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Remittances and the Brain Drain: Evidence from Microdata for Sub-Saharan Africa*

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Abstract

Research on the relationship between high-skilled migration and remittances has been limited by the lack of suitable microdata. We create a unique cross-country dataset by combining household surveys from five Sub-Saharan African countries that enables us to analyze the effect of migrants' education on their remittance behavior. Having comprehensive information on both ends of the migrant-origin household relationship and employing household fixed effects specifications that only use within-household variation for identification allows us to address the problem of unobserved heterogeneity across migrants' origin households. Our results reveal that migrants' education has no significant impact on the likelihood of sending remittances. Conditional on sending remittances, however, high-skilled migrants send significantly higher amounts of money to their households left behind. This effect holds for the sub-groups of internal migrants and migrants in non-OECD countries, while it vanishes for migrants in OECD destination countries once characteristics of the origin household are controlled for.

JEL Classifications: F22, F24, O15

Keywords: migration, remittances, skill level, brain drain, Sub-Saharan Africa

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1 Introduction

The so-called "brain-drain" or the migration of high-skilled individuals to other regions where human capital is abundant is a major concern for developing countries with a relatively small number of highly educated individuals, as it represents the loss of their most talented workers (see, e.g., Haque and Kim, 1995; Beine *et al.*, 2008; Di Maria and Lazarova, 2012; Djiofack *et al.*, 2013).[1] The most evident way through which some of the negative externalities of the brain drain can be somewhat offset are remittances (Docquier and Rapoport, 2012; Gibson and McKenzie, 2012). Although numerous papers investigate the determinants of migrants' remittance patterns[2], there is still little consensus on whether and how the education of migrants affects the likelihood and the amount of remittances sent.

Building on previous literature, we revisit this question and create a unique cross-country dataset by combining household surveys from five Sub-Saharan African countries. This data includes detailed information on both the migrants and the households at the origin country and thus allows us to address the problem of unobserved heterogeneity across migrants' origin households. Investigating the nexus between migrants' education and their remittance behavior for the Sub-Saharan African case is of particular interest: Not only is the share of high-skilled individuals in Sub-Saharan Africa among the lowest in the world (UNESCO, 2016), but also has the high-skilled emigration rate in these countries steadily increased since the mid-nineties (from 11% in 1995 to 16% in 2010, see Figure 1), representing today the highest high-skilled emigration rate among all developing regions.

Theoretically, there are several reasons why high-skilled migrants may send more or less remittances than low-skilled migrants. On the one hand, high-skilled migrants may remit less because they often come from better-off families with lower income constraints. Besides, they may have a lower propensity to return to their origin countries, which

[1] Recent literature does not only consider the negative consequences of high-skilled migration, but also points to its positive effects, suggesting the existence of a brain gain instead of a brain drain (see, e.g., Beine *et al.*, 2001, 2011; Dustmann *et al.*, 2011; Batista *et al.*, 2012).

[2] See Rapoport and Docquier (2006), Gibson and McKenzie (2011), Yang (2011), and Docquier and Rapoport (2012) for a general literature overview and Azam and Gubert (2006) for a review on the remittance behavior of African migrants.

decreases their incentives to invest in their home community. On the other hand, more educated migrants are subject to higher wages which, according to the altruism motive of remittances, would predict them to remit more. Also, they face lower transaction costs because they are more likely to have access to bank accounts and other financial services, and are less likely to be undocumented migrants. In addition, following the investment motive, remittances may serve as a way of repayment if family members at the origin country have funded the education of the migrant (Rapoport and Docquier, 2006; Docquier and Rapoport, 2012). It is, thus, not clear if highly educated migrants remit more or less than less skilled migrants.

Previous empirical literature on the effect of education on remittance patterns mainly relies on macrodata, investigating the relationship between high-skilled emigration rates and remittances inflows at the country level. Limiting their analysis to OECD destination countries, Faini (2007), Adams (2009), and Niimi *et al.* (2010) come to the conclusion that the adverse impact of skilled migration cannot be mitigated through remittances because migrant remittances are lower in countries with a high share of high-skilled among emigrants. Using a panel database on bilateral remittances, Docquier *et al.* (2012) and Le Goff and Salomone (2016), on the other hand, find a positive relationship between the share of high-skilled migrants and the amount of remittances received. Docquier *et al.* (2012) further show that the destination country's immigration policy is a key determinant of the sign and magnitude of the relationship between high-skilled emigration rates and remittances.

As outlined by Bollard *et al.* (2011), the main disadvantage of such cross-country analyses is that they are only able to identify whether countries that send a larger share of educated migrants receive larger or smaller remittance flows than countries sending a smaller share of high-skilled migrants. However, there are many other ways in which countries differ. For example, if poverty is a constraint to both migration and education, poor countries might send less migrants (and thus receive less remittances) and those migrants might also be less educated, creating a spurious relationship between a country's high-skilled emigration rate and the amount of remittances received. Microdata, on the

other hand, allows a direct investigation of the relationship between migrants' education and their remittance behavior. Furthermore, is has the advantage of capturing remittances sent through both formal and informal channels. Empirical evidence based on microdata, however, is still scarce and the results are inconclusive.

Dustmann and Mestres (2010) use data from the German Socio-Economic Panel and find a negative effect of years of schooling on remittances after controlling for return intentions and for whether family members (spouse and children) still live in the origin country. Bollard *et al.* (2011), on the other hand, using a pooled dataset of household surveys in eleven OECD destination countries, find a mixed relationship between migrants' education and remittances. While they do not find a significant effect of having a university degree on the likelihood of sending remittances, they find a strong positive relationship between education and the amount of money sent, conditional on sending remittances. Using the same database but focusing on African migrants, Bollard *et al.* (2010) come to a similar conclusion and further show that the relationship between education and the amount remitted is non-linear.

A common issue that previous microdata studies share is that they are based on survey data collected in migrants' destination countries, and thus not able to incorporate the economic situation and the characteristics of the household left behind in their analysis.[3] However, the economic conditions in migrants' home region and the characteristics of the origin household, e.g., the income level, are important determinants of the remitting behavior of migrants.[4] As both are also correlated with the education level of the migrants, omitting these factors affects the results and leads to biased estimates.

We overcome these issues by analyzing the effect of migrants' education on their remitting behavior using unique household survey data from five Sub-Saharan African sending countries, namely Burkina Faso, Kenya, Nigeria, Senegal, and Uganda. This

[3]Notable exceptions include Osili (2007) using a matched sample of Nigerian migrants residing in Chicago and their origin households as well as Duval and Wolff (2010) and Bouoiyour and Miftah (2015) using household surveys from Albania and Morocco, respectively. However, these studies are different from ours as they do not address the brain drain, but focus on other aspects of migrants' remittance behavior.

[4]Empirical evidence shows, for example, that remittances increase when the household left behind experiences a negative income shock (see, e.g., Amuedo-Dorantes and Pozo, 2006; Yang and Choi, 2007; Bettin *et al.*, 2016; Gröger and Zylberberg, 2016).

database has two main advantages: First, it contains comprehensive information on both the migrant and the household left behind, enabling us to control for characteristics of both sides of the migrant-household relationship, thus limiting the concern of an omitted variable bias to a minimum. Especially, taking advantage of the fact that most households have more than one migrant, the data allows us to control for household fixed effects and thus solely rely on within-household (between-migrants) variation to identify the effect of migrants' education on their remittance behavior. Second, previous studies concerning remittances and high-skilled migration focus only on individuals who migrated to OECD countries, which represent a very selected group of migrants.[5] Yet, the brain drain is not limited to the migration of high-skilled individuals to high-income countries, but is also a regional and local concern. For instance, the movement of highly educated individuals within national borders, usually from rural to urban areas, can result in a persistent state of underdevelopment and impoverishment (George *et al.*, 2002). To address this, we use a sample of all individuals having migrated from five sending countries to different destination countries, including OECD countries, non-OECD countries as well as internal migrants. Hence, we are able to provide important insights into the remitting behavior of the largest, but so far neglected groups of migrants – internal migrants and migrants in non-OECD destination countries.[6]

Overall, we do not find evidence that education is a determinant of the likelihood of sending remittances. It is, however, an important factor to determine the amount of remittances sent. Conditional on sending remittances, migrants with a university degree send a significantly higher amount than migrants with lower levels of education. These results are robust to controlling for observable and unobservable characteristics of the households left behind. This suggests that some of the negative externalities of the "brain drain" on the source countries can be counterbalanced by migrants' remittances. These

[5]According to migration statistics provided by the World Bank (2013), only 27% of Sub-Saharan African migrants go to OECD countries, while the majority remains within the region (65%) or migrates to other non-OECD destination countries (8%).

[6]While international remittances have become a more frequently researched topic in recent years, studies on internal remittances are almost non-existent. A notable exception is de Brauw *et al.* (2013) analyzing the remittances motives of internal migrants in Ethiopia.

effects hold for the sub-samples of internal migrants and migrants in non-OECD countries. For migrants in OECD destination countries, however, the positive effect of education on the amount of remittances sent vanishes once characteristics of the household at the origin country are controlled for. This result highlights the importance of controlling for characteristics of both sides of the migrant-household relationship when analyzing migrants' remittance behavior.

The structure of the paper is as follows. The following section describes the data used and presents some descriptive statistics. Section 3 outlines the empirical methodology. In Section 4, we present our estimation results and Section 5 concludes.

2 Data and Descriptive Statistics

The data used in our empirical analysis comes from the *Migration and Remittances Households Surveys* conducted in 2009/10 by the World Bank in six Sub-Saharan African countries: Burkina Faso, Kenya, Nigeria, Senegal, Uganda, and South Africa (Plaza *et al.*, 2011). The single household surveys are part of the Africa Migration Project and are standardized across countries, which allows us to combine them to a unique cross-country dataset.[7] An exception is the survey for South Africa, which differs because South Africa rather represents a migrant-receiving country than a migrant-sending country, and is therefore excluded from our analysis.

In each country, about 2,000 households were interviewed and comprehensive information on the household at the origin country as well as on the characteristics of all household members was collected – of those still living in the household and of former household members who migrated. With respect to the latter, the database includes information on demographic characteristics, migration motives, and remittance patterns of each individual. As highlighted by Osili (2007) and de Brauw *et al.* (2013), having data on both the sending and the receiving household is crucial for understanding migrants' remittance behavior.

[7]The surveys are nationally representative for Nigeria, Senegal, and Uganda. In the case of Burkina Faso and Kenya, they are representative for the 10 largest provinces and the top 17 districts with the highest concentration of migrants, respectively. For further information about the data collection, see Plaza *et al.* (2011).

While previous studies on the brain drain and migrants' remittance behavior observe only one side of the migrant-origin family transaction, and are therefore likely to suffer from an omitted variable bias, we are the first to be able to consider comprehensive information on both sending and receiving households. In addition, a main feature of the data is that it not only reports information on migrants that live abroad, but also on internal migrants, who mainly moved from rural to urban areas. Hence, in contrast to previous studies, which only consider migrants to OECD countries, we observe a sample of all individuals who have migrated from five sending countries to different destinations, including OECD countries, non-OECD countries as well as internal migrants. Having data from migrants' sending countries further enables us to consider undocumented migrants, which are usually not included in surveys collected in migrants' destination countries.

Household surveys collected in migrants' sending countries have the disadvantage, though, that they are likely to miss migrants who emigrated with their entire household. However, as Bollard *et al.* (2011) show, household composition in the destination country is about the same for high- and low-skilled migrants, which makes us confident that this sort of selectivity will hardly affect our estimation results.

For the purpose of our identification strategy, we restrict the sample to households that report to have at least one former household member that migrated before the interview was conducted. Considering both internal and international migrants, the overall sample consists of 9,809 migrants from 5,368 origin households.[8]

In contrast to other data sources, we are able to observe remittances at the individual level sent through formal and informal channels. The households report if they received remittances from each migrant in the last 12 months before the interview was conducted, as well as the amount received in local currency. In order to make remittance and income levels comparable across countries, we convert all financial values to U.S. dollars using the average exchange rate for 2009 for each currency.[9] Of course, there is always a concern

[8]In our basic estimations, we do not impose any restriction on the age of the migrants. The results, however, are robust to restricting the sample to migrants of working age (i.e., those aged 25 to 65 years).

[9]Note that we exclude 5 observations from the sample because the reported amount of yearly remittances was implausibly high, exceeding 80,000 USD.

that remittance data collected through surveys may be subject to measurement error. However, there is no reason to believe that such measurement error is correlated with migrants' education status. Also, the use of origin household fixed effects (see Section 4.2) will allow us to capture any common effects at the household level. To still bias our estimates, the measurement error would have to systematically vary over migrants within the same household.

With respect to our variable of interest, the surveys report the migrant's education level in different categories across countries. We create a binary variable indicating whether the individual has a university degree or completed postgraduate studies. All individuals with lower education levels are included in the reference group.

To gain a first insight into the relationship between migrants' education and the amount of remittances sent to the household left behind, Figure 2 shows the underlying distribution of the logarithm of remittances, conditional on sending remittances, for the two education groups. While there is a large overlap between the distributions, the distribution of remittances sent by migrants with a university degree is clearly shifted to the right of the one for migrants with a lower educational degree. This provides some first descriptive evidence of a positive relationship between migrants' education and the amount of remittances sent to the origin households.

In our empirical analysis, we control for various characteristics of the migrants and the households at the origin country. With respect to migrants' demographic characteristics, we control for gender, age, marital status, and years spent at the destination country. To allow for non-linear effects, the latter two variables are further included as squared terms. In addition, we include a binary variable indicating if the individual migrated internally. We also control for the migration reason by indicating if the decision was made to search for a job, to pursue education, to reunite with family members, or for other reasons (e.g., related to conflict or weather conditions). We expect the individual remitting behavior to be correlated with the reason to migrate. For instance, individuals who migrated to reunite with family members may be less likely to send remittances than those who migrated for job-related reasons.

Unfortunately, we do not have information on the migrant's income level at the destination country, which is a key determinant of migrants' remittance behavior. We do, however, have information on the current labor force status of the migrant, distinguishing between full-time employment, part-time employment, self-employment, and not participating in the labor force. We expect the labor force status to be highly correlated with migrants' income and thus use it as a proxy for the unobserved earnings potential of the migrants.

We also control for the relationship of the migrant to the current household head in the origin country, as this may be relevant for the decision to transfer resources. We distinguish between spouses, children, and other relatives of the household head, whom we expect to have different motives to remit. Finally, we add indicator variables for different groups of destination countries, which we categorize in four groups according to their income level: high, upper-middle, lower-middle and low income (see World Bank, 2015). Alternatively, we include destination-country fixed effects to control for unobserved characteristics of the destination country.

We further control for a comprehensive set of characteristics of the households at the origin country. We proxy the non-remittance income by total household expenditures minus remittance income. As the time base for different expenditures varies over the categories, we aggregate weekly and monthly values to yearly values, to obtain a measure of the household's total expenditures. We also include additional controls that are related to the socioeconomic status of the family or its wealth, i.e., indicators for house ownership, agricultural land ownership, and access to electricity. In addition, we account for the demographic composition of the household by including household size, the number of migrants, a dummy variable indicating if the household head is male, and the share of dependents (children, unemployed, and elderly people). We build the latter variable by aggregating the number of household members who are not part of the labor force and dividing it by the total household size.

Lastly, as the region where the origin household is located may also matter for migrants' remittance behavior, we add district fixed effects to the model. This allows us to control for unobserved factors at a smaller regional level, such as the poverty level of the area and

access to services, which might be correlated with both migrants' education level and their remitting behavior.

Table 1 presents descriptive statistics for our basic sample and compares the characteristics of migrants who have completed a university degree and migrants who have lower levels of education. Overall, 48% of Sub-Saharan African migrants send remittances with an average of 435 USD per year. Conditional on sending remittances the annual amount increases to 917 USD, which is a significant amount considering that the average annual income in the countries considered ranges from 1,350 USD for Burkina Faso to 4,451 USD for Nigeria (World Bank, 2016). With respect to the education level, only 7.5% have completed tertiary education. This again highlights the importance of investigating the consequences of the brain drain for the Sub-Saharan African case, which is characterized by one of the lowest shares of high-skilled individuals in the world (UNESCO, 2016). We further see that 70% of the migrants in the sample are men, have an average age of 31 years, and have spent about 6.6 years in the destination country. There is a large number of internal migrants (61%), and most of the individuals migrate for work-related reasons (62%) and are currently either full-time employed (32%) or self-employed (35%).

Concerning the characteristics of the family in the origin country, Table 1 shows that households have on average three former members who are migrants. Moreover, most of the households are headed by men (77%). 72% own agricultural land and only 53% have access to electricity. The average household size is eight individuals and about half of the members in the household (53%) depend on other members.

Table 1 further highlights some differences between high and lower skilled Sub-Saharan African migrants. With respect to the remittance behavior, we observe that the proportion of individuals sending money back home is slightly higher for migrants who have a university degree (53%) than for those without a degree (47%). In addition, there is a large and significant difference in the average amount of money sent per year. Conditional on remitting, highly educated individuals send home about 2,000 USD per year, in contrast to 818 USD for migrants with lower levels of education.

Individual characteristics that can influence the remittance behavior also differ among

the two groups. Migrants with a university degree are less likely to be male and are older than less educated migrants. In terms of marital status and years since migration, we do not observe a significant difference between the groups. Individuals with a university degree are less likely to migrate internally (47%) than lower educated migrants (62%). About 29% of the individuals with a university degree migrated to pursue further education, compared to 19% of lower skilled migrants. The highly educated are also less likely to migrate for work-related reasons or to reunite with family members. Regarding the labor force status, migrants with a university degree are more likely to be full-time employed (66%) than migrants without a degree (29%), and they are less likely to be self-employed or inactive. In terms of the destination country chosen, high-skilled migrants are more likely to reside in high-income or upper-middle income countries (46%) than less skilled individuals (18%).

Differences in the composition of the household left behind among groups are also present. In line with conventional wisdom, more educated migrants come from better-off households. The most remarkable difference is that highly educated migrants come from households with a higher income level (13,182 USD) than migrants with lower levels of education (4,616 USD). Migrants with a university degree are also more likely to originate from a household located in an urban area (68% compared to 36% for less educated migrants). 82% have access to electricity, compared to only 51% for the lower skilled group. They are also less likely to own agricultural land (54%) than households of less educated migrants (73%). Lastly, highly educated migrants come on average from smaller households and have a smaller share of dependent members (49% vs. 53%) than lower skilled migrants.

3 Empirical Model

To identify the effect of migrants' education on their remittance behavior, we estimate a model in which migrants' remittances are a function of a set of independent variables comprised of information on the migrants and their households left behind. In our baseline

specification, we estimate the following model:

$$R_{ij} = \alpha + \beta' E_i + \theta' \mathbf{X_i} + \gamma' \mathbf{H_j} + \delta_d + \eta_r + \epsilon_{ij}, \tag{1}$$

where R_{ij} measures remittances sent by migrant i to household j. E_i is a dummy variable indicating if the individual has a university degree or not, $\mathbf{X_i}$ a vector of individual demographic characteristics, $\mathbf{H_j}$ a vector of characteristics of the household at the origin country, and ϵ_{ij} represents the error term. Our key coefficient of interest is β, the estimated impact of having a university degree on migrants' remittance behavior.

To account for observed and unobserved heterogeneity at the destination (e.g., labor market characteristics) and the origin level (e.g., educational quality), we further add destination-country fixed effects, δ_d, and origin-region fixed effects at the district level, η_r, to the estimation model. Destination and origin-region fixed effects are also important to control for the selection of specific types of individuals into migration and their sorting into specific destination countries (Licuanan *et al.*, 2015). For instance, migrants who have a high motivation to remit may choose to locate in countries with high wages. These countries may also primarily demand high-skilled migrants, because of their high labor market standards. As a result, the relationship between migrants' education and the level of remittances sent may be biased, because it merely reflects the type of migrants who choose to live in these countries. On the origin-region side, it is likely that regions that regularly face natural disasters, such as droughts and floods, receive more remittances. At the same time, it is likely that the educational infrastructure in these regions is comparatively underdeveloped and that migrants are mainly low skilled. If the origin region's exposure to natural disasters and other local characteristics are not controlled for, the estimated effect of migrants' education on their remittance behavior is therefore likely to be biased.

Similar to Bollard *et al.* (2011), we use three alternative measures of remittances. First, in order to capture the overall effect of migrants' education on remittances, we use the reported total amount of remittances to capture both the extensive and intensive margin. Second, we create a binary variable that indicates whether the migrant remits or not

(extensive margin). Third, we use the logarithm of the amount of remittances conditional on remitting (intensive margin). For all three outcomes, the model is estimated using OLS.[10] To account for within-household correlation, the standard errors are clustered at the origin household level.

In the previous specification, we control for observed characteristics of the household in the origin country, which raises the concern that the estimates are biased due to unobserved household characteristics that we cannot account for. For example, we might not able to perfectly capture the local conditions of the area the origin household is located in, which might be correlated with both migrants' remittances and their level of education. Taking advantage of the fact that most households in our dataset have more than one migrant, we address this issue by proposing an alternative identification strategy in which we restrict the sample to multiple-migrant households[11] and add household fixed effects, ϱ_j, to the model:

$$R_{ij} = \kappa + \mu' E_i + \rho' \mathbf{X_i} + \varphi_d + \varrho_j + \nu_{ij}. \tag{2}$$

In Eq. (2), we therefore solely rely on within-household variation to identify the effect of migrants' education (μ) on their remittance behavior. This enables us to eliminate any unobserved heterogeneity at the household level that might bias our estimates. Of course, we cannot rule out that unobserved heterogeneity at the individual level, e.g., due to ability, is still a potential threat for our identification strategy. Hence, while we are able to largely reduce the problem of unobserved heterogeneity present in other studies and address potential sources of measurement error, we do not claim to estimate a true causal effect of migrants' education on their remittance behavior. However, as argued amongst others by Bollard *et al.* (2011), from a policy perspective the main aim is not to identify the causal effect of education on remittances, but to provide evidence on whether policies that favor skilled-migration affect remittances.

[10] Using a probit or a logit model to estimate migrants' probability to remit delivers quantitatively similar results.

[11] In our sample, 69% of the households have more than one migrant. See Section 4.2 for a discussion of a possible selectivity of multiple-migrant households.

4 Results

4.1 Effect of Migrants' Education on Remittances

The results of estimating Eq. (1) are presented in Tables 2-4. We start our analysis by estimating the effect of education on the total amount of remittances sent using a sample of all migrants, i.e., unconditional on whether the migrants send remittances or not. Column I in Table 2 shows a parsimonious specification that controls for migrant characteristics, origin-country fixed effects, and the income group of the destination country. The results reveal that migrants with a university degree remit, on average, about 280 USD more than less educated migrants. When including destination-country fixed effects to control for destination-specific factors, such as differences in wages or employment probabilities, the coefficient slightly decreases in magnitude but remains similar in terms of significance (column II). In subsequent columns, we take advantage of the fact that the data provides comprehensive information on the households at the origin country and stepwise add the households' level of non-remittance income and further important household characteristics to the model. When controlling for household income (column III), which itself is negatively correlated with migrants' remittances, the estimated effect of having a university degree increases to 342 USD. This reveals that indeed, migrants from high-income households do remit less and are more highly educated, which creates a spurious relationship between migrants' education and their remittance flows. When adding further origin-household characteristics (column IV) as well as district fixed effects to capture the large regional heterogeneity within the origin countries (column V), the estimated education effect decreases to 297 USD and 255 USD, respectively. This suggests that both the economic situation of the household left behind and regional economic conditions at the origin country matter for migrants' remittance behavior and are correlated with their degree of education obtained. Lastly, to test whether the effect of education operates through other channels such as income, we exclude the labor force status of the migrant from the estimation model (column VI). Indeed, the results show a strong increase in the estimated education effect, which implies that a large part of the impact of education on remittances

works through the labor market success of the migrants in the destination country. In general, our results reveal that migrants with a university degree remit around 250-340 USD more per year than non-university educated migrants. Given that migrants remit 435 USD on average (Table 1), the difference in the amount of remittances sent by high- and low-skilled migrants is sizeable.

We next split the effect on the total level of remittances into two separate effects: the effect on the extensive margin and the effect on the intensive margin. The results for the extensive margin, migrants' probability to send remittances, are reported in Table 3. The estimated coefficients for having a university degree are negative and not statistically significant for all specifications, which reveals that the level of education is not a determinant of the decision to send remittances. Only when excluding the labor force status of the migrant from the estimation (column VI), the education effect turns positive, but is still not statistically significant. Hence, we do not find evidence that migrants' level of education is a determinant of their decision to remit.

The results for the intensive margin, the amount sent conditional on sending remittances, are reported in Table 4. For all specifications, the estimated effect of having a university degree is positive and highly significant. This reveals that, conditional on sending remittances, high-skilled migrants send higher amounts of money to their households left behind as compared to their lower skilled counterparts. In our basic specification (column I), the estimated education effect is about 0.54, suggesting that migrants with a university degree remit about 54% more than migrants without a university degree. This effect, however, largely decreases once origin-household characteristics (columns II and IV) are controlled for. In our preferred specification (column V), which further includes district fixed effects, migrants with a university degree remit around 30% more than migrants without a university degree. Given that, conditional on remitting, migrants remit on average 917 USD (Table 1), high-skilled migrants send on average around 275 USD more than low-skilled migrants.

Overall, our results reveal that high-skilled migrants do send larger amounts of remittances than low-skilled migrants and thus contradict the findings of most of the previous

literature based on macrodata (e.g., Faini, 2007; Adams, 2009; Niimi *et al.*, 2010). They are, though, in line with Bollard *et al.* (2011), who also find no robust effect of migrants' education on remittances at the extensive margin, but a positive effect at the intensive margin. However, our findings further reveal that part of the positive association between migrants' education and the amount of money sent is driven by differences in the characteristics of the households left behind, which are correlated with both migrants' education and their remittances. This again highlights the importance of observing both sides of the migrant-origin family relationship when analyzing migrants remittance behavior.

With respect to other individual characteristics determining migrants' remittance behavior, our results are largely consistent with theoretical predictions and the findings of previous literature. We find male migrants to remit significantly more than female migrants at both margins. Moreover, married migrants are more likely to remit than unmarried migrants, while the amount remitted is uncorrelated with migrants' marital status. The amount of remittances sent further increases with both the age of the migrant and the years spent at the destination country, though at a decreasing rate.[12] The latter result might be explained by two effects working against each other: On the one hand, migrants' income is likely to rise with increasing labor market experience in the destination country, leading them to remit higher amounts after having spent more time in the destination country. On the other hand, migrants intention to return to the origin country is likely to decrease with years spent in the destination country, leading to a negative correlation between years since migration and remittances. This interpretation is in line with the results of Bollard *et al.* (2010), who for a sample of African migrants in OECD countries do not find a significant relationship between remittances and years spent abroad once migrants' income and their return intention are controlled for.

Somewhat surprisingly, internal migrants are equally likely to remit as international migrants. Among those remitting, however, internal migrants remit significantly lower amounts to their households left behind than international migrants. Individuals who

[12]In our preferred specification (column V), migrants' remittances peak at age 50 and after having spent about 24 years in the destination country.

migrated for work-related reasons remit significantly more than individuals who migrated for other reasons, but this is rather driven by the extensive margin than by the intensive margin. In the same line, migrants who have a full-time job are both more likely to remit and do remit more than migrants with a different labor force status. These results are consistent with the findings of Vanwey (2004) and Bouoiyour and Miftah (2015) and do lend support to the altruism motive of remittances. They do, though, contradict the insurance motive of remittances (e.g., Amuedo-Dorantes and Pozo, 2006), which suggests that a precarious situation of the migrants should affect their transfers in a positive way.

Our results further reveal that the relationship of the migrant to the household head in the origin country is an important determinant of his or her remittance behavior: While spouses remit more than children, siblings and more distant relatives remit less, though these negative effects are only significant at the extensive margin. Lastly, our results reveal that migrants residing in high income and upper-middle income destination countries send more remittances than those residing in low income countries. Migrants in lower-middle income countries, in contrast, are less likely to remit than migrants in low income countries, but conditional on remitting, send higher amounts of remittances to their households left behind.

With respect to the characteristics of the households at the origin country, we find the households' non-remittance income to have a negative impact on both the probability to remit and the amount of money sent, conditional on remitting. Moreover, household size and the share of dependents at the origin household are positively correlated with migrants' remittances, while the latter effect is only significant at the extensive margin. These findings support the hypothesis that migrants from better-off households do remit lower amounts to their families left behind. At both margins, the number of migrants from the origin household is negatively correlated with migrants' remittances. The results confirm the findings of Agarwal and Horowitz (2002) and de Brauw *et al.* (2013) and support the altruism motive, but not the insurance motive of remittances.

With respect to the remaining household characteristics, we find varying effects at the extensive and at the intensive margin. Migrants from urban areas, for example, send

higher amounts of remittances, but this effect is only significant at the intensive margin. Households in which the head is male are less likely to receive remittance. Consistent with the bequest motive (see, e.g., Hoddinott, 1994; Melkonyan and Grigorian, 2012), we find that households that own their house or agricultural land are more likely to receive remittances, but these characteristics are uncorrelated with the amount of remittances received.[13] Overall, our results reveal that origin household characteristics, particularly those related to the socioeconomic status of the family, are important determinants of migrants' remittance behavior.

4.2 Effects Based on Within-Household Variation

So far, we have only considered observable characteristics of the migrants and their households at the origin country. However, there is a concern that there exist some unobserved factors at the household level that are correlated with both the education level of the migrants and their remittance behavior or that some of the household covariates, such as non-remittance income, are endogenous. We address this issue by restricting the sample to individuals that come from households with at least two migrants, and estimate the impact of education on remittances including a vector of individual characteristics, destination-country fixed effects, and origin-household fixed effects (Eq. 2). This allows us to identify the effect of education on remittances using within-household variation only.

In addition, adding household fixed effects enables us to eliminate any measurement error at the origin-household level. There might be a concern that the household at the origin country is not able to accurately report the amount of remittances sent by each former household member, and if this type of measurement error is correlated with any (unobserved) characteristics of the household, our estimates are at risk of being biased. The inclusion of household fixed effects addresses this problem by capturing any common household-level effects, and there is no reason to believe such measurement error to vary

[13]The bequest motive suggests that migrants continually send remittances to the household left behind to strengthen the relationship and thereby insure future bequests. Therefore, it predicts a positive correlation between the wealth of the origin household and migrants' probability to remit, but no strong relationship between the household's wealth and the amount sent by the migrants.

systematically across migrants from the same household, i.e., to be correlated with their education status.

Of course, restricting the sample to multiple-migrant households comes at the cost of a potential selectivity bias if individuals from multiple-migrant households systematically differ from those who come from one-migrant households. In order to test if this is a threat to our estimation strategy, we first run our preferred specification (column V of Tables 2-4) for the whole sample, including all households, and compare the estimated coefficients to those estimated for the restricted sample, including only multiple-migrant households. The respective results for the extensive and the intensive margin are shown in columns 1 and 2 of Tables 5 and 6.[14] Overall, the estimated coefficients for the whole sample and for the restricted sample are similar in both magnitude and significance. The results are thus robust to the sample restriction, suggesting that migrants from multiple-migrant households do not significantly differ from other migrants with respect to their remittance behavior.

In column 3 of Tables 5 and 6, we now replace the origin-district fixed effects by household fixed effects. Regarding our variable of main interest, migrants' education, the results are similar to those using the full sample. There is no significant effect of having a university degree on the decision to send remittances, but a strong positive effect on the amount of remittances sent. In terms of magnitude, the coefficient for the intensive margin is similar to the estimated effect obtained from the specifications without household fixed effects, indicating that migrants with a university degree remit about 29% more than their lower skilled counterparts. This reveals that both measurement error and unobserved heterogeneity at the origin-household level do not bias our estimated education effects.

With respect to the other individual characteristics, some of the estimated coefficients change in terms of magnitude and significance once household fixed effects are included. At the intensive margin, the estimated coefficients for males, years since emigration, and being an internal migrant are not significant when household fixed effects are included.

[14]Results for the overall effect are shown in Table A2. Full estimation results for the restricted sample are shown in Tables B1-B3.

Concerning the labor force status of the migrant, we observe that self-employed and part-time employed individuals do no longer differ from full-time employed individuals in terms of the amount of remittances sent. Also, the positive effect of being the partner of the head of the origin household decreases, while being a more distant relative to the head is now significantly negatively correlated with the amount of remittances sent.

4.3 Robustness Checks

In order to examine the robustness of our main findings, we conduct a number of sensitivity checks. The main results, based on estimating Eq. (1) for our preferred specification including the full set of individual and household controls, destination fixed effects, and origin-district fixed effects (column V of Tables 2-4), are summarized in Table 7.

First, there might be a concern that our results do not hold for all origin countries, but are driven by a single country. We therefore successively exclude one origin country from the sample and estimate Eq. (1) based on the remaining four origin countries.[15] The results of these five regressions are shown in Panel A of Table 7. Overall, the results confirm that our estimates are not driven by a single origin country. We find no effect of migrants' education at the extensive margin and a positive and significant effect at the intensive margin of migrants' remittances for all sub-samples. When excluding Kenyan migrants from the sample, however, the estimated effect at the intensive margin becomes somewhat smaller, suggesting that the positive relationship between migrants' education and the level of remittance sent to their origin household is particularly strong for migrants from Kenya.

Second, there is a concern that our findings might be driven by students or by particularly young migrants at the beginning of their labor market career, who are likely to send lower amounts of remittances to their origin households. This would be in line with the investment motive, which suggests that the origin household supports the migrant early in life to further his education, while the migrant starts to fulfill his part of the

[15] Due to the relatively small sample sizes, we refrain from estimating the regressions separately for each origin country.

implicit contract only later in his life-cycle, when his income increases (see, Cox *et al.*, 1998; Rapoport and Docquier, 2006). To test whether this is driving our results, we re-estimate our model for three different samples: (i) a sample including only migrants that are of working age, i.e., those who are aged between 25 to 65, (ii) a sample that excludes migrants that are still in education, and (iii) a sample that excludes individuals who migrated in order to pursue education. The respective results are shown in Panel B of Table 7. For all three samples, our previous findings hold; there is no effect of migrants' education on the likelihood of sending remittances, but a strong positive effect on the amount of remittances sent. At the intensive margin, the coefficient for migrants' university degree slightly increases once individuals who migrated in order to pursue education are excluded, but is overall stable in significance and magnitude.

Lastly, we check whether our results are sensitive to the definition of the skill level of the migrants. Specifically, we estimate an alternative specification in which we define high-skilled migrants as those who have obtained a university degree or a vocational education degree. The respective estimates using this broader definition of high-skilled migrants are presented in Panel C of Table 7. At the intensive margin, our results are robust to using this alternative education measure, as the respective coefficient for migrants' education remains similar in both magnitude and significance. At the extensive margin, however, we now find a significantly positive, though small, effect of migrants' education on their probability to remit, suggesting that migrants with a vocational degree are slightly more likely to remit than migrants with a lower educational qualification.

4.4 Heterogeneous Effects across Migrants' Destination Countries

In Section 4.1, we have shown that migrants living in more wealthy destination countries have a higher probability of sending remittances and send larger amounts of money to their households left behind (Tables 2-4). To gain further insights into the heterogeneous effects of migrants' education on their remittance behavior in different destination countries,

we split the baseline sample into three sub-samples: (i) migrants in OECD destination countries, (ii) migrants in non-OECD destination countries, and (iii) internal migrants.

Overall, the descriptive statistics (Table A1) show that OECD migrants are more likely to have a university degree, to be full-time employed, and come from wealthier households residing in urban areas than internal migrants and migrants in non-OECD countries. These disparities in migrants' earning potential, their liquidity constraints, and the economic situation of the households left behind are reflected in differences in their remittance behavior: The remittance rate of internal (41%) and non-OECD migrants (49%) lags the rate of OECD migrants (66%).[16] Furthermore, the average amount of money sent of those remitting varies from 2,231 USD per year for OECD migrants, 666 USD for non-OECD migrants to 412 USD for internal migrants.

Based on estimating Eq. (1), Table 8 reports the coefficients of our variable of interest, the estimated effect of migrants' education on the extensive and intensive margin of remittances.[17] In line with our previously presented results, the estimated effect of having a university degree on the likelihood of sending remittances is small and not statistically significant across all specifications for the three destination groups (Panel A). This reveals that, irrespective of their destination, migrants with a university degree do not have a higher probability of sending remittances than migrants without a university degree.

At the intensive margin (Panel B), we find a strong positive impact of having a university degree for migrants in non-OECD countries and for internal migrants, indicating that conditional on sending remittances, high-skilled migrants in these countries send larger amounts of money compared to less skilled migrants. In our preferred specification (column V), the estimated education effect is 0.76 and 0.40, respectively, suggesting that high-skilled individuals that migrate to a non-OECD country remit about 76% and high-skilled individuals that migrate internally remit about 40% more than comparable migrants without a university degree. Given the average amount of remittances sent by

[16]The remittance rate of internal migrants in our sample is around 15 percentage points higher than the rate reported by Azam and Gubert (2006), who only consider migrants from the Kayes area in western Mali though.

[17]The results for the overall effect are shown in Table A3.

these groups, high-skilled migrants in non-OECD countries remit around 506 USD and high-skilled internal migrants remit about 165 USD more than comparable low-skilled migrants in these countries.

The results for migrants in OECD countries, in contrast, differ from previous findings. The estimated effect of having a university degree is positive, but substantially smaller than the estimated effects for the other two destination groups. In addition, the estimated coefficient decreases further and becomes insignificant once the full set of household characteristics and district fixed effects (columns IV-VI) is controlled for. According to these results, high-skilled migrants living in OECD countries do not send more remittances than comparable low-skilled migrants in these countries.

One explanation for this pattern might be migrants' educational downgrading in destination countries (Dustmann and Glitz, 2011). In OECD countries, with their high educational standards, the educational level of migrants might not be fully recognized on the labor market. Therefore, in the destination country, high-skilled migrants may work in jobs that require lower qualifications than the jobs they held in their home country, and they may thus work in similar jobs as lower skilled migrants. This conjecture is supported by our data: In OECD countries, migrants with a university degree show only a 37% higher probability of working in a high-skilled job than migrants without a university degree. Compared to the figures for migrants in non-OECD countries (258%) and internal migrants (80%), this is a particular low probability, supporting the existence of a strong educational downgrading of migrants in OECD destination countries.[18] In the OECD labor markets, migrants' returns to having a university degree obtained in Sub-Saharan Africa are therefore likely to be small and thus do not affect their amount of remittances sent.[19] This has important implications for migrants' origin countries: If substantial public and private investments in higher education are devoted to individuals who work abroad

[18]Information on the skill level of migrants' jobs is obtained from self-reported information on migrants' occupations in the destination countries. As this information is available for a large fraction, but not for all migrants in our sample, we refrain from using it in our basic regressions.

[19]In our sample, high-skilled migrants in OECD countries remit similar amounts as high-skilled migrants in non-OECD countries (about 2,900-3,000 USD per year), while low-skilled migrants remit almost four times the amount in OECD countries than in non-OECD countries (2,100 vs. 570 USD per year).

in jobs that do not correspond to their educational qualifications, then the potential gain from high-skilled emigration, in terms of higher remittances due to higher foreign wages, is undermined by the waste of migrants' human capital.

5 Conclusion

The so-called "brain-drain" or the migration of high-skilled individuals to other regions where human capital is abundant is a major concern for many developing countries, as it represents the loss of their most talented workers. While remittances may offset some of the negative externalities of the brain drain, there is also a concern that highly educated migrants may send less remittances to their households at the origin country, suggesting that an increase in high-skill emigration will lower remittances flows (e.g., Faini, 2007; Adams, 2009; Niimi *et al.*, 2010).

This paper investigates the relationship between migrants' education and remittances using unique microdata from five countries in Sub-Saharan Africa. In contrast to the few existing studies using microdata, which are based on household surveys collected in migrants' destination countries, the data used in this study includes detailed information on both the migrants and the households at the origin country. This allows us to address identification problems caused by unobserved heterogeneity across migrants' origin households by controlling for migrants' characteristics as well as characteristics of the household at the origin country. Estimating household fixed effects models that only exploit within-household (between-migrants) variation to identify the impact of education on remittances further enables us to control for unobservable characteristics of the origin household. This within-household approach is able to isolate the effect of education from any observed and unobserved household-level differences that may affect both migrants' education and their remittance behavior. In addition, the data enables us to not only restrict our analysis to migrants in OECD destination countries, but to further provide important insights into the remitting behavior of internal migrants and migrants in non-OECD destination countries, which have so far been neglected by the existing literature.

Overall, we find that migrants with a university degree remit about 250-340 USD more to their households left behind than migrants without a university degree. This effect, however, is mainly driven by the intensive margin: While migrants' education does not affect the likelihood of sending remittances, it has a sizable positive effect on the amount of remittances sent for those who are remitting. In our preferred specification, migrants with a university degree remit around 30% or 275 USD more than migrants without a university degree. These results are robust to controlling for both observable and unobservable characteristics of the households at the origin country. This contradicts the finding of previous studies based on macrodata and suggests that some of the negative externalities of the "brain drain" on origin countries can be counterbalanced by migrants' remittances.

When splitting the sample into migrants in OECD countries, migrants in non-OECD countries, and internal migrants, the results remain robust at the extensive margin. For migrants in non-OECD countries and internal migrants the results also remain robust at the intensive margin. For migrants in OECD countries, however, the positive effect of migrants' education on the amount of remittances sent vanishes once characteristics of the household at the origin country are controlled for. This reveals that part of the positive effect of migrants' education on remittances is due to unobserved heterogeneity across origin households and thus highlights the importance of controlling for characteristics of both sides of the migrant-household relationship when analyzing migrants' remittance behavior. In addition, this result supports previous findings of migrants' educational downgrading in destination countries (see, e.g., Mattoo *et al.*, 2008). In OECD countries, migrants' returns to having a university degree obtained in Sub-Saharan Africa are likely to be small, as they are more likely to work in a lower skilled job, such that their educational qualification is uncorrelated with the amount of remittances sent.

Although our results do not necessarily reflect causal effects, they provide important insights from a policy perspective. In particular, two policy implications can be drawn from our analysis: First, high-skilled migrants do not remit less than low-skilled migrants as emphasized by part of the existing literature. In general, high-skilled migrants have higher

earnings and fewer liquidity constraints than low-skilled migrants and in turn send more remittances. This suggests that policies that favor skilled migration are beneficial for the amount of remittances received by the origin country. The conclusion of previous studies based on macrodata, that remittances will fall as the migrant skill level rises, is thus not supported by our findings. Second, policy makers should focus on implementing policies that increase the probability of sending remittances for both high- and low-skilled migrants. One promising measure to achieve this goal is to strengthen cooperation between origin and destination countries, both in terms of information sharing about potential needs in the destination country's labor market as well as in terms of improving the recognition of foreign qualifications (Mattoo *et al.*, 2008), which will improve the economic situation of migrants in their destination country and therefore likely lead to higher remittances flows to their countries of origin.

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Figures

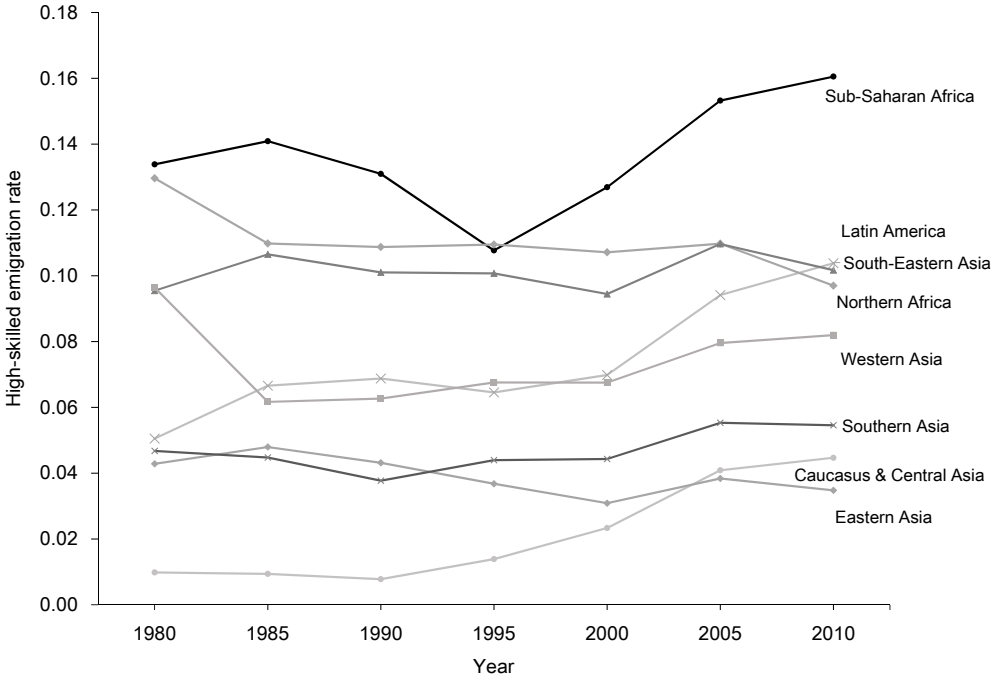

Figure 1: Evolution of High-Skilled Migration by Region
Source: Authors' analysis based on data from Brücker *et al.* (2013).

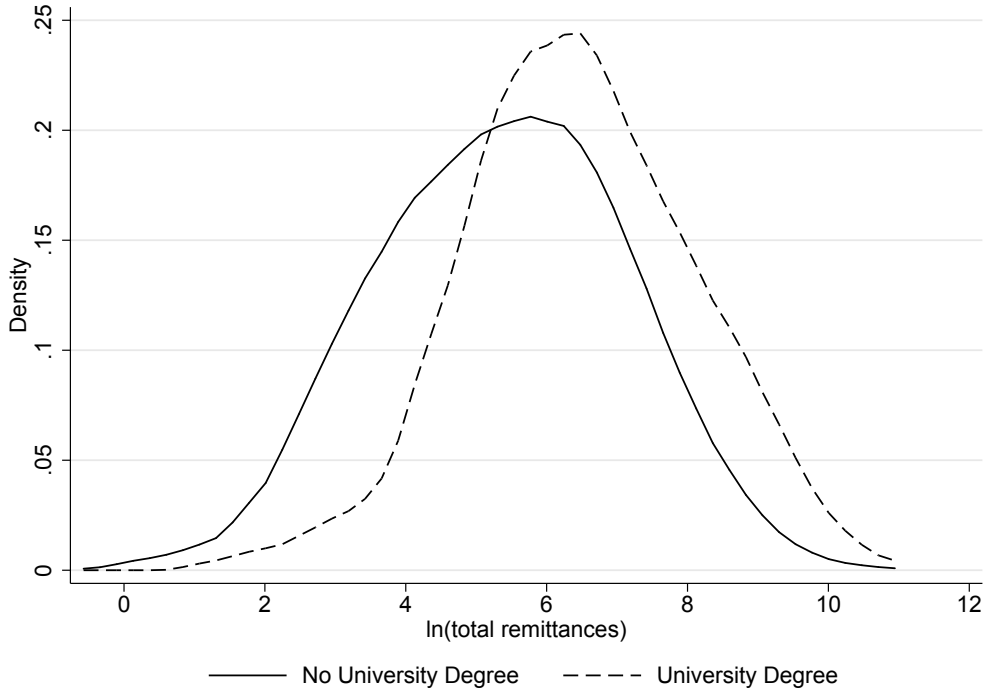

Figure 2: Kernel Density Distribution by Skill Group

Tables

Table 1: Descriptive Statistics

	All migrants		University degree		No degree		
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Δ Mean
Migrant's characteristics							
Probability of remitting	0.475	0.499	0.532	0.499	0.470	0.499	0.062^{***}
Total remittances (in 1,000 USD)	0.435	1.667	1.064	3.010	0.385	1.496	$0.680^{\dagger}$
Remittances, cond. on remitting (in 1,000 USD)	0.917	2.326	2.000	3.896	0.818	2.099	$1.182^{\dagger}$
University degree	0.075	0.263	–	–	–	–	–
Male	0.700	0.458	0.663	0.473	0.703	0.457	-0.040^{**}
Age	31.116	11.162	33.705	10.108	30.907	11.217	$2.799^{\dagger}$
Married	0.548	0.498	0.578	0.494	0.546	0.498	0.032^{*}
Years since emigration	6.581	6.845	6.962	7.316	6.551	6.805	0.411
Internal migrant	0.607	0.489	0.468	0.499	0.618	0.486	$-0.150^{\dagger}$
Migration reason							
Education	0.193	0.395	0.291	0.454	0.186	0.389	$0.105^{\dagger}$
Work	0.619	0.486	0.581	0.494	0.622	0.485	-0.041^{**}
Family	0.157	0.364	0.109	0.312	0.161	0.367	$-0.052^{\dagger}$
Other	0.031	0.172	0.019	0.137	0.032	0.175	-0.012^{*}
Labor force status							
Full time employed	0.315	0.464	0.655	0.476	0.287	0.452	$0.368^{\dagger}$
Part time employed	0.069	0.253	0.076	0.266	0.068	0.252	0.009
Self employed	0.348	0.476	0.063	0.243	0.371	0.483	$-0.308^{\dagger}$
Not in labor force	0.269	0.443	0.206	0.405	0.274	0.446	$-0.068^{\dagger}$
Relationship to head							
Child	0.574	0.494	0.615	0.487	0.571	0.495	0.044^{**}
Partner	0.062	0.241	0.111	0.314	0.058	0.234	$0.053^{\dagger}$
Sibling	0.219	0.413	0.168	0.374	0.223	0.416	$-0.055^{\dagger}$
Other relative	0.095	0.293	0.072	0.259	0.096	0.295	-0.024^{**}
Destination country							
High income	0.183	0.387	0.415	0.493	0.164	0.371	$0.250^{\dagger}$
Upper-middle income	0.021	0.143	0.040	0.195	0.019	0.138	$0.020^{\dagger}$
Lower-middle income	0.553	0.497	0.353	0.478	0.570	0.495	$-0.216^{\dagger}$
Low income	0.243	0.429	0.192	0.394	0.247	0.431	$-0.054^{\dagger}$
Origin country							
Burkina Faso	0.205	0.403	0.010	0.097	0.220	0.415	$-0.211^{\dagger}$
Kenya	0.175	0.380	0.431	0.496	0.155	0.362	$0.276^{\dagger}$
Nigeria	0.280	0.449	0.195	0.397	0.287	0.453	$-0.092^{\dagger}$
Senegal	0.201	0.401	0.120	0.325	0.208	0.406	$-0.088^{\dagger}$
Uganda	0.138	0.345	0.244	0.430	0.130	0.336	$0.114^{\dagger}$
Origin HH characteristics							
Non-remittance income (in 1,000 USD)	5.256	14.928	13.182	30.041	4.616	12.750	$8.566^{\dagger}$
Urban	0.387	0.487	0.679	0.467	0.364	0.481	$0.316^{\dagger}$
Number of migrants	3.126	2.632	2.861	2.335	3.147	2.653	-0.286^{***}
HH head=male	0.769	0.421	0.704	0.457	0.774	0.418	$-0.070^{\dagger}$
House is owned	0.824	0.381	0.742	0.438	0.831	0.375	$-0.089^{\dagger}$
Land is owned	0.716	0.451	0.540	0.499	0.730	0.444	$-0.190^{\dagger}$
Electricity	0.532	0.499	0.821	0.383	0.509	0.500	$0.312^{\dagger}$
HH size	7.669	5.463	5.177	3.798	7.871	5.527	$-2.693^{\dagger}$
Share of dependents	0.530	0.280	0.488	0.320	0.534	0.276	$-0.045^{\dagger}$
Observations	9,809		9,076		733		

Notes: – The total amount of remittances is calculated based on all migrants, irrespective of whether they send remittances or not. – The last column shows the difference in mean values between migrants with a university degree and migrants without a university degree. Significance stars indicate the result of the respective t-test. – † $p < 0.001$*;* *** $p < 0.01$*;* ** $p < 0.05$*;* * $p < 0.1$.

Table 2: Determinants of Total Remittances

	I	II	III	IV	V	VI
Migrant characteristics						
University degree	279.385**	252.235**	341.916†	297.082***	254.790**	318.051***
	(111.822)	(106.011)	(100.092)	(100.199)	(102.956)	(101.039)
Male	98.870**	92.097**	68.000*	53.953	47.752	61.000
	(39.939)	(40.206)	(39.403)	(38.927)	(38.921)	(38.498)
Age/100	−708.402	−807.314	−788.318	−601.207	−1000.554*	−337.683
	(587.930)	(564.717)	(556.290)	(580.007)	(562.675)	(558.918)
$Age^2/100$	15.685*	16.259*	16.204*	14.529	19.672**	12.175
	(9.208)	(8.828)	(8.844)	(8.980)	(8.720)	(8.639)
Married	3.828	−3.087	−37.767	−47.925	−36.349	−5.123
	(54.648)	(54.782)	(54.269)	(53.859)	(52.912)	(52.213)
Years since emigration/100	2774.264†	2833.464†	2492.126†	2749.562†	2577.888†	2837.200†
	(603.518)	(589.516)	(540.980)	(572.181)	(549.248)	(590.108)
Years since $emigration^2/100$	−61.336†	−60.197†	−51.357†	−55.485†	−50.272***	−55.488***
	(18.366)	(17.465)	(15.522)	(16.443)	(15.313)	(17.186)
Internal migrant	−184.528†	−177.790	−164.740	−116.413	−112.934	−95.429
	(45.070)	(181.254)	(183.983)	(187.459)	(194.134)	(194.589)
Migration reason (Ref: Work related)						
Education	−76.313	−95.626	−54.052	−52.242	−74.130	−196.025†
	(62.958)	(66.692)	(61.318)	(60.747)	(61.614)	(57.383)
Family	−25.116	−20.747	−1.725	1.031	−48.775	−153.405***
	(65.085)	(64.768)	(63.515)	(62.588)	(63.818)	(58.646)
Other	−167.824**	−181.494**	−166.196**	−158.952*	−174.287**	−242.513***
	(80.371)	(79.849)	(83.150)	(84.581)	(83.102)	(81.872)
Labor force status (Ref: Full time employed)						
Part time employed	−383.420†	−404.011†	−411.785†	−401.794†	−392.336†	–
	(74.056)	(77.787)	(68.854)	(67.076)	(64.801)	
Self employed	−287.023†	−294.107†	−286.635†	−270.096†	−311.821†	–
	(48.514)	(48.500)	(45.728)	(45.522)	(45.864)	
Not in labor force	−460.152†	−461.145†	−445.129†	−435.381†	−409.908†	–
	(58.558)	(58.074)	(57.167)	(54.353)	(53.484)	
Relationship to head (Ref: Child)						
Partner	873.799†	855.296†	786.848†	792.880†	748.470†	757.688†
	(127.975)	(129.247)	(126.662)	(123.752)	(121.603)	(121.975)
Sibling	−138.564†	−132.365***	−121.205***	−161.670†	−153.119†	−150.845†
	(39.638)	(40.262)	(38.180)	(38.846)	(40.439)	(40.765)
Other relative	−74.323	−68.712	−109.258**	−134.684***	−110.133**	−115.279**
	(46.086)	(45.754)	(47.531)	(47.392)	(50.061)	(50.131)
Destination (Ref: Low income country)						
High income	774.490†	–	–	–	–	–
	(111.980)					
Upper-middle income	446.634***	–	–	–	–	–
	(148.648)					
Lower-middle income	−144.407***	–	–	–	–	–
	(45.568)					
Origin HH characteristics						
ln(non-remittance income)	–	–	−166.670†	−183.983†	−200.421†	−201.501†
			(22.704)	(23.644)	(24.841)	(24.996)
Urban	–	–	–	79.161*	101.640*	117.592**
				(43.145)	(54.754)	(55.211)
Number of migrants	–	–	–	−34.461†	−38.443†	−38.289†
				(8.993)	(10.937)	(11.503)
HH head is male	–	–	–	49.244	72.112	76.988
				(49.608)	(48.697)	(49.170)
House is owned	–	–	–	31.028	100.796	119.870*
				(58.556)	(65.669)	(67.629)
Land is owned	–	–	–	−72.393	45.481	55.893
				(49.660)	(48.253)	(49.469)
Electricity	–	–	–	164.420†	138.743**	149.671**
				(47.194)	(62.943)	(62.614)
HH size	–	–	–	26.628†	27.662†	27.286†
				(4.256)	(4.625)	(4.668)
Share of dependents	–	–	–	−59.010	19.769	32.943
				(78.864)	(79.824)	(79.999)
Constant	359.770***	236.717**	1470.175†	1367.877†	672.718	67.632
	(126.062)	(113.064)	(201.518)	(193.699)	(574.502)	(572.839)
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes
Observations	9,809	9,809	9,809	9,809	9,809	9,809
Adj-R^2	0.143	0.152	0.191	0.199	0.219	0.212

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 3: Determinants of the Probability of Sending Remittances

	I	II	III	IV	V	VI
Migrant characteristics						
University degree	−0.030	−0.029	−0.015	−0.002	−0.005	0.030
	(0.021)	(0.022)	(0.021)	(0.021)	(0.020)	(0.021)
Male	0.026**	0.025**	0.022*	0.015	0.011	0.040***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)	(0.012)
Age/100	0.649†	0.615†	0.618†	0.606†	0.595†	1.391†
	(0.173)	(0.173)	(0.171)	(0.171)	(0.174)	(0.191)
Age^2/100	−0.006***	−0.006**	−0.006**	−0.006***	−0.005**	−0.014†
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Married	0.116†	0.115†	0.110†	0.106†	0.098†	0.127†
	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)
Years since emigration/100	0.488**	0.509**	0.456**	0.484**	0.475**	0.734***
	(0.223)	(0.224)	(0.216)	(0.223)	(0.214)	(0.252)
Years since emigration^2/100	−0.014**	−0.014**	−0.013*	−0.014*	−0.013**	−0.019**
	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)
Internal migrant	−0.003	−0.020	−0.018	−0.013	0.010	0.028
	(0.016)	(0.044)	(0.043)	(0.043)	(0.044)	(0.046)
Migration reason (Ref: Work related)						
Education	−0.116†	−0.119†	−0.113†	−0.108†	−0.105†	−0.271†
	(0.017)	(0.017)	(0.017)	(0.017)	(0.017)	(0.015)
Family	−0.119†	−0.118†	−0.115†	−0.103†	−0.087†	−0.207†
	(0.019)	(0.019)	(0.019)	(0.019)	(0.018)	(0.018)
Other	−0.182†	−0.178†	−0.176†	−0.167†	−0.166†	−0.241†
	(0.028)	(0.028)	(0.028)	(0.028)	(0.028)	(0.030)
Labor force status (Ref: Full time employed)						
Part time employed	−0.094†	−0.092†	−0.093†	−0.098†	−0.106†	–
	(0.025)	(0.025)	(0.025)	(0.025)	(0.025)	
Self employed	−0.113†	−0.111†	−0.110†	−0.109†	−0.098†	–
	(0.016)	(0.016)	(0.016)	(0.016)	(0.015)	
Not in labor force	−0.398†	−0.397†	−0.394†	−0.392†	−0.388†	–
	(0.018)	(0.018)	(0.017)	(0.018)	(0.017)	
Relationship to head (Ref: Child)						
Partner	0.070†	0.067***	0.057***	0.043*	0.033	0.041*
	(0.021)	(0.021)	(0.021)	(0.022)	(0.022)	(0.023)
Sibling	−0.100†	−0.099†	−0.097†	−0.090†	−0.091†	−0.087†
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)
Other relative	−0.055***	−0.053***	−0.059***	−0.057***	−0.076†	−0.081†
	(0.018)	(0.018)	(0.018)	(0.018)	(0.018)	(0.019)
Destination (Ref: Low income country)						
High income	0.098†	–	–	–	–	–
	(0.025)					
Upper-middle income	0.109***	–	–	–	–	–
	(0.036)					
Lower-middle income	−0.034*	–	–	–	–	–
	(0.018)					
Origin HH characteristics						
ln(non-remittance income)	–	–	−0.026†	−0.027†	−0.025†	−0.026†
			(0.003)	(0.003)	(0.003)	(0.003)
Urban	–	–	–	0.011	0.001	0.007
				(0.015)	(0.018)	(0.019)
Number of migrants	–	–	–	−0.012†	−0.014†	−0.014†
				(0.003)	(0.003)	(0.003)
HH head is male	–	–	–	−0.042***	−0.050***	−0.043***
				(0.016)	(0.015)	(0.016)
House is owned	–	–	–	0.043***	0.021	0.042**
				(0.016)	(0.016)	(0.017)
Land is owned	–	–	–	0.035**	0.036**	0.048***
				(0.015)	(0.016)	(0.016)
Electricity	–	–	–	−0.003	0.025	0.031*
				(0.016)	(0.017)	(0.018)
HH size	–	–	–	0.004***	0.003*	0.002*
				(0.001)	(0.001)	(0.001)
Share of dependents	–	–	–	0.053**	0.050**	0.052**
				(0.024)	(0.024)	(0.024)
Constant	0.408†	0.362†	0.551†	0.507†	−0.023	−0.301†
	(0.041)	(0.041)	(0.044)	(0.052)	(0.090)	(0.088)
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes
Observations	9,809	9,809	9,809	9,809	9,809	9,809
Adj-R^2	0.282	0.284	0.295	0.302	0.331	0.279

*Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.*

Table 4: Determinants of the Amount of Remittances

	I	II	III	IV	V	VI
Migrant characteristics						
University degree	0.537†	0.466†	0.503†	0.395†	0.300†	0.348†
	(0.086)	(0.084)	(0.082)	(0.077)	(0.080)	(0.080)
Male	0.151**	0.159***	0.141**	0.125**	0.102*	0.126**
	(0.061)	(0.062)	(0.060)	(0.059)	(0.053)	(0.053)
Age/100	4.615†	4.762†	4.463†	4.374†	4.609†	5.574†
	(1.086)	(1.099)	(1.095)	(1.065)	(1.010)	(1.049)
Age^2/100	−0.049†	−0.050†	−0.047†	−0.045†	−0.046†	−0.058†
	(0.013)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)
Married	0.014	0.024	0.010	0.014	−0.011	0.001
	(0.052)	(0.052)	(0.051)	(0.048)	(0.046)	(0.047)
Years since emigration/100	2.080***	2.191***	1.965***	2.245***	2.259†	2.528†
	(0.768)	(0.754)	(0.702)	(0.710)	(0.637)	(0.690)
Years since emigration^2/100	−0.053***	−0.054***	−0.047***	−0.052***	−0.048†	−0.051***
	(0.019)	(0.018)	(0.015)	(0.017)	(0.014)	(0.017)
Internal migrant	−0.563†	−1.340†	−1.335†	−1.175†	−1.062†	−1.079†
	(0.064)	(0.231)	(0.234)	(0.238)	(0.230)	(0.228)
Migration reason (Ref: Work related)						
Education	0.155	0.109	0.142	0.187**	0.139*	0.057
	(0.095)	(0.097)	(0.087)	(0.081)	(0.079)	(0.080)
Family	0.106	0.124	0.132	0.113	0.021	−0.136*
	(0.089)	(0.091)	(0.089)	(0.086)	(0.075)	(0.076)
Other	−0.454***	−0.471***	−0.440***	−0.461***	−0.434***	−0.480†
	(0.152)	(0.153)	(0.154)	(0.152)	(0.144)	(0.146)
Labor force status (Ref: Full time employed)						
Part time employed	−0.445†	−0.463†	−0.465†	−0.437†	−0.468†	–
	(0.093)	(0.092)	(0.081)	(0.077)	(0.077)	
Self employed	−0.437†	−0.452†	−0.452†	−0.371†	−0.323†	–
	(0.059)	(0.059)	(0.058)	(0.055)	(0.052)	
Not in labor force	−1.051†	−1.046†	−1.038†	−0.981†	−0.752†	–
	(0.112)	(0.112)	(0.104)	(0.101)	(0.087)	
Relationship to head (Ref: Child)						
Partner	0.794†	0.759†	0.713†	0.645†	0.598†	0.611†
	(0.082)	(0.081)	(0.078)	(0.082)	(0.078)	(0.080)
Sibling	−0.006	−0.041	−0.037	−0.088	−0.052	−0.043
	(0.058)	(0.058)	(0.055)	(0.055)	(0.053)	(0.053)
Other relative	−0.018	−0.027	−0.074	−0.113	−0.094	−0.107
	(0.080)	(0.079)	(0.077)	(0.069)	(0.071)	(0.071)
Destination (Ref: Low income country)						
High income	1.141†	–	–	–	–	–
	(0.108)					
Upper-middle income	0.993†	–	–	–	–	–
	(0.140)					
Lower-middle income	0.207***	–	–	–	–	–
	(0.072)					
Origin HH characteristics						
ln(non-remittance income)	–	–	−0.108†	−0.136†	−0.131†	−0.131†
			(0.010)	(0.010)	(0.010)	(0.010)
Urban	–	–	–	0.148**	0.097	0.129*
				(0.066)	(0.077)	(0.078)
Number of migrants	–	–	–	−0.061†	−0.071†	−0.073†
				(0.015)	(0.013)	(0.014)
HH head is male	–	–	–	0.021	0.056	0.079
				(0.068)	(0.061)	(0.063)
House is owned	–	–	–	−0.051	0.052	0.104
				(0.067)	(0.067)	(0.070)
Land is owned	–	–	–	−0.109*	0.077	0.093
				(0.060)	(0.067)	(0.069)
Electricity	–	–	–	0.524†	0.422†	0.439†
				(0.067)	(0.069)	(0.071)
HH size	–	–	–	0.029†	0.025†	0.024†
				(0.005)	(0.004)	(0.004)
Share of dependents	–	–	–	−0.086	0.068	0.068
				(0.106)	(0.092)	(0.094)
Constant	3.234†	3.324†	4.173†	4.317†	4.598†	4.009†
	(0.229)	(0.228)	(0.235)	(0.255)	(0.396)	(0.408)
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes
Observations	4,656	4,656	4,656	4,656	4,656	4,656
Adj-R^2	0.459	0.470	0.492	0.520	0.578	0.566

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 5: Determinants of the Probability of Sending Remittances Using Within-Household Variation

	I	II	III	IV
Migrant characteristics				
University degree	−0.018	−0.016	0.005	0.055
	(0.021)	(0.027)	(0.034)	(0.035)
Male	0.019	0.009	0.019	0.046***
	(0.012)	(0.014)	(0.016)	(0.017)
Age/100	0.649†	0.596***	0.601**	1.312†
	(0.174)	(0.206)	(0.266)	(0.290)
$Age^2/100$	−0.006**	−0.004	−0.002	−0.010***
	(0.002)	(0.003)	(0.004)	(0.004)
Married	0.103†	0.096†	0.081†	0.099†
	(0.013)	(0.016)	(0.019)	(0.020)
Years since emigration/100	0.471**	0.561**	0.512*	0.832***
	(0.215)	(0.251)	(0.297)	(0.308)
Years since $emigration^2/100$	−0.013**	−0.017**	−0.015	−0.021**
	(0.007)	(0.008)	(0.009)	(0.009)
Internal migrant	0.011	0.036	−0.098	−0.069
	(0.045)	(0.064)	(0.081)	(0.082)
Migration reason (Ref: Work related)				
Education	−0.112†	−0.122†	−0.076***	−0.229†
	(0.017)	(0.022)	(0.025)	(0.025)
Family	−0.097†	−0.113†	−0.100†	−0.214†
	(0.018)	(0.022)	(0.027)	(0.027)
Other	−0.173†	−0.162†	−0.171***	−0.249†
	(0.029)	(0.038)	(0.054)	(0.057)
Labor force status (Ref: Full time employed)				
Part time employed	−0.103†	−0.103***	−0.136***	–
	(0.026)	(0.036)	(0.044)	
Self employed	−0.103†	−0.096†	−0.102†	–
	(0.015)	(0.020)	(0.025)	
Not in labor force	−0.393†	−0.384†	−0.370†	–
	(0.018)	(0.022)	(0.027)	
Relationship to head (Ref: Child)				
Partner	0.067***	−0.036	−0.033	−0.013
	(0.022)	(0.040)	(0.048)	(0.049)
Sibling	−0.096†	−0.101†	−0.055*	−0.040
	(0.014)	(0.020)	(0.029)	(0.031)
Other relative	−0.071†	−0.081†	−0.119†	−0.127†
	(0.019)	(0.024)	(0.032)	(0.034)
Constant	−0.181**	0.285***	0.216***	−0.097
	(0.082)	(0.097)	(0.072)	(0.070)
Destination FE	yes	yes	yes	yes
District FE	yes	yes	no	no
Household FE	no	no	yes	yes
Observations	9,809	6,801	6,801	6,801
Adj-R^2	0.317	0.313	0.514	0.476

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – Column I shows the results for the whole sample. Columns II-IV show the results for the sample restricted to migrants that come from multiple-migrant households. – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 6: Determinants of the Amount of Remittances Using Within-Household Variation

	I	II	III	IV
Migrant characteristics				
University degree	0.298†	0.300**	0.294**	0.319**
	(0.088)	(0.119)	(0.145)	(0.145)
Male	0.127**	0.137**	0.070	0.096
	(0.056)	(0.065)	(0.094)	(0.094)
Age/100	5.020†	5.778†	5.332***	6.068***
	(1.031)	(1.409)	(1.910)	(1.987)
Age^2/100	−0.052†	−0.065†	−0.055**	−0.065***
	(0.012)	(0.017)	(0.023)	(0.024)
Married	0.003	−0.014	0.111	0.107
	(0.048)	(0.061)	(0.095)	(0.098)
Years since emigration/100	2.354†	3.862†	0.959	1.325
	(0.669)	(0.980)	(1.383)	(1.371)
Years since emigration^2/100	−0.051***	−0.089†	−0.020	−0.027
	(0.016)	(0.026)	(0.036)	(0.036)
Internal migrant	−1.102†	−1.753†	−0.860	−0.892*
	(0.239)	(0.386)	(0.530)	(0.537)
Migration reason (Ref: Work related)				
Education	0.100	0.126	−0.085	−0.130
	(0.088)	(0.113)	(0.188)	(0.188)
Family	0.000	0.054	−0.244*	−0.369**
	(0.079)	(0.098)	(0.143)	(0.148)
Other	−0.472***	−0.565***	−0.375	−0.379
	(0.148)	(0.205)	(0.417)	(0.433)
Labor force status (Ref: Full time employed)				
Part time employed	−0.458†	−0.441†	−0.196	–
	(0.085)	(0.125)	(0.200)	
Self employed	−0.347†	−0.366†	−0.160	–
	(0.055)	(0.071)	(0.113)	
Not in labor force	−0.792†	−0.774†	−0.633***	–
	(0.090)	(0.112)	(0.204)	
Relationship to head (Ref: Child)				
Partner	0.648†	0.692†	0.462*	0.479**
	(0.077)	(0.129)	(0.237)	(0.236)
Sibling	−0.027	−0.090	−0.141	−0.124
	(0.055)	(0.073)	(0.169)	(0.170)
Other relative	−0.036	0.021	−0.432***	−0.442***
	(0.077)	(0.091)	(0.153)	(0.153)
Constant	3.821†	3.715†	2.680†	2.472†
	(0.376)	(0.452)	(0.548)	(0.556)
Destination FE	yes	yes	yes	yes
District FE	yes	yes	no	no
Household FE	no	no	yes	yes
Observations	4,656	3,072	3,072	3,072
Adj-R^2	0.543	0.547	0.702	0.697

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – Column I shows the results for the whole sample. Columns II-IV show the results for the sample restricted to migrants that come from multiple-migrant households. – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 7: Robustness Checks

	Total remittances	Extensive margin	Intensive margin
A. Excl. single origin countries			
	Excl. Burkina Faso		
University degree	249.872**	−0.009	0.303†
	(104.477)	(0.020)	(0.081)
Observations	7,802	7,802	3,789
	Excl. Kenya		
University degree	224.678**	0.028	0.219*
	(110.585)	(0.024)	(0.112)
Observations	8,089	8,089	3,786
	Excl. Nigeria		
University degree	244.996**	−0.018	0.381†
	(114.135)	(0.023)	(0.092)
Observations	7,058	7,058	3,393
	Excl. Senegal		
University degree	312.658***	0.002	0.305†
	(120.153)	(0.022)	(0.088)
Observations	7,835	7,835	3,409
	Excl. Uganda		
University degree	232.400*	−0.022	0.263***
	(121.674)	(0.022)	(0.083)
Observations	8,452	8,452	4,247
B. Sample restrictions			
	Working age (25-65)		
University degree	224.112*	−0.004	0.294†
	(121.713)	(0.022)	(0.084)
Observations	7,125	7,125	4,001
	Excl. students		
University degree	283.895**	−0.006	0.288†
	(123.550)	(0.023)	(0.081)
Observations	8,370	8,370	4,579
	Excl. if migrated to study		
University degree	326.106**	−0.010	0.396†
	(143.761)	(0.025)	(0.088)
Observations	7,911	7,911	4,228
C. Alternative skill definition			
	University or vocational education		
Vocational education or university degree	204.727†	0.029**	0.357†
	(56.275)	(0.014)	(0.054)
Observations	9,809	9,809	4,656

Notes: – All results are obtained from OLS regressions of Eq. (1) for our preferred specification including a full set of individual and household controls, destination fixed effects, and origin-district fixed effects (column V of Tables 2-4). – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Table 8: Effect of Education on Remittances by Destination Country

	I	II	III	IV	V	VI
A. Extensive margin						
			OECD countries			
University degree	−0.033	−0.037	−0.023	−0.010	−0.041	−0.024
	(0.034)	(0.034)	(0.033)	(0.032)	(0.032)	(0.035)
Observations			1,733			
			Non-OECD countries			
University degree	−0.071	−0.041	−0.034	−0.017	−0.021	0.017
	(0.048)	(0.049)	(0.049)	(0.049)	(0.054)	(0.056)
Observations			2,125			
			Internal migrants			
University degree	−0.025	−0.025	−0.010	−0.001	−0.005	0.044
	(0.030)	(0.030)	(0.029)	(0.029)	(0.028)	(0.028)
Observations			5,951			
B. Intensive margin						
			OECD countries			
University degree	0.219*	0.225*	0.246**	0.183	0.099	0.115
	(0.121)	(0.120)	(0.112)	(0.111)	(0.127)	(0.126)
Observations			1,147			
			Non-OECD countries			
University degree	0.754***	0.518**	0.572**	0.572**	0.764***	0.824***
	(0.258)	(0.250)	(0.252)	(0.252)	(0.269)	(0.277)
Observations			1,049			
			Internal migrants			
University degree	0.671***	0.671***	0.718***	0.567***	0.404***	0.470***
	(0.122)	(0.122)	(0.121)	(0.110)	(0.112)	(0.113)
Observations			2,460			
Individual Controls	all	all	all	all	all	no LFS
HH Controls	no	no	income	all	all	all
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$*;* *** $p < 0.01$*;* ** $p < 0.05$*;* * $p < 0.1$.

Appendix

Table A1: Descriptive Statistics by Destination Country

	OECD		Non-OECD		Internal	
	Mean	S.D.	Mean	S.D.	Mean	S.D.
Migrant's characteristics						
Probability of remitting	0.662	0.473	0.494	0.500	0.413	0.492
Total remittances (in 1,000 USD)	1.477	3.265	0.329	1.301	0.170	0.694
Remittances, cond. on remitting (in 1,000 USD)	2.231	3.798	0.666	1.790	0.412	1.033
University degree	0.174	0.379	0.041	0.199	0.058	0.233
Male	0.678	0.467	0.840	0.367	0.657	0.475
Age	35.089	10.524	32.168	10.991	29.583	11.075
Married	0.634	0.482	0.579	0.494	0.513	0.500
Years since emigration	7.470	6.847	7.003	7.370	6.172	6.613
Internal migrant	0.000	0.000	0.000	0.000	1.000	0.000
Migration reason						
Education	0.305	0.460	0.086	0.280	0.200	0.400
Work	0.573	0.495	0.797	0.403	0.569	0.495
Family	0.106	0.308	0.079	0.270	0.199	0.400
Other	0.016	0.126	0.039	0.193	0.032	0.176
Labor force status						
Full time employed	0.517	0.500	0.184	0.388	0.302	0.459
Part time employed	0.114	0.318	0.088	0.283	0.048	0.215
Self employed	0.157	0.364	0.594	0.491	0.315	0.465
Not in labor force	0.212	0.409	0.135	0.341	0.334	0.472
Relationship to head						
Child	0.540	0.499	0.488	0.500	0.615	0.487
Partner	0.087	0.282	0.061	0.239	0.055	0.228
Sibling	0.220	0.415	0.289	0.454	0.193	0.395
Other relative	0.094	0.292	0.127	0.333	0.083	0.276
Destination country						
High income	1.000	0.000	0.029	0.168	0.000	0.000
Upper-middle income	0.000	0.000	0.096	0.295	0.000	0.000
Lower-middle income	0.000	0.000	0.673	0.469	0.672	0.470
Low income	0.000	0.000	0.201	0.401	0.328	0.470
Origin country						
Burkina Faso	0.010	0.099	0.536	0.499	0.143	0.350
Kenya	0.307	0.461	0.126	0.332	0.155	0.362
Nigeria	0.289	0.453	0.088	0.283	0.347	0.476
Senegal	0.334	0.472	0.179	0.384	0.171	0.376
Uganda	0.061	0.240	0.071	0.256	0.185	0.388
Origin HH characteristics						
Non-remittance income (in 1,000 USD)	9.213	26.275	3.438	11.270	4.754	10.726
Urban	0.623	0.485	0.248	0.432	0.368	0.482
Number of migrants	2.802	2.408	2.573	2.092	3.417	2.818
HH head=male	0.689	0.463	0.841	0.365	0.767	0.423
House is owned	0.774	0.418	0.879	0.326	0.819	0.385
Land is owned	0.531	0.499	0.816	0.387	0.734	0.442
Electricity	0.844	0.363	0.305	0.460	0.523	0.500
HH size	7.393	6.484	9.451	5.949	7.114	4.781
Share of dependents	0.566	0.297	0.470	0.249	0.542	0.282
Observations	5,951		1,733		2,125	

Notes: – The table shows descriptive statistics for the three sub-samples (i) migrants in OECD destination countries, (ii) migrants in non-OECD destination countries, and (iii) internal migrants. – The total amount of remittances is calculated based on all migrants, irrespective of whether they send remittances or not.

Table A2: Determinants of Total Remittances Using Within-Household Variation

	I	II	III	IV
Migrant characteristics				
University degree	188.373*	109.262	158.517	208.876
	(110.733)	(124.596)	(141.456)	(137.292)
Male	75.292*	75.149*	86.229	102.051
	(40.000)	(40.782)	(61.740)	(62.934)
Age/100	−993.566*	−100.283	399.727	971.273
	(565.865)	(460.971)	(854.242)	(978.066)
Age^2/100	19.518**	6.360	−0.913	−7.135
	(8.709)	(6.290)	(11.670)	(12.687)
Married	−4.401	−34.318	−17.604	0.783
	(53.504)	(69.420)	(89.527)	(86.337)
Years since emigration/100	2737.258†	2298.396†	2097.307**	2388.532***
	(582.638)	(608.433)	(886.566)	(906.947)
Years since emigration^2/100	−57.313†	−44.670***	−34.755*	−40.883**
	(16.848)	(17.094)	(20.193)	(20.675)
Internal migrant	−122.522	−403.691	−628.235	−605.517
	(195.103)	(281.329)	(387.484)	(386.157)
Migration reason (Ref: Work related)				
Education	−109.167	−45.352	−140.098	−241.539***
	(67.988)	(84.578)	(97.247)	(85.952)
Family	−72.716	−41.315	−101.193	−188.288**
	(65.704)	(79.803)	(103.738)	(83.911)
Other	−187.552**	−144.550**	−94.641	−153.502
	(79.829)	(65.078)	(118.228)	(115.020)
Labor force status (Ref: Full time employed)				
Part time employed	−384.857†	−313.944***	−277.389**	–
	(76.182)	(108.411)	(113.247)	
Self employed	−323.211†	−284.715†	−160.132**	–
	(48.742)	(60.462)	(65.283)	
Not in labor force	−446.049†	−422.866†	−310.192***	–
	(56.737)	(65.096)	(103.582)	
Relationship to head (Ref: Child)				
Partner	772.782†	543.074***	652.715***	664.195***
	(126.811)	(193.231)	(252.957)	(250.373)
Sibling	−147.298†	−158.351***	−164.842	−157.794
	(41.736)	(52.568)	(154.172)	(152.720)
Other relative	−51.402	−68.827	−209.434**	−215.168**
	(47.434)	(44.883)	(86.310)	(87.554)
Constant	−493.770	254.261	398.717	63.859
	(605.917)	(208.368)	(248.278)	(190.761)
Destination FE	yes	yes	yes	yes
District FE	yes	yes	no	no
Household FE	no	no	yes	yes
Observations	9,809	6,801	6,801	6,801
Adj-R^2	0.169	0.150	0.316	0.313

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – Column I shows the results for the whole sample. Columns II-IV show the results for the sample restricted to migrants that come from multiple-migrant households. – † $p < 0.001$*;* *** $p < 0.01$*;* ** $p < 0.05$*;* * $p < 0.1$.

Table A3: Effect of Education on Total Remittances by Destination Country

	I	II	III	IV	V	VI
	OECD countries					
University degree	417.549*	399.007	602.209***	476.759**	262.161	319.973
	(250.427)	(250.241)	(230.291)	(229.485)	(236.068)	(235.456)
Observations	1,733					
	Non-OECD countries					
University degree	687.724*	592.086*	618.825*	639.172*	610.075	714.594*
	(362.698)	(351.315)	(350.600)	(355.383)	(406.010)	(421.256)
Observations	2,125					
	Internal migrants					
University degree	75.714	75.714	99.066*	64.165	74.266	117.115**
	(49.606)	(49.606)	(50.931)	(50.445)	(49.254)	(49.053)
Observations	5,951					
Individual Controls	all	all	all	all	all	no LFS
HH Controls	no	no	income	all	all	all
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes

Notes: – Results are obtained from OLS regressions. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$; *** $p < 0.01$; ** $p < 0.05$; * $p < 0.1$.

Supplementary Appendix

Table B1: Determinants of Total Remittances – Restricted Sample

	I	II	III	IV	V	VI
Migrant characteristics						
University degree	216.480*	173.225	266.892**	231.560**	179.426	239.202**
	(124.389)	(115.663)	(107.232)	(111.718)	(113.871)	(109.445)
Male	105.610***	99.631**	72.370*	64.102	57.477	73.229*
	(40.141)	(41.195)	(40.225)	(39.798)	(40.528)	(39.879)
Age/100	−169.124	−16.472	−100.871	106.114	−157.289	514.164
	(536.725)	(447.748)	(430.183)	(469.032)	(455.895)	(478.805)
$Age^2/100$	6.944	3.871	5.373	3.969	7.928	0.787
	(8.143)	(6.368)	(6.262)	(6.505)	(6.384)	(6.500)
Married	−9.370	−9.329	−56.676	−76.327	−72.790	−42.095
	(69.679)	(70.549)	(70.907)	(70.124)	(68.606)	(66.697)
Years since emigration/100	2436.174†	2344.654†	2030.571†	2125.530†	2118.219†	2456.448†
	(611.910)	(608.207)	(585.861)	(600.112)	(611.778)	(614.185)
Years since $emigration^2/100$	−53.607***	−48.270***	−39.812**	−41.018**	−37.000**	−45.050***
	(18.463)	(17.400)	(17.030)	(16.948)	(16.911)	(16.973)
Internal migrant	−175.067***	−475.672*	−437.035	−395.772	−395.208	−373.651
	(54.370)	(261.621)	(268.628)	(270.353)	(281.677)	(282.941)
Migration reason (Ref: Work related)						
Education	−52.782	−57.377	−21.531	−9.307	−18.690	−127.876**
	(77.588)	(81.283)	(72.789)	(70.823)	(74.395)	(65.140)
Family	−4.985	−2.653	25.440	43.558	0.657	−100.028
	(83.606)	(83.526)	(83.002)	(81.583)	(78.773)	(70.069)
Other	−171.030***	−149.776***	−150.253***	−126.207**	−152.713**	−208.703***
	(57.368)	(55.733)	(58.131)	(61.275)	(70.107)	(68.893)
Labor force status (Ref: Full time employed)						
Part time employed	−314.694***	−323.022***	−344.431†	−356.146†	−353.108†	–
	(105.975)	(109.281)	(94.074)	(92.777)	(90.157)	
Self employed	−252.349†	−261.704†	−252.846†	−248.273†	−290.088†	–
	(61.037)	(61.496)	(57.580)	(57.188)	(56.992)	
Not in labor force	−427.432†	−428.548†	−419.501†	−406.850†	−394.531†	–
	(70.032)	(68.367)	(66.540)	(61.913)	(59.752)	
Relationship to head (Ref: Child)						
Partner	686.565†	609.141***	588.974***	631.284†	583.644***	577.524***
	(193.392)	(190.057)	(184.664)	(181.516)	(185.433)	(185.458)
Sibling	−151.443***	−152.572***	−135.171***	−158.389†	−151.744***	−150.200***
	(48.064)	(48.395)	(44.613)	(46.131)	(49.365)	(50.062)
Other relative	−86.116*	−78.448*	−121.626***	−136.417***	−125.545***	−134.212***
	(46.436)	(44.132)	(43.815)	(41.785)	(42.703)	(42.880)
Destination (Ref: Low income country)						
High income	699.521†	–	–	–	–	–
	(150.826)					
Upper-middle income	483.236***	–	–	–	–	–
	(185.047)					
Lower-middle income	−127.073*	–	–	–	–	–
	(71.620)					
Origin HH characteristics						
ln(non-remittance income)	–	–	−156.405†	−168.971†	−177.995†	−177.738†
			(24.963)	(26.134)	(27.906)	(28.010)
Urban	–	–	–	34.999	68.429	86.219
				(50.486)	(68.980)	(69.850)
Number of migrants	–	–	–	−26.448***	−33.881**	−33.924**
				(10.225)	(13.411)	(14.027)
HH head is male	–	–	–	105.929**	129.325**	132.675**
				(52.499)	(51.874)	(52.200)
House is owned	–	–	–	94.240	164.628**	190.043**
				(61.535)	(79.381)	(82.716)
Land is owned	–	–	–	−28.928	80.906	94.628*
				(57.608)	(53.189)	(54.308)
Electricity	–	–	–	149.817***	143.909*	148.630*
				(57.047)	(85.758)	(85.618)
HH size	–	–	–	25.306†	25.617†	25.118†
				(5.044)	(5.651)	(5.690)
Share of dependents	–	–	–	−110.621	−63.774	−44.998
				(89.526)	(96.652)	(96.083)
Constant	264.191**	116.939	1303.238†	1028.372†	1379.159†	887.844**
	(130.213)	(91.169)	(202.837)	(192.012)	(377.729)	(372.126)
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes
Observations	6,801	6,801	6,801	6,801	6,801	6,801
Adj-R^2	0.121	0.134	0.183	0.192	0.207	0.199

Notes: – Results are obtained from OLS regressions. – The sample is restricted to households with more than one migrant as in Tables 5, 6, and A2. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$*;* *** $p < 0.01$*;* ** $p < 0.05$*;* * $p < 0.1$*.*

Table B2: Determinants of the Probability of Sending Remittances – Restricted Sample

	I	II	III	IV	V	VI
Migrant characteristics						
University degree	−0.021	−0.024	−0.009	−0.001	−0.005	0.029
	(0.028)	(0.028)	(0.028)	(0.027)	(0.026)	(0.027)
Male	0.012	0.014	0.010	0.006	0.003	0.036**
	(0.014)	(0.014)	(0.014)	(0.014)	(0.014)	(0.015)
Age/100	0.587***	0.558***	0.545***	0.527***	0.536***	1.324†
	(0.204)	(0.203)	(0.202)	(0.202)	(0.205)	(0.220)
Age^2/100	−0.005*	−0.004	−0.004	−0.004	−0.004	−0.012†
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
Married	0.111†	0.111†	0.104†	0.099†	0.091†	0.120†
	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)	(0.016)
Years since emigration/100	0.602**	0.614**	0.565**	0.592**	0.567**	0.887†
	(0.248)	(0.250)	(0.244)	(0.247)	(0.250)	(0.260)
Years since emigration^2/100	−0.020***	−0.019***	−0.018**	−0.019**	−0.017**	−0.025***
	(0.007)	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)
Internal migrant	0.013	−0.024	−0.018	−0.011	0.042	0.067
	(0.022)	(0.059)	(0.058)	(0.057)	(0.063)	(0.065)
Migration reason (Ref: Work related)						
Education	−0.130†	−0.134†	−0.128†	−0.123†	−0.116†	−0.270†
	(0.022)	(0.022)	(0.021)	(0.021)	(0.021)	(0.020)
Family	−0.140†	−0.139†	−0.135†	−0.122†	−0.100†	−0.215†
	(0.023)	(0.023)	(0.022)	(0.022)	(0.021)	(0.021)
Other	−0.181†	−0.177†	−0.177†	−0.164†	−0.158†	−0.224†
	(0.036)	(0.036)	(0.036)	(0.036)	(0.037)	(0.039)
Labor force status (Ref: Full time employed)						
Part time employed	−0.088**	−0.083**	−0.086**	−0.089**	−0.107***	–
	(0.037)	(0.036)	(0.035)	(0.035)	(0.035)	
Self employed	−0.109†	−0.108†	−0.107†	−0.108†	−0.093†	–
	(0.020)	(0.021)	(0.020)	(0.020)	(0.019)	
Not in labor force	−0.388†	−0.386†	−0.385†	−0.381†	−0.378†	–
	(0.023)	(0.023)	(0.022)	(0.022)	(0.021)	
Relationship to head (Ref: Child)						
Partner	−0.030	−0.038	−0.041	−0.040	−0.048	−0.042
	(0.038)	(0.038)	(0.038)	(0.038)	(0.039)	(0.039)
Sibling	−0.117†	−0.118†	−0.116†	−0.105†	−0.094†	−0.090†
	(0.020)	(0.019)	(0.019)	(0.019)	(0.019)	(0.020)
Other relative	−0.069***	−0.066***	−0.073***	−0.075†	−0.090†	−0.100†
	(0.023)	(0.023)	(0.023)	(0.023)	(0.023)	(0.024)
Destination (Ref: Low income country)						
High income	0.088**	–	–	–	–	–
	(0.036)					
Upper-middle income	0.138***	–	–	–	–	–
	(0.048)					
Lower-middle income	−0.042	–	–	–	–	–
	(0.026)					
Origin HH characteristics						
ln(non-remittance income)	–	–	−0.024†	−0.025†	−0.024†	−0.024†
			(0.003)	(0.003)	(0.004)	(0.004)
Urban	–	–	–	0.013	0.000	0.011
				(0.019)	(0.024)	(0.026)
Number of migrants	–	–	–	−0.010**	−0.015†	−0.015†
				(0.004)	(0.004)	(0.004)
HH head is male	–	–	–	−0.041**	−0.047**	−0.040*
				(0.021)	(0.020)	(0.021)
House is owned	–	–	–	0.061***	0.037*	0.069***
				(0.021)	(0.022)	(0.023)
Land is owned	–	–	–	0.044**	0.043**	0.057***
				(0.019)	(0.021)	(0.021)
Electricity	–	–	–	0.004	0.032	0.035
				(0.021)	(0.023)	(0.023)
HH size	–	–	–	0.004**	0.002	0.002
				(0.002)	(0.002)	(0.002)
Share of dependents	–	–	–	0.026	0.027	0.036
				(0.030)	(0.031)	(0.032)
Constant	0.446†	0.386†	0.571†	0.504†	0.472†	0.075
	(0.053)	(0.052)	(0.055)	(0.065)	(0.108)	(0.108)
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes
Observations	6,801	6,801	6,801	6,801	6,801	6,801
Adj-R^2	0.273	0.277	0.288	0.295	0.328	0.277

Notes: – Results are obtained from OLS regressions. – The sample is restricted to households with more than one migrant as in Tables 5, 6, and A2. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$*;* *** $p < 0.01$*;* ** $p < 0.05$*;* * $p < 0.1$*.*

Table B3: Determinants of the Amount of Remittances – Restricted Sample

	I	II	III	IV	V	VI
Migrant characteristics						
University degree	0.577†	0.466†	0.503†	0.395†	0.300†	0.348†
	(0.113)	(0.084)	(0.082)	(0.077)	(0.080)	(0.080)
Male	0.186**	0.159***	0.141**	0.125**	0.102*	0.126**
	(0.073)	(0.062)	(0.060)	(0.059)	(0.053)	(0.053)
Age/100	5.682†	4.762†	4.463†	4.374†	4.609†	5.574†
	(1.586)	(1.099)	(1.095)	(1.065)	(1.010)	(1.049)
$Age^2/100$	−0.067†	−0.050†	−0.047†	−0.045†	−0.046†	−0.058†
	(0.019)	(0.013)	(0.013)	(0.013)	(0.012)	(0.013)
Married	−0.001	0.024	0.010	0.014	−0.011	0.001
	(0.066)	(0.052)	(0.051)	(0.048)	(0.046)	(0.047)
Years since emigration/100	3.993†	2.191***	1.965***	2.245***	2.259†	2.528†
	(1.067)	(0.754)	(0.702)	(0.710)	(0.637)	(0.690)
Years since $emigration^2/100$	−0.107†	−0.054***	−0.047***	−0.052***	−0.048†	−0.051***
	(0.028)	(0.018)	(0.015)	(0.017)	(0.014)	(0.017)
Internal migrant	−0.606†	−1.340†	−1.335†	−1.175†	−1.062†	−1.079†
	(0.094)	(0.231)	(0.234)	(0.238)	(0.230)	(0.228)
Migration reason (Ref: Work related)						
Education	0.154	0.109	0.142	0.187**	0.139*	0.057
	(0.128)	(0.097)	(0.087)	(0.081)	(0.079)	(0.080)
Family	0.155	0.124	0.132	0.113	0.021	−0.136*
	(0.113)	(0.091)	(0.089)	(0.086)	(0.075)	(0.076)
Other	−0.571***	−0.471***	−0.440***	−0.461***	−0.434***	−0.480†
	(0.192)	(0.153)	(0.154)	(0.152)	(0.144)	(0.146)
Labor force status (Ref: Full time employed)						
Part time employed	−0.355**	−0.463†	−0.465†	−0.437†	−0.468†	–
	(0.140)	(0.092)	(0.081)	(0.077)	(0.077)	
Self employed	−0.439†	−0.452†	−0.452†	−0.371†	−0.323†	–
	(0.076)	(0.059)	(0.058)	(0.055)	(0.052)	
Not in labor force	−1.075†	−1.046†	−1.038†	−0.981†	−0.752†	–
	(0.148)	(0.112)	(0.104)	(0.101)	(0.087)	
Relationship to head (Ref: Child)						
Partner	0.980†	0.759†	0.713†	0.645†	0.598†	0.611†
	(0.140)	(0.081)	(0.078)	(0.082)	(0.078)	(0.080)
Sibling	−0.047	−0.041	−0.037	−0.088	−0.052	−0.043
	(0.077)	(0.058)	(0.055)	(0.055)	(0.053)	(0.053)
Other relative	0.042	−0.027	−0.074	−0.113	−0.094	−0.107
	(0.099)	(0.079)	(0.077)	(0.069)	(0.071)	(0.071)
Destination (Ref: Low income country)						
High income	1.108†	–	–	–	–	–
	(0.162)					
Upper-middle income	1.067†	–	–	–	–	–
	(0.191)					
Lower-middle income	0.203*	–	–	–	–	–
	(0.106)					
Origin HH characteristics						
ln(non-remittance income)	–	–	−0.108†	−0.136†	−0.131†	−0.131†
			(0.010)	(0.010)	(0.010)	(0.010)
Urban	–	–	–	0.148**	0.097	0.129*
				(0.066)	(0.077)	(0.078)
Number of migrants	–	–	–	−0.061†	−0.071†	−0.073†
				(0.015)	(0.013)	(0.014)
HH head is male	–	–	–	0.021	0.056	0.079
				(0.068)	(0.061)	(0.063)
House is owned	–	–	–	−0.051	0.052	0.104
				(0.067)	(0.067)	(0.070)
Land is owned	–	–	–	−0.109*	0.077	0.093
				(0.060)	(0.067)	(0.069)
Electricity	–	–	–	0.524†	0.422†	0.439†
				(0.067)	(0.069)	(0.071)
HH size	–	–	–	0.029†	0.025†	0.024†
				(0.005)	(0.004)	(0.004)
Share of dependents	–	–	–	−0.086	0.068	0.068
				(0.106)	(0.092)	(0.094)
Constant	2.865†	3.324†	4.173†	4.317†	4.598†	4.009†
	(0.326)	(0.228)	(0.235)	(0.255)	(0.396)	(0.408)
Destination FE	no	yes	yes	yes	yes	yes
Origin FE	yes	yes	yes	yes	no	no
District FE	no	no	no	no	yes	yes
Observations	3,072	4,656	4,656	4,656	4,656	4,656
Adj-R^2	0.456	0.470	0.492	0.520	0.578	0.566

Notes: – Results are obtained from OLS regressions. – The sample is restricted to households with more than one migrant as in Tables 5, 6, and A2. – Standard errors in parentheses (clustered at the household level). – † $p < 0.001$*;* *** $p < 0.01$*;* ** $p < 0.05$*;* * $p < 0.1$.