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**The impact of remittances and gender on household expenditure patterns:  
Evidence from Ghana**

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Abstract

The overall objective of this paper is to explore the relation between gender and remittances. Building on the adjusted Working-Leser curve, we use the nationally representative Ghana Living Standard Survey 1998/99 to investigate how the sex of the household head and remittances affect the household budget allocations, as well as how the sex of the remitter affects these allocations. The results indicate that the sex of the household head and whether or not the household receives remittances both separately and jointly affect household expenditure allocations.

Consistent with findings from the intra-household bargaining literature, we find that female-headed households spend a larger percentage of expenditures on food and education and a lower percentage on consumer and durable goods, housing and other goods. When headship is interacted with receipt of remittances from abroad or from within Ghana, more interesting results emerge; controlling for expenditure differences between female and male-headed households, we find that female-headed households that receive international remittances spend a lower share of their budgets on food and a greater share on consumer and durable goods, housing and other goods than do female-headed households that not receive these remittances.

We find that the sex of the remitter is a significant determinant of the household's expenditure pattern only when we control for the remitter's ability to monitor how the remittances receiving household allocates its resources. Once these factors are controlled for, households that receive remittances from female remitters (as opposed to male remitters) allocate a larger expenditure share to spending on health and other goods, but a lower share on food. Based on these results, we conclude that the literature on remittances would benefit from including a gender analysis.

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## 1. Introduction

In recent decades international migration and remittance flows from migrants have increased substantially. In 2005 the total projected value of remittances exceeded \$232 billion, with \$167 billion going to developing countries (Ratha 2005). Remittances represent an important category of capital transfers from North to South and have proven to be a crucial tool for poverty alleviation.<sup>1</sup> Women form an increasing part of the migratory movements—almost half of today’s migrant population is female (UNDP 2005)—and there are indications that the character of female migration is changing—more women are migrating for employment reasons instead of following their male relatives (United Nations 2005).

Women who migrate may have a greater say over the allocation of origin household spending than if they have stayed at home, by virtue of an increased financial contribution to the household. On the other hand, since they are not physically present in the origin household typical principal-agent problems may limit the extent to which they can influence or monitor household spending. The same type of arguments apply to women who remain in households where the principal male earner has migrated: these women may enjoy increased independence in the decisions on household expenditures, or the male migrants may have a greater say in household expenditure decisions because of a greater financial contribution to the household—subject to the principal-agent issues mentioned above. In sum, the impact of migration and remittances on household expenditure patterns is an empirical issue and one in which many parts of the nexus

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<sup>1</sup> For review of the impact of remittances on poverty on the household level see e.g. World Bank (2006) chapter 5.

between gender and remittances remain unexplored (Jolly 2005; Omelaniuk 2005; Pfeiffer, Richter *et al.* forthcoming; Ramirez, Garcia Dominiguez *et al.* 2005).

This paper pulls together the strands of literature on intrahousehold allocation and remittances to examine, using data from Ghana, how household budget allocations are affected by the sex of the household head that receives remittances and by the sex of the individual sending remittances.

The remainder of the paper is organized as follows. Section 2 presents relevant research on the determinants of and motivations for remittances, with particular emphasis on the differences between men and women. It also examines the most salient results from the intrahousehold expenditure literature. Section 3 describes the data from Ghana that are employed. Section 4 describes the econometric approach used, and section 5 presents the results of the regression analysis. Section 6 concludes.

## **2. Motivations to remit and intrahousehold models of expenditures: a quick review of research**

The literature on determinants of remittances is particularly important for the purpose of this paper, since there is growing consensus that remittances flows are not driven solely by individual motives, but rather explained as part of familial inter-temporal contracts between the migrant and the remittances receivers (Lucas and Stark 1985; Rapoport and Docquier 2005; Stark and Lucas 1988).

The major focus of literature examining the motivation for remittances is whether individuals remit because of altruistic motives or because of self-interest. Only a subset of these studies disaggregates by the gender of the remitter. One of the earliest studies to do so was Hoddinott (1994), who shows that son's remittances, in western Kenya, respond to their parent's inheritable assets, while those of daughters do not. Using data from the Dominican Republic, De la Brière et al. (2002) document that remittances from female migrants respond strongly to the number of lost working days by parents, while male migrant remittances are unaffected by this variable, unless they are the only migrant in the family. On the other hand, their results indicate that remittances sent as investment to increase future inheritance is gender neutral. They conclude that insurance is the main motive to remit for international female migrants. These results are in line with observations from a study on financial support to parents conducted in Taiwan, which shows that daughters, as opposed to sons, respond to parents' special needs rather than ordinary needs, and function as an insurer of last resort (Lee, Parish *et al.* 1994). Finally, a recent study by Vanwey (2004) investigates gender differences in remittance motives in Thailand. He concludes that female remitters are more motivated by altruism than are male remitters.

Beyond the motivation for remittances, male and female remitters potentially may have different preferences about the type of expenditures that their remittances should support. In her case study in Mexico, De La Cruz (1995) finds that male migrants, to a greater degree than female migrants, intend to return to Mexico to live permanently in the future; for this reason, their remittances are directed towards personal investments such as land,

housing, agriculture production and cattle. Female migrants also remit for investment purposes, but it appears that their investments are more targeted to support family with education and business opportunities, rather than personal educational and business investments.

Along the lines of these findings, a recent descriptive study by the IOM, using data from Moldova, finds that substantially more women than men remit funds to pay for education, health, furniture, and loans (IOM 2005). Female migrants from Moldova state that they intend their remittances to be spent on current expenses (food, clothes, commodities and household equipment) and special expenses (education, health, furniture, and loans); male migrants, on the other hand, prefer to direct their remittances to investment in housing, cars and other consumer durables (IOM 2005).<sup>2</sup>

In sum, the tentative conclusion emerging from the literature is that female migrants prefer their remittances to be spent on education and health, while male remitters, on the other hand, tend to prefer investments in housing and other assets.

An important question, then, is if migrants' preferences for the use of their remittances are respected by origin households. If men and women remitters have systematically different preferences for the use of remittances, it is reasonable to expect that the identity of the individual receiving the remittances—and, more broadly, the demographic

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<sup>2</sup> Intentional data on the use of remittances may not give an accurate indication on how remittances actually will be used unless there are mechanisms of monitoring available for the remitter to control how the receivers of the remittances spend the money they receive.

composition of the household receiving the remittance and male-female power relations in the household—may also influence how remittances are spent.

Thus, the findings of the voluminous literature on intrahousehold expenditure patterns are quite relevant. In general, this research rejects the traditional *unitary household model* which assumes that a household has a single preference function and fully pools resources;<sup>3</sup> instead, it suggests that there are differences in preferences between household members and that distribution of resources depends on individuals' bargaining power within the household, which almost always favors men (Quisumbing 2003). A key finding of the intrahousehold expenditure literature is that increases in resources controlled by women raise allocations toward education, health and nutrition (Quisumbing 2003).

Quisumbing and Maluccio (2000), using data from Bangladesh, Ethiopia, Indonesia and South Africa, conclude that the most consistent effect across countries of an increased percent of resources controlled by women at the time of marriage is an increase in expenditure shares towards education. This finding holds for all countries except for Ethiopia. Similar studies in rural Bangladesh find that an increase in women's assets has a positive effect on expenditure on children's clothing and education (Hallman 2000; Quisumbing and de la Brière 2000).<sup>4</sup>

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<sup>3</sup> For reviews see Haddad, Hoddinott, et al., 1997; Quisumbing, 2003; Strauss and Thomas, 1995

<sup>4</sup> Current asset is defined as all assets owned by the household at the time of the survey. For more information, see Quisumbing and de la Brière, 2000.

This behavior by women may be eminently rational: since women often marry at an earlier age than men, and therefore are expected to live longer than men with their children. Consequently, they choose to invest in education of their children, as they rely on them more than men for old age support (Quisumbing and Maluccio 2000). Moreover, Guyer (1997) claims that in a society where assets that enable consumption-smoothing are controlled by men, investments in human capital may be an attempt for females to smooth consumption over time.

Regarding expenditure on health care, various studies published during the 1980s and 1990s conclude that women on average spend a greater part of their income on health care for children (and food), than men.<sup>5</sup> For example, Thomas (1994) finds that control of non-labor income by women is associated with increased expenditures on health care in Brazil, Ghana and the United States. In the case of Brazil, Thomas (1990) finds that the marginal impact of female-controlled income on child survival is 20 times that of male-controlled income. A more recent study by Hallman (2000) uses data from Bangladesh; the study finds that assets controlled by women are associated with better health outcomes for girls.

As far as expenditure on nutrition is concerned, Haddad and Hoddinott (1995), using the Côte d'Ivoire Living Standards Survey, show that share of income controlled by females has a positive and significant effect on the budget share expenditure on food. Drawing on Demographic and Health Survey data from Bangladesh, India, Nepal and Pakistan, Smith

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<sup>5</sup> See Dwyer, Bruce, et al., 1988; Garcia, 1991; Guyer, 1997; Katz, 1992; Kennedy, 1991; Thomas, 1990; Thomas, 1994; Thomas and Chen, 1994.

and Byron conclude that increases in women's decision-making power relative to men are associated with improved nutritional well-being of children (Smith and Byron 2005).

To-date, as far as we know only one study has examined whether the impact of remittances on health and education of children in the receiving household depends on the bargaining power of women in the household. De and Ratha (2005), using female headship as proxy for bargaining power, show that remittances in Sri Lanka have a positive impact on health and education of the children when the household head is female but not if the household head is male. If the household head is male, remittances have a positive impact on asset accumulation.

### **3. Data**

The study is based on the Ghana Living Standards Survey round four (GLSS 4), collected nationwide by the Ghana Statistical Service between April 1998 and March 1999. The dataset comprises 5,998 households and is representative both at the national level and for urban and rural areas. Although the survey is comprehensive in character and includes detailed information on households' expenditure patterns, it is not a specialized remittances or migration survey. As such, it collects only basic information on current remitters' characteristics: sex, relationship to household head, and the place of residence. In addition, it does not contain data on migrants from a household *unless* the migrant sends remittances. The data on characteristics of the migrant remitters is limited to sex and country of residence. The data set, on the other hand, contains relatively good data on remittances, including amount remitted in cash and in-kind, and frequency of

receiving remittances. Furthermore, the expenditure data included in the survey are of high quality.<sup>6</sup>

Studies on Ghana show that both cash and in-kind remittances are important (Quartey 2005). For this reason, the definition used in this paper for remittances includes cash, food and other goods (non-food items). Remittance receiving households are defined as households receiving remittances from within Ghana, from abroad or both. We make a distinction between remittances received from Ghana (internal remittances) and remittances received from abroad (international remittances), since previous literature suggests that internal and international remittances differ both in frequency and amount (see Lopez Cordoba 2005; Mora and Taylor 2004, Adams 2006a, Adams 2006b).

Table 1 shows descriptive statistics from the Ghana household survey. In total, 41 percent of households receive remittances; 35 percent of household receive remittances from Ghana and 8 percent receive remittances from abroad. Three percent of households receive both international and internal remittances.

Of the total sample, 37 percent of the households are female-headed. Within this group, 50 percent receive remittances from Ghana, 12 percent receive remittances from abroad, 5 percent receive remittances both from abroad and from Ghana, and 44 percent receive no remittances. Among male-headed households, 28 percent receive remittances from Ghana, 7 percent receive remittances from abroad, 1 percent receive both internal and international remittances, and 67 percent receive no remittances.

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<sup>6</sup> For more information on the dataset, see Republic of Ghana Statistical Service (1999).

#### **4. Methodology**

Our goal in this study is to test whether households in which women have stronger bargaining power have different expenditure patterns than households where women have less bargaining power, and whether the sex of the individual sending the remittance matters as well.

The first challenge is to find a variable that measure intrahousehold decision-making power. GLSS4 lacks the type of pre-determined, exogenous variables typically used to measure decision-making power and women's empowerment (e.g., wealth upon marriage). The best proxy available is the sex of the household head, since the household head is defined as the person who provides most of the needs of the household and is familiar with all the activities and occupations of the household members (Republic of Ghana Statistical Service 1999).<sup>7</sup>

We will examine expenditure patterns in four types of households: i) female-headed households receiving remittances, ii) male-headed households receiving remittances, iii) female-headed households not receiving remittances, and iv) male-headed households not receiving remittances.

A general methodological issue well recognized in the literature on remittances is that the comparison of remittances receiving and non-receiving households may produce biased

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<sup>7</sup> Clearly this is a less-than-perfect proxy variable, since it in essence reverts back to a unitary household model; nevertheless, since this is the best proxy for decision-making power available in the dataset, it will be used.

estimates if receivers of remittances differ systematically from non-receivers along observable and non-observable dimensions (see Acosta 2006; Adams 2006b; De and Ratha 2005). There are multiple ways to correct for a non-random selection, including difference-in-difference estimation (DID), propensity score matching (PSM), ordinary least squares (OLS), and an instrumental variable (IV) approach. McKenzie, Gibson and Stillman (2006) use the point estimates of the impact of migration on income from a natural experiment in New Zealand as a benchmark to compare how well these four approaches perform; they find that the IV approach with a good IV is the best method, followed by PSM and the DID. Using a poor IV proved to generate substantially upwardly biased results, much more biased than those produced by OLS.

For purposes of this paper, feasible methods are restricted by data availability. In the absence of panel data, the DID approach is not possible. Given that we investigate four sub-groups and have two different “treatments”- *remittances* and *sex of the household head*- PSM requires using a multinomial approach, but Imbens (1999) shows that in such instances the effect of the treatments cannot be identified unless an instrument is used.

Thus, the remaining option is to use an IV. Adams (2006b) uses the age of the household head as the variable that identifies the model in his study on the impact of remittances on expenditure in Ghana.<sup>8</sup> Given the difficulty to guarantee that this or other variables in the

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<sup>8</sup> The rationale behind his choice is that households with older household heads are likely to produce more migrants (and consequently remittances) because they have more household members aged 15-30 with a high propensity to migrate, but they are not expected to have a higher income (expenditure) because older household heads tend to be less educated. The question here is whether the increase in income due to greater labor market experience is exactly offset by the decreased income due to less educated household

dataset are exogenous to the error term—and the potential of biasing the results further by using a bad instrument—our preferred specification is a standard fractional logit model without instruments. As a type of sensitivity analysis, we also report the results of using two different instruments: age of the household head (as in Adams 2006b) and migration experience (defined by whether or not the household has a returned migrant). These instrumental variable results are reported in Appendix Table 1.

Our six dependent variables reflect the six categories of household expenditure collected in GLSS4. These are the fraction of total expenditure spent on food, consumer and durable goods, housing, education, health, and other items.<sup>9</sup> This paper uses an approach similar to that used in Adams (2006b) to estimate the determinants of expenditure shares among Ghanaian households.

The choice of functional form to model expenditure shares will depend on the degree of emphasis placed on various properties that one desires the function to possess. For purposes of this paper, the functional form needs to meet the following criteria: (i) the curve must be suitable for multiple types of goods; (ii) it should mathematically allow for increasing, decreasing and constant marginal propensities to spend over a wide range of expenditure levels; and (iii) it should satisfy the additivity criterion, i.e., the sum of the marginal propensities for all goods should equal unity (Adams, 2006b). In the light of these considerations, we use an adjusted Working-Leser curve as specified in Case and Deaton (2002) and Bhalotra and Attfield (1998). We specify the model of the form:

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heads. If the net effect is zero, Adams' choice of instrument is appropriate. If not, age of the household head remains correlated with income.

<sup>9</sup> For more information on the variables included in the study, please see Table 2.

$$w_{ih} = \alpha_i + \beta_i \log \frac{x_h}{n_h} + \varepsilon_i \log n_h + \theta_i z_h + u_{ih} \quad (1)$$

where  $w_{ih}$  is the share of the budget devoted to good  $i$  by household  $h$ ,  $x_h$  is total household expenditure,  $n_h$  is household size (i.e.  $x_h/n_h$  is per capita expenditure),  $z_h$  is a vector of household characteristics that may affect expenditure behavior, and  $u_{ih}$  is an error term.

Since our dependent variables are bound between 0 and 1 (being the percentage of total expenditure spent on good  $i$ ), we model  $E(w_{ih}|\mathbf{X})$  as a logistic function:  $E(w_{ih}|\mathbf{X}) = \exp(\mathbf{X}\boldsymbol{\beta})/[1+\exp(\mathbf{X}\boldsymbol{\beta})]$ , where  $w_{ih}$  represents the fraction of total expenditure spent on each of our six expenditure categories, and  $\mathbf{X}$  is a matrix of independent and control variables. This model guarantees that predicted values of  $w_{ih}$  fall between 0 and 1.<sup>10</sup>

The basic equation that serves as a point of departure for the analysis is:

$$w_{ih} = \alpha_i + \beta_{0i} RR_h + \beta_{1i} FHH_h + \delta_{1i} RR_h \times FHH_h + \beta_i \log \frac{x_h}{n_h} + \varepsilon_i \log n_h + \theta_i z_h + u_{ih} \quad (2)$$

where  $w_{ih}$  is defined as above,  $RR$  is a dummy variable that equals unity for those household receiving remittances and zero for households not receiving remittances.  $FHH$  represents a dummy variable that equals unity for female-headed households and zero for male-headed households. The coefficient of interest is  $\delta_1$  (i.e., the coefficient for the interaction term), since it captures the impact of being both a female-headed household and receiving remittances on expenditure patterns. This coefficient is similar to a

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<sup>10</sup> For more details on the rationale for using the fractional logit model, see Papke and Wooldridge, 1996; Wooldridge, 2002.

difference-in-difference estimator, and it will be referred to as a quasi difference-in-difference estimator in the discussion below. Equation 3 illustrates what it represents:

$$\hat{\delta}_1 = (\overline{FRR} - \overline{FNR}) - (\overline{MRR} - \overline{MNR}) \quad (3)$$

where the first term in parentheses represents the difference in mean values between female-headed household receiving remittances ( $\overline{FRR}$ ) and female-headed households not receiving remittances ( $\overline{FNR}$ ), and the second term in parentheses equals the difference in mean values between male-headed households receiving remittances ( $\overline{MRR}$ ) and male-headed households not receiving remittances ( $\overline{MNR}$ ). Given that the range of the dependent variables lies between 0 and 1,  $\hat{\delta}_1$  is also bound to be in that range.

The second part of our analysis focuses on whether or not the sex of the remitter is associated with differences in household's expenditure allocations. In this analysis, we use the remitter as the unit of analysis instead of the household. The advantage of this approach is that we do not have to create multiple summary variables that classify the different cases that would be present in households that receive remittances from multiple individuals. By using the remitters as unit of analysis, we examine whether or not, on average, the households to which women send remittances allocate their expenditure differently than the households to which men send remittances.

The dependent variables, as above, are household expenditure shares of the household receiving remittances from the individual remitter. Household characteristics of the receiving household are included in the analysis; since these characteristics will be

common across all individuals remitting to the same household, we cluster by household and calculate robust standard errors. We divide each weight by the number of remitters to the household so that the weights add up to the original population size. The final sample of remitters is 4,011 individuals, of which 1,617 (40 percent) are female and 2,394 (60 percent) are male.

Assuming the remitter has a specific desire for how the remittances should be spent, the relation between the remitter and the receiving household could be framed as a classical *principal-agent problem*, where the remitter (i.e., the principal) desires effective use of the remittances, and the receiver of the remittances (i.e. the agent), is asked to perform—that is to spend the remittances.<sup>11</sup> Through this lens, the extent to which the remitter is able to enforce his/her contract with the receiver of the remittances becomes important for the analysis. In other words, even if male and female remitters have different preferences for use of remittances, these preferences may not be realized because of principal-agent problems.

In order to deal with this issue, we introduced two new variables into the analysis to capture the severity of principal-agent problems: remitter's relationship to the household head and the country of residence of the remitter. These two variables will serve as proxies for the degree of enforcement; they are the best candidates to measure ability to enforce explicit or implicit contracts between migrants and origin households on the use of remittance. We assume that remitters who have a close relationship (defined as child, spouse or sibling) to the household head and who are located close to the receiver of the

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<sup>11</sup> For further readings on the principal-agent dilemma see e.g. Ross, 1973; Spence and Zeckhauser, 1971.

remittances (defined as in Ghana) have a relatively higher degree of control over how the remittances are being used.<sup>12</sup>

## **5. Results**

Table 3 shows descriptive statistics on average budget shares allocated to the six different expenditure categories by female-headed households, male-headed households, remittance-receiving households and non-remittance-receiving households. Comparing female-headed and male-headed households, we find that there is a statistically significant difference in the average budget shares for four of the six expenditure categories. Female-headed households have a higher average budget share than male-headed households devoted to food, education and health. Male-headed households, on the other hand, have a higher average budget share allocated to consumer and durables goods. These descriptive statistics correspond to the findings in the literature on intrahousehold expenditure allocations. Furthermore, there are indications that remittance-receiving households, as opposed to non-remittance receiving households, have statistically significantly larger budget shares devoted to housing, education and health, whereas non-remittance-receiving households have relatively higher budget shares allocated to consumer and durable goods.

Table 4 shows selected coefficients from the fractional logit regression for the determinants of expenditure shares, with the coefficients expressed in odds ratios.<sup>13</sup> A

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<sup>12</sup> The dataset includes six different categories of the remitter's relationship to household head: 1) Parent, 2) Spouse, 3) Child, 4) Sibling, 5) Other Relative, 6) Non-relative. After testing the explanatory power of each of these categories, we opted for using the above-mentioned variables, since they had the best explanatory power.

coefficient larger (smaller) than one indicates that the corresponding variable is associated with an increase (decrease) in the share of expenditure for each type of consumption good. The first observation is that several coefficients for female-headed households are significant. Female-headed households have a different expenditure pattern than male-headed households, which coincides both with the findings in the intrahousehold expenditure allocation literature and with the unconditional descriptive statistics. Compared to male-headed households, female-headed households on average have a higher budget share allocated to food and education, and a smaller share devoted to consumer and durable goods, housing, and other goods.

As explained in section 4 (see equation 3), the coefficient of the interaction term (indicating female-headed households that receive remittances, i.e., the quasi difference-in-difference estimator) indicates whether the difference between female-headed households receiving remittances and female-headed household not receiving remittances is larger or smaller than the difference between male-headed households receiving remittances and male-headed households not receiving remittances. In the case of internal remittances, the coefficient is statistically significant and less than one for consumer and durable goods. With regards to international remittances, the coefficient is significant for four of the six expenditure categories; food, consumer and durable goods, housing and other goods. For expenditure on food, the logs ratio is less than one; for consumer and durable goods, housing, and other goods, it is greater than one. Note that this effect is net of the income effect of receiving remittances, since per capita expenditure is included as a regressor in our specifications.

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<sup>13</sup> For the full regression results, see Appendix Table 2.

The coefficient for the quasi difference-in-difference estimators is important since it allow us to disentangle the confounding effect that female headship and remittances could have on the budget allocation. It is not easily interpretable from Table 4, however, how expenditure is allocated among the different types of households. For this reason, Table 5 and Figure 1 show the predicted marginal budget shares calculated using the estimated coefficients from Table 4.

The results show that female-headed households not receiving remittances and receiving remittances from within Ghana tend to devote a larger share of their expenditure to food than do other groups. On the other hand, female-headed households receiving remittances from abroad devote a much lower share of the budget to food expenditure—lower than other types of female-headed households and all types of male-headed households. Female-headed households receiving remittances from abroad allocate a larger share of expenditures to consumer and durable goods than the other types of households (except for male headed households receiving international remittances). Furthermore, female-headed households—regardless of whether or not they receive remittances—devote a larger share of expenditures to education in comparison with their male counterparts; the difference is most pronounced in the case of female-headed households receiving remittances.

Regarding the impact of the sex of the remitter on expenditure allocations, in our initial specification (see Appendix, Table 3) sex of the remitter does not have a statistically

significant impact on the household expenditure allocations. As previously mentioned, this may be due to principal-agent issues: the remitter cannot enforce his/her preferences about how remittances should be spent because he/she is absent from the household. For this reason and as previously mentioned, we introduce two variables that attempt to measure the ability of the remitter to monitor use of remittances and enforce his/her preferences. We include the remitter's relation to the household head and the remitter's place of residence; a remitter who has a close relationship to the household head (operationalized as the remitter being the child, spouse or sibling of the household head) or who is located close to the receiver of the remittance (defined as living in Ghana) is assumed to have a relatively higher degree of control over how remittances are used.

Table 6 shows the regression results for the variables of interest using the same structure as equation 2.<sup>14</sup> Controlling for the remitter's ability to supervise how the household spends the remittances, the sex of the remitters is statistically significant for the expenditure shares in food, health and other goods for households with female remitters; expenditure shares on food are lower, while expenditure shares on health and other goods are higher than for male remitters.

In the equation for the expenditure share on food, the differences between female remitters living inside and outside Ghana are quite interesting: for households receiving remittances from female remitters inside Ghana, the expenditure share on food is greater than one, while for female remitters as a whole the expenditure share on food is lower.

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<sup>14</sup> Controls include the log of expenditure per capita, household structure, and location variables. For the full regression results see Appendix Table 4

The difference is accounted for by female migrants living outside Ghana, who presumably have less ability to monitor/enforce their preferences on expenditures. Similarly, there is a difference in the effect on health expenditures depending upon where the female remitter lives. For households receiving remittances from female migrants within Ghana, the expenditure share on health is lower, but for households receiving from female remitters as a whole the share is higher. Again, the difference is accounted for by international female remitters.

Relationship to household head also seems to matter for both food and health expenditures. In the food equation, the quasi difference-in-difference estimator for female remitter and being a child, and for female remitter and being a sibling are statistically significant and greater than one. In the equation for the expenditure share on health, the quasi difference-in-difference estimator for female remitter and child of household head, as well as female remitter and live in Ghana are significant and less than one. The same holds for the variable remitter is female and spouse of household head with regards to education expenditure.

Table 7 and Figure 2 illustrate the predicted marginal budget shares for each expenditure category by type of remitter. Female remitters in general have receiving households that allocate a higher percentage of expenditures to food than do households of male remitters; these percentages are especially high for female remitters who are located in Ghana. Households with male remitters, on the other hand, tend to have a larger expenditure share on consumer and durables goods; this share is particularly high in the

case of male remitters in Ghana who are remitting to their female spouse. With respect to expenditure share on housing, households with male remitters tend to spend more than households with female remitters; while there is little variation among different types of male remitters, households with female remitters living abroad tend to spend more on housing than households with female remitters living in Ghana. Expenditure patterns on health seem more sensitive to the location of the remitter and his/her relation to the household head than to the sex of the remitter. Households with male or female spouses remitting from within Ghana have lower expenditure shares on housing, compared to households with all other types of remitters. For education expenditures, households with a male or female spouse living abroad have a relatively high budget share devoted to education, compared to other types of remitters. Households with spouses remitting from within Ghana—whether male or female spouses—have relatively low expenditure shares on education.

There are two possible interpretations for these results. The first is that the preferences of families receiving remittances vary depending on the location from which migrants remit as well as the remitter's relationship to the receiving household. For instance, a family receiving remittances from a close relative may have different expectations about the temporal properties of the remittances, and thus will spend them accordingly, than a family receiving money from less close relatives.<sup>15</sup> The second—and perhaps most likely—explanation is that the ability of migrants to enforce the informal contracts governing the use to which remittances will be put depends both upon migrants' location and the strength of their relationship to the household head.

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<sup>15</sup> We are indebted to David McKenzie for this point.

## 6. Conclusions

In this paper, we examine two different research questions regarding remittances and gender: first, how the sex of the household head and remittances affect household budget allocations; and second, how the sex of the remitter shapes these allocations. We find that the sex of the household head and whether or not the household receives remittances jointly affect household expenditure allocations. Female-headed households as a whole spend a larger percentage of expenditures on food and education, and a smaller percentage on consumer and durable goods, housing and other items—thus confirming conclusions from a host of intrahousehold models. Female-headed households are heterogeneous, though: those receiving remittances from abroad spend significantly more on consumer and durable goods and housing than do those receiving remittances from within Ghana or those who do not receive remittances; conversely, they spend significantly less on food.

At first blush, the sex of the remitter has no impact on expenditure patterns. Once we control for remitters' relation to the household head and for whether funds are remitted from inside or outside of Ghana, however, significant differences emerge. These variables serve as proxy to the capacity of the remitter to follow up on the intended use of the remittances.

Our results indicate that households with female remitters in Ghana have a relatively higher share of their budget devoted to food expenditure, whereas the opposite holds for

households with female remitters living abroad. In the case of health expenditures, the coefficients tend not to be statistically significant; hence, there is weaker evidence that sex of the remitter matters: households with female remitters living abroad are likely to spend a larger percentage of expenditure on health, while the opposite is true for households with female remitters within Ghana. The results of this exercise are evidence that the sex of the remitter can matter for budget allocations, but seemingly only if location of the remitter and his/her relationship to the household head are taken into account.

This paper is one of the first pieces of evidence that the sex of the receiver of remittance has to be taken into account when analyzing the impact of remittances on household expenditure patterns. In addition, we show that the sex of the remitter affects the share of the household budget that is devoted to some expenditure categories once we control for relationship to household head and geographic location of the remitter. In sum, we find that the literature on remittances would benefit from including a gender analysis in order to further the understanding of the relationships between remittances and household expenditure patterns.

Future research should use data sets that contain information on absent household members, whether or not these absent members send remittances. Such data will permit researchers to disentangle the effects of remittances and out migration per se. This is important since migration will change household size and may affect the composition of expenditure, whether or not the migrants remit (Schiff, 2006).

In addition, there is a need to develop better data that can provide more precise measurement of intrahousehold bargaining power, thus obviating the need to use imperfect proxy variables such as the sex of the household head. Future research should also work to solidify the links between the intrahousehold allocation literature and the remittances literature by measuring not only the impact of remittances on expenditure shares, but also their impact on important developmental outcomes such as children's nutritional and educational outcomes.

**Table 1. Descriptive Statistics by sex of the household head and remittances in Ghana: 1998/99**

<i>Variable</i>	<b>FHH<sup>1</sup></b>	<b>MHH</b>	<b>RR</b>	<b>NRR</b>	<b>TOTAL</b>
Receive remittances (1=yes)	0.568 ( 0.022)	0.333 ( 0.011)	- -	- -	0.408 ( 0.013)
Receive internal remittances (1=yes)	0.503 ( 0.024)	0.281 ( 0.012)	0.862 ( 0.012)	- -	0.352 ( 0.014)
Receive international remittances (1=yes)	0.115 ( 0.010)	0.068 ( 0.006)	0.203 ( 0.013)	- -	0.083 ( 0.006)
Household size	3.697 ( 0.077)	4.600 ( 0.084)	4.019 ( 0.084)	4.513 ( 0.082)	4.312 ( 0.072)
Age of household head (years)	47.001 ( 0.633)	43.972 ( 0.386)	47.277 ( 0.597)	43.330 ( 0.369)	44.939 ( 0.379)
Number of males over age 15	0.481 ( 0.029)	1.388 ( 0.023)	0.953 ( 0.030)	1.199 ( 0.026)	1.099 ( 0.024)
Number of females over age 15	1.555 ( 0.027)	1.154 ( 0.024)	1.301 ( 0.024)	1.269 ( 0.022)	1.282 ( 0.018)
Girls not over age 5	0.063 ( 0.005)	0.073 ( 0.003)	( 0.067) ( 0.004)	( 0.071) ( 0.003)	( 0.069) ( 0.002)
Boys not over age 5	0.058 ( 0.004)	0.071 ( 0.002)	0.059 ( 0.003)	0.072 ( 0.003)	( 0.067) ( 0.002)
Number of members over age 15 with primary education	0.290 ( 0.017)	0.323 ( 0.014)	0.298 ( 0.018)	0.322 ( 0.015)	0.312 ( 0.012)
Number of members over age 15 with junior secondary school	0.595 ( 0.028)	0.802 ( 0.027)	0.703 ( 0.031)	0.758 ( 0.025)	0.736 ( 0.023)
Number of members over age 15 with secondary school	0.076 ( 0.012)	0.060 ( 0.006)	0.067 ( 0.007)	0.064 ( 0.007)	0.065 ( 0.005)
Number of members over age 15 with university education	0.005 ( 0.002)	0.015 ( 0.004)	0.011 ( 0.003)	0.012 ( 0.004)	0.011 ( 0.003)
Head of household is of Asante ethnicity (1=yes)	0.230 ( 0.029)	0.150 ( 0.019)	0.210 ( 0.029)	0.150 ( 0.019)	0.178 ( 0.021)
Total household expenditure	1455703 ( 72073)	1426578 ( 63011)	1452904 ( 78960)	1424153 ( 58534)	1435879 ( 60765)
Observations	2017	3981	2481	3517	5998

1. FHH=female-headed households, MHH=male-headed households,

Note: N=5998 households; 146 households receive both internal and international remittances.

RR=remittances receiving households, NR=non-remittances receiving households

In 1999, US\$ 1.00=2,394 Ghanaian cedis.

All values are weighted; linearized standard errors in parentheses.

Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: GLSS 1998/99

**Table 2 . Descriptions of variables included in the analysis**

<b>Variable Name</b>	<b>Description</b>	<b>Examples</b>
<b>Dependent variables</b>		
Food	Purchased food	Maize, bread, cassava, meat
	Non-purchased food	Food from: own production, gifts, donations etc.
Consumer and durable goods	Consumer goods	Clothing and footwear, fabric etc.
	Household durables	Annual use value of stove, refrigerator, furniture etc.
Housing	Annual use value	Estimated from rental payments or imputed values
Education	Educational expenses	Books, school supplies, uniforms, registration fees etc.
Health	Health expenses	Doctor and dentist fees, medicine, hospitalization etc.
Other	Utilities	Water, gas, electricity, telephone
	Transport	Bus and taxi fees, gasoline, postage, fax
	Remittances expenses	Expenses on remittances
<b>Independent variables of specific interest for the first part of the analysis</b>		
Female-headed households receiving remittances from Ghana	Interaction term, dummy variable, quasi difference-in-difference term	
Female-headed households receiving remittances from abroad	Interaction term, dummy variable, quasi difference-in-difference term	
Female-headed households	Dummy variable	
Receiving remittances from Ghana	Dummy variable	
Receiving remittances from abroad	Dummy variable	
<b>Independent variables of specific interest for the second part of the analysis</b>		
Remitter is female and child of the household head	Interaction term, dummy variable, quasi difference-in-difference term	
Remitter is female and spouse of the household head	Interaction term, dummy variable, quasi difference-in-difference term	
Remitter is female and sibling of the household head	Interaction term, dummy variable, quasi difference-in-difference term	
Remitter is female and lives in Ghana	Interaction term, dummy variable, quasi difference-in-difference term	
Female remitter	Dummy variable	
Remitter is child of the household head	Dummy variable	
Remitter is spouse of the household head	Dummy variable	
Remitter is sibling of the household head	Dummy variable	
Remitter lives in Ghana	Dummy variable	
<b>Independent variables*</b>		
Household size	Numeric variable	
Age of household head	Numeric variable	
Proportion of male household members under age 5	Numeric variable	
Proportion of female household members under age 5	Numeric variable	
Proportion of male household members over age 15	Numeric variable	
Proportion of female household members over age 15	Numeric variable	
Proportion of family members completed primary school	Numeric variable	
Proportion of family members completed junior secondary school	Numeric variable	
Proportion of family members completed senior secondary school	Numeric variable	
Proportion of family members completed university	Numeric variable	
Head of household of Asante ethnicity	Dummy variable	
loc_2	Dummy variable (urban coastal)	
loc_3	Dummy variable (urban forest)	
loc_4	Dummy variable (urban savannah)	
loc_5	Dummy variable (rural coastal)	
loc_6	Dummy variable (rural forest)	
loc_7	Dummy variable (rural savannah)	

Note: \*These independent variables are introduced based on Adams (2006)

Source: GLSS 4

**Table 3. Average budget shares by sex of the household head and status of receiving households, Ghana: 1998/99**

Expenditure Category	FHH <sup>1</sup>	MHH	RR	NR	Two Sample independent t-test	
					FHH vs. MHH	RR vs. NR
Food	0.604	0.591	0.596	0.595	2.28*	0.26
Consumer and durable goods	0.179	0.207	0.193	0.201	-9.16	-2.43
Housing	0.026	0.025	0.026	0.024	1.60	2.42*
Education	0.044	0.035	0.039	0.037	4.49**	1.35*
Health	0.040	0.035	0.039	0.035	3.35**	3.24**
Other	0.108	0.107	0.106	0.108	0.25	-0.61
TOTAL	1.000	1.000	1.000	1.000		
Observations	2017	3981	2481	3517	5998	5998

\* significant at 5%; \*\* significant at 1%

Note: 1. FHH=female-headed households, MHH=male-headed households,

RR=remittances receiving households, NR=non-remittances receiving households

Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: GLSS 1998/99

**Table 4. Fractional logit odds ratio coefficients by expenditure type (selected variables)**

Variables	Food	Consumer and durable goods	Housing	Health	Education	Other
Female-headed household receiving internal remittances	0.99 (0.034)	0.94 (0.032)*	1.00 (0.034)	1.10 (0.077)	1.09 (0.089)	1.01 (0.048)
Female headed-household receiving international remittances	0.86 (0.049)***	1.12 (0.072)*	1.11 (0.067)*	1.13 (0.167)	0.96 (0.131)	1.12 (0.075)*
Female-headed household	1.10 (0.038)***	0.85 (0.027)***	0.92 (0.030)***	0.92 (0.055)	1.40 (0.100)***	0.92 (0.043)*
Receive internal remittances	0.99 (0.024)	1.02 (0.024)	1.00 (0.024)	1.05 (0.051)	1.02 (0.064)	0.97 (0.035)
Receive international remittances	0.94 (0.041)	1.07 (0.046)	1.04 (0.049)	1.07 (0.112)	1.15 (0.123)	0.99 (0.046)

Robust standard errors in parentheses correspond to the logit coefficients

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Note: Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: GLSS 1988/99

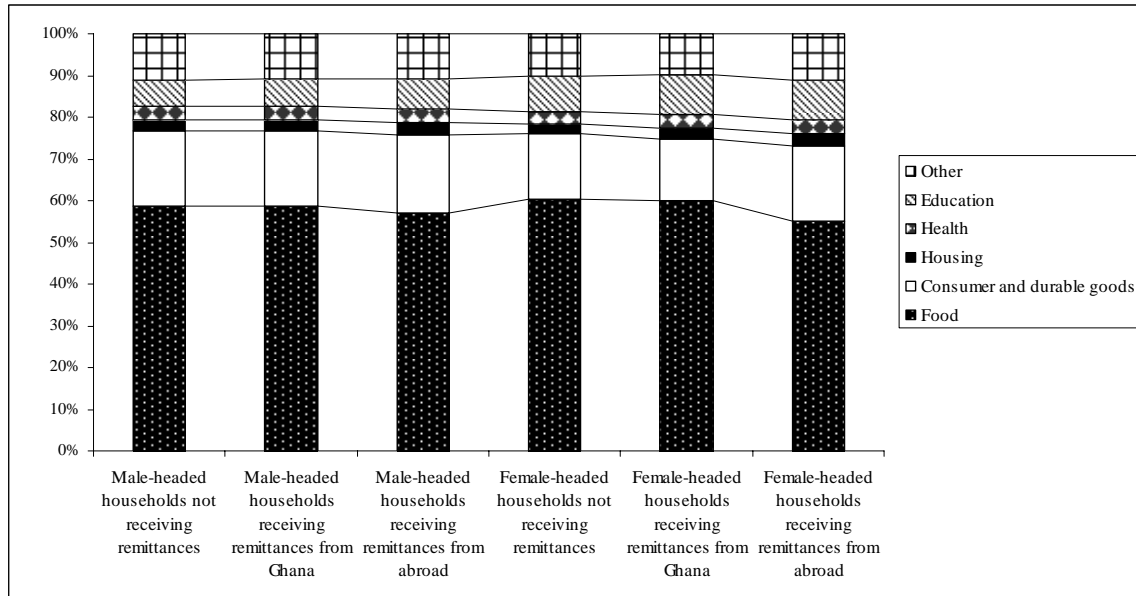
**Table 5. Predicted marginal budget shares by sex of the household head receiving remittances and type of expenditure (percentage of total budget)**

Type of households	Food	Consumer and durable goods	Housing	Health	Education	Other
Male-headed households not receiving remittances	58.0	17.7	2.6	3.1	6.3	11.0
Male-headed households receiving remittances from Ghana	57.8	17.9	2.6	3.3	6.4	10.7
Male-headed households receiving remittances from abroad	56.4	18.7	2.7	3.3	7.1	10.8
Female-headed households not receiving remittances	60.3	15.4	2.4	2.9	8.6	10.2
Female-headed households receiving remittances from Ghana	59.9	14.8	2.4	3.3	9.4	9.9
Female-headed households receiving remittances from abroad	54.9	18.0	2.8	3.4	9.3	11.1

Source: Authors' calculation based on regression results presented in table 4. Other variables were set at the original values for each observation.

Note: Percentage might not sum to 100 because of rounding.

**Figure 1. Predicted marginal budget shares by type of household and expenditures: Ghana 1998/99 (percentage of total budget)**



Source: Authors' calculations. Table 5.

**Table 6. Fractional logit odds ratio coefficients by type of expenditure (selected variables)**

	Food	Consumer and durable goods	Housing	Health	Education	Other
Remitter is female and spouse of head of household	1.16 (0.270)	1.01 (0.328)	0.95 (0.145)	0.57 (0.251)	0.46 (0.183)*	1.18 (0.299)
Remitter is female and child of head of household	1.12 (0.056)**	0.93 (0.047)	0.99 (0.053)	0.81 (0.094)*	1.19 (0.176)	0.87 (0.067)*
Remitter is female and sibling of head of household	1.13 (0.070)*	0.95 (0.055)	0.96 (0.060)	0.94 (0.116)	0.80 (0.114)	0.89 (0.081)
Remitter is female and lives in Ghana	1.13 (0.067)**	0.98 (0.058)	0.97 (0.063)	0.80 (0.106)*	0.96 (0.133)	0.86 (0.078)*
Remitter is female	0.83 (0.050)**	1.06 (0.065)	1.01 (0.067)	1.32 (0.193)*	1.08 (0.163)	1.24 (0.116)**
Remitter is spouse of head of household	0.98 (0.051)	0.99 (0.055)	0.97 (0.045)	1.08 (0.115)	1.30 (0.149)**	0.92 (0.066)
Remitter is child of head of household	1.04 (0.040)	0.97 (0.042)	0.96 (0.041)	1.22 (0.105)**	0.84 (0.085)*	1.01 (0.063)
Remitter is sibling of head of household	1.06 (0.039)	0.93 (0.033)**	1.01 (0.042)	1.04 (0.083)	1.07 (0.100)	0.98 (0.052)
Remitter lives in Ghana	1.11 (0.040)**	0.88 (0.035)**	0.92 (0.040)*	1.08 (0.090)	0.95 (0.094)	0.97 (0.047)

Note: Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: GLSS 1998/99

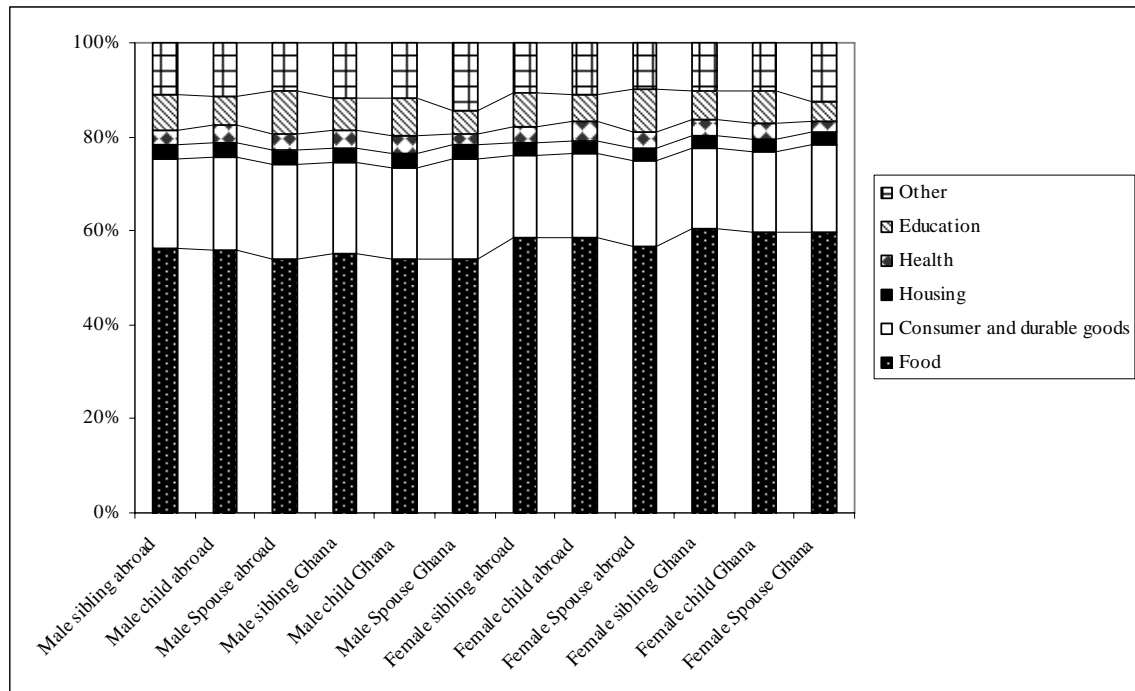
**Table 7. Predicted budget shares by remitter's sex, location and relationship to the household head, and type of expenditure: (percentage of total budget)**

Remitter's characteristics	Food	Consumer and durable goods	Housing	Health	Education	Other
<b>Male Remitter</b>						
Living Abroad						
<i>Relationship to household head</i>						
Sibling	55.4	18.8	3.1	3.1	7.6	10.7
Child	55.0	19.4	2.9	3.6	6.1	11.1
Spouse	53.5	19.8	2.9	3.2	9.1	10.2
Living in Ghana						
<i>Relationship to household head</i>						
Sibling	53.9	18.9	3.0	3.8	6.7	11.7
Child	53.3	19.1	3.0	3.9	7.7	11.8
Spouse	52.8	20.9	2.8	2.4	4.8	14.2
<b>Female Remitter</b>						
Living Abroad						
<i>Relationship to household head</i>						
Sibling	57.9	16.9	2.8	3.3	7.3	10.4
Child	57.5	17.5	2.7	3.9	5.8	10.7
Spouse	56.0	17.9	2.7	3.4	8.7	9.9
Living in Ghana						
<i>Relationship to household head</i>						
Sibling	59.3	16.6	2.7	3.3	6.1	9.9
Child	58.7	16.8	2.6	3.4	7.0	10.0
Spouse	58.2	18.5	2.5	2.1	4.3	12.1

NOTE: Percentages might not sum to 100 due to rounding.

Source: Authors' calculations base on regression results presented in Table 6. Other variables set to original values of each observation.

**Figure 2. Predicted marginal budget shares by remitter's characteristics and type of expenditure**



Source: Authors' calculations. Table 7.

**Appendix Table 1. Expenditure share coefficients including instrumental variables**

	Food		Consumer and durable goods		Housing	
	corrected OLS	First Stage	corrected OLS	First Stage	corrected OLS	First Stage
Female-headed household receiving internal remittances	0.02 (0.026)		-0.01 (0.016)		0.00 (0.004)	
Female headed-household receiving international remittances	-0.02 (0.022)		0.02 (0.014)		0.00 (0.002)	
Female-headed household	-0.06 (0.030)	0.45 (0.055)**	0.02 (0.018)	0.42 (0.052)**	0.00 (0.004)	0.48 (0.059)**
Receive internal remittances	-0.01 (0.020)		0.00 (0.012)		0.00 (0.002)	
Receive international remittances	-0.03 (0.018)		0.01 (0.012)		0.00 (0.002)	
log_total expenditure/capita	-0.01 (0.007)	-0.05 (0.038)	0.02 (0.005)**	-0.01 (0.035)	-0.03 (0.002)**	-0.04 (0.039)
log_household size	-0.02 (0.008)**	-0.23 (0.045)**	0.01 (0.005)	-0.19 (0.043)**	-0.02 (0.002)**	-0.23 (0.046)**
Proportion of males>15 yrs	0.02 (0.017)	-0.21 (0.116)	-0.03 (0.015)	-0.19 (0.115)	0.01 (0.003)	-0.24 (0.123)*
Proportion of females>15 yrs	0.00 (0.016)	-0.21 (0.106)*	0.00 (0.011)	-0.21 (0.104)*	0.01 (0.002)**	-0.22 (0.112)
Proportion of girls<5 yrs	-0.15 (0.105)	1.79 (0.622)**	0.28 (0.062)**	1.78 (0.570)**	-0.02 (0.010)*	1.57 (0.689)*
Proportion of boys<5 yrs	0.04 (0.095)	-0.10 (0.563)	0.16 (0.072)*	0.33 (0.546)	-0.03 (0.010)**	-0.17 (0.583)
Proportion of family member who completed primary school	0.01 (0.021)	-0.01 (0.126)	0.00 (0.014)	0.00 (0.123)	0.00 (0.002)*	0.01 (0.132)
Proportion of family members who completed junior secondary school	-0.04 (0.015)*	0.08 (0.102)	0.04 (0.012)**	0.11 (0.101)	0.00 (0.002)	0.07 (0.106)
Proportion of family members who completed senior secondary school	-0.16 (0.034)**	0.58 (0.223)**	0.10 (0.026)**	0.64 (0.234)**	0.00 (0.004)	0.56 (0.242)*
Proportion of family members who completed university	-0.35 (0.113)**	-0.01 (0.484)	0.07 (0.074)	0.09 (0.527)	0.07 (0.029)*	-0.06 (0.479)
Location 2	0.03 (0.027)	0.23 (0.131)	0.01 (0.016)	0.21 (0.124)	-0.03 (0.003)**	0.24 (0.131)
Location 3	0.02 (0.028)	0.33 (0.124)**	0.05 (0.016)**	0.34 (0.116)**	-0.03 (0.003)**	0.35 (0.133)**
Location 4	0.14 (0.034)**	-0.20 (0.118)	-0.03 (0.018)	-0.21 (0.113)	-0.03 (0.004)**	-0.17 (0.120)
Location 5	0.07 (0.028)*	0.20 (0.117)	0.02 (0.014)	0.19 (0.115)	-0.03 (0.003)**	0.21 (0.121)
Location 6	0.08 (0.026)**	0.19 (0.097)	0.04 (0.014)**	0.22 (0.094)*	-0.04 (0.003)**	0.19 (0.097)*
Location 7	0.12 (0.026)**	0.03 (0.105)	0.03 (0.015)*	0.07 (0.102)	-0.04 (0.003)**	0.06 (0.108)
Head of household is of Asante ethnicity	-0.02 (0.012)	0.15 (0.074)*	0.01 (0.009)	0.12 (0.072)	0.00 (0.001)	0.14 (0.076)
Age household head		0.01 (0.001)**		0.01 (0.001)**		0.01 (0.001)**
Household has at least one returned migrant		0.07 (0.034)		0.04 (0.030)		0.06 (0.044)
Constant	0.84 (0.102)**	-0.18 (0.597)	-0.21 (0.070)**	-0.73 (0.549)	0.43 (0.029)**	-0.22 (0.618)
Observations	5998	5998	5998	5998	5998	5998
Lambda	-0.15		0.12		0	
Chi2	197.88		125.72		407.33	

See notes at end of table.

**Appendix Table 1. Expenditure share coefficients including instrumental variables—Continued**

	Health		Education		Other	
	corrected OLS	First Stage	corrected OLS	First Stage	corrected OLS	First Stage
Female-headed household receiving internal remittances	0.01 (0.012)		0.00 (0.011)		0.03 (0.008)**	
Female headed-household receiving international remittances	0.01 (0.010)		0.00 (0.009)		0.03 (0.006)**	
Female-headed household Receive internal remittances	-0.01 (0.011)	0.48 (0.058)**	0.02 (0.014)	0.48 (0.059)**	0.01 (0.009)	0.42 (0.047)**
Female-headed household Receive international remittances	0.01 (0.007)		0.00 (0.008)		-0.01 (0.006)	
Female-headed household Receive international remittances	0.01 (0.006)		0.00 (0.006)		0.00 (0.005)	
log_total expenditure/capita	0.00 (0.002)	-0.04 (0.040)	0.00 (0.002)	-0.04 (0.040)	0.00 (0.004)	-0.05 (0.034)
log_household size	0.00 (0.002)	-0.23 (0.046)**	0.04 (0.003)**	-0.23 (0.046)**	-0.01 (0.005)*	-0.18 (0.040)**
Proportion of males>15 yrs	0.01 (0.007)	-0.24 (0.122)	-0.01 (0.007)	-0.24 (0.122)	0.00 (0.010)	-0.05 (0.097)
Proportion of females>15 yrs	0.01 (0.008)	-0.21 (0.111)	-0.03 (0.007)**	-0.21 (0.111)	0.01 (0.010)	-0.01 (0.091)
Proportion of girls<5 yrs	0.02 (0.028)	1.56 (0.693)*	-0.20 (0.025)**	1.54 (0.689)*	0.07 (0.070)	1.00 (0.607)
Proportion of boys<5 yrs	0.11 (0.028)**	-0.19 (0.584)	-0.25 (0.026)**	-0.20 (0.583)	-0.15 (0.059)*	-0.92 (0.497)
Proportion of family member who completed primary school	0.00 (0.008)	0.01 (0.132)	0.00 (0.005)	0.01 (0.132)	0.00 (0.013)	-0.09 (0.116)
Proportion of family members who completed junior secondary school	0.00 (0.005)	0.07 (0.105)	0.01 (0.005)	0.07 (0.105)	-0.01 (0.009)	-0.02 (0.091)
Proportion of family members who completed senior secondary school	-0.02 (0.007)*	0.56 (0.241)*	0.04 (0.013)**	0.56 (0.244)*	0.05 (0.027)	0.54 (0.222)*
Proportion of family members who completed university	0.05 (0.044)	-0.06 (0.473)	0.00 (0.018)	-0.06 (0.472)	0.12 (0.058)*	0.12 (0.497)
Location 2	0.00 (0.007)	0.23 (0.132)	-0.03 (0.008)**	0.23 (0.132)	0.02 (0.012)*	0.32 (0.111)**
Location 3	0.00 (0.007)	0.35 (0.134)**	-0.03 (0.008)**	0.35 (0.133)**	0.01 (0.013)	0.33 (0.117)**
Location 4	-0.01 (0.008)	-0.17 (0.120)	-0.04 (0.012)**	-0.17 (0.121)	-0.04 (0.016)**	-0.20 (0.128)
Location 5	0.01 (0.007)	0.21 (0.121)	-0.04 (0.008)**	0.21 (0.121)	-0.01 (0.013)	0.23 (0.112)*
Location 6	0.00 (0.006)	0.19 (0.097)	-0.05 (0.008)**	0.19 (0.097)	-0.03 (0.010)*	0.17 (0.089)
Location 7	0.00 (0.007)	0.06 (0.108)	-0.05 (0.008)**	0.06 (0.108)	-0.04 (0.011)**	-0.01 (0.095)
Head of household is of Asante ethnicity	0.00 (0.003)	0.14 (0.076)	0.00 (0.005)	0.14 (0.076)	0.01 (0.008)	0.14 (0.071)
Age household head		0.01 (0.001)**		0.01 (0.001)**		0.00 (0.001)**
Household has at least one returned migrant		0.08 (0.043)		0.07 (0.042)		0.03 (0.016)*
Constant	-0.02 (0.028)	-0.21 (0.627)	0.01 (0.034)	-0.21 (0.628)	0.00 (0.063)	0.26 (0.526)
Observations	5998	5998	5998	5998	5998	5998
Lambda	0		0		0.12	
Chi2	72.24		455.9		230.6	

Robust standard errors in parentheses. Estimation using Maximul Likelihood

\* significant at 5%; \*\* significant at 1%

Note: Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: GLSS 1988/99

**Appendix Table 2. Fractional logit odd ratio coefficients, sex of the household model by type of expenditure groups: Ghana 1998/99**

	Food	Consumer and durable goods	Housing	Health	Education	Other
Female-headed household receiving internal remittances	0.992 (0.034)	0.938 (0.032)*	0.999 (0.034)	1.099 (0.077)	1.087 (0.089)	1.005 (0.048)
Female headed-household receiving international remittances	0.855 (0.049)***	1.123 (0.072)*	1.107 (0.067)*	1.13 (0.167)	0.962 (0.131)	1.121 (0.075)*
Female-headed household	1.1 (0.038)***	0.85 (0.027)***	0.916 (0.030)***	0.923 (0.055)	1.401 (0.100)***	0.918 (0.043)*
Receive internal remittances	0.992 (0.024)	1.015 (0.024)	0.998 (0.024)	1.054 (0.051)	1.02 (0.064)	0.968 (0.035)
Receive international remittances	0.939 (0.041)	1.071 (0.046)	1.039 (0.049)	1.069 (0.112)	1.145 (0.123)	0.987 (0.046)
log_total expenditure/capita	0.926 (0.024)***	1.167 (0.032)***	0.45 (0.014)***	1.081 (0.043)*	0.994 (0.048)	1.12 (0.032)***
log_household size	0.819 (0.019)***	1.177 (0.030)***	0.493 (0.013)***	1.064 (0.045)	2.796 (0.154)***	1.054 (0.027)**
Age household head	1.007 (0.001)***	0.989 (0.001)***	1.001 (0.001)*	1.003 (0.001)*	1.001 (0.002)	0.998 (0.001)**
Proportion of males>15 yrs	1.05 (0.053)	0.979 (0.057)	1.146 (0.068)**	0.842 (0.109)	0.284 (0.055)***	1.038 (0.072)
Proportion of females>15 yrs	0.914 (0.044)*	1.127 (0.056)**	1.26 (0.055)***	1.16 (0.147)	0.23 (0.043)***	1.231 (0.088)***
Proportion of girls<5 yrs	1.6 (0.474)	1.829 (0.400)***	0.521 (0.134)**	2.076 (1.046)	0 (0.000)***	1.239 (0.627)
Proportion of boys<5 yrs	1.466 (0.361)	1.815 (0.444)**	0.509 (0.109)***	7.062 (3.395)***	0 (0.000)***	0.816 (0.250)
Proportion of family member who completed primary school	0.989 (0.048)	1.011 (0.053)	0.876 (0.048)**	0.976 (0.134)	1.369 (0.249)*	1.059 (0.077)
Proportion of family members who completed junior secondary school	0.863 (0.033)***	1.159 (0.050)***	1.03 (0.037)	0.986 (0.075)	2.153 (0.331)***	0.995 (0.046)
Proportion of family members who completed senior secondary school	0.616 (0.058)***	1.383 (0.135)***	1.098 (0.060)*	0.578 (0.108)***	7.483 (1.959)***	1.205 (0.175)
Proportion of family members who completed university	0.282 (0.076)***	1.983 (0.329)***	3.663 (1.588)***	0.568 (0.333)	2.791 (1.585)*	2.279 (0.708)***
Location 2	1.097 (0.086)	1.004 (0.061)	0.431 (0.037)***	1.095 (0.173)	0.723 (0.092)**	1.082 (0.072)
Location 3	1.152 (0.088)*	1.217 (0.076)***	0.462 (0.025)***	1.054 (0.154)	0.571 (0.060)***	0.817 (0.054)***
Location 4	1.449 (0.149)***	1.035 (0.080)	0.541 (0.046)***	0.766 (0.118)*	0.39 (0.050)***	0.757 (0.074)***
Location 5	1.359 (0.113)***	1.077 (0.069)	0.362 (0.022)***	1.201 (0.176)	0.461 (0.053)***	0.752 (0.063)***
Location 6	1.418 (0.103)***	1.206 (0.067)***	0.29 (0.017)***	1.18 (0.161)	0.424 (0.049)***	0.602 (0.041)***
Location 7	1.714 (0.142)***	1.113 (0.080)	0.291 (0.018)***	0.932 (0.135)	0.277 (0.039)***	0.525 (0.043)***
Head of household is of Asante ethnicity	0.971 (0.038)	0.986 (0.036)	1.067 (0.033)**	0.94 (0.055)	1.062 (0.091)	1.08 (0.067)
Observations	5998	5998	5998	5998	5998	5998
Deviance	397.23	278.83	31.55	212.96	270.23	290.06

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

**Appendix Table 3. Fractional logit odds ratio coefficients for the influence of the sex of the remitter by expenditure type: Ghana, 1998/99**

	Food	Consumer and durable goods	Housing	Health	Education	Other
Remitter is female	0.99 (0.023)	1.00 (0.022)	0.97 (0.021)	1.01 (0.046)	0.99 (0.059)	1.03 (0.034)
Female-headed household	1.02 (0.032)	0.86 (0.030)***	0.90 (0.031)***	1.10 (0.080)	1.54 (0.139)***	0.98 (0.046)
log_total expenditure/capita	0.96 (0.024)	1.16 (0.029)***	0.44 (0.013)***	1.10 (0.051)**	1.02 (0.057)	1.09 (0.038)**
log_households size	0.80 (0.021)***	1.25 (0.038)***	0.48 (0.014)***	1.07 (0.059)	3.12 (0.208)***	1.03 (0.039)
Age household head	1.01 (0.001)***	0.99 (0.001)***	1.00 (0.001)***	1.00 (0.002)	1.00 (0.003)	1.00 (0.001)**
Proportion of males>15 yrs	0.94 (0.065)	1.08 (0.090)	1.08 (0.079)	1.19 (0.208)	0.35 (0.091)***	1.05 (0.116)
Proportion of females>15 yrs	0.86 (0.055)**	1.28 (0.093)***	1.24 (0.080)***	1.42 (0.228)**	0.20 (0.056)***	1.15 (0.109)
Proportion of girls<5 yrs	1.20 (0.144)	1.08 (0.120)	0.91 (0.101)	1.38 (0.306)	0.10 (0.030)***	1.20 (0.256)
Proportion of boys<5 yrs	1.26 (0.136)**	1.22 (0.133)*	0.72 (0.071)***	2.54 (0.583)***	0.06 (0.018)***	0.77 (0.123)*
Proportion of family member who completed primary school	1.10 (0.073)	0.92 (0.063)	0.96 (0.064)	1.00 (0.177)	1.02 (0.247)	1.01 (0.105)
Proportion of family members who completed junior secondary school	0.93 (0.054)	1.15 (0.061)***	1.05 (0.049)	1.00 (0.124)	1.62 (0.408)*	0.91 (0.072)
Proportion of family members who completed senior secondary school	0.69 (0.095)***	1.31 (0.170)**	1.08 (0.081)	0.62 (0.136)**	4.91 (1.674)***	1.21 (0.296)
Proportion of family members who completed university	0.20 (0.082)***	2.12 (0.798)**	5.97 (4.011)***	2.50 (1.640)	1.22 (1.164)	2.70 (1.082)**
Location 2	1.27 (0.068)***	0.95 (0.052)	0.38 (0.023)***	1.07 (0.134)	0.56 (0.067)***	1.05 (0.069)
Location 3	1.28 (0.069)***	1.09 (0.058)	0.46 (0.024)***	1.04 (0.115)	0.53 (0.063)***	0.82 (0.053)***
Location 4	1.73 (0.128)***	0.86 (0.061)**	0.46 (0.037)***	0.75 (0.150)	0.41 (0.113)***	0.74 (0.075)***
Location 5	1.50 (0.082)***	0.99 (0.053)	0.35 (0.019)***	1.14 (0.139)	0.44 (0.047)***	0.75 (0.051)***
Location 6	1.54 (0.076)***	1.16 (0.056)***	0.28 (0.013)***	1.07 (0.108)	0.38 (0.041)***	0.62 (0.039)***
Location 7	1.76 (0.102)***	1.15 (0.065)**	0.27 (0.013)***	0.89 (0.102)	0.28 (0.044)***	0.55 (0.042)***
Head of household is of Asante ethnicity	0.98 (0.035)	0.97 (0.033)	1.06 (0.041)	0.98 (0.066)	1.15 (0.109)	1.07 (0.056)
Observations	4011	4011	4011	4011	4011	4011
Deviance	148.97	97.74	12.10	82.27	107.18	116.59

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Note: Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: Authors' calculation based on GLSS4.

**Appendix Table 4. Fractional logit odds ratio coefficients by type of expenditure (all variables)**

	Food	Consumer and durable goods	Housing	Health	Education	Other
Remitter is female	0.834 (0.050)***	1.058 (0.065)	1.013 (0.067)	1.320 (0.193)*	1.081 (0.163)	1.237 (0.116)**
Remitter is spouse of head of household	0.975 (0.051)	0.994 (0.055)	0.966 (0.045)	1.078 (0.115)	1.297 (0.149)**	0.923 (0.066)
Remitter is child of head of household	1.037 (0.040)	0.968 (0.042)	0.964 (0.041)	1.224 (0.105)**	0.843 (0.085)*	1.010 (0.063)
Remitter is sibling of head of household	1.055 (0.039)	0.929 (0.033)**	1.005 (0.042)	1.036 (0.083)	1.068 (0.100)	0.976 (0.052)
Remitter is female and spouse of head of household	1.163 (0.270)	1.012 (0.328)	0.949 (0.145)	0.568 (0.251)	0.461 (0.183)*	1.179 (0.299)
Remitter is female and child of head of household	1.118 (0.056)**	0.925 (0.047)	0.993 (0.053)	0.811 (0.094)*	1.188 (0.176)	0.871 (0.067)*
Remitter is female and sibling of head of household	1.126 (0.070)*	0.953 (0.055)	0.964 (0.060)	0.941 (0.116)	0.801 (0.114)	0.887 (0.081)
Remitter lives in Ghana	1.106 (0.040)***	0.880 (0.035)***	0.923 (0.040)*	1.075 (0.090)	0.945 (0.094)	0.966 (0.047)
Remitter is female and lives in Ghana	1.127 (0.067)**	0.975 (0.058)	0.965 (0.063)	0.804 (0.106)*	0.957 (0.133)	0.859 (0.078)*
Female headed household	1.021 (0.033)	0.856 (0.031)***	0.907 (0.031)***	1.082 (0.082)	1.482 (0.133)***	0.992 (0.047)
log_total expenditure/capita	0.979 (0.024)	1.140 (0.028)***	0.435 (0.013)***	1.098 (0.050)**	1.007 (0.056)	1.075 (0.037)**
log_households size	0.809 (0.021)***	1.228 (0.037)***	0.475 (0.013)***	1.068 (0.058)	3.083 (0.203)***	1.020 (0.039)
Age household head	1.008 (0.001)***	0.988 (0.001)***	1.002 (0.001)***	1.001 (0.002)	1.001 (0.004)	0.997 (0.001)*
Proportion of males>15 yrs	0.950 (0.065)	1.063 (0.087)	1.074 (0.078)	1.184 (0.206)	0.363 (0.093)***	1.033 (0.116)
Proportion of females>15 yrs	0.859 (0.053)**	1.275 (0.089)***	1.237 (0.078)***	1.412 (0.224)**	0.212 (0.058)***	1.127 (0.107)
Proportion of girls<5 yrs	1.226 (0.148)*	1.068 (0.119)	0.912 (0.102)	1.405 (0.317)	0.092 (0.028)***	1.196 (0.251)
Proportion of boys<5 yrs	1.291 (0.139)**	1.205 (0.131)*	0.718 (0.072)***	2.546 (0.582)***	0.055 (0.017)***	0.760 (0.122)*
Proportion of family member who completed primary school	1.094 (0.073)	0.922 (0.063)	0.954 (0.065)	1.007 (0.177)	0.970 (0.231)	1.022 (0.106)
Proportion of family members who completed junior secondary school	0.929 (0.053)	1.151 (0.062)***	1.051 (0.049)	1.014 (0.125)	1.598 (0.391)*	0.909 (0.072)
Proportion of family members who completed senior secondary school	0.690 (0.092)***	1.300 (0.161)**	1.088 (0.081)	0.617 (0.138)**	4.937 (1.695)***	1.196 (0.289)
Proportion of family members who completed university	0.220 (0.090)***	1.946 (0.729)*	5.670 (3.905)**	2.609 (1.696)	1.170 (1.075)	2.586 (1.045)**
Location 2	1.251 (0.068)***	0.960 (0.053)	0.379 (0.023)***	1.067 (0.135)	0.583 (0.068)***	1.049 (0.068)
Location 3	1.278 (0.068)***	1.092 (0.058)*	0.459 (0.024)***	1.040 (0.115)	0.542 (0.065)***	0.819 (0.053)***
Location 4	1.684 (0.124)***	0.877 (0.063)*	0.465 (0.036)***	0.753 (0.148)	0.438 (0.121)***	0.746 (0.075)***
Location 5	1.459 (0.080)***	1.013 (0.055)	0.358 (0.019)***	1.121 (0.138)	0.455 (0.050)***	0.763 (0.051)***
Location 6	1.506 (0.076)***	1.181 (0.060)***	0.284 (0.013)***	1.063 (0.110)	0.391 (0.043)***	0.626 (0.038)***
Location 7	1.713 (0.100)***	1.183 (0.068)***	0.270 (0.013)***	0.875 (0.101)	0.292 (0.047)***	0.557 (0.042)***
Head of household is of Asante ethnicity	0.986 (0.034)	0.960 (0.032)	1.055 (0.040)	0.974 (0.066)	1.138 (0.104)	1.063 (0.056)
Observations	4011	4011	4011	4011	4011	4011
Deviance	146.030	96.340	12.010	81.780	106.130	115.730

Robust standard errors in parentheses

\* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

Note: Robust standard errors are used to account for the primary sample unit (PSU) of the survey methodology.

Source: GLSS 1998/99

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