offered by federal government	variation
Rural			
Poverty incidence (P0)	0.699	0.721	0.031
Poverty depth (P1)	0.288	0.305	0.059
Poverty Severity (P2)	0.15	0.162	0.080
Urban			
Poverty incidence (P0)	0.38	0.42	0.105
Poverty depth (P1)	0.115	0.127	0.104
Poverty severity (P2)	0.05	0.056	0.120
National			
Poverty incidence (P0)	0.611	0.637	0.043
Poverty depth (P1)	0.24	0.256	0.067
Poverty severity (P2)	0.122	0.132	0.082

The relatively lower effect on poverty among rural households is consistent with the fact that this group is least involved in the migration process and receives the least remittances. This may be explained by two factors: (i) the higher cost of migration makes it unaffordable for poorer households, and (ii) low skills and language barriers may prohibit the poor from migrating. Digging further, we examine the impact of remittance shocks on poverty across geopolitical zones (Table 9). This is important because of the high incidence of national poverty, and therefore, targeting the poor through national poverty alleviation programmes may not be feasible. Thus, based on insights from the severity and depth indices, it is easier to target the poor by zone in a more efficient manner for resource allocation and poverty reduction strategies. The results follow a similar pattern to that of the rural-urban strata. Overall, the baseline poverty level shows that the poor are more concentrated in the north than in the south. Interestingly, this region has fewer migrants.

A reduction in remittance inflows leads to an increase in poverty across all households in the 6 geopolitical zones. The highest effect is recorded in the southern part of the country, where emigration is quite high, suggesting they rely more on diaspora funds as a source of income. This means that if family members invested in the Federal Government's diaspora bonds and this reduces the amount they remit, it worsens the incidence of poverty.

Table 9: Poverty impact of remittance shocks by zones

FGT Indices	Baseline	Scenario 1: $300mill. diaspora bonds offered by federal government	variation
North Central			
Poverty incidence (P0)	0.561	0.594	0.059
Poverty depth (P1)	0.198	0.214	0.081
Poverty Severity (P2)	0.099	0.107	0.081
North East			
Poverty incidence (P0)	0.771	0.791	0.026
Poverty depth (P1)	0.329	0.347	0.055
Poverty severity (P2)	0.175	0.188	0.074
North West			
Poverty incidence (P0)	0.772	0.786	0.018
Poverty depth (P1)	0.326	0.345	0.058
Poverty severity (P2)	0.168	0.181	0.077
South East			
Poverty incidence (P0)	0.574	0.604	0.052
Poverty depth (P1)	0.231	0.245	0.061
Poverty severity (P2)	0.121	0.13	0.074
South-South			
Poverty incidence (P0)	0.422	0.45	0.066
Poverty depth (P1)	0.145	0.157	0.083
Poverty severity (P2)	0.067	0.074	0.104
South West			
Poverty incidence (P0)	0.395	0.439	0.111
Poverty depth (P1)	0.123	0.135	0.098
Poverty severity (P2)	0.055	0.06	0.091

4.2 Scenario 2: Effects of Reduction in Cost of Remittances

The effect of the second scenario on selected macroeconomic indicators is reported in Table 10, and it portrays an entirely different picture. As expected, a reduction in remittance costs positively affects macroeconomic aggregates. For instance, gross domestic product increases by 0.27% following a reduction in remittance costs. The reason for this decline may be traced to two factors: First, increased demand for imports drives up domestic prices and hurts the sales of both export-oriented and import-competing activities. Second, labour supply declines as households consume more leisure, leading to

higher wages and production costs. This prompted wage increases due to higher labour demand. The effect on government tax revenue is positive after the first simulation but negative in the second scenario (See Table B1 in the appendix). A positive remittance shock, through a reduction in remittance costs, leads to higher tax receipts for the government due to the increase in household income.

Since the current account is fixed by the available quantity of savings, higher remittance inflows under scenario 2 led to an increase in the volume of imports without a corresponding rise in exports. These findings are in line with Bussolo and Medvedev (2008). Table 10 also shows the effect of increased remittance inflows on wages and labour supply. The decline in labour supply is because of the increase in non-wage income, which in turn encourages households to spend more time on leisure. This, in turn, increases labour demand, leading to higher wages.

Table 10: Impact on selected macroeconomic variables

	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
Gross domestic product	20,053,620.20	25,368,050.26	0.265
Government spending	3,716,689.71	4,263,051.59	0.147
Investment spending	976,108.98	2,124,377.23	1.176
Gross fixed capital formation	976,107.98	2,124,376.17	1.176
Consumer price index	1.00	1.27	0.274
Government Income	5,767,877.01	6,361,230.77	0.103
Imports	4,967,063.56	7,653,316.42	0.541
Exports	7,836,670.85	6,909,397.36	-0.118
Labour supply	9,099,655.22	8,740,568.10	-0.039
Wages	9,099,655.22	12,696,920.06	0.791

Note: All values excluding the consumer price index in million naira

The price effects of a positive remittance shock (Scenario 2) are presented in Table B2 in the appendix. The increase in household income from a positive remittance shock leads to higher prices, while a decline in remittance inflows leads to lower prices. The fall in domestic commodity prices is attributed to lower household demand due to lower income, while the subsequent price increase following a reduction in remittance costs is due to higher household income, which in turn led to higher domestic prices. A similar pattern is observed for the prices of composite goods.

The reverse was observed in the case of the impact of a positive remittance shock (see Table B3 in the appendix) on food output. This outcome can be explained by Engel's law, which states that as income rises, the proportion of income spent on food falls, even as absolute expenditure on food rises. The decline in productivity of sectors recorded may also be explained by the decline in output, which implies that fewer resources are channelled to these sectors. In terms of industry value added, we observe a similar trend to that of domestic output (see Table B4 in the appendix). Notably, the decrease in value added by some sectors (staples) explains the significant price reduction observed following a negative

remittance shock; contrary to the outcomes of an exogenous increase in remittance inflows induced by a fall in transaction costs of remitting.

The effect of the simulations on sectoral factor demand is presented in Table B5 of the appendix. A reduction in remittance inflows (scenario 1) led to a decline in demand for factors of production, while an increase in remittance inflows led to an increase in factor demand in the agriculture sector. In the manufacturing industry, demand for capital and labour increased but subsequently declined due to an increase in remittance inflows. The decline is due to a fall in labour supply occasioned by higher income. Another explanation for the reduction in factor demand in some sectors is a shift of factor inputs from contracting to expanding sectors due to price changes.

4.2.1 Effect on Households: consumption, transfers, income, savings and taxes

The increase in remittances following a reduction in transaction costs led to higher rural and urban household consumption (Table 11). The increase in the former is relatively larger than the latter because the share of remittances in total income receipts of rural households is relatively smaller. Due to higher income from additional remittances (Tables 12 and 13), households demand more goods and services, and consumption in rural and urban households rises by 0.65% and 0.45%, respectively, relative to the initial equilibrium when a positive remittance simulation is considered (scenario 2). The reason for the large variation is that the shock was exogenous and directly affected the quantum of remittance inflows (Table 12).

Table 11: Impact on household consumption

	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
Rural households	6,230,168.27	10,257,849.84	0.646
Urban households	6,557,845.90	9,492,457.96	0.447

Note: All values in million naira

Table 12: Effect on transfers to households

	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
Remittance to rural households	661,776.38	2,274,781.27	2.437
Remittance to urban households	697,465.34	2,310,789.51	2.313
Transfer from government to rural households	171,781.10	218,772.98	0.274

Note: All values in million naira

The effect of a positive remittance shock is positive for both household groups, but the impact is more pronounced in rural areas. This suggests that remittance is an important source of income, and reducing the cost of remittances could help minimise the vulnerability of households to negative income shocks. The impact of an increase in remittances resulting from reduced remitting costs on wages and labour supply can be explained from two perspectives. First, the decline in household labour supply is traced to the rise in other income sources, which encourage households to increase consumption and leisure

time. Second, the decrease in labour supply prompts an increase in labour demand due to higher commodity demand. This is because an increase in wage rate raises the implicit cost of leisure and, as long as the substitution effect dominates the income effect, it encourages households to supply more labour (Bussolo and Medvedev, 2008).

Table 13: Impact on Household Income

	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
Total income			
Rural households	6,289,097	10,354,874.85	0.646
Urban households	9,164,102.6	13,265,004.96	0.447
Capital income			
Rural households	2,190,044	3,323,826.62	0.518
Labour income			
Rural households	3,317,904.8	4,629,534.92	0.395
Urban households	5,781,750.5	8,067,385.14	0.395
Income from transfers			
Rural households	781,148.25	2,401,513.3	2.074
Urban households	3,382,352.1	5197619.82	0.537

Note: All values in million naira

Table 14: Household saving and tax effect

	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
Household savings			
Rural households	58,928.74	97,025.01	0.646
Urban households	2,480,851.5	3,591,023.5	0.447

Note: All values in million naira

4.2.2 Effect on Poverty: poverty incidence, depth, and severity

The positive remittance shock from reduced transaction costs is presented in Table 15. From a methodological perspective, most studies that deal with poverty issues tend to favour the CGE approach because it allows one to capture general equilibrium effects (Uzagalieva and Menezes, 2009). The positive remittance simulation had a poverty-reducing effect on households, consistent with the findings of Agbola (2013) for Ghana and Adams and Page (2005) for developing countries. This can be explained by the fact that household consumption and income increased (See Dadson and Kato, 2016, p.213 for Ghana). This impact had a larger poverty-reducing effect in urban areas because households in this stratum receive more remittances due to higher emigration prospects than their rural counterparts.

Table 15: Impact of remittance shocks on poverty

FGT Indices	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
Rural			
Poverty incidence (P0)	0.699	0.418	-0.402

Poverty depth (P1)	0.288	0.132	-0.542
Poverty Severity (P2)	0.15	0.058	-0.613
Urban			
Poverty incidence (P0)	0.38	0.141	-0.629
Poverty depth (P1)	0.115	0.036	-0.687
Poverty severity (P2)	0.05	0.015	-0.700
National			
Poverty incidence (P0)	0.611	0.341	-0.442
Poverty depth (P1)	0.24	0.105	-0.563
Poverty severity (P2)	0.122	0.046	-0.623

Contrary to the findings for the negative remittance shock (scenario 1), a positive remittance shock arising from a reduction in transaction costs (scenario 2) leads to a significant reduction in poverty. A closer inspection of Table 16 shows that the decline is higher in southern households due to the relatively higher share of remittances in their total income. It is pertinent to note that, as observed in the rural-urban dimension of the results, the impact of the shock is higher across the various household groups considered than the national average. This suggests that northern households were the least affected by the shocks because they were less dependent on diaspora income. Our findings align with the observations of Gupta et al. (2009) and Adams and Cuecuecha (2013) that an increase in remittance inflows has a positive impact on poverty.

Table 16: Poverty impact of remittance shocks by zones

FGT Indices	Baseline	Scenario 2: 3% Reduction in Cost of Remittances	variation
North Central			
Poverty incidence (P0)	0.561	0.257	-0.542
Poverty depth (P1)	0.198	0.082	-0.586
Poverty Severity (P2)	0.099	0.039	-0.606
North East			
Poverty incidence (P0)	0.771	0.472	-0.388
Poverty depth (P1)	0.329	0.154	-0.532
Poverty severity (P2)	0.175	0.071	-0.594
North West			
Poverty incidence (P0)	0.772	0.491	-0.364
Poverty depth (P1)	0.326	0.147	-0.549
Poverty severity (P2)	0.168	0.06	-0.643
South East			
Poverty incidence (P0)	0.574	0.327	-0.43
Poverty depth (P1)	0.231	0.107	-0.537
Poverty severity (P2)	0.121	0.048	-0.603
South-South			
Poverty incidence (P0)	0.422	0.196	-0.536

Poverty depth (P1)	0.145	0.053	-0.634
Poverty severity (P2)	0.067	0.021	-0.687
South West			
Poverty incidence (P0)	0.395	0.162	-0.59
Poverty depth (P1)	0.123	0.041	-0.667
Poverty severity (P2)	0.055	0.016	-0.709

In sum, the results show that the remittance shocks considered do not affect households symmetrically; rather, the impact depends on the household group and the share of remittances in total income. Instructively, remittances contribute more to smoothing urban household income and consumption, while their effect is relatively weaker in rural areas. This conforms to the findings of Uzagalieva and Menezes (2009) for Georgia and McKay and Deshingkar (2014) for selected African countries (Nigeria inclusive). The size of a negative remittance shock (scenario 1) is relatively smaller compared with the positive shock (scenario 2). This suggests that if diaspora bonds lead to a reduction in remittances back home, poverty increases marginally, especially among urban households. The fall in poverty indices recorded following a reduction in the cost of remitting implies that minimising the charges imposed by domestic financial institutions may increase remittance inflows, and this exerts a poverty-reducing effect. This, however, will largely depend on the income and motive for remitting by the migrant and may not necessarily change the amount remitted.

The poverty outcomes in the second scenario are larger than those in the first simulation, and thus the results should be viewed with caution. This may be explained by the fact that remittance shock costs were exogenous and directly affected the volume of remittance inflows. The poverty rates estimated generally conform to the 62.2% recorded in the 2009/2010 Household Living Standard Survey (HLSS), but depart from 33.1% incidence of poverty recorded in the 2012/2013 household survey data (World Bank, 2014). Despite the rise of remittance inflows, some binding constraints that contribute to the persistence of poverty in Nigeria include: low farm income, high food prices, socio-cultural and macroeconomic conditions, insecurity, and a weak rural economy, amongst others. These issues need to be addressed to maximise the benefits of increased diaspora inflows.

6 Conclusion and Policy Implications

This research investigates the general equilibrium effect of positive and negative remittance shocks on poverty in Nigeria using a computable general equilibrium model. The model was calibrated using a 2006 social accounting matrix, while the poverty analysis used data from the 2012/2013 general household survey. Quantitative evidence shows that a reduction in remittance inflows resulting from the launch of the $300 million diaspora bonds by the Federal Government leads to an increase in poverty. This reduces the incentive to remit, as remitting households want to invest in diaspora bonds. Specifically, the negative remittance shock led to a decline in household income and consumption, and

the impact was relatively larger in urban and southern households in Nigeria due to higher dependence on remittance as a source of income. The second scenario is a positive remittance shock that assumes a 3% reduction in remittance transaction costs, in line with one of the Sustainable Development Goals (SDGs) to cut the cost of remittance as a poverty-reduction strategy. The result shows that a reduction in remittance costs increases household income and consumption. This led to a reduction in poverty levels. Notably, the impact of remittance shocks is larger for urban households due to a relatively larger share of remittances in total income.

The results have important policy implications. First, the results show that remittances play a vital role in buffering adverse income and consumption shocks, which in turn ameliorate the level of poverty in Nigeria. This means that addressing barriers to remittance markets resulting from the money transfer regulations, while policies that incentivise the financial institutions to reduce the cost of remittances should be considered. Second, in view of the positive effect of remittance on poverty, the government may also consider encouraging domestic households to send family members abroad by providing credit opportunities and enhancing educational attainment to facilitate emigration. At the same time, taxation of remittances increases transaction costs, and this discourages the inflow of diaspora funds. This needs to be addressed through dialogue involving the origin and destination countries. Alongside these efforts, appropriate policies and regulatory frameworks that allow financial institutions and other money transfer operators to operate under their supervision should be widely promoted. This will contribute to lowering transaction costs and enhancing financial inclusion, especially in rural areas. Design appropriate policies that seek to facilitate the flow of remittances more reliably and at the lowest cost, develop remittances-related products (i.e., savings, insurance contributing to social protection for households), and foster access to financial and business services, thus stimulating the local economies. Thus, a set of key features that lead to costly inefficiencies, such as weak infrastructure, low competition, and financial regulation constraints, needs to be addressed. The study concludes that remittances cannot be exclusively relied upon for ameliorating poverty, they should be used to complement other poverty-reduction efforts.

References

Acharya, C.P. and Leon-Gozalez, R. (2012) The Impact of Remittance on Poverty and Inequality: A Micro-Simulation Study for Nepal. GRIPS Discussion Paper 11-26 National Graduate Institute for Policy Studies.

Acosta, P., Calderon, C., Fajnzylber, P., Lopez, H. (2008) What is the Impact of International Remittances on Poverty and Inequality in Latin America, World Development, 36(1), pp.89-114

.

.

.

.

Adams, R.H. and Cuecuecha, A. (2013) The impact of Remittances on Investment and Poverty in Ghana, *World Development*, 50(C), 24-40. Adams, R.H., Cuecuecha, A. (2010) The Economic Impact of International Remittances on Poverty and Household Consumption an Investment in Indonesia, Policy Research Working Paper No. 5433, Washington D.C.: World Bank

Adams, R.H., Cuecuecha, A., Page, J. (2008) The Impact of Remittances on Poverty and Inequality in Ghana, Policy Research Working Paper No. 4732, Washington D.C.: World Bank

Adams, R.H., Page, J. (2003) International Migration, Remittance and Poverty in Developing Countries, Policy Research Working Paper No. 3179, Washington D.C.: World Bank

Adams, R.H., Page, J. (2005) Do International Migration and Remittances Reduce Poverty in Developing Countries, World Development, 33(10), pp.1645-1669

Adenikinju and AERC. (2009) Computable General Equilibrium Modelling in Nigeria. University of the Ibadan Press University of Ibadan, Ibadan.

Ajaero, C.K., Nzeadibe, C.T., Obisie-Nmehielle, N. and Ike, C.C. (2017) The Linkages between International Migration, Remittances and Household Welfare in Nigeria. DOI: 10.1080/21632324.2017.1322171

Ajakaiye. O. (2009) Macroeconomic Analysis of VAT in Nigeria: A Computable General Equilibrium Analysis. In Computable general equilibrium modelling in Nigeria. Adenikinju, A. Ajakaiye, O., Decaluwe, B., and Iwayemi, A. (Eds). University of Ibadan Press University of Ibadan, Ibadan.

Aker, J. (2010) Information from markets near and far: Mobile phones and agricultural markets in Niger. American Economic Journal: Applied Economics, 2(3):46–59.

Baas, T. and Melzer, S. (2016) The Macroeconomic Impact of Remittances: A Sending Country Perspective, Beiträge zur Jahrestagung des Vereins für Socialpolitik: Demographischer Wandel - Session: Macroeconomic and Regional Aspects of Migration, No. B22-V1.

Barai, M.K. (2012) Development Dynamics of Remittances in Bangladesh, SAGE Open, 2, pp.1-13

Bettin, G., Zazzaro, A. (2009) Remittances and Financial Development: Substitutes or Complements in Economic Growth? MoFiR Working Paper no. 28, Money and Finance Research Group

Bhalla, G. S. (2008) Globalisation and Employment Trends in India, The Indian Journal of Labour Economics Vol 51, No. 1.

Brookings Institute (2018) The Start of a New Poverty Narrative, Commentary by Kharas, H., Hamel, K. and Hofer, M.

Brown, R. and Poirine, B. (2005) A model of migrants' remittances with human capital investment and intrafamilial transfers. International Migration Review, 39(2), pp. 407–438.

Bussolo, M. and Medvedev, D (2008) Do Remittances have a Flipside: A general equilibrium analysis

of remittances, Labour supply responses and Policy options for Jamaica. Journal of Economic Integration, 23(3), pp734-764.

Calderon, C., Fajnzylber, P., Lopez, J.H. (2008) Remittances and Growth: The Role of Complementary Policies, in Fajnzylber and Lopez (eds.), Remittances and Development: Lessons from Latin America, pp. 335-368, Washington D.C.: World Bank

Campbell, E. K. (2008) Moderating Poverty: The Role of Remittances from Migration in Botswana. Africa Development, Vol. XXXIII, No. 2, 91–115.

Chimhowu, A. Piesse, J., Pinder, C. (2005) The Socioeconomic Impact of Remittances on Poverty Reduction, in S.M. Maimbo and D. Ratha (eds.), Remittances: Development Impact and Future Prospects, pp. 83-102, Washington D.C.: World Bank

Chukwuone, N., Amaechina, E., Enebeli-Uzor, S.E., Iyoko, E., Okpukpara, B. (2012) Analysis of Impact of Remittance on Poverty in Nigeria, Working Paper No. 9, Partnership for Economic Policy.

Clarke, G. and Wallsten, S. (2004) Do Remittances Protect Households in Developing Countries Against Shocks? Evidence From a Natural Disaster in Jamaica. Unpublished paper. World Bank, Washington, DC. November.

Cox E. A. and Ureta, M. (2003) International Migration, Remittances, and Schooling: Evidence from El Salvador. Journal of Development Economics 72(2): 429–61.

Cury, S., Coelho, A.M. and Corseuil, C.H. (2005) A Computable General Equilibrium Model to Analyse Distributive Aspects in Brazil with a Trade Policy Illustration. Esst. Econ. Sao Paolo, 35(4) 739-765.

Dadson, I. and Kato, R.R. (2016) Remittances and the Redistributive Policy in Ghana: A Computable General Equilibrium Approach. Review of Economics and Finance, 6, 28-44.

Dawkins, C., Srinivasan, T. N., Whalley, J. and Heckman, J. J. (2001) Calibration in, *Handbook of Econometrics*, 5.58:3653-3703.

de la Briere, B., Sadoulet, E., de Janvry, A. and Lambert, S. (2002) The roles of destination, gender and household composition in explaining remittances: an analysis for the Dominican Sierra. Journal of Development Economics, 68(2), pp. 309–328.

De, P. and Ratha, D. (2005) Remittance Income and Household Welfare: Evidence from Sri Lanka Integrated Household Survey. Unpublished paper. Development Research Group, World Bank, Washington, DC.

Decaluwe, B, Lemelin, A., Robichaud, V. and Maisonnave, H. (2013) PEP 1-1; The PEP Standard Single-Country, Static CGE Model (version 2.1), Partnership for Economic Policy (PEP) Research Network, Universite Laval, Quebec.

Djajic, S. (1986) International Migration, Remittances and Welfare in a Dependent Economy, Journal of Development Economics, 21, pp.229-234

Djiofack, C.Z, Djimeu, E.W, and Boussichas, M. (2013) Impact of Qualified Worker Emigration on Poverty: A Macro-Micro-Simulation Approach for an African Economy, Journal of African Economies, 23(1), pp. 1-52.

Edwards, A.C., Ureta, M. (2003) International Migration, Remittances and Schooling: Evidence from El Salvador, NBER Working Paper No, 9766, Massachusetts: National Bureau of Economic Research.

Fonta, W.M., Ayuk, E.T, Chukwu, J.O., Onyukwu, O.E., Agu, C.C. and Umenwa, I.O. (2015) Dynamics of Remittance Utilisation by Nigerian Households. Progress in Development Studies, 15(4), 343-357.

Fonta, W.M., Onyukwu, O.E. and Nwosu, E.O. (2011) International Remittance Inflows and Household Welfare: Empirical Evidence from Nigeria. Research Journal of Finance and Accounting, 2(3) 140-149.

Ghadimi, H. 2007. CGE Modeling and Applications: A Short Course," In. Morgantown, West Virginia.

Gupta, S., Pattillo, C.A, and Wagh, S. (2009) Effect of Remittances on Poverty and Financial Development in Sub-Saharan Africa. *World Development*, 37(1), 104-115.

Gyimah-Brempong, K. and Asiedu, E. (2011) Remittances and Poverty in Ghana. Paper presented at the 8th IZA Annual Migration Meeting, Washington D.C., May 12-15 2011.

IMF (2005) World Economic Outlook: Globalization and External Imbalances, April, Washington D.C.: International Monetary Fund

IMF (2018) Nigeria Biannual Economic Update: Fragility Report, May, Washington D.C.: International Monetary Fund.

International Fund for Agriculture Development (IFAD) (2017) Sending Money Home: Contributing to the SDGs, One Family at a Time. June 2017

Irfan, M. (2011) Remittances and Poverty Linkages in Pakistan: Evidence and Some Suggestions for Further Analysis, PIDE Working Papers 78, Islamabad: Pakistan Institute of Development Economics

Irwin, D.A. (2005) Trade and Globalization, in W.M. Weinstein (ed.) Globalization: What's New? pp. 19-35. New York: Columbia University Press.

Ivus, O. and Strong, A. (2007) Modelling Approaches to the Analysis of Trade Policy: Computable General Equilibrium and Gravity Models, Chapters in Handbook on International Trade Policy, Chapter 5 Edward Elgar Publishing.

Ketkar, S.L. and Ratha, D. (2007) Development Finance via Diaspora Bonds: Track Record and Potential. Policy Research Working Paper no. 4311. World Bank Washington DC.

Khodker, B.H and Raihan, S. (2008) Poverty effects of remittance and ready-made garment growth in Bangladesh: A computable general equilibrium analysis. https://pdfs.semanticscholar.org/003c/cb5984ea44ff23e32e22e408bbfe53812e09.pdf. Accessed January 4, 2018.

Lartey, E.K.K., Mandelman, F.S., Acosta, P.A. (2008) Remittances, Exchange Rate Regimes and the Dutch Disease: A Panel Data Analysis, Working Paper 2008-12, Federal Reserve Bank of Atlanta

Lubambu, K.L. (2014) The Impact of Remittances on Developing Countries. European Commission Study, Brussels. EXPO/B/DEVE/2013/34. (Accessed 06 February 2019)
http://www.europarl.europa.eu/activities/committees/studies.do?language=EN

McKay, A., Deshingkar, P. (2014) International Remittances and Poverty: Further Evidence from Africa and Asia, Working Paper 12, Sussex: Migrating out of Poverty Programme.

McKenzie, D. and Sasin, M. J. (2007) Migration, Remittances, Poverty and Human Capital: Conceptual and Empirical Challenges. World Bank Policy Research Working Paper No. 4272.

Mughal, M. Anwar, A.I. (2012) Remittances, Inequality and Poverty in Pakistan: macro and Microeconomic Evidence, CATT WP No. 2, CATT-UPPA

Mughal, M., Diawara, B. (2010) Impact of Remittances on Inequality and Poverty: Macro and micro-evidence from Pakistan, mimeo

Nkang, N.M., Omonona, B.T., Yusuf, S.A. and Oni, O.a. (2013) Simulating the Impact of Exogenous Food Price Shock on agriculture and the poor in Nigeria: Results from a Computable General Equilibrium Model. Economic Analysis and Policy. 43(1), 79-94.

Nwafor, M., Adenikinju, A. and Ogujiuba, K. (2007) The impacts of trade liberalisation on poverty in Nigeria: dynamic simulations in a CGE model. Partnership for Economic Policy (PEP) Network *Modelling and Policy Impact Analysis (MPIA) Working Paper* No. 16.

Nyamongo, E.S., Misati, R.N., Kipyegon, L., Ndirangu, L. (2012) Remittances, Financial Development and Economic Growth in Africa, Journal of Economics and Business, 64, pp.240-260.

Odior, E.S. (2014) Remittances and the National Household Disposable Income in Nigeria (1980-2025): Dynamic Forecasting Approach. British Journal of Economics, Management and Trade, 4(9), 1335-1355.

OECD (2006) International Migration Outlook, Paris: Organisation for Economic Co-operation and Development.

Ogunwole, O.O. (2016) Does Remittances and Output Growth Improve Household Welfare in Nigeria? Journal of Economics and Sustainable Development, 7(3) 44-55.

Okodua, H., Ewetan, O.O. and Urhie, E (2015) Remittance Expenditure Pattern and Human Development Outcomes in Nigeria. Developing Country Studies, 5(2) 70-80.

Plaza, S. and Ratha, D. (2011) Overview: Harnessing Diaspora Resources for Africa, in Diaspora for Development in Africa, Plaza, S. and Ratha, D. (eds.), pp. 1-54, Washington D.C.: World Bank

Porter, S. (2009) *Mobile Remittances: A Study of the Philippines and Tonga*. microfinancegateway.org. Available from www.microfinancegateway.org/gm/document-1.9.43942/Mobile%20Remittances.pdf.

Quartey, P. (2006) The Impact of Migrant Remittances on Household Welfare in Ghana, AERC Research Paper 158, Nairobi: African Economic Research Consortium.

Quibria, M.G. (1997) International Migration, Remittances and Income Distribution in the Source Country: A Synthesis, Bulletin of Economic Research, 49(1), pp. 29-46

Raihan, S., Khodker, B.H., Sugiyarto, G. and Shikha, J. (2009) Remittances and Household Welfare: A case study of Bangladesh. Asian Development Bank Working Paper No. 189.

Rapoport, H. and Docquier, F. (2006) The economics of migrants' remittances, in S. Kolm and J. Mercier-Ythier (eds) Handbook on the Economics of Giving, Altruism and Reciprocity (New York: Elsevier-North Holland), pp. 1135–1198.

Ratha, D., Mohapatra, S. (2012) Migrant Remittances and Development, in G. Caprio (ed.) The Evidence and Impact of Financial Globalization: II Forces Behind Globalization, Elsevier.

Rivera-Batiz, F. (1982) International Migration, Non-traded Goods and Economic Welfare in the Source Country, Journal of Development Economics, 11, pp. 81-90

Round. J. I (2001) Constructing SAMs for Development Policy Analysis Department of Economics, University of Warwick. Prepared for a Seminar "Data Analysis for Poverty and Income Distribution Analysis", The Hague, Amsterdam.

Schiff, M. and Winters, A. (2003) Regional Integration and Development. World Bank and Oxford University Press.

Siddiqui, R., Kemal, A.R. (2006) Remittances, Trade Liberalisation and Poverty in Pakistan: The Role of Excluded Variables in Poverty Change Analysis, Pakistan Development Review.

Taylor, J.E., Mora, J., Adams, Jr., R. and Lopez-Feldman, A. (2005) Remittances, inequality and poverty: evidence from rural Mexico. Working Paper 05–003. Department of Agricultural Economics, University of California, Davis, CA.

Thanh, N.D. (2006) Economy-wide Effects of International Remittances: A Computable General Equilibrium Assessment for Vietnam.

Tsaurai, K. (2018) The Impact of Remittances on Poverty Alleviation in Selected Emerging Markets. Comparative Economic Research, Volume 21, Number 2, 51-68

UNCTAD (2012) *The Least Developed Countries Report 2012: Harnessing Remittances and Diaspora Knowledge for Productive Capacities.* UNCTAD: New York and Geneva. Available from http://unctad.org/en/PublicationsLibrary/ldc2012_en.pdf.

UNCTAD (2013) Maximizing the development impact of remittances. UNCTAD, New York and Geneva. Available from http://unctad.org/en/docs/ditctncd2011d8_en.pdf.

Waheed, O.O., Awoyemi, T.T., Adebayo, S.M. and Olowa, A.O (2013) Effects of Remittances on Poverty among Rural Households in Nigeria. European Journal of Sustainable Development, 2(4), 263-284.

Wenner, M.D. (2015) Can Diaspora Bonds be used in The Caribbean. Inter-American Development Bank, Caribbean Group Technical Note No. 875.

Woodruff, C. and Zenteno, R. (2001) Remittances and Microenterprises in Mexico. Unpublished paper. Graduate School of International Relations and Pacific Studies, University of California–San Diego.

World Bank (2006) Economic Implications of Remittances and Migration. In. Global Economic Prospects, 2006 The International Bank for Reconstruction and Development / The World Bank Washington, DC.

World Bank (2014) Nigeria Economic Report. Document of the World Bank. No. 2 July 2014.

World Bank (2016) Migration and Remittances Fact book 2016, 3rd edition, Washington D.C.: World Bank,

World Bank (2018) Migration and Remittances; Recent Developments and Outlook, Migration and Development Brief 29, Washington D.C.: World Bank,

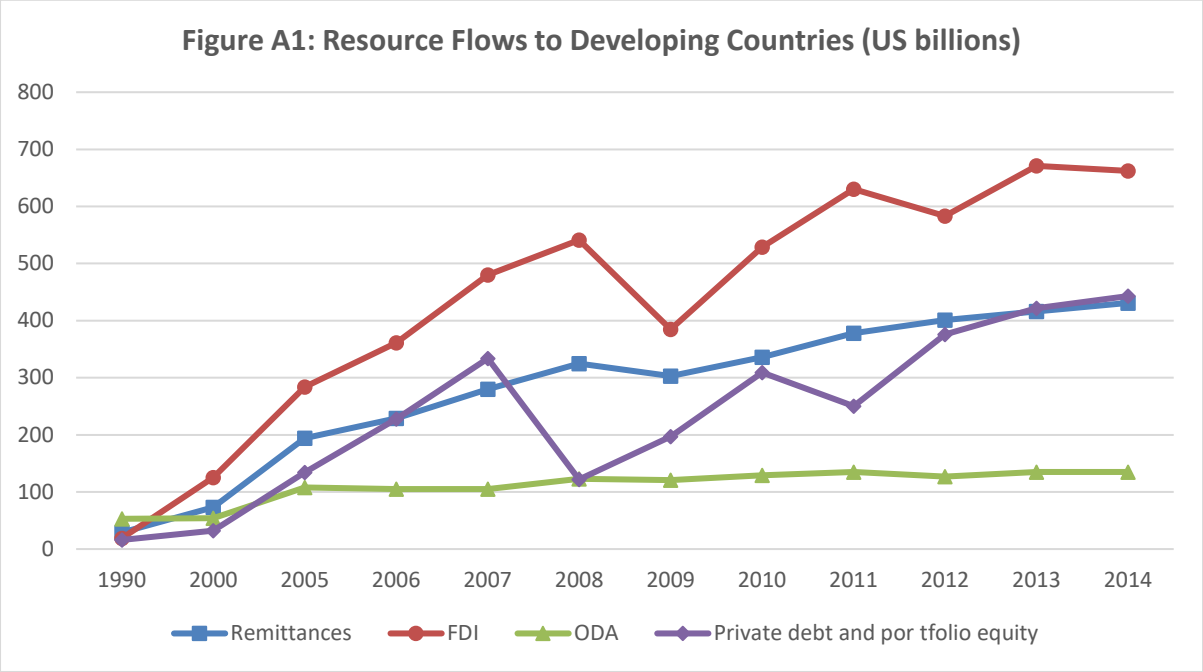
Yang, D. (2004) International Migration, Human Capital, and Entrepreneurship: Evidence from Philippine Migrant's Exchange Rate Shocks. Research Program on International Migration and Development. DECRG. Policy Research Working Paper 3578. World Bank.

Yang, D. and Choi, H. (2007) Are remittances insurance? Evidence from rainfall shocks in the Philippines. World Bank Economic Review, 21(2), pp. 219–248.

Yoshino, N., Taghizadeh-Hesary, F. and M. Otsuka. (2017) International Remittances and Poverty Reduction: Evidence from Asian Developing Countries. ADBI Working Paper 759. Tokyo: Asian Development Bank Institute.

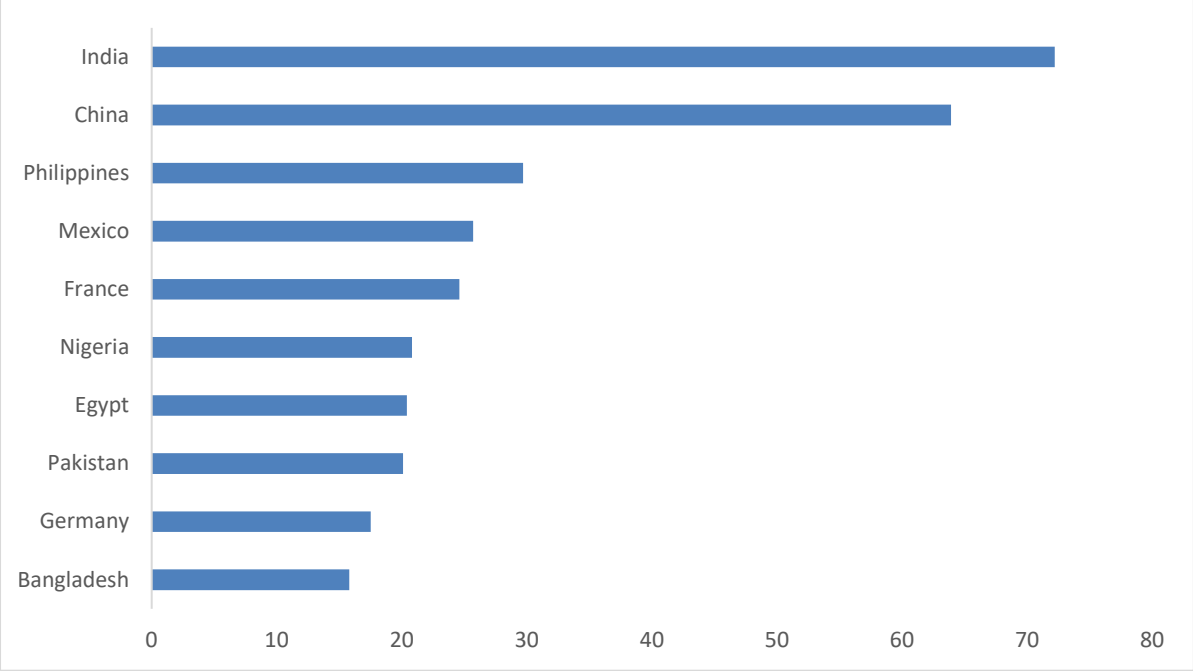
Zhu, N., Lou, X. (2008) The Impact of Remittances on Rural Poverty and Inequality in China, Policy Research Working Paper No. 4637, Washington D.C.: World Bank.

Appendix



Source: World Bank (2016)

Figure A2: Top Remittance-Receiving Countries in the World in 2014 (US$ billions)



Source: World Bank (2016)

Table A1: Incidence of Poverty by Geo-Political Zone, 1980-2004 (%)

Zone	1980	1985	1992	1996	2004
South South	13.2	45.7	40.8	58.2	35.1
South East	12.9	30.4	41	53.5	26.7
South West	13.4	38.6	43.1	60.9	43
North Central	32.2	50.8	46	64.7	67
North East	35.6	54.9	54	70.1	72.2
North West	37.7	52.1	36.5	77.2	71.2

Source: National Bureau of Statistics

Table A2: Structure of the SAM and Model Linkages

	Activities C1	Commodities C2	Factors C3	Households C4	Firms C5	Government C6	Taxes C7	Saving & Investment C8	Rest of the World C9	Total
Activities R1		Domestic supply								Gross output
Commodities R2	Intermediate demand			Household consumption		Government consumption		Investment demand	Exports	Total supply
Factors R3	Factor incomes									Factor income
Households R4			Wages, rent		Profit income	Transfers to households			Foreign remittances	Household expenditure
Firms R5			Profits							Firm expenditure
Government R6			Government share of profit						Net government income from abroad	Government expenditure
Taxes R7	Production taxes	Consumption & import taxes		Personal income tax	Company income tax		Direct & indirect taxes			Taxes
Saving & Investment R8				Household savings		Government savings			Current account balance	Total investment
Rest of the World R9		Imports	Payment to foreign capital							Foreign exchange inflow
Total	Gross output	Total supply	Factor income	Household expenditure	Firm expenditure	Government expenditure	Taxes	Total investment	Foreign exchange inflow	

Notes: Rows correspond to income while columns represent expenditure. Adapted from the IFPRI 2006 SAM for Nigeria

PEP 1-1 Model Specification

Production Block

1. $VA_j = v_j XST_j$
2. $CI_j = io_j XST_j$
3. $VA_j = B_j^{va}\left[\beta_j^{va} LDC_j^{-\rho_j^{va}} + \left(1-\beta_j^{va}\right) KDC_j^{-\rho_j^{va}}\right]^{-\frac{1}{\rho_j^{va}}}$
4. $LDC_j = \left[\frac{\beta_j^{va}}{1-\beta_j^{va}}\frac{RC_j}{WC_j}\right]^{\sigma_j^{va}} KDC_j$
5. $LDC_j = B_j^{LD}\left[\sum_l \beta_{l,j}^{LD} LD_{l,j}^{-\rho_j^{LD}}\right]^{-\frac{1}{\rho_j^{LD}}}$
6. $LD_{l,j} = B_j^{LD}\left[\frac{\beta_{l,j}^{va} WC_j}{WTI_{l,j}}\right]^{\sigma_j^{LD}} \left(B_j^{LD}\right)^{\sigma_j^{LD}-1} LDC_j$
7. $KDC_j = B_j^{KD}\left[\sum_l \beta_{k,j}^{KD} KD_{k,j}^{-\rho_j^{KD}}\right]^{-\frac{1}{\rho_j^{KD}}}$
8. $KD_{k,j} = B_j^{KD}\left[\frac{\beta_{k,j}^{KD} RC_j}{RTI_{k,j}}\right]^{\sigma_j^{KD}} \left(B_j^{KD}\right)^{\sigma_j^{KD}-1} KDC_j$
9. $DI_{i,j} = aij_{i,j} CI_j$

Income and savings: Households, Firm, Government, Rest of the World and Transfers

10. $YH_h = YHL_h + YHK_h + YHTR_h$
11. $YHL_h = \sum_l \lambda_{h,l}^{WL} \left(W_l \sum_j LD_{l,j} \right)$
12. $YHK_h = \sum_l \lambda_{h,k}^{RK} \left(\sum_j RK_{k,j} KD_{k,j} \right)$
13. $YHTR_h = \sum_{ag} TR_{h,ag}$
14. $YDH_h = YH_h - TDH_h - TR_{gvt,h}$
15. $CTH_h = YDH_h - SH_h - \sum_{agng} TR_{agng,h}$
16. $SH_h = PIXCON^{\eta} sh0_h + sh1_h YDH_h$
17. $YF_f = YFK_f + YFTR_f$
18. $YFK_f = \sum_k \lambda_{f,k}^{RK} \left(\sum_j RK_{k,j} KD_{k,j} \right)$
19. $YFTR_f = \sum_{ag} TR_{f,ag}$
20. $YDF_f = YF_f - TDF_f$
21. $SF_f = YDF_f - \sum_{ag} TR_{ag,f}$
22. $YG = YGK + TDHT + TDFT + TPRODN + TPRCTS + YGTR$
23. $YGK = \sum_k \lambda_{gvt,k}^{RK} \left(\sum_j RK_{k,j} KD_{k,j} \right)$
24. $TDHT = \sum_h TDH_h$
25. $TDFT = \sum_h TDF_h$
26. $TPRODN = TIWT + TIKT + TIPT$
27. $TIWT = \sum_{l,j} TIW_{l,j}$
28. $TIKT = \sum_{k,j} TIK_{k,j}$
29. $TIPT = \sum_j TIP_j$
30. $TPRCTS = TICT + TIMT + TIXT$
31. $TICT = \sum_i TIC_i$
32. $TIMT = \sum_i TIM_i$
33. $TIXT = \sum_i TIX_i$
34. $YGTR = \sum_{agng} TR_{gvt,agng}$
35. $TDH_h = PIXON^{\eta} ttdh0_h + ttdh1_h YH_h$
36. $TDF_f = PIXON^{\eta} ttdf0_f + ttdf1_f YFK_f$
37. $TIW_{l,j} = ttiw_{l,j} + W_l LD_{l,j}$
38. $TIK_{k,j} = ttik_{k,j} + RK_{k,j} KD_{k,j}$
39. $TIP_j = ttip_j + PP_j XST_j$
40. $TIC_i = ttic_i \left[\left(PL_i + \sum_{ij} PC_{ij} tmrg_{ij,i} \right) DD_i + \left((1 + ttim_i) PWM_i e + \sum_{ij} PC_{ij} tmrg_{ij,i} \right) IM_i \right]$
41. $TIM_i = ttim_i PWM_i eIM_i$

42. $TIX_i = ttix_i \left(PE_i + \sum_{ij} PC_{ij} tmrg_{ij,i}^X \right) EXD_i$

43. $SG = YG - \sum_{agng} TR_{agng,gvt} - G$

44. $YROW = e \sum_i PWM_i IM_i + \sum_k \lambda_{row,k}^{RK} \left(\sum_j RK_{k,j} KD_{k,j} \right) + \sum_{agd} TR_{row,agd}$

45. $SROW = YROW + \sum_i PE_i^{FOB} EXD_i - \sum_{agd} TR_{agd,row}$

46. $SROW = -CAB$

47. $TR_{agng,h} = \lambda_{agng,h}^{TR} YDH_h$

48. $TR_{gvt,h} = PIXCON^{\eta} tr0_h + tr1_h YH_h$

49. $TR_{ag,f} = \lambda_{ag,f}^{TR} YDF_f$

50. $TR_{agng,gvt} = PIXCON^{\eta} tr_{agng,gvt}^0$

51. $TR_{agd,row} = PIXCON^{\eta} tr_{agd,row}^0$

Demand Equations

52. $PC_i C_{i,h} = PC_i C_{i,h}^{MIN} + \gamma_{i,h}^{LES} \left(CTH_h - \sum_{ij} PC_{ij} C_{ij,h}^{MIN} \right)$

53. $GFCF = IT - \sum_i PC_i VSTK_i$

54. $PC_i INV_i = \gamma_i^{INV} GFCF$

55. $PC_i CG_i = \gamma_i^{GVT} G$

56. $DIT_i = \sum_j DI_{i,j}$

57. $MRGN_i = \sum_{ij} tmrg_{i,ij} DD_{ij} + \sum_{ij} tmrg_{i,ij} IM_{ij} + \sum_{ij} tmrg_{i,ij}^X EXD_{ij}$

International Trade and Producer Commodity Supply Block

58. $XST_j = B_j^{XT} \left[\sum_l \beta_{j,i}^{XT} XS_{j,i}^{\rho_j^{XT}} \right]^{\frac{1}{\rho_j^{XT}}}$

59. $XS_{j,i} = \frac{XST_j}{\left(B_j^{XT} \right)^{1+\rho_j^{XT}}} \left[\frac{P_{j,i}}{\beta_{j,i}^{XT} PT_j} \right]^{\sigma_j^{XT}}$

60. $XS_{j,i} = B_{j,i}^{XT} \left[\beta_{j,i}^{XT} EX_{j,i}^{\rho_{j,i}^X} + \left(1 - \beta_{j,i}^{XT} \right) DS_{j,i}^{\rho_{j,i}^X} \right]^{\frac{1}{\rho_{j,i}^X}}$

61. $EX_{j,i} = \left[\frac{1 - \beta_{j,i}^X}{\beta_{j,i}^X} \frac{PE_i}{PL_i} \right]^{\sigma_{j,i}^X} DS_{j,i}$

62. $EXD_{j,i} = EXD_i^O \left[\frac{ePWX_i}{PE_i^{FOB}} \right]^{\sigma_i^{XD}}$

63. $Q_i = B_i^M \left[\beta_i^M IM_i^{-\rho_i^M} + \left(1 - \beta_i^M \right) DD_i^{-\rho_i^M} \right]^{\frac{-1}{\rho_i^M}}$

64. $IM_i = \left[\frac{\beta_i^M}{1 - \beta_i^M} \frac{PD_i}{PM_i} \right]^{\sigma_i^M} DD_i$

Prices

Production

65. $PP_j = \dfrac{PVA_j VA_j + PCI_j CI_j}{XST_j}$

66. $PT_j = (1 + ttip_j) PP_j$

67. $PCI_j = \dfrac{\sum_i PC_i DI_{i,j}}{CI_j}$

68. $PVA_j = \dfrac{WC_j LDC_j + RC_j KDC_j}{VA_j}$

69. $WTI_{l,j} = W_l (1 + ttiw_{l,j})$

70. $RTI_{k,j} = R_{k,j} (1 + ttik_{k,j})$

71. $R_{k,j} = RK_k$

International trade

71. $R_{k,j} = RK_k$

72. $PT_j = \dfrac{\sum_i P_{j,i} XS_{j,i}}{XST_j}$

73. $P_{j,i} = \dfrac{PE_i EX_{j,i} + PL_i DS_{j,i}}{XS_{j,i}}$

74. $PE_i^{FOB} = \left(PE_i + \sum_{ij} PC_{ij} tmrg_{ij,i}^{X} \right) (1 + ttix_i)$

75. $PD_i = (1 + ttic_i) \left(PL_i + \sum_{ij} PC_i tmrg_{ij,i} \right)$

76. $PM_i = (1 + ttic_i) \left((1 + ttim_i) ePWM_i + \sum_{ij} PC_i tmrg_{ij,i} \right)$

77. $PC_j = \dfrac{PM_i IM_i + PD_i DD_i}{Q_i}$

Price Indexes

78. $$PIXGDP = \sqrt{\frac{\sum_j \left(PVA_j + \frac{TIP_j}{VA_j} \right) VA_j^O \sum_j PVA_j VA_j + TIP_j}{\sum_j (PVA_j^O VA_j^O + TIP_j^O) \sum_j \left(PVA_j^O + \frac{TIP_j^O}{VA_j^O} \right) VA_j}}$$

79. $$PIXCON = \frac{\sum_i PC_i \sum_h CI_{i,h}^0}{\sum_{ij} PC_{ij}^0 \sum_h CI_{i,j}^0}$$

80. $$PIXINV = \prod_i \left(\frac{PC_i}{PC_i^0} \right)^{\gamma_i^{INV}}$$

81. $$PIXGVT = \prod_i \left(\frac{PC_i}{PC_i^0} \right)^{\gamma_i^{GVT}}$$

Equilibrium Block

82. $$Q_i = \sum_h C_{i,h} + CG_i + INV_i + VSTK_i + DIT_i + MRGN_i$$

83. $$\sum_j LD_{l,j} = LS_l$$

84. $$\sum_j KD_{k,j} = KS_k$$

85. $$IT = \sum_h SH_h + \sum_f SF_f + SG + SROW$$

86. $$\sum_j DS_{j,i} = DD_i$$

87. $$\sum_j EX_{j,i} = EXD_i$$

Gross Domestic Product Equations

88. $$GDP^{BP} = \sum_j PVA_j VA_j + TIPT$$

89. $$GDP^{MP} = GDP^{BP} + TPRCTS$$

90. $$GDP^{IB} = \sum_{l,j} W_l LD_{l,j} + \sum_{k,j} R_{k,j} KD_{k,j} + TPRODN + TPRCTS$$

91. $$GDP^{FD} = \sum_i PC_i \left[\sum_h C_{i,h} + CG_i + INV_i + VSTK_i \right] + \sum_i PE_i^{FOB} EXD_i - e \sum_i PWM_i IM_i$$

Real (volume) Variables Computed from Price Indices

92. $CTH_h^{REAL} = \dfrac{CTH_h}{PIXCON}$

93. $G^{REAL} = \dfrac{G}{PIXGVT}$

94. $GDP^{BP\_REAL} = \dfrac{GDP^{BP}}{PIXGDP}$

95. $GDP^{MP\_REAL} = \dfrac{GDP^{MP}}{PIXCON}$

96. $GFCF^{REAL} = \dfrac{GFCF}{PIXINV}$

SETS

Industries and Commodities

All industries: $j, jj \in J = \{J_1, ..., J_j, ...\}$

All commodities: $i, ij \in I = \{I_1, ..., I_j, ...\}$

Production Factors

Labour categories: $l \in L = \{L_1, ..., L_l, ...\}$

Capital categories: $k \in K = \{K_1, ..., K_k, ...\}$

Agents

All Agents: $ag, agj \in AG = H \cup F \cup \{GVT, ROW\} = \{H_1, ..., H_h, ..., F_1, ..., F_f, ..., GVT, ROW\}$

Households: $h, hj \in H \subset AG = \{H_1, ..., H_h, ...\}$

Firm: $f, fj \in F \subset AG = \{F_1, ..., F_h, ...\}$

Non-government agent:

$agng \in AGNG \subset AG = H \cup F \cup \{ROW\} = \{H_1, ..., H_h, ..., F_1, ..., F_f, ..., ROW\}$

Domestic agents: $agd \in AGD \subset AG = H \cup F \cup \{GVT\} = \{H_1, ..., H_h, ..., F_1, ..., F_f, ..., GVT\}$

VARIABLES

Volume variables

$C_{i,h}$: Consumption of commodity i by type h household

$C_{i,h}^{MIN}$: Minimum consumption of commodity i by type h household

CG_i : Government consumption of commodity i

CI_j : Total intermediate consumption of industry j

CTH_h^{REAL} : Real consumption expenditures of household h

DD_i : Domestic demand for commodity i produced locally

$DI_{i,j}$: Intermediate consumption of commodity i by industry j

DIT_i : Total intermediate demand for commodity i

$DS_{j,i}$: supply of commodity i by sector j to the domestic market

$EX_{j,i}$: Quantity of product i exported by sector j

EXD_i : World demand for exports of product i

G^{REAL} : Real government spending

GDP^{BP_REAL} : Real GDP at basic prices

GDP^{MP_REAL} : Real GDP at market prices

$GFCF^{REAL}$: Real gross fixed capital formation

IM_i : Quantity of product i imported

INV_i : Final demand for commodity i for investment

$KD_{k,j}$: Demand for type k capital by industry j

KDC_j : Industry j demand for composite capital

KS_k : Supply of type k capital

$LD_{l,j}$: Demand for type l labour by industry j

LDC_j : Industry j demand for composite labour

LS_i : Supply of type l labour

$MRGN_i$: Demand for commodity i as a trade or transport margin

Q_i : Quantity demanded of composite commodity i

VA_j : Value added of industry j

$VSTK_i$: Inventory change of commodity i

$XS_{j,i}$: Industry j production of commodity i

XST_j : Total aggregate output of industry j

Price Variables

e : Exchange rate

$P_{j,i}$: the Basic price of industry j's production of commodity i

PC_i : Purchaser price of composite commodity i

PCI_j : Intermediate consumption price index of industry j

PD_i : Price of local product i sold on the domestic market

PE_i : Price received for exported commodity

PE_i^{FOB} : FOB price of exported commodities (LCU)

$PIXCON$: Consumer price index

$PIXGDP$: GDP deflator

$PIXGVT$: Government spending price index

$PIXINV$: Investment price index

PL_i : Price of local product i

PM_i : Price of imported products

PP_j : Industry j unit cost

PT_j : the Basic price of industry j's output

PVA_j : Price of industry j value added

PWM_i : World price of imported commodity I (expressed in foreign currency)

PWX_i : World price of the exported product (expressed in foreign currency)

$R_{k,j}$: Rental rate of type k capital in industry j

RC_j : Rental rate of industry j composite capital

RK_k : Rental rate of type k capital (if capital is mobile)

$RTI_{k,j}$: Rental rate paid by industry j for type k capital

W_l : Wage rate of type l labour

WC_j : Wage rate of industry j composite labour

$WTI_{l,j}$: Wage rate paid by industry j for type l labour

Nominal (Value) Variables

CAB : Current account balance

CTH_h : Consumption budget of type h household

G : Current government spending on goods and services.

GDP^{BP} : GDP at basic prices

GDP^{FD} : GDP at purchasers' prices (based on final demand)

GDP^{IB} : GDP at market prices (income-based)

GDP^{MP} : GDP at market prices

$GFCF$: Gross fixed capital formation

IT : Total investment spending

SF_f : Savings of type f business

SG : Government savings

SH_h : Savings of type h household

$SROW$: Rest of the world savings

TDF_f : Income taxes of type f businesses

$TDFT$: Total government revenue from business income taxes

TDH_h : Income taxes of type h households

$TDHT$: Total government revenue from household income taxes

TIC_i : Government revenue from indirect taxes on product i

$TICT$: Total government receipts of indirect taxes on commodities

$TIK_{k,j}$: Government revenue from taxes on type k capital used by industry j

$TIKT$: Total government revenue from taxes on capital

TIM_i : Total government revenue from import duties on product i

$TIMT$: Total government revenue from import duties

TIP_j : Government revenue from taxes on j industry production

$TIPT$: Total government revenue from production taxes

$TIW_{l,j}$: Government revenue from payroll taxes

$TIWT$: Total government revenue from payroll taxes

TIX_i : Government revenue from export taxes on product i

$TIXT$: Total government revenue from export taxes

$TPRCTS$: Total government revenue from taxes on products and imports

$TPRODN$: Total government revenue from taxes on production

$TR_{ag,agj}$: Transfers from agent agj to agent g

YDF_f : Disposable income of type f business

YDH_h : Disposable income of type h household

YF_f : Total income of type f business

YFK_f : Capital income of type f business

$YFTR_f$: Transfer income of type f business

YG : total government income

YGK : Government capital income

$YGTR$: Government transfer income

YH_h : Total income of type h household

YHK_h : Capital income of type h household

YHL_h : Labour income of type h household

$YHTR_h$: Transfer income of type h household

$YROW$: Rest of the world income

Rates, Intercepts and other Variable Parameters

$sh0_h$: Intercept (type h household savings)

$sh1_h$: Slope (type h household savings)

$tr0_h$: Intercept (transfers by type h households to the government)

$tr1_h$: Marginal rate of transfers by type h household to government

$ttdf0_f$: Intercept (income taxes of type f businesses)

$ttdf1_f$: Marginal income tax rate of type f businesses

$ttdh0_h$: Intercept (income taxes of type h household)

$ttdh1_h$: Marginal income tax rate of type h households

$ttic_i$: Tax rate on commodity i

$ttik_{k,j}$: a Tax rate of type k capital used in industry j

$ttim_i$: Rate of taxes and duties on imports of commodity i

$ttip_j$: Tax rate on production of industry j

$ttiw_{l,j}$: Tax rate on type l worker compensation in industry j

$ttix_i$: Export tax rate on exported commodity i

PARAMETERS

$aij_{i,j}$: Input-output coefficient

B_j^{KD} : Scale parameter (CES-composite capital)

B_j^{LD} : Scale parameter (CES-composite labour)

B_i^M : Scale parameter (CES-composite commodity)

B_j^{VA} : Scale parameter (CES- value added)

$B_{j,i}^X$: Scale parameter (CET-export and local sales)

B_j^{XT} : Scale parameter (CET-total output)

$B_{k,j}^{KD}$: Share parameter (CES-composite capital)

$B_{k,j}^{LD}$: Share parameter (CES-composite labour)

B_i^M : Share parameter (CES-composite commodity)

B_j^{VA} : Share parameter (CES-value added)

$B_{j,i}^X$: Share parameter (CET-exports and local sales)

$B_{j,i}^{XT}$: Share parameter (CET-total output)

η : Price elasticity of indexed transfers and payments

γ_i^{GVT} : Share of commodity i in total current government sending on goods and services

γ_i^{INV} : Share of commodity i in total investment expenditure

$\gamma_{i,h}^{LES}$: Marginal share of commodity I in type h household consumption budget

io_j : Coefficient (Leontief-intermediate consumption)

$\lambda_{ag,k}^{RK}$: Share of type k capital income received by agent ag

$\lambda_{ag,agj}^{TR}$: Share parameter (transfer function)

$\lambda_{h,l}^{WL}$: Share of type l labour income received by type h household

ρ_j^{KD} : Elasticity parameter (CES-composite capital); $-1 < \rho_j^{KD} < \infty$

ρ_j^{LD} : Elasticity parameter (CES-composite labour); $-1 < \rho_j^{LD} < \infty$

ρ_i^M : Elasticity parameter (CES-composite commodity); $-1 < \rho_j^M < \infty$

ρ_j^{VA} : Elasticity parameter (CES-value added); $-1 < \rho_j^{VA} < \infty$

$\rho_{j,i}^{X}$: Elasticity parameter (CET-export and local sales); $1 < \rho_{j,i}^{X} < \infty$

ρ_j^{XT} : Elasticity parameter (CET-total output); $1 < \rho_j^{XT} < \infty$

σ_j^{KD} : Elasticity of substitution (CES-composite capital); $0 < \sigma_j^{KD} < \infty$

σ_j^{LD} : Elasticity of substitution (CES-composite labour); $0 < \sigma_j^{LD} < \infty$

σ_i^{M} : Elasticity of substitution (CES-composite commodity); $0 < \rho_j^{M} < \infty$

σ_j^{VA} : Elasticity of transformation (CES-value added); $0 < \sigma_j^{VA} < \infty$

$\sigma_{j,i}^{x}$: Elasticity of transformation (CET-exports and local sales); $0 < \sigma_{j,i}^{X} < \infty$

σ_i^{XD} : Price elasticity of world demand for exports of product i

σ_j^{XT} : Elasticity of transformation (CET-total output); $0 < \sigma_j^{XT} < \infty$

$tmrg_{i,ij}$: Rate of margin i applied to commodity ij

$tmrg_{i,ij}^{X}$: Rate of margin i applied to exported commodity ij

v_j : Coefficient (Leontief-value added)

FIXED VARIABLES IN DEFAULT CLOSURE

$C_{i,h}^{MIN}$: Minimum consumption of commodity i by type h household

CAB : Current account balance

e : Exchange rate

G : Current government spending on goods and services

$KD_{k,j}$: Demand for type k capital by industry j

Table B1: Effect on government tax revenue

	Baseline	Scenario 1	% change	Scenario 2	% change
Corporate tax	2,233,366.13	2,227,304.07	-0.003	2,371,069.76	0.062
Household income tax	125,405.17	120,910.00	-0.036	181,523.53	0.447
Indirect tax	51,599.99	49,599.49	-0.039	79,015.02	0.531
Taxes on capital	42,982.70	41,590.28	-0.032	62,615.32	0.457
Import duties	245,199.96	234,075.07	-0.045	395,120.24	0.611
Payroll tax	102,104.97	98,811.92	-0.032	134,439.78	0.317
Production tax	145,087.67	140,402.20	-0.032	197,055.10	0.358

Note: All values in million naira

Table B2: Effect on prices

	Baseline	Scenario 1	% Change	Scenario 2	% Change
Sectors	Price of domestic output to home market				

Public admin.	1.000	0.976	-0.024	1.257	0.257
Agriculture	1.065	1.033	-0.030	1.430	0.343
Cereals	1.066	1.028	-0.035	1.504	0.411
Food	1.069	1.033	-0.033	1.482	0.386
Industry	1.030	1.021	-0.009	1.209	0.174
Rice	1.096	1.058	-0.035	1.539	0.405
Services	1.092	1.063	-0.026	1.405	0.287
			Price of composite commodity		
Public admin.	1.000	0.976	-0.024	1.257	0.257
Agriculture	1.072	1.042	-0.028	1.400	0.306
Cereals	1.083	1.049	-0.031	1.452	0.342
Food	1.070	1.035	-0.032	1.470	0.374
Industry	1.038	1.034	-0.004	1.102	0.061
Rice	1.347	1.313	-0.025	1.706	0.266
Services	1.092	1.067	-0.023	1.353	0.239

Table B3: Impact on industry output

	Baseline	Scenario 1	% change	Scenario 2	% change
Rice	570,166.03	581,085.71	0.019	462,878.60	-0.188
Cereals	1,073,138.95	1,082,860.81	0.009	969,612.98	-0.096
Other Agric.	6,108,250.09	6,050,188.68	-0.010	7,024,856.56	0.150
Industry	9,374,177.64	9,446,844.15	0.008	8,702,171.70	-0.072
Services	6,633,696.96	6,611,501.59	-0.003	6,653,214.76	0.003
Public admin.	3,108,960.07	3,049,189.48	-0.019	2,837,879.59	-0.087

Note: All values in million naira

Table B4: Effect on value added

	Baseline	Scenario 1	% change	Scenario 2	% change
Rice	526,484.47	536,567.57	0.019	427,416.55	-0.188
Cereals	1,007,656.05	1,016,784.69	0.009	910,447.23	-0.096
Other Agric.	4,995,965.15	4,948,476.47	-0.010	5,745,661.70	0.150
Industry	7,880,637.05	7,941,725.97	0.008	7,315,698.43	-0.072
Services	4,581,901.00	4,566,570.64	-0.003	4,595,381.96	0.003
Public admin.	915,888.80	898,280.60	-0.019	836,029.44	-0.087

Note: All values in million naira

Table B5: Impact on sectoral factor demand

	Baseline	Scenario 1	% change	Scenario 2	% change
Public admin.	915,888.80	898,281.42	-0.019	836,091.24	-0.087
Capital	1,005.20	937.24	-0.068	1,381.83	0.375
Labour	914,883.61	897,344.18	-0.019	834,709.41	-0.088
Agriculture	4,995,965.15	4,948,558.30	-0.009	5,767,038.82	0.154
Capital	378,489.79	364,794.59	-0.036	540,614.84	0.428
Labour	3,028,425.05	3,004,734.75	-0.008	1,705,338.32	-0.437

Land	1,589,050.32	1,579,028.97	-0.006	3,521,085.66	1.216
Cereals	1,007,656.05	1,016,791.69	0.009	911,569.96	-0.095
Capital	1,766.79	1,736.17	-0.017	1,965.65	0.113
Labour	617,836.60	621,907.42	0.007	324,376.79	-0.475
Land	388,052.66	393,148.11	0.013	585,227.52	0.508
Industry	7,880,637.05	7,942,004.97	0.008	7,328,274.72	-0.070
Capital	7,579,863.64	7,623,775.05	0.006	7,140,231.88	-0.058
Labour	300,773.42	318,229.93	0.058	188,042.84	-0.375
Rice	526,484.47	536,571.91	0.019	427,952.59	-0.187
Capital	1,180.31	1,171.31	-0.008	1,182.80	0.002
Labour	312,363.14	317,533.68	0.017	160,328.87	-0.487
Land	212,941.01	217,866.92	0.023	266,440.92	0.251
Services	4,581,901.00	4,566,324.23	-0.003	4,637,605.19	0.012
Capital	656,527.59	626,418.96	-0.046	933,456.32	0.422
Labour	3,925,373.41	3,939,905.26	0.004	3,704,148.87	-0.056

Note: All values in million naira

Mission

To strengthen local capacity for conducting independent,
rigorous inquiry into the problems facing the management of economies in sub-Saharan Africa.

The mission rests on two basic premises: that development is more likely to occur where there is sustained sound management of the economy, and that such management is more likely to happen where there is an active, well-informed group of locally based professional economists to conduct policy-relevant research.

Bringing Rigour and Evidence to Economic Policy Making in Africa

- Improve quality.
- Ensure Sustainability.
- Expand influence.

www.aercafrica.org

Learn More

www.facebook.com/aercafrica

www.instagram.com/aercafrica_official/

twitter.com/aercafrica

www.linkedin.com/school/aercafrica/

Contact Us
African Economic Research Consortium
Consortium pour la Recherche Economique en Afrique
Middle East Bank Towers,
3rd Floor, Jakaya Kikwete Road
Nairobi 00200, Kenya
Tel: +254 (0) 20 273 4150
communications@aercafrica.org