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Analysis of Household Expenditures and the Impact of Remittances using a Latent Class Model: the Case of Burkina Faso.

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Abstract

This paper applies a latent classes model to assess the impact of international remittances on households' expenditures using 2010 cross-sectional data from Burkina Faso. Household expenditures are modeled using the Almost Ideal Demand System (AIDS). With the latent class model, these expenditure equations are estimated simultaneously for both groups of households as well as factors that explain the probability of being in one group or another.

The latent class model is used to estimate eight different expenditure equations: food, education, healthcare, durable goods, housing, fuel for cooking, communication (phone), and transportation. Results suggest that the household size, schooling, the age of the head of the household, farmer heads, female heads, access to electricity, living in urban areas, and international remittances contribute to

explain household expenditure behavior. Factors that contribute to increase the household chance to live below the poverty line include: household size, if the household head is a farmer, a female, or is aged, or living in a province other than Kadiogo. Factors that increase the household chance of living above the poverty line are: the amount of remittances received, if the head of the household is educated, is Muslim, if the household has access to electricity or public water pump, or if the household lives in the province of Kadiogo.

Results also suggested that all the consumption items are necessary goods for households living below the poverty line, and only two items (durable goods and housing) are luxury goods for those living above that line.

Keywords: remittances, migration, latent class, Almost Ideal Demand System, poverty, Burkina Faso

JEL codes: D12, C31, C36, C38

1 Introduction

Migrant remittances have become a major and stable source of foreign exchange revenues in many African countries. The estimated official net inflow of remittances to Africa reached USD40 billion in 2010 (Mohapatra and Ratha 2011), yet this figure is understated due to the prevalence of unofficial remittances. During the past decades, international remittances have not only been increasing in importance but have also remained resilient and stable compared to other sources of foreign exchange. For instance, in Sub-Saharan-African (SSA) countries, during the recent financial crisis, migrant remittances decreased by about 4% while Official Development Assistance (ODA) decreased by 50% in the same period. Examining the impact of remittances on migrants' countries of origin has been the subject of numerous studies. Remittances can have profound impacts on poverty alleviation, income distribution and economic growth in developing countries. They affect not only the recipient country's macro level indicators but also have major impacts on recipient households' living conditions.

Firstly, remittances can generate large benefits in migrants' countries of origin. If well managed, migrant remittances can boost economic growth in their countries of origin. Yet some studies have resulted in contradictory findings partly due to a lack of differentiation between the various forms of migration. For instance, international migration has been accused of creating a brain-drain from poor developing countries to Western countries.

Secondly, at the micro level, remittances can improve recipient households' living conditions. According to Adams (1991a), remittances sent to families in home countries can become a direct part of household income that can be spent to meet basic needs, e.g., consumption of durable and nondurable goods, or be used for savings. The benefits that recipient families derive from these cash flows largely depend on how and where they spend the received money. In fact, remittance cash flows can raise the standard of living of recipient households. Thus, remittances could help reduce poverty and improve health and education outcomes, and could play the role of external insurance to recipients. Although the impact of international remittances has been well documented, little is known about the impact of migration on household expenditures or poverty in SSA countries, especially in Burkina Faso, one of the poorest countries in the world with a high rate of migration.

Burkina Faso with a GDP per capita of USD536 in 2010, is a country with the largest diaspora abroad in Africa. Estimations indicated that there are as many Burkinabè abroad than inside (See Table in Annex). Migration has been an important social phenomenon due originally to the pressure coming from colonization, and then the search for better economic conditions by migrants. These migrants send on average about 33 billion CFA annually in the country from 2000-2009. However, this number under estimates the total amount of remittances the country receives, as a major proportion of remittances are sent through informal channels. Migration seems to be an important development driver at the household as well as at the national level.

Remittances improve the living standards of household-recipients as evidence shows in some

localities with high migration rate such as Beguedo and Niagho in Burkina Faso (SP/CSBE, 2011). Furthermore, because of the recent crises in Côte d'Ivoire, and to some extent in Libya, many Burkinabè migrants returned temporarily home to Burkina Faso, and this has affected migration as well as remittance flows sent to Burkina Faso, and hence the living standards of remittance-recipients. Therefore, one would like to know how migration and remittances affect households living conditions, or if poor household remittance recipients have the same consumption behaviour as non-poor households. Or do remittances and migration impact for poor and non-poor households the same?

Two latent classes were then defined according to the national poverty line: households living under the national poverty line called the poor, and households living above the national poverty line called the non-poor or the rich¹. These two classes are not directly observable by the researcher, based on the available data. However, the household knows its true status, which depends on its exact income. We also assume that these latent classes do not behave the same in terms of consumption, investments and other decisions.

Consequently, we can assume that the coefficients in the expenditure equation differ between the two latent groups, while the explanatory variables remain the same. Omission of these latent groups could lead to biased estimates. To our knowledge, this aspect has not been considered in previous studies on expenditures and poverty analysis.

Although some recent studies have investigated the impact of migrant remittances on poverty in Burkina Faso (Wouterse 2008; Lachaud 2000, 2005), most of them have limited their analysis to remittances only, except Wouterse (2008), and none of them have considered analyzing separately households below the poverty line and those above that line. Poor households do not have the same consumption behaviour as non-poor households, and assuming the same behaviour could lead to biased estimates.

Usually, the impact of remittances on poverty is assessed using a Probit model while correcting for the remittance endogeneity (see for instance McKenzie and Gubert 2007; Gyimah-Brempong and Asiedu 2011; Ang et al., 2009). When the poverty status is defined based on latent information (the household's real income or wealth which is well known by the household but not known by the researcher), estimating the expenditure equation by ignoring this fact could lead to biased results.

A latent class approach is an appropriate way of taking into consideration this kind of simultaneity. The major contribution of this study is the introduction of the latent class approach in this area of research. The present study contributes to the literature on poverty and economic development by introducing a new way of assessing household expenditure and poverty simultaneously using a latent classes model².

¹For robustness check, the one dollar poverty line has also been considered.

²Quintile regression could be an alternative, but the use of such technic is limited with a small sample size and it does not allow analyze simultaneously factors that contribute to explain why a giving individual belongs to a group or another.

The next section summarizes previous relevant studies on the issue. Section 3 gives an overview of the pattern of migration and remittances in Burkina Faso. Section 4 presents the methodology and the model, while Section 5 presents the data and the results. The paper concludes in Section 6 by highlighting some policy implications of our findings.

2 Literature review

The literature on migration and consequently on remittances is quite impressive with two main views: the brain-drain and the brain-gain or diaspora effect. The transfer of human capital, especially skilled workers (brain drain) has fueled the migration debate in recent decades, both in developing countries and in industrialized countries that receive a large number of talented migrants.

In fact, in the traditional brain-drain literature, the exodus of migrants from their native countries has been viewed as a curse for developing countries. Djiofack, Djimeux and Boussicha (2013) found that the pattern of emigration from Cameroon for instance contributed to an increase in the number of poor by 0.8 percentage points. They also found a negative effect of skilled migration on productivity which overpasses the positive impact from unskilled migration. In Africa, migrants have often been implicitly condemned for harming those remaining behind (Azam and Gubert, 2006, Djiofack et al., 2013). For these reasons, some policy recommendations have been given in order to reduce the negative effects of brain drain on the migrants' countries of origin (Bhagwati 1976; Hamada and Bagwati 1976; Bagwati and Wilson 1989).

However, the same literature has also recognized certain benefits of massive migration, e.g., remittances, trade, knowledge gain and sharing, and foreign direct investment (FDI) which are partially attributed to a diaspora effect (Lucas 2005). According to this new literature, skilled migrants acquire knowledge and higher wages abroad, and therefore can potentially send money back home. Ratha et al. (2011) argued that African governments can tap into their diaspora human and financial capital to support the continent's economic transformation. For instance, the contribution of migrants (or diaspora) can be through technology and knowledge transfer, investments (including diaspora bonds) in their home country. In addition, remittances are the more tangible contribution often cited when referring to migration in Africa.

At the macro level, according to the World Bank (2006, 2011), remittances help improve countries' creditworthiness and therefore enhance their access to the international financial markets. In addition, remittances can improve the sustainability of external debt. Because migrants may send money to their relatives during downturns (e.g., natural disasters, financial crises, political conflicts), remittance variations are often stable and counter-cyclical. For instance, Singh et al. (2011) found that remittances behave countercyclically as a shock absorber and countries with well functioning institutions seem to benefit much more from the potential of remittances. Remittances sustain investment and consumption during downturns and serve as shock absorbers in the recipient countries. Remittances can also increase fiscal income

through recipient households consumption. They help in reducing the country's external deficit, especially in many African countries such as Burkina Faso.

At the micro level, remittances constitute an opportunity for recipient households to improve their living conditions and reduce poverty, and can therefore contribute positively to economic growth (Adams 2005; Sosa and Medina 2006). Remittances can be considered as an input in household decision-making, which can affect labour supply, self-employment, education, and healthcare. In this end, the benefits that recipient families derive from remittances largely depend on how and where they spend them.

Several authors have investigated the effects of remittances on poverty and income distribution. Adams (2004, 2006) assessed the effects of domestic and international remittances on poverty and income distribution using survey data for Guatemala and Ghana. He estimated what recipient households' expenditures would have been without migration, and found out that in both countries, remittances reduce poverty but have no impact on income distribution. Moreover, Adams (2008) found that the positive effect of international remittances on poverty is far larger than that of domestic remittances. Several other studies have also reached the same conclusion (Adams 1991, 1994, 2004 and 2006, Lopez 2005, Taylor et al. 2005, Esquivel and Huerta-Pineda 2006; and Acosta et al. 2007).

Other studies have shown that remittances positively impact human capital development through education and health, and thereby contribute to long-term growth. Mansuri (2007) found that remittances in Pakistan have a positive and significant effect on child education and health, including a gender-equalizing effect. She found that better access to schooling reduces child labour in recipient households. Yang (2004) also showed that remittances lead to higher spending on education, increased school attendance, and less child labour in the Philippines. In a sample of 11 Latin American countries, Acosta et al. (2007) found that remittances increase the educational attainment of children whose parents have low level schooling. In El Salvador, Edwards and Ureta (2003) found that remittances prolong childhood education. Lopez-Cordova (2004) observed that in Mexico, an increase in remittances improves children (aged 6-14 years) schooling attendance and literacy. Adams (2006) found that remittance-recipient households spend less on consumption but more on education than non-recipient households.

Several studies have found that migration and remittances have positive impacts on the health of recipient households. According to Yang (2003), remittances improve nutrition and access to healthcare facilities. Acosta et al. (2007) found that, in Nicaragua and Guatemala, remittances improve children's health, particularly in low-income households. Ratha et al. (2007) found evidence that recipient households have better use of the extra income from remittances. However, their results show that remittances do not induce households to spend more on vice goods such as tobacco and alcohol. Tabuga (2007) found that while there is evidence that recipient households tend to spend more on consumer goods, they also invest more in education, housing, healthcare, and durable goods.

Most recent empirical research on remittances and/or migration has concerned Latin American and Asian countries, while relatively few studies have focused on SSA countries, especially on Burkina Faso. The short list includes Guzman et al. (2006), Quartey and Blankson (2004), and Quartey (2006) who used data on Ghana; Azam and Gubert (2006) who used data on Senegal and Mali, Singh et al. (2011) used data on SSA countries, Djiofack et al. (2013) used data on Cameroon.

Studies on the impacts of remittances and/or migration in Burkina Faso are very rare. Using two independent household survey datasets from Burkina Faso (1994 and 1995), Lachaud (1999) showed that the number of poor households below the poverty line was reduced by 7.2% in rural areas as a result of remittances from Côte d'Ivoire. In addition, based on two other independent household survey datasets (1998 and 2003), Lachaud (2005) analyzed the impact of remittances from Côte d'Ivoire on poverty. He found that the crisis in Côte d'Ivoire had a negative effect on remittance flows to Burkina Faso, which in turn increased incidence of poverty in Burkina Faso in the study years (1998 and 2003). A limitation of Lachaud's study was that remittances are considered an exogenous transfer of income while they should be treated as endogenous to household consumption decisions as concluded in many studies.

Another work on the case of Burkina Faso is from Wouterse (2008). Using household survey data from Burkina Faso, he found that households with international migrants tend to be much less poor in terms of poverty headcount, depth, and severity measures. He also found that the role of international remittances in alleviating poverty is limited by the infrequency of international migration among poorer households. Therefore, he concluded, the main beneficiaries of international remittances appear to be the wealthiest households.

3 Pattern of migration and remittance flows in Burkina Faso

Burkina Faso has a very high rate of international migration even since colonization. According to the SP/CSBE(2011), because of the poll tax introduced in 1895, the dismantling of the colony in 1932, the penal labor in 1935, and military recruitment during the second world war, many Burkinabè moved to other francophone countries in West Africa. After independence, migration was motivated by agreements the country signed with other countries³. Official estimation indicate that there are now as many Burkinabè abroad as inside the country, which means about 12 million Burkinabè living outside the country. Using data from the United Nations (2012), Figure 1 shows the country's net migration trend from 1950 to 2010 as well as the projection by 2050.

Burkina Faso also has the largest diaspora in terms of emigration from one African country to another (Lindley 2005). In 1960, 56.6%, 31.3% and 3.9% of all emigrants moved to Côte d'Ivoire, Ghana, and Mali, respectively (Somé 1991). Yet, from 1988 to 1992, 85.4 %, 4.3%, and 3.3% of all emigrants moved to Côte d'Ivoire, Niger, and Mali, respectively (Konseiga 2005). In 2010,

³(i) the 09/03/1960 agreement between Haute Volta and Côte d'Ivoire, (ii) the 13/08/1973 convention between Haute Volta and Gabon, and (iii) the 17/09/1969 convention between Haute Volta and Mali.

Côte d’Ivoire was still by far the principal destination of Burkinabè migrants. The migration flows in the Burkina Faso-Côte d’Ivoire corridor are the largest not only in West Africa but in the entire SSA region.

Table 1 reports the estimate numbers of Burkinabè emigrants by country of destination. These numbers are official numbers and may under-estimate the exact numbers as many Burkinabè emigrants use illegal migration channels. However, coastal countries such as Côte d’Ivoire and Ghana have recorded the highest number of Burkinabè emigrants (3 and 3.5 million emigrants, respectively). Migration to landlocked countries such as Niger and Mali resulted from the dismantling of the country during the colonial time, while migration to Sudan for instance (about one million migrants) resulted from the pilgrimage to Mecca. Migrants who were reported in Central Africa were more attracted by the opportunities coming from the oil boom and the labour market in these countries. Those who go to Western European countries often pass first by Arab countries such as Libya, Egypt, Algeria and Tunisia, where they can get their migration papers. Projections for the next four decades suggest that this trend will not change in the near future.

Yet Côte d’Ivoire has experienced several political instability and several wars in recent years,

Table 1: Estimated Number of Burkinabè Emigrants - 2008

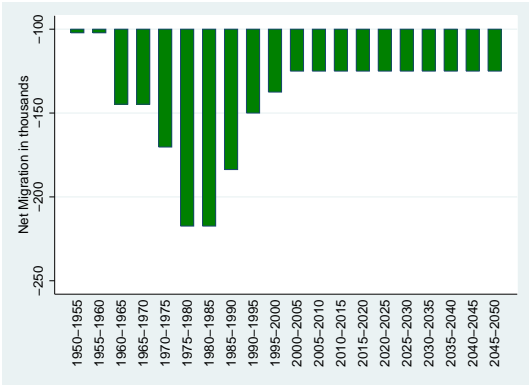
RANK	COUNTRY	NUMBER	RANK	COUNTRY	NUMBER
1	Côte d’Ivoire	3 500 000	23	Guinea	300
2	Ghana	3 000 000	24	Canada	200
3	Soudan	1 200 000	25	United Kingdom	200
4	Mali	1 000 000	26	Liberia	200
6	Togo	500 000	27	Algeria	167
7	Benin	500 000	28	Angola	100
8	Senegal	400 000	29	Egypt	100
9	Niger	350 000	30	Israel	80
10	Italy	30 000	31	South Africa	50
11	Gabon	11 700	32	Ethiopia	30
12	USA	6 000	33	The Gambia	30
13	Saudi Arabia	6 000	34	Cuba	21
14	France	4 500	35	Denmark	20
15	Equatorial Guinea	4 000	36	Japan	15
16	Libya	1200	37	Congo, Dem; rep.	15
17	Belgium	750	38	Cape Verde	12
18	Germany	700	39	Guinea-Bissau	8
19	Netherlands	450	40	Sweden	5
20	Cameroon	400	41	Comoros	3
21	Morocco	300			
22	Congo Rep.	300			

Source: Ministère des Affaires étrangères du Burkina Faso, 2008

and this has directly or and indirectly impacted economic and social conditions in Burkina Faso. For instance, the net migration flows from Côte d’Ivoire was positive between 2002-2005, and an estimated 610,805 Burkinabè emigrants in Côte d’Ivoire returned home between 1996-2006 (INSD, 2011). In addition, during the recent crisis in Libya, about 1472 emigrants returned home (SP/CSBE, 2011). Consequently, this has impacted remittance inflows to Burkina Faso during recent years. It is therefore important to increase knowledge about how migration and

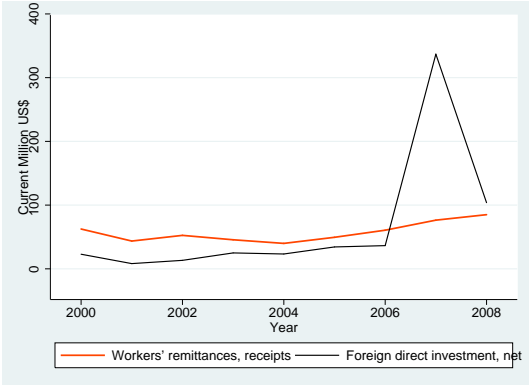
remittances affect the population and their living standards and what can be done to maximize the benefit from migration.

Figure 1: Migration Trend in Burkina Faso



Source: United Nations - Department of Economic and Social Affairs, Population Division

Figure 2: Remittance and FDI Trend in Burkina Faso



Source: World Development Indicators, 2012

From 1974 to 2000, annual remittances into Burkina Faso peaked in 1986 at USD192 million. After 2000 they have remained stable, averaging about USD57 million per annum. From 2000 to 2006, remittance inflows outpaced annually foreign direct investment (FDI) inflows and slightly increased as shown in Figure 2. On average, remittances equaled about 40% of the country’s imports and 17% of its exports from 1980 to 1989. But from 2000 to 2008, these shares decreased to about 5% and 15%, respectively. From 2000 to 2009, international remittance inflows represented 7.2% of the country’s GDP, 8.2% of private final consumption, 7.5% of tax revenues, 20% total external non-debt capital, and reduced external balance deficit by 1.2% points (BCEAO, 2011).

At the regional level, localities that have many migrants abroad have experienced an acceleration in the urbanization process (i.e.: the case of the region of Béguedo and Niagho in the East). Furthermore, at the micro level, remittances to Burkina Faso go to about one-third of the country’s households, especially the poorest (Lachaud 2000; World Bank 2011). All these observations justify why there is a growing interest in knowing how migration and remittances

impact the country's economic and social development. In this vein, the present study tries to assess the impact of remittances and migration on households in Burkina Faso using a 2010 representative household survey from the World Bank.

4 Methodology and model

This section analyzes the relationship between household expenditure and international remittances and migration. It also analyzes the impact of remittances and migration on households expenditure and their probability of being poor. The equation of interest of household expenditure is derived from the economic theory of consumer demand following the Engel approach. Household maximizes their utility by choosing a set of goods according to their preference, the market prices and their wealth. According to Lewbel (2006), the Engel function is a Marshallian demand curve that describes how consumer's expenditures on some goods and services are related to his or her total income, assuming that the prices of all goods remain constant. The share of each consumption item is expressed as a linear function of the logarithm of total per capita expenditure, remittances, and other household's socio-economic characteristics. The equation is therefore written as:

$$y_{jn} = \alpha + \beta \text{remit}_n + \theta Z_{jn} + \varepsilon_{jn}$$

where

y_{jn} is the household n 's share of per capita total expenditure on item j . Here we used the log of total per capita expenditure,

Remit_n is the international remittances variable indicating the amount the household n has received, and

Z_{jn} is a set of household characteristics such as the household's size (in logarithm), the educational status of the head of the household, the age of the head, female head, the number of elderly members, and the household geographical location.

The Almost Ideal Demand System is used to model household expenditure behavior. One of the advantage of this model is its simplicity and the derivation of demand elasticities.

On the other side, it is important to consider two major issues related to remittances and poverty: (i) the endogeneity between remittances and poverty, and (ii) the presence of two latent classes as a consequence of the definition of the poverty status. Regarding the first issue, in the remittances-poverty literature the reverse causality is an important issue. - International remittances help reduce household poverty, but the level of poverty may also influence the amount of remittances sent to a household. In addition, while we can expect that remittances influence household expenditures (i.e., food, durable goods, education, and health), the causality also runs in the opposite direction. For instance, whether a household receives remittances or not may depend on the level of expenditure in the absence of remittances.

Thus, studies that ignore this reverse causality in their analysis of the impact of remittances

on households could reach erroneous conclusions (e.g., Lachaud 2000, 2005). It has therefore become a common practice in the literature to test for endogeneity or simply assume that there is endogeneity, especially when using household survey data. When there is empirical evidence of endogeneity, instrumental variable techniques are used to measure the net effect of remittances on household expenditures, income, poverty, inequality or other indicators (Ozden and Schiff, 2006; Mckenzie and Sasin 2007; Ang et al. 2009; and Gyimah-Brempong 2011). We addressed this issue using two instruments which will be discussed in the next section.

When modelling household poverty through their expenditures, it might be relevant to consider the presence of latent classes. In fact, the poverty line is defined as the minimum level of income necessary to achieve an adequate standard of living. There are several ways to assess the poverty line, including the needs-based approach, which focuses on the minimum expenditure to maintain a decent life. We used the national poverty line. This generates two groups of households according to their income level: those with an average income below the poverty threshold, called the poor, and those with an average income higher than or equal to the threshold, called the rich or non-poor. But, since we do not have data on household's income, we used their total expenditures as a proxy to their income.

An interesting question is, do poor households benefit more from the diaspora (through remittances for instance) than non-poor households? And, do remittances have the same impact on poor and non-poor household? The model developed in this paper tried to answer these questions ⁴.

Let us assume that the household is in one of the two classes: (1) poor and (2) or poor: s , ($s = 1, 2$) with a certain probability. Let $Q(y_{ns}^* \leq c)$, the probability of being poor (the first class) and $Q(y_{ns}^* > c)$ the probability of being non-poor (the second class). Let us assume that the household's per capita income, whose proxy is its per capita total expenditure (y_{ns}^*), depends on a certain number of explanatory variables:

$$\begin{aligned}
 y_{ns}^* &= M_{ns}\alpha + u_{ns} & u_{ns} &\sim N(0, \sigma_u^2) & (1) \\
 Q(y_{ns}^* \leq c) &= Q\left(\frac{y_{ns}^* - M_{ns}\alpha}{\sigma_u} \leq \frac{c - M_{ns}\alpha}{\sigma_u}\right) \\
 &= \Phi\left(\frac{c - M_{ns}\alpha}{\sigma_u}\right) = \Phi(M^*\alpha) \\
 Q(y_{ns}^* > c) &= 1 - Q(y_{ns}^* \leq c) = 1 - \Phi\left(\frac{c - M_{ns}\alpha}{\sigma_u}\right) = 1 - \Phi(M^*\alpha).
 \end{aligned}$$

In addition, it should be noted that households with zero consumption of some items (the shares of total expenditure for some items are zero) are excluded from the sample. In order to correct for this selection bias, in a first stage, we estimated the inverse Mills ratio for the two subsets of equations (Greene 2003). The final model to be estimated has two components:

a. A component for the household's expenditures conditional on the item chosen⁵:

⁴In this study, for robustness check, we also used different poverty lines: the one dollar or 1.25 dollar poverty line. But the results do not change substantially with the poverty line chosen. Due to the definition of the system of demand equations, this threshold does not significantly affect the results.

⁵Let us recall that the expenditure function is derived from the household utility maximization process using

$$y_{jn} = W_{jn}\theta + \widehat{F}_{jn}\tau + a_{jn},$$

with \widehat{F}_{jn} being the estimated selection bias corrector – or the inverse Mills ratio – obtained in a first stage two-step Heckman⁶ regression of the share of household expenditures spent on item j .

- b.** A component related to the choice of the household's class (poor or rich): $Q(s = 1) = \Phi(M^*\alpha)$ if the household is in the first class and $Q(s = 2) = 1 - \Phi(M^*\alpha)$ if it is in the second class.

The final expenditure model for item j is defined as:

$$\begin{cases} y_{jn} = W_{jn}\theta_1 + \widehat{F}_{jn}\tau_1 + a_{jn} & \text{if } y_{ns}^* \leq c \\ y_{jn} = W_{jn}\theta_2 + \widehat{F}_{jn}\tau_2 + a_{jn} & \text{if } y_{ns}^* > c. \end{cases}$$

Let us assume that the conditional density of the household expenditure in class s is $f(y_{jn} | j, s)$. Let $d_{jn} = 1$ if household j is in the first class and 0 otherwise. The latent class model is defined as follows:

$$\begin{aligned} L &= \prod_{n=1}^N \prod_{j \in C_n} \prod_{s=1}^2 [f(y_{jn} | j, s) Q(s)]^{d_{jn}} \\ &= \prod_{n=1}^N \prod_{j \in C_n} [f(y_{jn} | j, s = 1) Q(1)]^{d_{jn}} \times [f(y_{jn} | j, s = 2) Q(2)]^{1-d_{jn}} \\ &= \prod_{n=1}^N \prod_{j \in C_n} [f(y_{jn} | j, s = 1) Q(y_{jn}^* \leq c)]^{d_{jn}} \times [f(y_{jn} | j, s = 2) Q(y_{jn}^* > c)]^{1-d_{jn}}. \end{aligned}$$

Assuming that the random term follows a normal distribution, the expenditure equation for item j is

$$y_{jn} = W_{jn}\theta_s + \widehat{F}_{jn}\tau_s + a_{jn} \quad s = 1, 2 \quad (2)$$

$$a_{jn} \sim N(0, \sigma_a^2). \quad (3)$$

The conditional density of the expenditures conditional on the choice of the class and the consumption item is

$$\begin{aligned} f(y_{jn} | j, s) &= \phi(a_{jn}) \times \frac{1}{\sigma_a} \\ &= \frac{1}{\sigma_a} \times \frac{1}{\sqrt{2\pi}} \exp\left(-\frac{(y_{jn} - W_{jn}\theta_s - \widehat{F}_{jn}\tau_s)^2}{2\sigma_a^2}\right), \end{aligned}$$

with \widehat{F}_{jn} the selection bias corrector obtained in the first stage. Therefore, the likelihood function

the Roy identity. A household chooses item j among others in order to maximize its utility. Hence, we correct for the selection bias by including the inverse Mills ratio in the conditional demand function.

⁶The inverse Mills ratio is defined as $\lambda: \lambda = \frac{\phi(W\theta)}{\Phi(W\theta)}$ with $\phi(\cdot)$ and $\Phi(\cdot)$ being the normal and cumulative normal density, respectively.

is

$$L = \prod_{n=1}^N \prod_{j \in C_n} \left[\frac{1}{\sigma_a} \phi \left(\frac{y_{jn} - W_{jn} \theta_1 - \hat{F}_{jn} \tau_1}{\sigma_a} \right) (1 - \Phi(M^* \alpha)) \right. \\ \left. \times \frac{1}{\sigma_a} \phi \left(\frac{y_{jn} - W_{jn} \theta_2 - \hat{F}_{jn} \tau_2}{\sigma_a} \right) \Phi(M^* \alpha) \right]^{d_{jn}}.$$

5 Data and results

5.1 Data

The data used for this study come from a survey conducted by the World Bank in 2010 for the Africa migration project in Burkina Faso. The survey contains detailed information on socio-economic characteristics of households as well as their relatives who have emigrated to urban and rural areas in Burkina Faso, to other African regions, or to the rest of the world. The survey also contains information on whether households receive remittances, their sources, their use, and the amount and form of the remittances.

The descriptive statistics (Table 2) suggest that about 77.63% of households are classified as poor households: they have per capita total expenditures (proxy of total income since this information is not available) below the national poverty line, equivalent to 113,623 FCFA ⁷. On average, households spend 377,234 FCFA on food, education, healthcare, transportation, housing, durable goods, leisure, and other items annually. Households have on average nine members; 60% of the head of the household are workers, 51% are female, and 5% have migrated in the past. Household heads are predominantly farmers (86%) with an average age of 49 years old. Only 14% of households attended school.

Table 2: Some descriptive statistics

Sample	Variables	Average/Value
	Number of households	1980
	Household average expenditure per year	377 234 FCFA
	Household size, average	9
	% of household's workers	60%
	% females	51%
	Former migrants in the household	5%
	% of households with at least 1 migrant	34%
	% households remittance-recipients	27%
	% of households below national poverty line	22%
Head of the household	% male	93%
	% Farmers	86%
	schooling	15%
	Average age	49 years

Source: The survey

From the sample, we found that about 34% of households in the sample have at least one member who is an international migrant. About 58% of all migrants are international migrants.

⁷One dollar poverty line is equivalent to a per capita annual expenditure of 180,296 FCFA. This poverty line is also used to check for the robustness of the model. But we will present and discuss only the results with the national poverty line, since the results are not sensitive to the poverty line chosen.

In addition, 30.55%, 10.26%, 10.29%, and 7.19% of international migrants have a relative in Sanmatenga, Boulkiemde, Yatenga, or Kadiogo. Côte d’Ivoire is by far the most preferable destination for migrants. Among international migrants, 49.5% emigrated to Côte d’Ivoire and 4.5% to Mali. Other destinations include Ghana (0.76%) and Gabon (0.56%) (See Table 3).

International migrants aged on average 31 years old and only 11% were female. International migrants spent on average eight years abroad and only 11% attended school. About 87.5% of international migrants worked before they migrated, 92% were farmers, only 4.5% were full-time students, and 1.59% were jobless. Searching for a better job is the top reason for migrating (81.23%), followed by marriage arrangement (5.89%) and education (4.46%). Among these migrants, 61.92% were able to finance their first travel by themselves, 44.65% were helped by relatives, 1.93% used a loan, and 0.93% received a grant.

After migration, about 90% of international migrants had jobs, 1.78% were students, and 1.05% were looking for a job. About 44% of them sent remittances to their relatives in Burkina Faso, worth an average of 66,500 FCFA per migrant. Migrants who remitted money to their relatives used mainly informal channels (63.78% through friends and relatives) and Western Union (11.33%) (See Table 4). Those who used a formal channel sent on average 146,116 FCFA while informal channel users sent on average 50,376 FCFA to their relatives. This implies that a substantial proportion of remittances do not go through the official channels, and therefore the official value of remittances is far below the real value. This raises the need to build up a good financial infrastructure for remittances in Burkina Faso in order to maximize their benefits to the country.

Table 3: Distribution of migrants by destination

CURRENT RESIDENCE	FREQUENCY	PERCENT	CUMULATIVE
Urban area Burkina Faso	555	25.93	25.93
Rural area Burkina Faso	344	16.07	42.01
Côte d’Ivoire	1,059	49.49	91.50
Mali	96	4.49	95.98
Niger	6	0.28	96.26
Ghana	16	0.75	97.01
Togo	5	0.23	97.24
Benin	1	0.05	97.29
Nigeria	3	0.14	97.43
Gabon	12	0.56	97.99
Libya	1	0.05	98.04
Other African countries	13	0.61	98.64
Western Countries			
Italy	5	0.23	98.88
France	3	0.14	99.02
Germany	2	0.09	99.11
Swiss	1	0.05	99.16
USA	7	0.33	99.49
Others	11	0.51	100.00
Total	2,140	100.00	

Source: the survey

Dividing households according to their expenditure level (from the poorest 20% to the richest

Table 4: Money transfer channels used by migrants

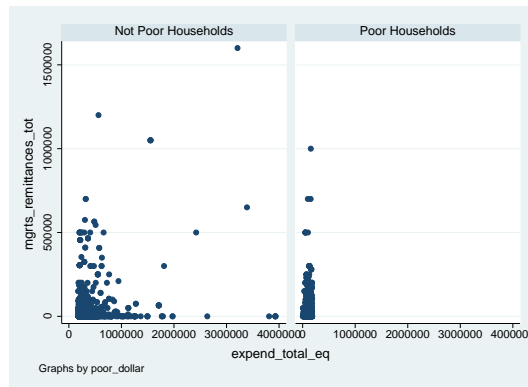
INFORMAL CHANNELS	FORMAL CHANNELS
Informal individual agents (2.10%)	Western Union (11.33%)
Friends and relatives (63.78%)	MoneyGram (0.98%)
Courier, bus, or other transport (3.92%)	Other money transfer operator (0.14%)
Brought back him/herself during visit (13.57%)	Postal money order (3.08%)
Others (0.14%)	Direct transfer to bank account (0.14%)
Travel agency (0.28%)	Bank as paying agent for money transfer (0.56%)

Source: The survey

20% in society), as reported in Table 5, it came out that the 20% richest received on average more than twice the amount of remittances sent to the 40% poorest. The 20% richest of households received 2.5 times the amount of remittances received by the 20% poorest. Remittance recipients spend on average 69% of their remittances on food items: poor recipients spend about 72% on food, while rich households spend 66%.

When splitting households by remittance recipients (Table 6), there is evidence that remittance recipients tend to allocate more of their total budget to education than non remittance recipients. They also seem to allocate more to durable goods than non-recipient households. In addition, except the poorest 40% of the sample, remittance-recipient households spend more of their budget on housing compared to non-recipient households. They tend to spend more to start businesses than non-recipient remittance households. However, there is no indication of whether or not remittance recipients save part of their remittances.

Figure 3: Remittances and expenditures by poverty status



Source: Based on the survey data

Table 5 shows that the poorest allocate the highest budget share to food while the richest tend to spend more on education, durable goods, and transportation, and also invest more in housing. Furthermore, the poorest households tend to have fewer children in the 0-18 years old category.

Figure 3 reports the relationship between household expenditure and international remittances by poverty status, and simply indicates that the relationship is not the same for households living below and above the poverty line. There seems to be more dispersion or variability among rich households than among poor households.

Table 5: Household spending and other characteristics by expenditures quintile

Quintile	Food	Health	Education	Durable	Transport.	housing	Others	Remittance	N[0-18 years]	Workers
Lowest	0.6837	0.0721	0.0430	0.0167	0.0273	0.0073	0.150	71 593	4.45	4.72
Second	0.7051	0.0580	0.0303	0.0191	0.0393	0.0115	0.1368	75 607	4.67	4.97
Third	0.6823	0.0614	0.0351	0.0173	0.0581	0.0192	0.1266	90 510	5.21	5.55
Fourth	0.6776	0.0509	0.0412	0.0228	0.0649	0.0199	0.1227	100 440	5.47	5.79
Highest	0.5630	0.0613	0.0500	0.0426	0.0940	0.0559	0.1332	143 908	5.079	5.12
All	0.6624	0.0607	0.040	0.0237	0.0567	0.0228	0.1339	95 337	4.98	5.23
Non-recipients	.6492	.0639	.0333	.0299	.0623	.0244	.1371	0	4.77	4.89
Recipients	.6648	.0601	.0411	.0225	.0557	.0225	.1332	64 971	6.03	5.17

Source: The survey

Table 6: Household spending by remittance recipient status, and expenditure quintile

Quintile	FOOD		HEALTH		EDUCATION		DURABLE		TRANSPORT.		HOUSE		OTHERS	
	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R	NR	R
Lowest	.6870	.6833	.0856	.070	.0349	.0440	.0167	.0167	.0356	.0263	.0052	.0075	.1350	.1518
Second	.6610	.7123	.0547	.0585	.0286	.0305	.0176	.0388	.0388	.0394	.0204	.0101	.1789	.1299
Third	.6943	.6801	.0692	.0599	.0309	.0359	.0185	.0482	.0482	.060	.0156	.0199	.1233	.1272
Fourth	.6829	.6765	.0598	.0492	.0335	.0426	.0273	.0433	.0433	.0690	.0191	.0201	.1340	.1206
Highest	.5610	.5635	.0578	.0622	.0371	.0534	.055	.1177	.1177	.0878	.0479	.0580	.1227	.1360

Notes: R for remittance receiver and NR for non-receiver

5.2 Empirical Results

5.2.1 Instrumental variables to correct the remittances endogeneity

As mentioned earlier, because of the endogeneity between remittances and household expenditures, instrumental variables are used to make the correction. The instruments for remittances should meet three conditions which are: (i) uncorrelated with the error term a_{jn} of equation (2); (ii) correlated with the endogenous variable i.e. remittances; (iii) not explanatory variable in equation (2).

We defined two instruments by following the approach suggested by McKenzie and Sasin (2007) and Gyimah-Brempong and Asiedu (2011). As a first instrument, we used the migrant networks i.e., the number of people who do not belong to the household but are in the households' neighborhood and have migrated in the past years. As a second instrument, we used the number of times the non household migrants made money transfers (or remitted) to the household.

We conducted an over-identification test for these two instruments. Since we are interested in nine (9) different consumption items, the test was conducted for these nine expenditure equations: food, education, health, housing, fuel for cooking, phone communication, transport, durable goods, and others. Table (7) reports the over-identification test results. Under the null hypothesis that the over-identification restrictions is valid, the statistic is asymptotically distributed following a chi-square with (K-L) degrees of freedom, with K the number of instruments (2) and L the number of endogenous variables (1). Results in Table 7 indicate a non-rejection of the null hypothesis of each of the nine equations.

Table 7: Validation of the instruments: the Sargan statistics of over-identification test

CATEGORY	Food	Education	Health	Durable	Education	House	Transport	Phone	Fuel
Sargan Statistics	1.289	0.906	0.301	0.037	0.000	1.211	0.485	2.276	0.002
P-Value	0.2562	0.3412	0.5835	0.8484	0.9948	0.2712	0.4860	0.1314	0.9672

The IV used are: (i) the non-household migrants, (ii) the number of times the non household migrants made money transfers.
Source: Computation done by the author using the survey data.

Based on the criteria defined previously, we estimated the model in two stages. In the first stage, using a simple ordinary least square regression, the endogenous variable (remittances) is regressed on both instrumental variables and the other explanatory variables in W_{jn} (see equation (2)). In the second stage, we estimate the latent class model correcting first for the selection bias due to zero expenditure and for the remittances endogeneity. The results are discussed in the next section.

5.2.2 Results of households expenditure equations

The latent class model results are presented from Table 8 to Table 15. We estimated the model for eight consumption items: food, education, healthcare, durable goods, housing, transportation, communication (cell phone and land phone expenditures), and fuel for cooking. The other consumption items are put in "others" or miscellaneous and this category is considered as the

reference group. The estimates of this reference category can be obtained by subtraction from the other eight equations, using the AIDS model properties. We estimated the model using two different poverty lines: the one dollar poverty line and the national poverty line. But, the results are not too sensitive to the poverty line used. Only the results of the LCM based on the national poverty line.

For each item, the latent class model (LCM) estimates the expenditure model for households living under the poverty line (we call them the poor) and those above the poverty line (the non-poor or the rich). In addition, the LCM estimates the probability that a given household belongs to one group or the other. We also took into account group heterocedasticity in the model by defining the variance of the error term according to the poverty line. Since the demand model used is an AIDS model, we also derived income elasticities for the different items under consideration. The income elasticity derived from the AIDS model is defined as following:

$$\eta_i = 1 + \left[\frac{\beta_i}{s_i} \right] \quad (4)$$

with s_i the share of total expenditure allocated to item i and β_i the coefficient of the log of total expenditure per capita. The value of the income elasticity indicates also the type of good i.e.: either it is a normal good ($0 < \eta_i < 1$), or a luxury good ($\eta_i > 1$) or an inferior good ($\eta_i < 0$) (Blanciforti and Green, 1983). Table 16 reports income elasticities.

Table 8: Results Latent Class Model: Food

Variables	Poor	Non-Poor
log of total expenditure	-0.030** (0.0097)	-0.128*** (0.0212)
log Household size	-0.063*** (0.0114)	-0.084*** (0.0172)
attended school	0.056*** (0.0158)	0.056* (0.0244)
farmer	0.040* (0.0175)	0.052* (0.0253)
Remittance	-0.000 (0.0002)	0.001 (0.0005)
Inverse Mills Ratio	-0.413 (0.4019)	-0.188 (0.8636)
Constant	0.952*** (0.1277)	2.080*** (0.2888)
Sigma	-0.012 (0.0073)	0.200*** (0.0065)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Food expenditures

The estimation results indicate that the log of total per capita expenditure and the log of the household size have negative and significant estimates in both groups of households. If the household income increases by 1%, rich households increase food consumption by 0.77%, while poor households increase by 0.93%. Food is a necessary good for both groups. The head of the households who have attended school or who are farmers tend to allocate much more share of their budget to food consumption than the other heads of households. The estimate of remittances is positive and significant only for the group of rich households, meaning that, when

remittances increase, households above the poverty line increase their share of food consumption.

Education expenditures

Let us now look at the education expenditures, which are investments in human capital. For both classes, the log of total expenditure and the log of household size have negative effects on the education budget share. When total expenditures increase by 1%, households increase their budget share spent on education by less than 1%: 0.28% for poor households and 0.51% for rich households. This indicates that education is a necessary good for both groups of households. Households with kids aged 7 to 24 years old allocate much more of their budget to education expenditures. Households with a head who attended school tend to allocate a smaller share of their income to education and the magnitude is higher for rich households. Living in urban area, especially in the province of Kadiogo increases education expenditures. The estimates of remittances are not statistically significant for the education equation.

Table 9: Results Latent Class Model: Education

Variables	Poor	Non-Poor
log total expenditure	-0.033*** (0.0047)	-0.019 (0.0116)
log household size	-0.055*** (0.0096)	-0.055*** (0.0164)
nb kids (7-24yrs)	0.005* (0.0022)	0.019*** (0.0045)
attended school	-0.028*** (0.0079)	-0.052*** (0.0141)
female	0.026* (0.0125)	0.016 (0.0220)
age	0.000* (0.0002)	0.000 (0.0004)
electricity	0.019 (0.0145)	0.020 (0.0164)
urban	0.048** (0.0166)	0.011 (0.0187)
Remittances	-0.000 (0.0001)	0.000 (0.0003)
Inverse Mills Raio	-0.082* (0.0321)	0.073 (0.0469)
Constant	0.597*** (0.0649)	0.355* (0.1559)
Sigma	-0.014*** (0.0041)	0.093*** (0.0038)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Health expenditures

For healthcare expenditures - another human capital investment - the estimations indicate that the health category is a necessary good. The estimates of the log of total expenditures and the log of the household size are statistically significant for only the poor category. Only the estimate of the number of elderly members is significant and positive for the rich households. The effect of remittances is not statistically significant. We tried other specifications but estimates were

not statistically significant.

Table 10: Results Latent Class Model: Health

Variables	Poor	Non-Poor
log total expenditure	-0.042*** (0.0046)	-0.010 (0.0108)
log household size	-0.028** (0.0106)	-0.009 (0.0163)
Elderly	0.002 (0.0025)	0.014* (0.0056)
Remittances	-0.000 (0.0002)	-0.000 (0.0005)
Inverse Mills Ratio	-0.118 (0.1064)	-0.093 (0.2199)
Constant	0.614*** (0.0768)	0.222 (0.1789)
Sigma	-0.017*** (0.0039)	0.104*** (0.0036)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Durable goods

The estimate of the log of total expenditures is negative and statistically significant for the poor households while it is positive and significant for the category of rich households. Durable goods are necessities for the poor while they are luxuries for the rich. When income increases by 1%, the rich increase their durable goods expenditures by more than one percent (1.24%) but the poor increase by only 0.51%. Remittances affect negatively the the share of income allocates to durable goods purchasing for households living above the poverty line.

Table 11: Results Latent Class Model: Durable Goods

Variables	Poor	Non-Poor
log total expenditure	-0.047*** (0.0049)	0.026* (0.0108)
log household size	0.002 (0.0175)	0.014 (0.0194)
attended school	-0.012 (0.0082)	-0.008 (0.0123)
farmer	-0.013 (0.0094)	0.027* (0.0127)
Remittances	0.000 (0.0003)	-0.001 (0.0004)
Inverse Mills Ratio	0.253 (0.3339)	-0.197 (0.4822)
Constant	0.620*** (0.1072)	-0.212 (0.1911)
Sigma	-0.005 (0.0038)	0.102*** (0.0034)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Housing expenditures

The estimate of the log of total expenditure is positive and significant at 1% for the rich households while it is insignificant for the poor households. When income increases by 1%, the rich increase their housing expenditures by 6.3% while the poor increase by only 0.55%. The household size has a positive and significant sign for the rich while it is insignificant for the poor. The remittances variable effect is statistically insignificant for both groups.

Table 12: Results Latent Class Model: Housing

Variables	Poor	Non-Poor
log total expenditure	-0.017 (0.0131)	0.075** (0.0269)
log household size	-0.007 (0.0111)	0.073** (0.0234)
attended school	0.013 (0.0156)	0.053 (0.0324)
farmer	-0.001 (0.0188)	-0.014 (0.0378)
Remittances	0.001 (0.0015)	-0.006 (0.0048)
Inverse Mills Ration	0.292 (0.3033)	-1.172 (0.9935)
Constant	-0.195 (0.4887)	0.603 (1.4889)
Sigma	-0.073*** (0.0096)	0.157*** (0.0090)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Fuel for cooking

The log of total expenditure and the log of household size are negative and significant for both groups. When total income increases by 1%, households increase their fuel expenditures by less than 1%: 0.4% for the poor and 0.5% for the rich. Remittances positively affect fuel expenditures for the poor.

Communication

The estimates of total expenditures and log of the household size are negative and statistically significant for both groups. When the household's income increases by 1%, the poor increase their phone expenditures more than the rich (0.7% vs 0.56%). Households who own a mobile phone tend to allocate much more of their budget to communication. The estimate of remittances is negative and statistically significant for only the rich households.

Transportation

The log of total expenditures is negative and statistically significant for only the poor households. When their income increases by 1%, they increase their transport expenditures by 0.7%. The remittances variable effect is not statistically significant in both classes.

Table 13: Results Latent Class Model: Fuel for Cooking

Variables	Poor	Non-Poor
log total expenditure	-0.037*** (0.0055)	-0.033*** (0.0079)
log household size	-0.031* (0.0152)	-0.037** (0.0137)
age	0.000 (0.0002)	0.000 (0.0002)
female	0.011 (0.0326)	0.011 (0.0389)
urban	-0.006 (0.0139)	-0.022* (0.0110)
Remittances	0.000* (0.0001)	-0.000 (0.0002)
Inverse Mills Ratio	0.122 (0.1406)	-0.024 (0.1728)
Constant	0.488*** (0.1245)	0.564*** (0.1614)
Sigma	0.008* (0.0032)	0.074*** (0.0027)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Table 14: Results Latent Class Model: Phone

Variables	Poor	Non-Poor
log total expenditure	-0.022*** (0.0066)	-0.019 (0.0108)
log household size	-0.035* (0.0172)	-0.053** (0.0200)
Adults(+5years)	0.000 (0.0020)	-0.007 (0.0046)
attended school	0.019* (0.0080)	0.006 (0.0121)
age	-0.001** (0.0002)	-0.000 (0.0004)
Own mobile phone	0.025*** (0.0060)	0.019 (0.0135)
Remittances	0.000 (0.0004)	-0.002 (0.0010)
Inverse Mills ratio	0.024 (0.1018)	-0.459 (0.2419)
Constant	0.369* (0.1463)	0.853** (0.3009)
Sigma	-0.017*** (0.0040)	0.091*** (0.0035)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Table 15: Results Latent Class Model: Transport

Variables	Poor	Non-Poor
log total expenditure	-0.025** (0.0096)	-0.003 (0.0121)
log household size	-0.014 (0.0237)	-0.007 (0.0208)
Adult (+5years)	-0.005 (0.0026)	-0.006 (0.0031)
Age	-0.001 (0.0007)	-0.002* (0.0008)
Own motorcycle	0.046*** (0.0082)	0.031* (0.0134)
Center	-0.027 (0.0228)	-0.008 (0.0211)
Eastern Center	0.056** (0.0185)	0.037 (0.0237)
Western-Center	-0.020 (0.0148)	-0.052** (0.0199)
Remittances	-0.000 (0.0002)	-0.000 (0.0003)
Inverse Mills ratio	-0.083* (0.0380)	-0.068 (0.0392)
Constant	0.561*** (0.1285)	0.306 (0.1694)
Sigma	-0.007 (0.0048)	0.098*** (0.0040)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

Table 16: Income elasticities

Items	Below poverty line	Above poverty line
Food	.9341427	.7738376
Education	.2806005	.5143282
Health	.2997613	.8409293
Durable goods	.5137539	1.245677
Communication	.7009444	.5570014
Fuel for cooking	.4017	.5058258
Transportation	.7023011	.939275
Housing	.5589509	6.301426

Computation done by the author

5.2.3 The probability of being poor

Finally, we analyzed the household's probability of being below the poverty line. The results for only food regression are reported in Table (17). For the rest of the seven items results are similar and are not sensitive to the consumption item chosen.

The household's characteristics that contribute to explain why it is below the poverty line are estimated simultaneously with the expenditure equations in the latent class model. This shows that households who have received remittances have more chance to live above the national poverty line. Access to public infrastructure also helps to reduce the household chance of being poor.

Results indicate that factors that contribute to reducing the chance of a household living below the poverty line include the following: remittances, the head of the household is educated, being Muslim, having access to electricity and a public water pump, and living in the province of Kadiogo, which contains the national capital, Ouagadougou.

In summary, for all the consumption items, the estimation results indicated that households below the poverty line (the poor) behave differently from those above the poverty line (rich). In order to investigate if this is statistically relevant, we applied a log-likelihood test (LR) for all the eight expenditure models. It came out that models with the two classes are statistically better than models which constrain the two groups to have the same estimates.

Table 17: Results Latent Class Model: Probability of being below poverty line

Variables	Estimates/SE
Remittances	-0.008*** (0.0013)
household size	0.064*** (0.0087)
educated	-0.231* (0.1014)
farmer	0.595*** (0.1019)
female	0.237 (0.1394)
age	0.006** (0.0023)
Monogamous	0.025 (0.0740)
mossi	0.065 (0.0929)
muselum	-0.144 (0.0752)
electricity	-0.720*** (0.1452)
Access public Pump	-0.086 (0.0729)
Constant	-0.699** (0.2474)

Notes: * p<0.05, ** p<0.01, *** p<0.001 - Standard errors in parenthesis

6 Policy implications

This study used a latent class modelling approach to analyze household consumption behaviour, taking into consideration their poverty status, and the amount of remittances received. The latent class model has the advantage of dissociating the behaviour of households that live under the poverty line (the national poverty line or the one dollar poverty line) from those living above the line.

The results of this study have some policy implications. Firstly, from the descriptive analysis, we found that only 16% of international migrants in the sample sent remittances through official channels in 2010. It is then important to find a way to reduce remittances sent through informal channels. This can be done by reducing the costs of using official channels in order to give stronger incentives to use them. Other government incentives could be the introduction of innovative financial instruments in the market, such as the bi-bancarization, long-term financial products such as diaspora bonds, assistance to migrant associations, e-banking, and mobile banking (Bourenane et al. 2011).

We also found that the poorest households allocate a high proportion of their budget including remittances to food items, while the richest households tend to spend more on education, durable goods, and transportation and also invest more in housing.

Our results also indicate that international remittances contribute to reducing the chances of a household being poor. We also found that households with a head who attended school and households that have access to public infrastructure have less chance of living below the poverty line. Households with an aged head, farmer head, or households that have large size, and not living in the province of Kadiogo have more chance of living below the poverty line.

These findings confirm that investing in public infrastructure and education is the best way to go to help reduce poverty in Burkina Faso. Families that have access to water and electricity have more chance of living above the poverty line. Those that receive remittances have also more chance escaping poverty. But these remittances should be invested instead of spent on perishable goods. Yet, a very small share of remittances have been invested in starting a new business.

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