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Impact of Remittances on Food Security and Nutrition of Migrant's Household: Evidence from Nigeria

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Abstract:

Migration cum remittances has become an important livelihood strategy among households in most developing countries. This is because it provides migrant households with remittances that are uncorrelated with agricultural income. It is estimated that there are about 232 million migrants worldwide today. Remittances sent back home by these migrants is believed to have a huge impact on the socioeconomic conditions of families left behind in the country of origin. In Sub-Saharan Africa, Nigeria is the highest receiver of remittances. However, despite the huge remittances flow into the country, malnutrition, poverty and food insecurity are still widespread in Nigeria. This paper examined the impact of remittances on food security and nutrition of farming households in Kwara State of Nigeria. Descriptive analysis indicates that, compared to non-receiving households, remittances receiving households are better off in terms of total income, assets, calorie supply, micronutrients supply, as well as, child nutritional status. Econometric analyses show that remittance income contributes to improved calorie supply at the household level, an aspect which has not been analyzed previously. Likewise, household income net of remittances increase calorie supply in a significant way, but the effect is twice larger than the effect of remittance income.

Acknowledegment:

JEL Codes: J62, R23

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Key words: Migration, remittances, food security, micronutrients, nutritional status

JEL codes: R23, F22, O15, Q12

1. Introduction

Migration – whether national or international, has become an important livelihood strategy among households in most developing countries. This is because it provides migrant households with remittances that are uncorrelated with agricultural income (World Bank, 2006). It is estimated that there are some 232 million migrants in the world today (World Bank, 2014). Remittances sent back home by these migrants is believed to have a huge impact on the socioeconomic conditions of families left behind in the country of origin. World Bank (2014) reported that the volume of remittances to developing countries has increased on average by 8.4% annually since 2013 totaling about USD 436 billion in 2014. Moreover, there are evidences that remittance flows are underreported, so that the actual amount could more than double the official formal transfer. In addition, IFAD (2007) suggested that over the next five years, cumulative remittances to developing countries will exceed USD 1.5 trillion.

Available evidences show that remittances to Sub-Saharan Africa (SSA) are relatively small compared to South Asia and Latin America. Though most recorded remittances in SSA are only a small fraction of total remittances, formal flow to the region were estimated at USD 33 billion in 2013 with Nigeria, Egypt, Sudan and Senegal being the largest recipient. Two motives have been identified for sending remittances – the insurance and investment motives. The insurance motives describes migration as a risk-sharing behaviour – between the migrants and the household, and remittance income serves as insurance against income and consumption shocks in the context of missing or imperfect credit and insurance markets (Briere et. al., 2002). In the investment motives, the decision to remit by migrants is seen as contribution to investment in household assets later to be inherited. Migration is considered as a potential source of investment capital in the absence of a functioning capital market – so that remittances enable households to invest in productive assets and activities that can improve their livelihoods (Taylor, 1999).

In the migration literature, considerable attention has been given to the poverty effects of remittance income in developing countries (e.g. Adams and Page, 2005; Adams, 2004, Guptal et. al., 2009). In contrast, much less is known about the food security and nutrition impacts of remittances

in developing countries. As a result, relatively little policy efforts have been made to utilize the welfare and developmental potentials of remittances. Concrete policies that could encourage the flow and effective use of remittances are generally lacking (Maphosa, 2007). One reason for this might be the absence of concrete up-to-date empirical evidences regarding the effects of remittances in the specific context (Adams, 2004; Shaw, 2007). Nutrition impacts might be positive, because remittances contribute to higher household income and therefore better access to food (e.g. Taylor et. al., 2003). But the impacts might also be negative, at least when controlling for total household income, as migration could potentially reduce household food availability due to reduction in family labour (Sesabo, 2001; Azam and Gubert, 2006).

The purpose of this paper is to examine the impact of remittance income on food security and nutrition among farm households in Kwara State of Nigeria. Nigeria represents a good case study for examining these issues. Not only is food insecurity widespread in Nigeria, but the country also produces a large number of internal and international migrants. For instance, remittances to Nigeria was estimated at USD 21 billion in 2014, making the country the highest receiver in SSA and sixth in the World (World Bank, 2014). A recent study by Oseni and Winter (2009), using a nationally representative dataset, showed that about 5.5% of the average household income in Nigeria is from remittances, and that households in the Southern regions received more from remittances than their Northern counterpart. The authors are silent on the specific impacts of remittances on food security and nutrition in the country. This is the research gap, which we hope to address, using a micro-level survey data collected from rural villages in Kwara State, Nigeria.

2. Remittances and food security: Previous evidences

As mentioned in the previous section, studies that investigate the impact of remittances on household nutrition at the micro-level are not common. No such study is available for Nigeria. Empirical investigation into the relationship between remittances and poverty are more common. In the remaining part of this section, we present a review of empirical literature on the underlying issues and linkages. INSTRAW (2008), in a study on gender, remittances and development in the

Philippines found that remittances contribute to improvement in food security of receiving households. Besides, the study also found a significant change in food consumption patterns – leading to increased consumption of quality foods and food away from home. Apart from the direct nutrition effects found by this study, some evidence of indirect effects on non-receiving households have been reported. For instance, Durand et. al. (1996), found increased consumption by non-receiving households in rural Mexico, as a result of increased income brought about by increased consumption spending of remittances receiving households.

Jimenez (2009), used the household economy approach to carry out a comparative analysis between remittances-receiving households and non-receiving households in Tlapanala village of Mexico. The author found that the consumption patterns do not differ significantly, but food consumption expenditures were higher in remittance-receiving households. Gustafsson and Makkonen (1993), employed the 1986/87 household survey data in Lesotho and find that remittances increased per capita food consumption by 35% on average among recipient households. Using the living standard measurement survey data, Quartey and Blankson (2004), found evidence of increased food consumption among remittance-receiving households in Ghana. The authors concluded that remittances help to smooth consumption in the face of economic shocks.

Ratha (2003), summarized the results of several studies on migration and remittances. The author concludes that remittances not only raise the food consumption level of recipient households in developing countries, but it also has multiplier effects because they are mostly spent on acquiring locally produced goods. IDS (2006), also carried out a similar review on the role of remittances in Latin America and conclude that households receiving remittances tend to have better nutrition and access to health and educational services compared to non-receiving households.

In terms of poverty effects, there are growing evidences that remittances reduce poverty among recipient households. For instance, Adams and Page (2005), focused on the relationship between international remittances and poverty in developing countries. The authors found that international remittances significantly reduce poverty in the developing world. Their study suggest

that on average, and after controlling for the possible endogeneity of international remittances, a 10% increase in per capita remittances lead to a 3.5% decline in the share of poor people. In another study conducted in Guatemala, Adams (2004), found that remittances reduce the level, depth and severity of poverty among receiving households.

Gupta et. al. (2009), using data set from 76 countries (including 24 in Sub-Saharan Africa) found that remittances have a significant direct poverty-mitigating effect and a positive impact on financial development. Similarly, Adams et. al. (2008), used a nationally representative data set to examine the impacts of remittances on poverty in Ghana. They found that remittances reduce total poverty in a significant way, with international remittances exerting more impacts than internal remittances. Also from Ghana, Litchfield and Hugh (2003), found a negative and significant relationship between remittances and household poverty. Dejene (2005), utilizes a large dataset from urban households to study the characteristics of remittance-receiving households in Ethiopia. The author found that the level of poverty is significantly lower in receiving compared to non-receiving households.

3. Background and data

3.1 Background

With an estimated population of 180 million people, Nigeria is the most populous country in Africa. About two thirds of the population resides in the rural areas where they derive livelihood from agriculture and allied sectors (Oseni and Winter, 2009). Despite the reported decrease in poverty – in the last decade, it is generally believed the poverty rate is still unexpectedly high in Nigeria with the rural areas worse affected. For instance, Nigeria is counted among the twenty poorest countries in the world based on World Bank indicators in 2004 (World Bank, 2005). The high incidence of poverty in the country has been blamed on declining agricultural productivity, poor infrastructure and unemployment, among other factors.

During the period of the oil boom, Nigeria was a major international migration destination. The number of immigrants in the country was almost 2% of the population in 1980 (Shaw, 2007).

The flow of migrants to Nigeria was dramatically reduced by the civil war of 1970s and the downturn in the economy caused by the fall in the prices of oil. In addition, the expulsion of many illegal migrants – mostly Ghanaians, in 1983 considerably reduced the migrant population in Nigeria. Migration in Nigeria after this has been characterized by emigration, as well as, internal migration. SAMP (2006), reported that nearly 15,000 Nigerians migrated legally to Europe and North America every year from 1995 – 2001. Shaw (2007), suggest that some 11% of educated Nigerians live and work in OECD countries. Likewise, a recent survey of migrant population in Europe shows that there are some 45,000 Nigerians in United Kingdom, 17,000 in Italy and 15,000 in Germany. Significant migrations to the Middle East and Asian countries have also been reported (SAMP, 2006). The growing number of Nigerian migrants worldwide has led to increased international remittances to the country. For example, World Bank (2014), submitted that Nigeria was the highest receiver of remittances in Africa and the sixth in the world. Majority of these remittances are from Europe and North America, where 40% of the Nigerian migrants reside. In terms of number, a recent survey of African migrant population in USA and Europe between 1995 – 2000 shows that Nigeria accounts for the largest share of African migrant population in these regions (SAMP, 2006).

3.2 Data

The primary data used in the analysis were collected from a comprehensive survey of farm households in Kwara State, north-central region of Nigeria. Kwara State was chosen for this study because undernutrition is prevalent in the State. For example, the nationwide living standard measurement survey conducted in 2004, indicated that about 83% of the households in the State are poor (NBS, 2006). Beside this, both national and international migrations are common phenomenon in the State, so that remittances are important component of the household income. The State is one of the most heterogeneous in Nigeria because of its location: it is the gateway between the northern and southern regions, and it has a good mixture of the three major ethnic groups in Nigeria. The state has a total population of about 2.4 million people, 70% of which can be

classified as smallholder farmers. The farming system is characterized by low quality land and predominantly cereal-based cropping patterns. Most farm households are net buyers of food, at least seasonally (KWSG, 2006).

We employed a three-stage random sampling technique in selecting our sample farm households. Eight out of the 16 local government areas in Kwara State were randomly selected in the first stage.[1] Then, five villages were randomly chosen from each selected local government area, and finally, six households were sampled in each of the resulting 40 villages, using complete village household lists provided by the local authorities. Overall 240 farm households were selected. However, only 220 were used for the analysis due to missing values in 20 households. Personal interviews were carried out with the household head, usually in the presence of other family members. A standardized questionnaire was used that covered information on migration and remittances, household food consumption, anthropometry data, income, socioeconomic characteristics, and various institutional and contextual variables.

Total income is measured as the sum of all income from the activities of the members of the household, both on and off-farm. On-farm income covers livestock and crop sales both valued at local market prices. Respondents were asked to specify in detail all inputs used, outputs obtained, and prices for the different crop and livestock activities over the 12-months period prior to the survey. Off-farm income includes agricultural wages, non-agricultural wages, self-employed income, remittances, and other income such as capital earnings and pensions. These were recorded separately for all household members, also covering a 12-months period, in order to avoid a seasonality bias. Since our primary interest is to examine the food security and nutrition effects of remittance income, we emphasize more on the amount of remittances received by the household in the last 12 months before the survey.[2]

[1] Local government area is the smallest administrative unit in Nigeria, usually made up of several wards. A ward consists of several villages that are often composed of people of related ethnicity and culture.

[2] Remittance is defined here to include all cash money received by the household from migrant members and relatives living elsewhere in the country and outside the country.

Food consumption data were elicited at the household level covering 105 food items. Quantities consumed include food from own production, market purchases, and out-of-home meals and snacks. While also here it would be desirable to have annual data that are free from seasonality effects, it is well known that the accuracy of food consumption data is negatively correlated with the length of the recall period (e.g., Bouis, 1994). Hence, we decided to use a 7-day recall in our survey. The interviews were carried out in the lean season, during which household food consumption is often below the annual average. Therefore, the prevalence of malnutrition derived from the data might be somewhat overestimated. This is not a serious problem in our context, because – rather than establishing the prevalence of malnutrition on a representative basis – we are primarily interested in the nutritional impact of remittance income.

As indicators of nutritional status, child anthropometric data were collected from children that are 60 months old and younger in the households. Using a standard reference population as defined by the United States National Center for Health Statistics (NCHS), *Z*-scores for height-for-age, weight-for-age, and weight-for-height were calculated.[3] In the 220 sample households, we obtained weight and height data from 127 children made up of 66 from remittances receiving households and 61 from non-receiving households.

3.3 Sample characteristics

Table 1 presents the definition and summary statistics of variables used in the analysis. The last row of the table indicates that 61% of the sample households received remittances, at least once, in the last one year. On the contrary, 39% of the households did not receive remittance income. We also found that, remittances from internal migration – as opposed to international migration, is more common in the sample. Total income, including remittances, is approximately 30 thousand naira (USD 250) per AE over all income sources. This mean income figure is somewhat lower than the national average in Nigeria. Annual Remittance income – from both internal and

[3] For example, the height-for-age *Z*-score is calculated as $Z = X - \mu/\sigma$, where X is the child's height-for-age, μ is the median height-for-age of the reference population of children of the same age and sex group, and σ is the standard deviation of the reference population.

international sources is 1611 naira (USD 13) per AE. The standard deviation of the remittance income variable shows a wide range of variability in remittances across the sample.

The average daily calorie supply in the sample is 2428 kcal and about 60% of the households are undernourished. The mean calorie supply is slightly below the 2500 kcal recommended by the FAO as standard minimum daily requirement; however, it is in line with another recent study for rural Nigeria (Aromolaran, 2004). Dietary quality – measured by the amount of calorie supply that comes from fruits, vegetables and animal products is 437 kcal. This make up about 18% of the total daily calorie supply. The survey also shows that the households are 71% diversified in terms of food consumption, having consumed, on average five out of the seven food group during the 7-days recall period. Mean daily Iron and Vitamin A supply are respectively 27 mg and 289 μg RE per adult equivalent (AE). Children anthropometric data indicates that height-for-age, weight-for-age and weight-for-height Z-scores are respectively 0.455, -0.586 and -0.991.

The average household size of five AE is consistent with the national average in Nigeria reported by NBS (2006). About 10% of the households are headed by women. The average farmer in the sample is 59 years old and has seven years of schooling. The average wife has three years of schooling. The mean farm size of 1.9 ha is comparable to the national average of 2 ha. The value of household productive asset is approximately 74 thousand naira (USD 617). Average age of children is 50 months and 52% are male. Fifty-seven percent of the households have toilet facilities in their houses. The infrastructure variables indicate that many of the farm households do not have access to electricity, tapped water, or a tarred road. The mean distance to the nearest market place is 11.7 kilometers.

Table 1: Summary statistics and definition of variables used in the analysis

Variable	Definition and unit	Mean	SD
Dependent variables			
CAL_SS	Household calorie supply in kcal/AE/day	2427.5	704.0
FS_STA[a]	Food security status of household, food secure = 1	0.391	0.489
DIET_Q[b]	Dietary quality in kcal/AE/day	436.9	126.7
DIET_D[c]	Dietary diversity in number of food groups	5.30	1.63
IRON_SS	Household Iron supply in mg/day/AE	26.57	8.58
VITA_SS	Household Vitamin A supply in μg RE/day/AE	289.0	86.66
HFA_Z	Child height-for-age Z-scores	0.455	2.64
WFA_Z	Child weight-for-age Z-scores	-0.586	1.40
WFH_Z	Child weight-for-age Z-scores	-0.991	1.88
Independent variables			
HH_SIZE	Number of household members in adult equivalents	5.08	1.31
GENDER	Gender of household head, male = 1	0.90	0.31
AGE_HHH	Age of household head in years	59.1	6.80
EDU_HHH	Education of household head in years of schooling	6.89	3.93
EDU_MOT	Mother education in years of schooling	3.27	2.71
FAM_SIZE	Area cultivated by the household in ha	1.90	0.58
ASSETS	Value of household productive assets in naira	73761	53154
A_CHILD	Age of child in months	49.7	8.64
G_CHILD	Gender of child, male = 1	0.52	0.50
TOILET	Dummy for toilet in the household, yes = 1	0.566	0.497
ELECT	Dummy for electricity in household, yes = 1	0.83	0.38
T_WATER	Dummy for water tap in household, yes = 1	0.65	0.48
T_ROAD	Dummy for tarred road in the village, yes =1	0.74	0.44
D_MARKET	Distance to the nearest market place in km	11.71	12.89
NET_INC	Household income per year minus remittances in naira/AE	28634.4	23223.4
REM_INC	Remittance income per year in naira/AE	1161.3	2471.8
TOT_INC	Total household income per year in naira/AE	30245.7	23416.3
AC_REM	Access to remittance income, yes = 1	0.61	0.48

Notes: Official exchange rate in 2006: 1 US dollar = 120 naira; SD is standard deviation. AE is adult equivalent.
RE is retinol equivalent. The number of observations is N = 220.
[a] We define a food secure household as one whose daily calorie supply per AE is greater than or equal the minimum daily calorie requirement for adult men of 2500 kcal (FAO/WHO/UNU, 1985).
[b] This is the calorie supply that comes from fruits, vegetables, and animal products.
[c] This is the number of food group out of seven eaten by the household over a 7-day recall period.

4. Methodology

4.1 Estimation issues

The main objective of this article is to find out whether remittance income improves food security and nutrition of farm households in Kwara State, Nigeria. Many of the available studies suggest a positive impact of remittances on total household income. However, it remains unclear whether this translates to better nutrition for the receiving households. Our hypothesis is that

remittance income increase nutrition in the receiving households. To test this hypothesis formally, we specify a general model of household food security and nutrition as follows:

$$FN = \alpha_0 + \alpha_1 R + \alpha_2 Y + \alpha_3 X + \alpha_4 H + \varepsilon \quad (1)$$

Where FN is the food security and nutrition indicator, R is migrant remittances in naira per adult equivalent, Y is household income minus remittances, X is the vector of household head variables (gender, age, and education), H is the vector of other household variables and ε is the error term. In this model, the main parameter of interest is α_1 in terms of sign and significance. As dependent variable, we employed four indicators of food and nutrition security namely; calorie supply, dietary quality, micronutrient supply and child nutritional status.

Calorie supply is a measure of diet quantity and energy supply. It represents a good indication of overall household food security, so that household that does not meet the minimum calorie intake are regarded as food insecure (Smith et. al., 2006). In adequate calorie supply has been found to be associated with malnutrition, low productivity and ill-health (Aromolaran, 2004). Household calorie supply was derived from the food consumption data based on the 7-days food recalls. The total household calorie supply is divided by seven and the number of adult equivalent to obtain the daily calorie supply per capita. We measured dietary quality in two ways. One, by using the amount of calorie supply that comes from fruit, vegetables and animal products, and two by the number of food groups, out of seven, from which household acquires food over the 7-days recall period. From the food consumption data, dietary quality and diversity were calculated. As nutrition indicator, dietary quality is usually correlated with calorie intake (Smith et. al., 2006).[4]

The third indicator of food security and nutrition used in this study is micronutrient supply. We focused on iron and vitamin A, for which deficiencies are particularly widespread in Sub-Saharan Africa (Mason et. al., 2005). Micronutrient supplies were estimated from the food consumption data based on local and United State Department of Agriculture (USDA) food composition tables. The last indicator is child nutritional status. Other things being equal, child

[4] We use calorie intake and calorie supply interchangeably in this article, but because we build on food consumption and expenditure data, what we actually measure is calorie supply.

nutritional status is expected to be positively correlated with calorie supply and food security. It is mostly used to indicate the extent of malnutrition and chronic food insecurity. For the purpose of this article, we use child's height-for-age, weight-for-age, and weight-for-height *Z*-scores as our dependent variables to model the effect of remittances on child nutritional status.

Before discussing the choice of our covariates, we point out below, some estimation issues in our model. Estimating equation (1) by ordinary least square (OLS) regression would imply that all the right hand side variables are truly exogenous. But, OLS estimates are likely to be biased when any of the variables is endogenous. This is particularly true for the net income variable. Moreover, one can argue that the relationship between food security and remittances is unlikely to be unidirectional (Guptal et. al., 2009). In order to tackle this endogeneity bias, we employ an instrumental variable (IV) approach, using household assets, access to electricity, tapped water and tarred road as instruments to instrument remittance and net income.

Another estimation problem is one that might occur due to the multi-stage random sampling approach, with household's observations clustered by villages. This introduces a potential intra-cluster correlation of the error term and produces an inconsistent variance-covariance matrix. As a remedy for this problem, we use a cluster correction procedure, so that the t-values are derived from robust standard errors (Deaton, 1997).

4.2 Explanatory variables

Given our small sample size, we include only eight important covariates so as to maintain the degree of freedom (Deaton, 1997). Remittance income, which is our main variable of interest, is included as one of the covariates. It is measured as total remittance income received by the household over the last one year expressed in naira per adult equivalent. In the literature, income has been identified as one of the important determinants of food security (Abdulai and Aubert, 2004), we include household income specified as total income minus remittances and expressed in naira per adult equivalent. We exclude remittances from the measure of household income – and include it as a separate covariate – so that we are able to properly disentangle the effect of

remittances from those of other income sources (Edwards and Ureta, 2003). We include household size because it is believed to be an important factor in food security and nutrition. Lesser food might be available for individuals in larger households than in smaller households. Farm size – the total farm land cultivated by the household in the survey year – reflects the own-food production potential of households when other factors are kept constant. It is thus expected that households which cultivate larger farm size are more likely to produce more food and hence more food secure compared to those who cultivate smaller farm size (Feleke et. al., 2005).

We include market access, measured by the distance in kilometer to the nearest market. Presumably, market access affects the ease with which households sell their produce and buy other market-purchased foods and calories. This might affect – positively or negatively – household food security and nutrition. We used a gender dummy to account for the differential effects of gender on resource availability and food consumption. Though women are known to be more concerned about household nutrition, they are often disadvantaged in terms of social status and economic opportunities. Other variables used are age and education of household head measured in years.

5. Empirical results

5.1 Impact of remittances: preliminary descriptive evidence

We begin this section by looking at the relative importance of remittances, especially among the receiving households. Table 2 shows composition of household income, differentiating between remittance-receiving and non-receiving farm households. While the figures represent mean income per capita from the different sources, the percentage share of the respective income sources in total household income is shown in the bracket. The results indicate that remittances contribute to increased total income among the receiving households. It contributes, on average, 8.1% of total income among this group of households. Farming remains the most important single source of income in the area, but compared to remittances receiving households, the non-receiving households received a slightly larger share of their income from farming activities.

Table 2: Per capita income composition by access to remittances

	All households (N = 220)	Remittances receiving households (N = 134)	Remittances Non-receiving households (N = 86)
Farm income	15226.5 (50.3)	14980.4 (46.1)	15609.9 (54.5)
Agricultural wage income	3946.6 (13.1)	4278.5 (13.2)	3429.6 (12.8)
Non-agricultural wage income	1828.6 (6.0)	1852.3 (5.7)	1792.5 (6.7)
Self-employed income	7285.2 (24.1)	8402.5 (25.8)	5544.4 (20.7)
Remittances	1611.3 (5.3)	2645.5 (8.1)	- -
Pensions, dividends	347.1 (1.1)	358.8 (1.1)	328.6 (1.2)
Total income	30245.7 (100.0)	32518.1 (100.0)	26705.2 (100.0)

Notes: Figures in bracket are the percentage of the respective income sources in total household income

Table 3 shows household assets and important food security and nutritional indicators, also differentiating between remittance-receiving and non-receiving farm households. The uppermost part of table 3 suggests that productive assets of remittance-receiving households is significantly larger compared to those of non-receiving households. Farm size – a measure of own food production – is also larger in remittances receiving households. The middle part of table 3 indicates that remittance receiving households consume significantly more calories than non-receiving households, so that the prevalence as well as depth of undernourishment are slightly lower. Dietary quality and dietary diversity are higher among households with remittance income, though the differences are not statistically significant. This is also observed in the case of vitamin A supply. Iron supply is significantly higher among remittance-receiving than non-receiving households.

Looking at child nutritional status in table 3, we observe that children in households with remittance income have higher *Z*-scores and thus better nutritional status than children in households without remittance income. Accordingly, the prevalence of child stunting, underweight, and wasting is lower in remittance-receiving households.[5] These results suggest that remittance-receiving households seem to have better access to food and nutrition. It thus supports the belief that a large proportion of remittances in poor households are used for smoothing consumption.

[5] Stunting is defined as height-for-age *Z*-score less than -2, underweight as weight-for-age *Z*-score less than -2, and wasting as weight-for-height *Z*-score less than -2 (WHO, 1995).

The pathway by which remittance income contributes to better food security is further analyzed in the following sections.

Table 3: Income, assets, food security and nutritional indicators by access to remittances

	All households (N = 220)	Remittances receiving households (N = 134)	Remittances Non-receiving households (N = 86)
Household assets			
Farm size (ha)	1.90	1.91	1.89
	(0.58)	(0.59)	(0.56)
Assets (naira)	73761.8	79350.4	65054.0*
	(53154.0)	(60443.2)	(37907.9)
Education (years)	6.89	7.42	6.04
	(3.93)	(3.60)	(4.28)
Calorie and micronutrients supply			
Calorie supply (kcal/day/AE)	2427.5	2462.6	2372.7*
	(704.0)	(692.5)	(722.1)
Prev. of undernourishment (%)	60.9	60.0	63.0
Depth of calorie deficiency (%) [a]	22.2	9.8	34.6
Dietary quality (kcal/day/AE) [b]	436.9	443.2	427.1
	(126.7)	(124.6)	(129.9)
Dietary diversity (number) [c]	5.30	5.37	5.15
	(1.63)	(1.61)	(1.66)
Iron supply (mg/day/AE)	26.6	27.4	25.3**
	(8.58)	(8.47)	(8.65)
Vitamin A supply (μgRE/day/AE)	289.0	291.0	285.9
	(86.7)	(85.4)	(88.9)
Child nutritional status [d]			
Height-for-age *Z*-score	0.456	0.992	-0.124**
	(2.64)	(2.59)	(2.59)
Weight-for-age *Z*-score	-0.586	-0.415	-0.771
	(1.41)	(1.31)	(1.49)
Weight-for-height *Z*-score	-0.991	-1.15	-0.811
	(1.88)	(1.79)	(1.97)
Prevalence of stunting (%)	23.6	14.3	28.1
Prevalence of underweight (%)	22.0	13.2	30.7
Prevalence of wasting (%)	14.2	7.9	19.3

Notes: AE is adult equivalent. RE is retinol equivalent. Figure in bracket are standard deviation.
* Differences between households with and without remittances are statistically significant at 10% level.
** Differences between households with and without remittances are statistically significant at 5% level.
[a] This only refers to food insecure households.
[b] This is the calorie supply that comes from fruits, vegetables, and animal products.
[c] This is the number of food group out of seven eaten by the household over a 7-day recall period
[d] Child nutritional status refers to pre-school children up to 60 months of age. The total sample includes 127 children: 66 from households with and 61 from households without remittance income.

5.2 Remittances and calorie supply

The previous section has already suggested that migrant remittances contribute positively to food security and nutrition. In this section, we analyze the effect more formally by controlling for other factors. At first, we estimate equation (1), in which household calorie supply per AE is regressed on the amount of remittance income and household net income (total income minus remittances) both measured in naira per AE. We used household assets, access to electricity, pipe-water and tarred road to instrument remittance and household net income. In terms of functional form, we tried different specifications, with a linear model showing the best statistical fit.[6] As mentioned earlier we use a cluster correction procedure for model estimation. While the first stage regression results explaining remittance income and net income are shown in the appendix table A1, the second-stage results of the estimations are presented in table 5. The Durbin-Wu-Hausman test statistics given in the last row of the table confirm that remittances and net income variables are endogenous, so that the IV approach is appropriate.

Column (1) of table 4 illustrates that remittance income has a positive and significant effect on household calorie supply. An increase in annual remittance income by 1000 naira per AE results in an average consumption improvement by 10 kcal per day. This result seems to support the general belief that remittance income is usually associated with better nutrition in poor households. Likewise, household net income contributes significantly to higher household calorie supply. This is not surprising, as many similar studies have found a significant positive relationship between household income and calorie supply in different contexts (Abdulai and Aubert, 2004). The results further show that calorie supply is larger in male-headed households than female-headed ones. While it is known that women usually take greater care of family nutrition, female-headed households are often disadvantaged in terms of social status and economic opportunities.

Farm size contributes positively to calorie supply with a marginal effect of 197 kcal per additional hectare. The coefficient of the variable for household size is negative and significantly

[6] A double-log specification also resulted in a relatively good model fit, but with fewer observations, because all households with zero remittance income had to be excluded. This appeared inappropriate in our context.

different from zero, suggesting that calorie supply declines with increasing household size. This finding is probably due to the fact that larger households are those with larger fractions of children and that children eat less than adults. The market distance variable has a negative and significant effect on calorie supply. This implies that the farther away the household is from the market place, the lower the calorie supply. This result is consistent with the findings of Feleke et. al. (2004) in rural Ethiopia.

A potential problem in our estimation might be that there are unaccounted village factors that could be correlated with remittance income variables. This would lead to an omitted variable bias. For instance, functional infrastructures and better employment opportunities in certain villages might discourage migration and reduce remittances and vice-versa. To account for these village unobservables, we include village fixed effects through 39 dummy variables, representing the 40 villages in our sample. This give rise to another set of estimation results that are shown in column (2) of table 4. None of the village dummies is significant at the 10% level. Furthermore, the magnitude of the other coefficients, especially those for net income and remittances, remains unaffected. We therefore conclude that village fixed effects do not bias the results and proceed without the village dummies, in order to save degrees of freedom.

Column (3) of table 4 shows results of a model with a slightly different specification. Instead of measuring calorie supply as a continuous variable, we use a dummy that takes a value of one when the household is food secure with a daily calorie supply above 2500 kcal, and zero otherwise. This specification is estimated as an instrumental variable probit model. As can be seen in table 4, remittance income and household net income both increases the probability of households being food secure. Overall, our results suggest that remittance income improve the calorie supply of farm households. The effect on dietary quality and micronutrient consumption is analyzed in the following sections.

Table 4: Household calorie supply models

	(1) Calorie supply (2SLS)	(2) Calorie supply (2SLS)	(3) Food security status (IV-Probit)
Constant	2939.6**	2972.1***	0.641**
	(6.66)	(3.74)	(2.47)
HH_SIZE	-106.9**	-184.44	-0.031*
	(-2.22)	(-0.06)	(-1.88)
GENDER	423.8**	452.6**	-0.056
	(2.55)	(2.12)	(-0.99)
AGE_HHH	-9.55	-10.8	-0.311
	(-1.48)	(-1.43)	(-1.20)
EDU_HHH	6.46	13.6	0.043
	(0.39)	(1.21)	(1.19)
FAM_SIZE	197.2**	261.5**	0.710*
	(2.47)	(2.34)	(2.01)
D_MARKET	-9.19**	-16.8**	-12.4
	(-2.06)	(2.19)	(-0.19)
REM_INC [a]	0.010**	0.010**	1.1E-05*
	(2.08)	(2.18)	(1.89)
NET_INC [a]	0.021***	0.021***	9.8E-04**
	(4.03)	(3.76)	(2.32)
Village fixed effects [b]	No	Yes	No
Adjusted R^2	0.251	0.386	
Durbin-Wu-Hausman chi^2	11.02	10.89	21.42

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values.
*, **, *** statistically significant at the 10%, 5%, and 1% level, respectively.
[a] These are instrumental variables, predicted by household assets, access to electricity, tapped water and tarred road
[b] Village fixed effects are captured through 39 village dummy variables.

5.3 Remittances, dietary quality and dietary diversity

To examine the impact of remittance income on dietary quality we use similar model as in the case of calorie supply described above, and use an IV approach with cluster correction. We take the calorie amount stemming from fruits, vegetables, and animal products as dependent variable. While in the dietary diversity model, our dependent variable is the number of food group out of seven that was eaten by the household during the 7-days recall period. For the dietary diversity model, we use a Poisson estimation procedure, since our dependent variable is in form of count data. The two estimations were conducted without the village fixed effects, as explained above. Estimation results are shown in table 5.

Column (1) indicates that remittance income is not significant at 10% level. This implies that, though remittances enable household to consume more calories, effect on the consumption of high-value calorie is not confirmed in our sample. One possible explanation is that, it is possible that remittance income is spent only on purchasing starchy staple foods in order to meet household basic calorie requirement. It is also possible that beyond meeting the basic calorie needs, households might be spending remittance income on non-food items such as cloth and leisure. The other results of the dietary quality model show that net income has a positive and significant impact. Every 1000 naira increase in household net income per AE will increase diet quality by 0.4 kcal per AE per day. This implies that when household income increases, not only more calories in general, but also more nutritious food is consumed. In addition, household size has a significant negative effect, meaning that dietary quality decrease in larger households. As in the case of calorie supply, farm size also contributes positively to dietary quality. By contrast, age of household head has a significant negative effect.

Column (2) of table 5 shows that household income net of remittances and education of household head increase dietary diversity in a significant way. On the contrary, household size and distance to the nearest market decrease dietary diversity. Remittance income does not have any significant effect on dietary diversity in our sample.

Table 5: Dietary quality and diversity models

	(1) Dietary quality (2SLS)	(2) Dietary diversity (POISSON)
Constant	439.3***	1.94***
	(4.42)	(5.65)
HH_SIZE	-14.22*	-0.054**
	(-1.92)	(-2.01)
GENDER	49.11**	0.181
	(2.00)	(1.62)
AGE_HHH	-2.37**	-0.01
	(-2.19)	(-1.09)
EDU_HHH	4.68	0.016**
	(1.18)	(2.42)
FAM_SIZE	30.37*	0.027
	(1.79)	(0.51)
D_MARKET	0.428	-0.002*
	(0.42)	(-1.88)
REM_INC [a]	0.0001	1.29E-06
	(0.24)	(0.81)
NET_INC [a]	0.0004***	2.29E-06**
	(2.69)	(2.34)
Adjusted R^2/χ^2	0.287	44.04
Durbin-Wu-Hausman chi^2	5.55	

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values.
*, **, *** statistically significant at the 10%, 5%, and 1% level, respectively.
[a] These are instrumental variables, predicted by household assets, access to electricity, tapped water and tarred road

5.4 Remittances and micronutrient supply

The results of the micronutrient model estimations are presented in table 6. Household size has a negative and significant influence on iron supply. Likewise, age of household head impact negatively on iron supply in the sample: the older the household head the lower is the iron supply. Education of the head of household has a positive and significant effect on iron supply. This makes sense, since educated people are often more aware of the nutritional implications of consuming foods that are rich in micronutrients. For every extra year of schooling, daily iron supply increase by 0.02 mg per adult equivalent. In addition, household income net of remittances, improves iron supply in a significant way. Again, remittance income is insignificant in determining iron supply in the sample household.

Household vitamin A supply is analyzed in column (2) of table 6. Household income net of remittances has a positive effect: for every 1000 naira additional income net of remittances, daily

vitamin A supply increase by 3 μg. The effect of farm size is also positive, and for every additional hectare of farm land, vitamin A supply increases by 21 μg. Male-headed households tend to consume more vitamin A compared to female-headed one. Age of household head reduces vitamin A supply and every additional year decrease vitamin A supply by 1.5 μg. As is the case with iron supply, remittance income has not impact on vitamin A supply in our sample. These results probably suggest that remittances have no clear micronutrients consumption effects among poor farming households in the region.

Table 6: Household micronutrient supply models

	(1) Iron supply (2SLS)	(2) Vitamin A supply (2SLS)
Constant	22.71***	270.5***
	(3.51)	(3.70)
HH_SIZE	-0.068*	-7.52
	(-1.88)	(-0.96)
GENDER	4.19***	29.48*
	(2.62)	(1.93)
AGE_HHH	-0.149**	-1.47*
	(-2.12)	(-1.85)
EDU_HHH	0.019**	-3.13
	(2.29)	(-1.08)
FAM_SIZE	0.010	21.48*
	(0.01)	(1.72)
D_MARKET	0.029	0.464
	(0.44)	(0.61)
REM_INC [a]	0.0002	0.002
	(1.06)	(0.92)
NET_INC [a]	0.0002***	0.003**
	(2.64)	(2.57)
Adjusted R^2	0.341	0.177
Durbin-Wu-Hausman chi^2	12.61	6.39

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values.
*, **, *** statistically significant at the 10%, 5%, and 1% level, respectively.
[a] These are instrumental variables, predicted by household assets, access to electricity, tapped water and tarred road

5.5 Remittances and child nutritional status

To analyze the effects of remittances on child nutritional status, we regress anthropometric measurements of children on a set of socioeconomic variables, including remittance income. Our sample is confined to children up to 60 months of age. As explanatory variables, we used selected

household characteristics as before, but additionally include a few child individual level variables such as sex, age and mother's education, plus a dummy for households with a private toilet, which proxies the sanitary conditions. These variables are important for child nutritional development and anthropometry (Smith et. al., 2005). As before, a cluster correction approach is used to obtain a consistent variance-covariance matrix. However, the exogenous hypothesis for remittance income and household net income could not be rejected, so that OLS estimators are used.

Columns (1), (2) and (3) in table 7 show the estimation results. The dependent variable is the individual child Z-scores for height-for-age, weight-for-age, and weight-for-height respectively. Within the age range covered, older children have lower Z-scores for height-for-age and weight-for-height and thus a lower nutritional status than younger children. This is plausible considering that many of the younger children are breastfed, so that more severe malnutrition sets in only after weaning. Mother's education has a positive and significant influence on child nutritional status in our sample. Every additional year of schooling by the mother improves the height-for-age, weight-for-age, and weight-for-height Z-scores by 0.04, 0.07 and 0.1 respectively. These results appear consistent with that of Garrett and Ruel (1999) in different context.

Having a toilet in the household has a positive effect on child anthropometry in all three models, which is not surprising, as better sanitary conditions entail a lower risk of infectious diseases. The effect of household net income on child nutritional status is positive, albeit significant only for the weight-for-age Z-scores. Farm size shows significant positive influence on height-for-age and weight-for-age Z-scores only. No significant relationship is found between remittances and child nutritional status. Though the child nutritional status estimates appear not very robust, it seems that remittance income is not spent on meeting child nutrition requirements beyond the provision of calorie for the household in general. Nonetheless, it is possible that with more comprehensive data, including further child specific details – such as birth weight and birth order – as well as health related variables, significant effects of remittances could be shown.

Table 7: Child nutritional status model

	(1) Height-for-age (Z-score)	(2) Weight-for-age (Z-score)	(3) Weight-for-height (Z-score)
Constant	7.37***	-1.10	-6.72***
	(2.88)	(-0.97)	(-3.62)
HH_SIZE	-0.047	0.099	0.092
	(-0.21)	(0.99)	(0.56)
G_CHILD	0.765	0.338	-0.191
	(1.57)	(1.55)	(-0.54)
A_CHILD	-0.137***	-0.063	-0.067***
	(-4.10)	(-1.56)	(-2.80)
EDU_HHH	0.169**	0.023	0.021
	(0.21)	(0.66)	(0.37)
EDU_MOT	0.043**	0.071*	0.139**
	(2.47)	(1.74)	(2.07)
FAM_SIZE	0.736*	0.342*	0.147
	(1.67)	(1.73)	(0.46)
D_MARKET	0.015	0.018	0.008
	(0.67)	(1.43)	(0.48)
TOILET	1.00*	1.39***	1.08***
	(1.95)	(6.09)	(2.91)
REM_INC	0.000	-0.001	0.0001
	(1.00)	(-1.01)	(1.12)
NET_INC	0.0001	0.0001**	0.000
	(0.74)	(2.00)	(1.55)
Adjusted R^2	0.138	0.362	0.278

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values. *, **, *** statistically significant at the 10%, 5%, and 1% level, respectively.

6. Conclusions

Studies that investigate the impact of migrant remittances on household nutrition at the micro-level are not common. Empirical studies of the relationship between remittances and poverty are more common. This article analyzed the impact of remittance income on household food security and nutrition in Kwara State of Nigeria. Descriptive and econometric analyses were used to test whether remittance income improves calorie and micronutrients supply, dietary quality, as well as child nutritional status in a significant way among sample of farm households in the area.

Descriptive analysis of the sample data indicates that, compared to non-receiving households, remittances receiving households are better off in terms of mean total income, assets, calorie supply, micronutrients supply, as well as, child nutritional status. Econometric analyses show that remittance income contributes to improved calorie supply at the household level, an aspect which

has not been analyzed previously. Likewise, household income net of remittances increase calorie supply in a significant way, but the effect is twice larger than the effect of remittance income. Remittance income has no significant impact on diet quality, micronutrients supply and child nutritional status, thus limiting the extent to which nutrition programmes will benefit from remittances increase. In contrast, household income net of remittances has a significant effect on these indicators. Many studies have questioned whether remittance income is actually spent on food consumption, the preceding analyses suggest that remittances are important for food consumption, but it appears they are not spent on quality foods and micronutrients apart from that which is use for buying starchy staple foods.

The findings point to two policy recommendations. First, the positive impact of remittances on calorie supply makes it imperative to include migration and remittances as important components of food security programmes in developing countries. The designs of such programmes should takes into account measures that would make receiving households utilize remittances more effectively such that beyond improving calorie supplies, it would have a more favourable effect on household's nutrition in general. Second, based on the positive effect of remittances on household income, concrete policies that would encourage the flow of remittances should be pursued. While considerable attention has been given in the past to international movements of goods and services, much less attention has been paid to the international movements of people. To encourage the flow of remittances to developing countries, migration policy needs to be integrated into the global economic development dialogue on poor countries. The international community needs to take efforts to reduce the transaction costs of remitting money to developing countries. At present, lack of competition, regulation and poor financial sector performances in developing countries tend to increase the transaction costs. These have to be removed to be able to realize the full potential benefits of remittance income.

References

Abdulai, A. and Aubert, D. (2004): Nonparametric and parametric analysis of calorie consumption in Tanzania. *Food Policy,* 29, 113–129.

Adams, R.H. (2004): *Remittances and poverty in Guatemala.* World Bank, Washington, DC.

Adams, R. H., and Page, J. (2005): Do international migration and remittance reduce poverty in developing countries? *World Development,* 33(10), 1645–1669.

Adams, R.H., Cuecuecha, A. and Page, J. (2008): *The Impact of remittances on poverty and inequality in Ghana.* Policy Research Working Paper No. 4732, World Bank Development Prospects Group, Development Economics Department and Africa Region, 2008.

Aromolaran, A.B. (2004): Household income, women's income share and food calorie intake in South Western Nigeria. *Food Policy*, 29(5): 507–530.

Azam, J. and Gubert, F. (2006): Migrant remittances and the household in Africa: A review of evidence. *Journal of African Economies,* 15(2), 426–462.

Bouis, H.E. (1994): The effect of income on demand for food in poor countries: Are our food consumption databases giving us reliable estimates? *Journal of Development Economics,* 44, 199–226.

Briere, D.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 (2002) 309–328

Deaton, A. (1997): *The Analysis of household surveys.* Johns Hopkins University Press, Baltimore, MD.

Dejene, A. (2005): Migrant remittances, shocks and poverty in urban Ethiopia: An analysis of micro level panel data. Mimeo, Addis Ababa University, Addis Ababa, Ethiopia.

Durand, J., W. Kandel, E.A. Parrado and D.S. Massey. (1996): International migration and development in Mexican communities. *Demography,* 33(2): 249–264.

Edwards, A.C. and Ureta, M. (2003): Internattional migration, remittances and schooling: evidence from El Salvador. *Journal of Development Economics,* 72 (2003), 429–461.

FAO/WHO/UNU (1985): *Protein and Energy Requirements,* Food and Agriculture Organization, World Health

Feleke, S.T., Kilmer, R.L. and Gladwin, C.H. (2005): Determinants of food security in Southern Ethiopia at the household level. *Agricultural Economics*, 33(3): 351–363.

Garrett, J.L. and Ruel, M.T. (1999): Are determinants of rural and urban food security and nutritional status different? Some insights from Mozambique. *World Development*, 27(11): 1955–1975.

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.

Gustafsson, B. and Makonnen, N. (1993): Poverty and remittances in Lesotho. *Journal of African Economies,* 2(1): 49–73.

IDS (2006): Sending money home, can remittances reduce poverty? Institute of Development Studies, id21 insights, January 2006, University of Sussex, UK

IFAD (2007): Sending money home: Worldwide remittance flows to developing countries. International Fund for Agricultural Development. Rome, Italy, IFAD.

INSTRAW (2008): Gender, remittances and development: The case of Filippino migration to Italy. United Nations International Research and Training Institute for the Advancement of Women (UN-INSTRAW), Santo Domingo, Dominican Republic.

Jimenez, M.A.C. (2009): Household development in Tlapanana: A comparative study between households receiving remittances and households not receiving remittances. *Journal of Poverty,* 13(3): 331–349.

KWSG (2006): Kwara State Government of Nigeria, Planning Studies in Kwara State. Ministry of Land and Regional Planning, Ilorin.

Litchfield, J. and Hugh W. (2003): Migration and poverty in Ghana: Evidence from the Ghana living standards survey. Sussex Migration Working Paper No. 10. Sussex Centre for Migration Research, UK.

Maphosa, F. (2007): Remittances and development: The impact of migration to South Africa on rural livelihood in Southern Zimbabwe. *Development Southern Africa,* 24(1): 123–136.

Mason, J.; Rivers, J. and Helwig, C. (2005): Recent trends in malnutrition in developing regions: vitamin A deficiency, anemia, iodine deficiency, and child underweight. *Food and Nutrition Bulletin*, 26(1), 57–162.

NBS (2006). National Bureau of Statistics, Abuja, Socio-economic Survey of Nigeria.

Oseni, G. and Winters, P. (2009): Rural nonfarm activities and agricultural crop production in Nigeria. *Agricultural Economics,* 40(2), 189–201.

Quartey, P. and T. Blankson. (2004): Do migrant remittances minimize the impact of macro-volatility on the poor in Ghana? Global Development Network, 2004.

Ratha, D. (2003): Worker's remittances: An important and stable source of external development finance. Washington, DC: Global Development Finance.

SAMP (2006): Migration and development in Africa: An overview. South African Migration Project, 2006, Cape Town, South Africa.

Sesabo J. K. (2001): Assessment of the impact of labour out-migration on household agricultural production and distribution. A thesis submitted in partial fulfillment of the degree of Master of Science in Development and Resource Economics, Agricultural University of Norway.

Shaw, W. (2007): Migration in Africa: A review of the economic literature on international migration in 10 countries. Development Prospects Group, The World Bank, Washington DC 20433

Smith, L.C.; Ruel, M.T. and Ndiaye, A. (2005): Why is child malnutrition lower in urban than in rural areas? Evidence from 36 developing countries. *World Development,* 33(8): 1285–1305.

Smith, L.C.; Alderman, H. and Aduayom, D. (2006): Food security in sub-Saharan Africa: New estimates from household expenditure surveys. Research Report 146, International Food Policy Research Institute, Washington, DC.

Taylor, J. E. (1999): The new economics of labour migration and the role of remittances in the migration process. *International Migration,* 37(1): 63–88.

Taylor, J. E.; Rozelle, S. and De Brauw, A. (2003): Migration and incomes in source communities: A new economics of migration perspective from China. *Economic Development and Cultural Change,* 52(1): 75–101.

WHO (1995): The use and interpretation of anthropometry: Report of a WHO expert committee. Technical Report Series No. 854, World Health Organization, Geneva.

World Bank (2006): Global Economic Prospect 2006: Economic Implications of remittances and migration. Washington D.C: The World Bank.

World Bank (2008): Migration and remittances fact book 2008. Washington D.C: The World Bank.

World Bank (2014): Remittances to developing countries to grow by 5% this year while conflict related forced migration at all-time high. World Bank press release on October 6, 2014. Washington D.C: The World Bank.

Table A1: First stage regression explaining remittance and household net income

	Remittance income (naira/AE)	Net income (naira/AE)
Constant	5125.9***	23115.940*
	(2.77)	(1.81)
HH_SIZE	372.1***	-5911.196***
	(2.76)	(-6.35)
GENDER	506.4	-2000.667
	(0.89)	(-0.51)
AGE_HHH	-19.5	148.640
	(-0.80)	(0.87)
EDU_HHH	53.6	1265.180***
	(0.85)	(2.89)
FAM_SIZE	-53.0	6535.976***
	(-0.17)	(3.11)
D_MARKET	25.7*	-354.732***
	(1.66)	(-3.31)
ASSETS	-5655.0	86.439***
	(-1.57)	(3.48)
ELECT	-220.9	7218.709**
	(-0.47)	(2.24)
T_WATER	-156.1**	1559.110
	(-2.31)	(0.47)
T_ROAD	-524.9*	-241.973
	(-1.86)	(-0.08)
Adjusted R^2	0.211	0.497

Notes: The number of observations in all models is N = 220. Figures in parentheses are *t*-values. *, **, *** statistically significant at the 10%, 5%, and 1% level, respectively.