Remittances and healthcare expenditure: human capital investment or responses to shocks? Evidence from Peru.

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ABSTRACT *This paper estimates the effect of international remittances on healthcare expenditures, taking into account both the interdependence with other consumption goods and the effects of health shocks. More precisely, we assess whether the budget allocation decisions of remittance-receiving households reveal different preferences to invest in health capital, even when the simultaneous effect that health shocks may have on the demand of remittances and on other types of nondurable expenditures is accounted for. Using data from the "Peruvian National Survey of Households", we find that remittances have a positive impact on healthcare budget shares, net of the remittance-related income effect and independently of the occurrance of a health shock. They also have a positive impact on housing and a negative one on other expenditure items, i.e. clothing, transports and education. Hence, our results indicate a 'pure' tendency of remittance-receiving households to devote larger shares of their budget to health capital investment, rather than to other types of consumption goods.*

KEYWORDS: demand system, health, Peru, remittances, shock response

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1. Introduction

Remittance inflows[1] have surged during the last decades, becoming a fundamental source of external funds for developing countries.[2] The economics of migration has devoted increasing efforts to the analysis of the effects of remittances on sending communities (Clemens et al., 2014). The potential additional income provided by remittances may relax household liquidity constraints, fostering poverty reduction, human and physical capital accumulation and insuring against income volatility. For example, several studies confirmed that these income flows support resource-constrained households for the enrolment and maintenance of children in school and for improving the quality of their educational investment (Cox Edwards and Ureta, 2003; Salas, 2014). These potential benefits may be counterbalanced by the direct costs of migration and the indirect costs in terms of reduced incentives to labour supply and rural productivity of members left behind, and skilled workers being lost (brain drain) (Acosta et al., 2007; Adams and Cuecuecha, 2013; de Haas, 2010, Lokshin et al., 2010; Randazzo and Piracha, 2014; Taylor and Lopez-Feldman, 2010)[3]. Moreover, evidence has been reported of some negative effects of migration on human capital investments due to parental absence (Grigorian and Melkonyan, 2011; Hanson and Woodruff, 2003; Hildebrandt et al., 2005; McKenzie and Rapoport, 2011).

The impact of migration on the health status of family members left behind has received less attention. The main contributions investigate the influence of migration on child health outcomes, identifying both losses and gains resulting from parental migration. A few studies analysed the effects of remittances on health inputs, i.e. expenditures for health services provision (preventive and curative), family planning activities, drugs, etc., providing contrasting evidence (see the next section for more details). This variation in results is partly due to different characteristics of the migratory phenomena considered, but also to some limitations in the empirical strategy adopted to model household expenditure

[1] The term “remittances” indicates the money and goods that are transmitted to households by migrants working outside of their origin communities, either in urban areas or abroad (Adams Jr, 2011). Remittances can be sent through either formal or informal channels. Cash transfers occurring through personal relationships, or carried out by unofficial courier companies, friends or relatives are the most common forms of informal remittances (Freund and Spatafora, 2008).

[2] Their amount at a global level was three times larger than official development assistance in 2013, and their flows are more regular than both private debt and portfolio equity. Aggregate data for Peru confirm the trends registered at the global level. The amount of remittance inflows from abroad reported in 2013 represents 1.3% of GDP (Migration and Remittances Team, 2014).

[3] A more recent literature contradicting the "brain drain" hypothesis suggests that, since the returns of education are higher when migrating, the prospect of future migration raises the overall expected returns to education, stimulating higher domestic investment in schooling (Docquier and Rapoport, 2012).

behaviour. Indeed, none of these studies simultaneously addresses the issue of reverse causality related to health shock occurrence, and the interdependence between healthcare expenditures and other types of nondurable expenditures. Migrants' influence (or intra-household agreements) on the allocation of resources coming from remittances may lead to larger investments in health capital. On the other hand, remittances may constitute an *ex-post* coping strategy to reduce the adverse consequences of health shocks affecting members left behind (Ambrosius and Cuecuecha, 2013). Therefore, reverse causality problems may occur in the estimation of the two-way relationship between the migrant decision to send transfers at home and healthcare expenditures of relatives left behind. Moreover, both remittances and health shocks may influence other expenditure items potentially correlated with health expenditures (e.g. food-at-home, transports, etc.). Hence, estimates of single demand equations suffer from an omitted variable bias.

This paper investigates the impact of international remittances on the expenditure for healthcare services of Peruvian households, overcoming these methodological limitations of previous contributions. First, we consider the whole budget allocation decision of households, by estimating an Almost Ideal Demand System (AIDS). Second, we address the issue of reverse causality, by controlling for the occurrence of health shocks and the effects that they may have on all consumption categories. Furthermore, unlike other contributions, we consider the total amount of healthcare expenditures instead of out-of-pocket expenditures only. Indeed, households may have access to healthcare through various channels besides out-of-pocket outlays, such as, for example, expenditures covered by public or private insurance, donations, or other informal channels. This issue is particularly relevant in Peru, due to the fragmentation of medical care provision by the health supply sector. By considering the overall level of medical care expenditure, we are able to identify whether receiving income from migrants really modify households' health capital investments.

Using data from the "Peruvian National Survey of Households" of 2011,[4] we find that remittance-receiving households (RRHs) allocate more resources to healthcare expenditure than no remittance-receiving households (NRRHs) and this outcome is robust to both the interdependence with other expenditure decisions and the potential reverse causality issue. Therefore, our results confirm a positive role of international remittances in fostering health capital investment. A limitation of our study is that we only estimate the income effect of migration through remittances. Data constraints do not allow us to

[4] See http://iinei.inei.gob.pe/microdatos for further details.

separately identify the impact of information flows between migrants and households left behind, or the effects of permanent absence of adult members on household expenditure decisions.

The next sections are organized as follows. Section 2 presents an overview of theoretical and empirical studies investigating the impact of migration on health of sending households. The main empirical challenges faced in the estimation of the net effect of remittances on health expenditure are outlined. Section 3 discusses the Peruvian context, identifying how remittances may contribute to improve household healthcare access. Dataset characteristics and some descriptive statistics are introduced in Section 4. Section 5 describes the empirical strategy pursued in our estimation and, finally, Section 6 presents and comments the main findings.

2. Migration and health of those staying behind

Several studies have tried to identify the net impact of migration on health *outputs*, considering both the income effect provided by remittances and other types of effects related to migration, such as the transfer of knowledge or the psychological costs generated by the absence of a family member. By increasing household economic resources, remittances may improve the access to healthcare and the adoption of good health practices, reducing the exposure to communicable diseases, risky behaviours and sedentary lifestyles (Deaton and Paxson, 1998; Case et al., 2002; Fletcher and Wolfe, 2014; Smith, 1999). At the same time, the awareness about healthcare practices and lifestyle behaviours accumulated by migrants may guide relatives' decisions in terms of both preventive and curative medical care consumption, improving the effectiveness of the healthcare provided. Knowledge flows may generate spillover effects also on non-migrant households, inducing an additional contribution in terms of "social remittances" (Hildebrandt and McKenzie, 2005; Lindstrom and Muñoz-Franco, 2005). On the other side, the absence of a family member may have direct negative consequences on the health of household members left behind. For example, it may worsen children's health by weakening caregiver attention and disrupting the division of labour within the household. Moreover, children may suffer from mental stress and depression because of the long term separation from parents (Wen and Lin, 2012; Wu et al., 2015).

Examining the effects of parental migration to US on child health in Mexico, Frank and Hummer (2002) show that children in migrant households are less exposed to the risk of low birth weight, largely because of the income effect associated with remittances. However, they also show that the risk of low

birth weight is significantly lower even among children born into migrant households who do not receive remittances. This effect is likely to be a consequence of the information flows from migrants to members left behind about good health practices and behaviours. Adhikari et al. (2011) find that out-migration of adult children is highly associated with poor mental health but not with the physical health of elderly parents left behind in Thailand. Children left behind in rural China exhibit higher levels of depression (Wu et al., 2015). Some of these drawbacks tend to shrink over time as migrants accumulate experience and households adapt to their absence (Kanaiaupuni and Donato, 1999).

Few contributions investigated the impact of migration on health *inputs*, mostly focusing on the effect of remittances on healthcare expenditures. Gerber and Torosyan (2013) report a positive impact of receiving remittances on medical care expenditure in Georgia. Also Amuedo-Dorantes and Pozo (2011) find that medical care outlays of Mexican families rise with the amount of income transfers from abroad. They also show that the responsiveness of healthcare expenditure to remittance income is greater than its responsiveness to other sources of income. (Amuedo-Dorantes et al., 2007; Amuedo-Dorantes and Pozo, 2011). On the contrary, by estimating a complete demand system, i.e. by taking into account the impact that remittances may have on other types of consumption goods, Mora and Taylor (2006) find no effect of international remittances on marginal health budget shares for rural Mexican households, and only a positive effect of domestic transfers. Such differing results are presumably due to the empirical strategies adopted. While Taylor and Mora (2006) estimate a simultaneous equation system, the other contributions adopt single demand equations.

Other studies based on a demand-system analysis identified a positive effect of migrant transfers on health expenditures in different countries. Adams and Cuecuecha (2010, 2013) estimate a Working-Leser model[5] on micro-data for Guatemala and Ghana, and identify a slight increase in health marginal budget share for both internal and international RRHs. Castaldo and Reilly (2007) use a similar specification to describe consumption patterns of Albanian families. The findings show significant and positive effects of external remittances on household health expenditures, while no relevant differences emerge between households receiving domestic transfers and NRRHs.

[5] The Working-Leser (W-L) (1943, 1963) model relates budget shares linearly to the logarithm of total household expenditure. The estimation of the W-L model is carried out using Ordinary Least Squares (OLS), separately estimating each equation of the demand system. The OLS coefficients and the average budget shares are used to calculate the marginal budget shares and the expenditure elasticity of good *i*.

An important limitation of these studies is that they do not verify whether the impact of remittances on health expenditures captures a shift in migrant household preferences towards human capital investment or it reflects reverse causality, i.e. it emerges because some unobserved health shocks have increased both healthcare expenditures and the demand for remittances. This would be in line with the predictions of the New Economics of Labor Migration theory which identifies international migration as a household strategy to reduce vulnerability to negative shocks through income diversification. Ambrosius and Cuecuecha (2013) provide evidence supporting the hypothesis that health shocks increase the demand of remittances. By comparing the impact of health-related shocks on debt levels between national and transnational households in Mexico, they report no effect of the shocks on the debt-burden of RRHs, while the average debt burden is doubled for NRRHs. Ponce et al. (2011) address the issue of reverse causality by restricting their attention to the way in which remittances affect households' responses to generic illness. They find that remittances have a positive effect on expenditure for medicines when illness occurs in Ecuadorian households. However, by estimating a single demand equation their findings suffer from an omitted variable bias. If illness influences other types of expenditures (e.g. food-in, transports or recreation) and these expenditures are correlated with health expenditures, the estimated coefficient on remittances could actually capture the effect of remittances on the omitted variables rather than their effect on health expenditures.

In this paper we carry out a demand-system analysis, addressing the reverse causality issue. Most of the previous contributions performing a demand system estimation, use a specification which is linear in expenditure[6]. An exception is the study by Mora and Taylor (2006) who adopt a locally flexible functional form, the Almost Ideal Demand System (AIDS) by Deaton and Muellbauer (1980b)[7]. The assumption of a linear relationship between budget shares and total expenditures has often been contradicted by empirical evidence (Barnett and Serletis, 2008), and it does not appear to hold in the data used in our empirical analysis either (see Figure 1 and 2 in the Supporting Information). For this reason, we will adopt the AIDS specification, which assumes that budget shares are linear in the logarithm of total expenditure.

[6] The Working-Leser model, the Rotterdam model and the Linear Translog model belong to this category of systems.

[7] A demand system composed by flexible functional form equations is capable to provide a second order approximation to the behaviour of any theoretically plausible demand system at a point in the price-expenditure space (Pollak and Wales, 1995). The AIDS belongs to a class of demand systems called price-independent generalized logarithmic (PIGLOG). It is a demand system with several desirable properties: it satisfies the aggregation restriction, and with simple parametric restrictions, homogeneity and symmetry.

3. The Peruvian context

International migration out of Peru is essentially a labour migration phenomenon, prompted by the will to improve the standards of living of both migrants themselves and relatives left behind. Data from the International Organization for Migration (IOM, 2012) indicate that Peruvian migrants live mostly in the US (31.5 per cent), Spain (16.0 per cent), Argentina (14.3 per cent) and Italy (10.1 per cent). Administrative information of the Dirección General de Migraciones y Naturalización (DIGEMIN) shows that among individuals who migrated out of Peru between 1994 and 2010 around 75 per cent are aged between 19 and 49, with women representing a slight majority. The vast majority of Peruvian migrants send money home on a regular basis and long after having left the country, pitching in to current expenditures and investing in house construction (International Organization of Migration, 2012). The nature of the phenomena corresponds to the understanding of migration as a household level investment decision to improve well-being in the medium and long run. Therefore, investing in human capital through preventive healthcare may constitute a priority for RRHs. Household members left behind could be incentivized to address resources sent by migrants to health investment by the commitment to an intra-household informal agreement on remittance use.

In order to figure out how remittances may contribute to raise health expenditure, facilitating the access to healthcare and improving the quality of the health services accessed, some features of the Peruvian healthcare system need to be pinpointed. Although some efforts to integrate the health sector supply side have been done since the early 2000s, it continues to be fragmented among various providers belonging to both public and private sector. Public health providers are the Ministry of Health, the regional governments, the social security health insurance institution under the Ministry of Labour (EsSalud) and the police, army, air force, and navy health funds. Each of these institutions provides healthcare to specific population subgroups, through heterogeneous sources of fundings. EsSalud guarantees health insurance to formal employees and their families and is financed by payroll contributions. The Ministry of Health and the regional governments co-manage the Comprehensive Health Insurance Scheme (Seguro Integral de Salud - SIS), which ensures access to health services for workers in the informal sector and the poor, and it is subsidised directly by the Ministry. The private health sector includes private providers and insurance companies, nonprofit entities, private medical doctors and other health professionals, as well as suppliers of traditional or indigenous medicine. Users

of private sector services can access to them throught out-of-pocket outlays, private insurance coverage, or even donations (Vermeersch et al, 2014; OECD, 2017).

The Universal Health Insurance Law of 2009 created a regulatory framework to achieve universal health coverage, promoting coordinated institutional efforts between previously mentioned actors. However, the affiliation to different health insurance programmes corresponds to heterogeneous ranges of available services and access costs. Moreover, actual availability of services at the local level, waiting time and low quality of public provision may induce patients to get access to healthcare through more than one channel contemporaneously, and overlapping different paying systems to cover healthcare costs (Maeda et al., 2014; OECD, 2017).

Remittances may help to get quicker and higher standard access to diagnostic and curative services, and support the direct and indirect costs of therapies in case of lack of insurance coverage. On the other hand, this source of money can be addressed to preventive healthcare, immunization or pregnancy care. Nevertheless, remittances may allow households to take out a health insurance they would not be able to afford otherwise, switching from public to private services and preventing from future health shock risk exposure. On the other hand, households who do not receive remittances may rely on other types of support (either formal or informal). Therefore, in order to examine the effects of remittances on health capital investments, we should not restrict our attention to direct expenditures only, as most of the studies presented above do. Thus, in the empirical analysis, an expenditure variable is built up considering in addition to out-of-pocket outlays paid by household members, all the expenditures covered by insurances or any other public or private institutions, members of other households, or other informal channels. These expenditure items are calculated asking the respondents to report the amount paid for healthcare services when they are aware of it. Analogously, the annual amount of total expenditure is computed for each consumption category.

4. Data and descriptive statistics

The data used in this analysis are retrieved from the "Peruvian National Survey of Households" of 2011 (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza*), conducted by the "Peruvian National Institute of Statistics and Informatics" (INEI). The ENAHO is a yearly administered-, nationally representative survey, which collects information on dwellings, expenditures and income at the

household level, and information on demographics, education, health and employment status for each household member[8]. The sample consists of about 24700 observations.

With respect to remittance status, the survey provides details on the frequency with which households receive international remittances and the annual amount of transfers received. RRHs represent 2.10 per cent of the sample. The average annual amount of remittances received is 5360 Nuevo Soles[9]. Table 1 summarizes descriptive statistics according to household remittance status. RRHs are mostly non-poor (90%), mostly living on the Coast or in Lima (78%), and settled in urban areas (90.73%). About 55 per cent of the household heads have completed at least secondary level of education, compared to less than 40 per cent for NRRs. The average age for household heads is higher in transnational families. Almost 70 per cent of them are older than 50, compared to 50 per cent in the other group. The percentage of female household heads is larger than among NRRHs. RRHs report a remarkably higher average total expenditure.

Transnational families are more likely to have a member experiencing chronic discomfort, i.e. arthritis, hypertension, asthma, rheumatism, diabetes, tuberculosis, HIV, cholesterol, etc. and a member having reported an episode of hospitalization in the 12 months before the survey. As shown by first stage estimation the occurrence of an episode of hospitalization among household members is a significant determinant of receiving international remittances. However, this does not seem to be determined by household's life cycle stage, as RRHs report higher hospitalization rates even among households with younger heads and no elderly members.

[TABLE 1 HERE]

Descriptive statistics in Table 2 (panel A) show that RRHs tend to spend more for healthcare, both in terms of direct expenditures and outlays covered by public or private institutions or by members of other households. In particular, we observe that out-of-pocket outlays and expenditures covered by public

[8] ENAHO survey data report information on health for all household members at the individual level. More specifically, we know if they are suffering from any chronic condition like arthritis, hypertension, asthma, rheumatism, diabetes, tuberculosis, HIV, cholesterol, etc. In addition we have information on whether they reported any other symptom, malaise, illness or relapse. For any health problem mentioned, respondents have been asked about what kind of treatment or care they received, by whom and in what type of medical centre this have been checked (hospital, medical health centre, pharmacy, etc...). In case they did not get any treatment they have to report the reason why they did not. For all treatments received in the year before the interview, the survey reports how much household paid for them and who covered the expenditure. For all treatments received in the year before the interview, the survey reports the cost of the treatment and who covered the expenditure. By means of this information, we reconstructed annual expenditure for healthcare.

[9] Official exchange rate (Nuevo Soles per US dollars, yearly average 2011) is 2.75; International Monetary Fund, International Financial Statistics.

institutions are more than double for RRHs, while the amount of expenditures covered by private insurances or by members of other households are more than three times larger for RRHs than NRRHs. Table 2 (panel B) presents the average budget shares for the expenditure categories included in the demand system by remittance status. Relevant divergences in expenditure allocation emerge between the two groups: RRHs report higher budget shares for health, education, housing and transportation, meanwhile lower shares are observed for food and clothes. A comprehensive definition of the expenditure categories included in the analysis is reported in the Online Appendix (Table A1) — see Supporting Information at the end of the paper.

In line with Table 1, these elements could simply reflect differences in life cycle stage and overall economic status for the two household groups. Thus, in order to identify a specific tendency to address resources from transfers towards human capital investment, it is necessary to disentangle the overall age and income effect from the remittance effect. As Table 3 shows, divergences in the level of the health expenditure shares are reported not only between RRHs and NRRHs, but also between the two groups in the same income quartile and household head age group. Since the share of medical care outlays is larger for RRHs across all income quartiles and age groups, this descriptive evidence is in line with the hypothesis of a specific contribution of migrant transfers to healthcare funding.

[TABLE 2 HERE]

[TABLE 3 HERE]

5. Empirical strategy

5.1 Identification

As mentioned above, there are various sources of endogeneity in the relationship between remittance status and expenditure decisions. Firstly, RRHs may differ from NRRHs for unobserved characteristics (e.g. skills, ability, motivation of migrant members, propensity to risk, previous migratory experiences), which may affect both the decision to send a migrant abroad and household preferences in terms of expenditure allocation, giving rise to self-selection issues. Moreover, as early discussed, there exists a reverse causality concern in the two-way relationship between the decision of sending money back and the health conditions of members left behind.

Following previous contributions, we use an instrumental variable technique (IV) to overcome these

potential sources of bias. Since recent Peruvian migration history is mostly characterized by labour migration and remittance patterns seem to be very selective at the geographical level, historical remittance flows at the local level may represent a suitable instrument[10]. The choice of the instruments is driven by the idea that migration networks, together with cultural, community or political factors of the area of origin influence the probability to migrate and remit, but not the expenditure decisions of the households. The argument sustaining this criterion is that past migration facilitates present migration, as a larger network of migrants provides contacts, information and logistic support for new migrants. Moreover, international migration is more likely to be undertaken when people get in touch with successful experiences reported by neighbours or acquaintances.

However, to determine the impact of remittances on health expenditure decisions we need to disentangle the specific effect of remittances from the overall consequences linked to migration. Indeed, although for many households remittances constitute the most tangible consequence of migration, they might not be the only channel through which migration influences the well-being of relatives left behind (McKenzie, 2005). Consequently, instrumenting household remittance status with a predictor of household likelihood of having a migrant (e.g. historical migration rates) may result in a violation of the exclusion restriction. To overcome this potential source of bias we adopt remittance rates at the province level in 2007 as an instrument[11]. As expected, the historical remittance rates are stronger predictors of household remittance status than migration rates (see Table A.3 in the Supporting Information)[12].

As it is shown in the next section, the coefficients of the first-stage regressions are significant and have the expected signs, confirming the validity of the instrument selected. However, to ensure the validity of the exclusion restriction, the historical remittance rates should not affect household health

[10] Hanson and Woodruff (2003), Hildebrandt and McKenzie (2005), McKenzie and Rapoport (2011) all employ historical migration rates as instruments for current migration.

[11] The number of provinces in Peru at the time of the survey was 193. The remittance rate at the province level is obtained from the 2007 wave of the ENAHO survey. The choice of the reference period for this instrument and also for the migration rates used in the robustness checks (see footnote 12), is partly driven by data constraints but it also complies with the historical trends of Peruvian migration. Indeed, until the second half of the 1990s, international migration involved exclusively an élite of the urban population in Lima. The economic crisis caused by the escalation of the civil war acted as a push-factor for labour out-migration for all social groups, especially middle class young people (International Organization of Migration, 2012). Thus, a surge in the outflows occurred at the end of the 1990s, while these became flatter after 2006 (http://webinei.inei.gob.pe:8080/sirtod-series/).

[12] To shed light on the effects of using different instruments, the demand system has also been estimated using the historical migration rates at the departmental level (1995-2005), both separately and together with the remittance rate. The direction of the effect of remittances on health budget shares does not change across models. However, using a predictor of the likelihood of having a migrant overestimates the positive effect of remittances, suggesting a role of migration in influencing expenditure decisions that goes beyond the remittance channel. Results are available from the authors upon request.

expenditure behaviour apart from their influence through current remittances[13]. A potential threat to this assumption is that previous remittance inflows, return migration or transmission of knowledge from migrants to those left behind may have provided resources to potentiate the supply of health facilities and increased the demand for higher quality services. As such, the historical remittance rate in a province could be positively correlated with the current level of health infrastructure in that same area. To deal with this possibility, we control for two proxies of geographical variation in health supply: the number of hospitals per 1000 population at the provincial level and a dummy for the presence of healthcare establishments in the district. The data on available healthcare supply at the local level are retrieved from *El Registro Nacional de Municipalidades* (2008)[14]. After adding these controls, historical remittance rates still remain a strong instrument, while none of the controls are individually significant.

Analogously, previous remittance inflows may have improved provincial living standards, which in turn may lead to different expenditure patterns compared to those prevailing in areas which did not benefit from these past inflows of resources[15]. Hence, we run some robustness checks, by including different measures of provincial household income in our regression models. Results available upon request show that our estimates are robust to the inclusion of these controls.

Finally, as discussed in the result section, the sign of our instrumental variable estimates is consistent with the direction of the bias in the OLS estimates[16]. Although this is not a formal test of the validity of our instrument, it supports the validity of our conclusions, at least qualitatively.

5.2 The model and other methodological issues

We model household expenditure behaviour using an Almost Ideal Demand System. This model overcomes the linearity assumption between budget shares and total expenditure fixed by the Working-Leser demand systems. The idea inspiring the class of models to which the AIDS belongs is to define a functional form which allows to perform a second-order approximation to any direct or indirect utility

[13] Estimations available upon request show that the correlation observed between our instrument and the outcomes is never larger than 0.25.
[14] For more details, see *El Registro Nacional de Municipalidades* (2008) – http://ineidw.inei.gob.pe/ineidw.
[15] We thank an anonymous referee for pointing out this possibility.
[16] We investigate the direction of the correlation between the remittance-receiving dummy and the residuals in our main regressions by performing an augmented regression test as suggested by Davidson and MacKinnon (1993). See Section 6 for more details.

function or to a cost function. Correspondingly, the demand functions, expressed in terms of budget shares, become:

$$w_{ih} = \alpha_i + \sum_j \gamma_{ij} \log p_j + \beta_i \log\left(\frac{x_h}{P_h}\right), \tag{1}$$

where w_{ih} is the expenditure share of commodity i for household h, p_j is the price of good j, x_h is the total expenditure for household h, and P is a price index defined by

$$\log P = \alpha_0 + \sum_k \alpha_k \log p_k + \frac{1}{2}\sum_j \sum_k \gamma_{kj} \log p_k \log p_j. \tag{2}$$

The adding up restriction requires that $\sum_{i=1}^{n} \alpha_i = 1$, $\sum_i \beta_i = 0$, $\sum_{i=1}^{n} \gamma_{ij} = 0$. Homogeneity condition is satisfied if and only if for all j, $\sum_j \gamma_{ij} = 0$, while the symmetry condition requires that $\gamma_{ij} = \gamma_{ji}$. However, since our analysis is based on cross-sectional data, we do not have information on the time variation of prices to separately identify price elasticities. Thus, a conventional normalization for cross-sectional data is applied setting $p_i = 1$ and $\log p_i = 0$. Consequently, the budget shares can be written in the form:

$$w_{ih} = \alpha_i + \beta_i \log x_h - \beta_i \alpha_0. \tag{3}$$

Changes in real expenditure operate through the β_i coefficients: these are positive for luxuries and negative for necessity goods (Deaton and Muellbauer, 1980a, 1980b). According to this empirical framework, different specifications are implemented, extending the model to include remittance status dummies and interactions of these dummies with total expenditure. Separate models are estimated to distinguish between average and marginal effects of remittances on expenditure allocation. The specific forms of the estimated equations are respectively:

$$w_{ih} = \alpha_i + \beta_{1j} \log Y_h + \beta_{2i} R_h + \beta_{3i} X_h + u_{hi}, \tag{4}$$

$$w_{ih} = \alpha_i + \beta_{1j} \log Y_h + \beta_{2i} \log(Y_h) * R_h + \beta_{3i} X_h + u_{hi}, \tag{5}$$

where w_{ih} corresponds to the budget share of commodity i for household h, Y_h is total expenditure for household h, R_h is the remittance status and X_h is a vector of household characteristics including both household-level and province-level variables. Such specification permits remittance status to shift the

propensity to allocate available income across the different expenditure categories, and the functional form holds the attractive theoretical properties of the AIDS model.

Since both the remittance status and total expenditure might be endogenous, the demand equations have been simultaneously estimated using an iterative three-stage least squares procedure (3SLS). In this way, the information contained in the cross-equation error correlations is exploited. More specifically, in the first stage we estimate the probability of receving remittances and household total expenditure[17]. In the second stage we compute the covariance matrix of the equation disturbances. Finally, in the third stage we estimate the demand system using the covariance matrix obtained in the second stage with the instrumented values in place of the right-hand-side endogenous variables. The other exogenous explanatory variables are identical for all the equations. They include variables describing household size and composition (total household size, number of children and elderly members, temporary absent members[18]), as well as, gender, age group and educational level of the household head in order to control for heterogeneous preferences and healthcare necessities. The model includes also a set of 4 regional dummies (Costa, Sierra, Selva, Metropolitan area of Lima) and a rural/urban dummy to take into account the possible heterogeneity across different areas of the country. A dummy indicating whether household dwelling is rented is considered to control for household assets.

In order to detect whether the observed health expenditure behaviour corresponds to a choice of investing more in healthcare or it simply reflects the occurrence of health shocks or permanently worse health conditions (i.e. to address the reverse causality issue), some proxies of household members' health status are included. In particular, we consider a dummy reporting the occurrence of a case of hospitalisation among family members during the 12 months before the survey, as a proxy of a relevant health shock, and a dummy for the presence of chronic discomforts, i.e. arthritis, hypertension, asthma, rheumatism, diabetes, tuberculosis, HIV, cholesterol, etc. as a proxy for permanently negative health conditions. A specification including the interaction between remittance status and the occurrence of the shock is estimated to test if resource allocation decisions vary between the two household groups when

[17] In line with what said in the previous section, the first stage regression estimating the likelihood of receiving international remittances is a linear probability model with the following specification: $R_h = \pi_0 + Z_h + X_h + v_h$, where $Z_h$is the instrumental variable (remittance rate at the province level in 2007). Total consumption has been instrumented by total household income and number of household members with high educational levels (Banks et al., 1997, Berloffa et al., 2006). To satisfy the adding-up restrictions required by the AIDS framework, a consumption category, that is other goods, is omitted and the estimation of those parameters is residually determined.

[18] A member is considered "absent" if it is absent from the household for 30 days or more. This absence is not related to migration because migrants who moved out of the household are not considered among family members by the survey protocol.

the shock happens. As a supplementary test, we split the sample according to the hospitalization dummy and we estimate the model considering only households not reporting health shocks during the last year to verify whether the positive effect of transfers on health budget shares is confirmed also in these circumstances.

6. Results

The third-stage equations for the demand system estimated with instrumental variables (Equation (4)) are reported in Table 4 and are in line with standard expenditure patterns. The food share increases with household size and for households living in rural areas but decreases with total expenditure, educational level and age of the household head. Concerning the health dimension, we observe that, as expected, total expenditure, number of children, number of elderly persons, age and education level of the household head, as well as the presence of a member with chronic discomfort, all increase healthcare budget shares. Geographical variation in health supply at the local level, instead, has no significant effect on household healthcare expenditure decisions.

Focusing on the role of remittances, our results reveal significant differences in the expenditure patterns of RRHs with respect to NRRHs. Getting migrant transfers has a positive and significant average effect on the budget shares for health and housing and a negative (and significant) effect on those for education, clothing and transports. The average effect of receiving transfers on healthcare budget shares is around 11 percentage points. This means that, for a level of annual total expenditure of 30000 Nuevo Soles (corresponding to around 10900 $), RRHs allocate 1200 $ more to healthcare than NRRHs. In order to assess if the size of the impact of remittances changes with the level of total expenditure, the estimates of Equation (5) reported in Table A.5 (Supporting Information) show that the marginal effect of receiving transfers is almost 1.1 percentage points. This result is an effect of remittances on healthcare budget shares of 9.2 and 11.4 percentage points, respectively for a level of total expenditure of 5000 and 35000 Nuevo Soles. Therefore, although the impact of remittances grows with the level of total expenditure, the magnitude of this effect does not vary so much along the expenditure distribution. The expenditure elasticities of demand for each expenditure category confirm that the size of the budget shares addressed to healthcare does not vary so much with the level of total expenditure. The outcomes displayed in Table 5 give a measure of the propensity to redistribute additional resources towards

healthcare for the two household groups as long as total expenditure increases[19]. Coherently with the elements emerged until now, the expenditure elasticity of demand for healthcare is larger for RRHs with respect to NRRHs. However, the difference in the size of this elasticity is not very large: indeed, if total expenditure increases by 10 per cent, healthcare expenditure augments by 13.3% for RRHs and by 11.8% for NRRHs[20].

In order to assess the validity of our results, we consider the OLS estimates of the demand system and the possible direction of their bias due to the correlation between the remittance-receiving dummy and the residuals in our main regressions. Indeed, we may suppose that RRHs receive transfers because of unobserved health shocks and that people who experience these shocks need more healthcare, move less and spend more time at home. This would imply a positive correlation between the remittance dummy and health, food and housing budget shares, and a negative correlation with clothing and transports. OLS coefficients of the remittance dummy would overestimate the effect of remittances on health, food and housing, and underestimate that on clothing and transport budget shares. Conversely, receiving remittances could be associated with higher standard of living, i.e. more involvement in social life, consumption of higher quality goods and services, more health awareness, etc. In this case, the OLS coefficients would underestimate the effect of remittances on health and housing and overestimate that on clothing and transport expenditure.

Since our OLS estimates (available in Table A.4 in the Supporting Information) of the remittance-receiving dummy on expenditure shares are not significant - with the exception of food - the underlying 'true' coefficient on health and housing would be negative under the first hypothesis and positive under the second hypothesis. The 'true' coefficient on clothing and transports would be positive under the first

[19] According to the definition of elasticity and in line with the model estimated with the interaction variable (Table 6 and Supporting Materials A.5), the consumption elasticity of good j for household i can be derived as $\eta_{ij} = (\alpha_{1j} + \bar{w}_j) * \frac{1}{\bar{w}_j} = \frac{\beta_{ij}}{\bar{w}_j} + 1$. In our case, the consumption elasticity for RRHs becomes $\eta_{ij}^R = \frac{\beta_{1j} + \beta_{2i}^R}{\bar{w}_j} + 1$. In this way we obtain the consumption elasticities of demand for RRHs and NRRHs at the same (average) level of consumption shares.

[20] Since RRHs are likely to be in a later stage of their life cycle than NRRHs (as shown by descriptive statistics in Table 1), they could need to spend more on health. Thus, the effect of remittances could be entirely explained by demographics. To test this hypothesis, we separately estimate the demand system by household head age group and we observe that the effect of remittances is mainly driven by the group of households with household heads aged 50-69 (results are available from the authors upon request). This element would seem to exclude the hypothesis that household life cycle fully explains the positive impact of remittances.

hypothesis and negative under the second hypothesis. We performed a Davidson and MacKinnon augmented regression test that shows a negative and significant correlation between the remittance-receiving dummy and the error term for health and housing and a positive one for clothing and housing[21]. Hence, we can conclude that the coefficient of the remittance-receiving dummy in an unbiased health equation should be positive, and this is consistent with our demand system estimation in Table 4.

These findings present both similarities and divergences with the previously mentioned studies. The results are consistent with what observed by Adams and Cuecuecha (2010a, 2013) for health and food, while they are hardly comparable with Castaldo and Reilly (2007), as the consumption categories adopted are different. Nonetheless, the evidence emerging in our estimation is conflicting with their findings showing that households receiving external remittances report higher food budget shares relative to those receiving no transfers. Undoubtedly, these divergences in the results are partly due to the estimation strategy adopted and how we constructed our expenditure variables. In terms of education, the results obtained seem to contradict most of the contributions mentioned above (Calero et al., 2009; Salas, 2014), claiming that additional liquidity from migrant transfers increases the level of available resources to be allocated to education investment. This finding seems to be more in line with the negative impact of remittances on education spending reported by Grigorian and Melkonyan (2011) in Armenia. As we said before the positive effect of remittances on human capital investment may be overturned by some negative drawbacks due to the migratory process, such as parental absence (Hildebrandt et al., 2005). Besides, the argument pursued by the brain drain literature, that the return to education is higher at destination than at home, may not be confirmed in the case of Latin American migration to the US and Europe (Chiquiar and Hanson, 2005). These two elements may explain a lower propensity to invest resources in education by transnational households.

[TABLE 4 HERE]

[TABLE 5 HERE]

As suggested by the first-stage regression in Table A.2 (Supporting Information), the occurrence of a health shock among household members, proxied by a reported case of hospitalization during the previous 12 months, has a positive and statistically significant effect on the probability of receiving

[21] Davidson and MacKinnon (1993) suggest an augmented regression test, that can easily be performed by including the residuals from the regression of each potentially endogenous right-hand side variable on all exogenous variables, in the original model. In our context, we first estimate two regressions, one for each endogenous regressors, i.e. remittance status dummy and the logarithm of total expenditure: $R_h = IV + X_h + v_{1h}$, and $Log(Y_h) = IV + X_h + v_{2h}$. Then we insert the residuals v_1 and v_2 in our main model.

remittances. On the contrary, the effect of having a household member suffering from a chronic discomfort is not significant. This suggests that remittances are not directly linked to permanently negative health conditions which could arise, for example, as a consequence of migrants' absenteeism[22]. However, the additional resources coming from migrant transfers and addressed to healthcare might constitute a coping strategy against health shocks rather than a choice of health capital investment. In order to distinguish between these interpretations, Table 6 reports the outcomes of the health demand equation estimation across different specifications (Columns 4 - 6).

Column 4 shows the results of the model including an interaction term between the occurrence of a health shock and the remittance status. Similarly to what observed in the other specifications, RRHs address more resources to health in general. The coefficient of the remittance-status dummy is even larger than the one in the model without the interaction term (from 11 to 16.8 percentage points - see Table 6, Column 2 and 4). This suggests that the effect of remittances on healthcare estimated in the original specification is not simply capturing a response to the occurrence of a health shock. As expected, healthcare expenditure increases for both household groups in case of shock. However, the interaction term between remittance status and the shock dummy is negative, indicating that in case of a health shock the two groups of households report the same level of healthcare expenditure and the overall positive effect of remittances on healthcare budget share is nullified. Coherently with what observed by Ambrosius and Cuecuecha (2013), the full results for this last specification (see Table A.6 – Supporting Information) suggest that RRHs use migrant transfers to cope with the additional healthcare expenditures related to the shock, while NRRHs resort to other sources to cover these outlays. For instance, although RRHs address fewer resources to education overall, the interaction term between remittance status and the shock dummy is positive, indicating that in case of a health shock RRHs may refrain from subtracting resources from this budget item. Therefore, remittances provide also an insurance instrument to cope with the indirect costs of a negative health shock, supporting liquidity-constrained families and preventing them from reducing the amount of resources addressed to other expenditure categories. As a robustness check, we estimate separate models for households experiencing a health shock or not (Table 6, columns 5 and 6). We observe that the positive effect of remittances on health budget shares is

[22] The survey does not collect specific information on mental health conditions; otherwise we could have separately tested whether the increase in health expenditure was associated with mental stress due to the absence of the migrant. However, access to mental healthcare in Peru is extremely limited. The WHO's Mental Health Atlas reports that the Peruvian Ministry of Health allocated only 0.27% of its entire budget to mental healthcare in 2011, of which 98% went to psychiatric hospitals (Toyama et al., 2017).

confirmed for the subsample of households not experiencing any shock, with effects of similar magnitude as those estimated in column 4. Full results are available in the Online Appendix (Tables A7 and A8). Thus, not allowing different effects in case of a health shock gives rise to a downward bias in the estimation of the impact of remittances on health capital investments.

[TABLE 6]

7. Conclusions

This paper provides some important insights into the impact of remittances on health capital investments of households left behind, with particular attention to healthcare expenditure. The main aim of the paper is to examine whether households receiving transfers from migrants abroad devote more resources to healthcare. However, since experiencing a negative health shock may increase the likelihood of obtaining remittances and using them to cope with it, we need to assess whether a higher healthcare expenditure reflects a genuine choice of investing more in health capital or a simple response to a negative health shock. Furthermore, we need to account for the possible interedependences of healthcare expenditure with expenditures on other types of consumption goods.

In order to address all these issues, we estimate an Almost Ideal Demand System (AIDS) for seven expenditure categories: health, food, education, clothes, housing, transports and other goods. We adopt an instrumental variable estimator to account for the endogeneity of total expenditure and the remittance-receving status. Geographical variation in the historical remittance rates has been exploited to instrument household remittance status and deal with the selectivity issues concerning the probability of receiving remittances. Furthermore, we control for the occurrence of relevant health shocks and permanently negative health conditions, in order to address possible reverse causality issues.

Our findings reveal that receiving transfers from migrants abroad has a significant impact on household expenditure decisions. Notably, transnational transfers seem to reshape household demand not only through an overall income effect, but by shifting household preferences in favour of higher health and real capital investments (healthcare and housing), with corresponding lower expenditure for other nondurable goods (clothing and transports). Our analysis shows that the propensity of remittance-receiving households to allocate additional resources to healthcare does not simply capture a reverse causality from the occurrence of a negative health shock to remittances and healthcare expenditure.

Indeed, we find a positive impact of remittances on healthcare expenditure for those households that do not experience a health shock, and a negligible impact for those households that do experience a shock. In other words, when a relevant health shock occurrs, all households need to increase their healthcare expenditure. Those households that can rely on remittances ask for them and use them to cover these expenditures. The other households cover these increase in expenditures with other types of resources. In more 'normal' times (i.e. without relevant health shocks), remittance-receiving households invest a larger share of their budget in healthcare. Hence, failing to control for the occurrence of a health shock actually generates a downward bias in the estimation of the impact of remittances on health capital investments.

Such evidence confirms that the healthcare expenditure behaviour of remittance-receiving households corresponds to a specific choice of investing in health capital through more (and better) medical care. This choice could be driven by several aspects related to migration, i.e. changes in preferences, role of migrants in determining income allocation decisions, intra-household informal agreements about the intended use of these resources. Unfortunately, we cannot separately identify these effects in our analysis because we do not have specific information on migration. For the same reason, we are not able to estimate the impact of information flows between migrants and households left behind, or the effects of permanent absence of adult members on household expenditure decisions. Despite these limitations, our study highlights the important role of migrant transfers in enhancing health investments of members left behind, with positive implications for their long-term health status.

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Table 1 - Descriptive statistics by remittance-receiving status of households.

	Remittance-Receiving Households (RRHs)	**Other households (NRRHs)**
Household composition (%)		
Household size	4.00	3.98
Number of children	0.92	1.16
Number of elderly persons	0.58	0.34
Poverty status (%)		
Extremely Poor	0.19	7.21
Poor	4.83	19.85
No poor	94.98	72.94
Geographical area (%)		
Costa	38.42	27.44
Sierra	40.42	12.55
Selva	9.65	21.09
Lima	39.38	11.05
Urban	90.73	60.05
Education household head (%)		
No education	17.76	29.31
Primary education	25.87	30.47
Secondary education	35.14	25.53
High school or more	21,24	14,41
Gender household head (%)		
Female	38.80	23.44
Age of the household head (%)		
0-49	30.50	49.03
50-69	44.02	36.56
70 +	25.48	14.41
Total expenditure (nuevo soles)	33,607	19,976
Rented House (%)	8.11	7.12
Member with chronic discomfort (%)	87.45	74.64
Member hospitalised in the last 12 months (%)	27.41	17.87

Source: Author's calculation on 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza*).

Table 2 – Healthcare expenditure and average budget shares by remittance-receiving status of households.

	RRHs	NRRHs	Test of means (*)
Panel A: Healthcare expenditure (Nuevo Soles)			
Healthcare expenditure (out-of-pocket expenditure)	2017	927	-11.99***
Healthcare expenditure (covered by public insurance or institutions)	1113	531	-6.77***
Healthcare expenditure (covered by private institutions or members of other households)	730	203	-10.12***
Panel B: Average budget shares			
Health	.098	.072	-6.85***
Food	.398	.508	16.52***
Education	.070	.053	-6.53***
Clothing	.043	.051	3.91***
Housing	.221	.180	-9.56***
Transports	.112	.082	-9.99***
Other	.058	.054	-2.09**
Total	1.000	1.000	

Notes: Test of means for remittance status, significant at 0.01 (***), 0.05 (**), 0.1 (*).
Source: Author's calculation on 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza).*

Table 3 - Household healthcare budget shares by remittance-receving status, income quartile and age group of the household head.

	Income quartile				
	1st quartile	*2nd quartile*	*3rd quartile*	*4th quartile*	*Total*
RRHs	0.08	0.08	0.10	0.10	0.10
NRRHs	0.05	0.06	0.07	0.09	0.07
	Age group of the household head				
	<50	*50-59*	*70+*		*Total*
RRHs	0.078	0.097	0.125		0.098
NRRHs	0.064	0.074	0.096		0.072
Total	0.064	0.075	0.097		0.073

Source: Author's calculation on 2011 Peruvian National Survey of Households (*ENAHO - Metodologia Actualizada - Condiciones de vida y pobreza*).

Table 4 - Almost Ideal Demand System Estimation with Instrumental Variable.

	(1) Health	(2) Food	(3) Education	(4) Clothing	(5) Housing	(6) Transports
Ln (total expenditure)	0.0139***	-0.1275***	0.0321***	0.0065***	0.0009	0.0489***
	(0.0025)	(0.0039)	(0.0017)	(0.0014)	(0.0028)	(0.0019)
Receiving international remittances (dummy)	0.1097***	-0.0259	-0.0846***	-0.0496**	0.2364***	-0.0809***
	(0.0358)	(0.0558)	(0.0245)	(0.0200)	(0.0408)	(0.0271)
Household size	-0.0052***	0.0303***	0.0024***	-0.0007*	-0.0179***	-0.0034***
	(0.0007)	(0.0010)	(0.0005)	(0.0004)	(0.0008)	(0.0005)
Number of children (0 – 14)	-0.0071***	-0.0173***	-0.0036***	-0.0111***	0.0453***	-0.0049***
	(0.0016)	(0.0025)	(0.0011)	(0.0009)	(0.0019)	(0.0012)
Number of elderly persons (65+)	0.0047***	-0.0135***	0.0016***	0.0051***	0.0090***	-0.0073***
	(0.0008)	(0.0012)	(0.0005)	(0.0004)	(0.0009)	(0.0006)
Educational level household head (Primary)	0.0139***	-0.0096***	-0.0089***	-0.0014**	0.0109***	-0.0038***
	(0.0012)	(0.0019)	(0.0009)	(0.0007)	(0.0014)	(0.0009)
Educational level household head (Secondary)	0.0013	-0.0051**	-0.0026**	-0.0011	0.0052***	0.0014
	(0.0015)	(0.0023)	(0.0010)	(0.0008)	(0.0017)	(0.0011)
Educational level household head (High School or more)	-0.0008	-0.0216***	0.0046***	-0.0004	0.0109***	0.0066***
	(0.0019)	(0.0029)	(0.0013)	(0.0010)	(0.0021)	(0.0014)
Age (group) household head 50-69	0.0005	-0.0541***	0.0171***	-0.0018	0.0269***	0.0122***
	(0.0024)	(0.0038)	(0.0017)	(0.0014)	(0.0028)	(0.0018)
Age (group) household head 70+	0.0049***	-0.0168***	-0.0065***	-0.0057***	0.0225***	0.0022**
	(0.0013)	(0.0021)	(0.0009)	(0.0007)	(0.0015)	(0.0010)
Urban	0.0116***	-0.0384***	-0.0038**	-0.0064***	0.0376***	0.0012
	(0.0024)	(0.0038)	(0.0017)	(0.0014)	(0.0028)	(0.0018)
Geographical area – Sierra	0.0026*	-0.0075***	0.0138***	0.0065***	-0.0073***	0.0021*
	(0.0015)	(0.0024)	(0.0010)	(0.0008)	(0.0017)	(0.0011)
Geographical area – Selva	0.0006	0.0183***	-0.0085***	-0.0017*	-0.0048***	-0.0018

	(0.0016)	(0.0025)	(0.0011)	(0.0009)	(0.0018)	(0.0012)
Geographical area – Lima	-0.0058**	0.0103**	0.0081***	-0.0136***	0.0146***	0.0060***
	(0.0028)	(0.0044)	(0.0019)	(0.0016)	(0.0032)	(0.0021)
Absent member (dummy)	-0.0072***	0.0472***	-0.0010	-0.0079***	-0.0144***	-0.0054***
	(0.0022)	(0.0034)	(0.0015)	(0.0012)	(0.0025)	(0.0017)
Rent (dummy)	0.0011	0.0087***	0.0013	0.0040***	-0.0132***	-0.0007
	(0.0020)	(0.0032)	(0.0014)	(0.0011)	(0.0023)	(0.0015)
Chronic discomfort (dummy)	0.0233***	-0.0100***	-0.0018**	-0.0030***	-0.0037***	-0.0027***
	(0.0012)	(0.0019)	(0.0009)	(0.0007)	(0.0014)	(0.0009)
Hospitalization (dummy)	0.0704***	-0.0286***	-0.0109***	-0.0016**	-0.0143***	-0.0092***
	(0.0014)	(0.0022)	(0.0010)	(0.0008)	(0.0016)	(0.0011)
Gender household head	-0.0025*	-0.0179***	0.0068***	0.0043***	0.0046***	0.0011
	(0.0014)	(0.0022)	(0.0009)	(0.0008)	(0.0016)	(0.0010)
Hospitals per 1000 population	-0.0007	0.0029	0.0026**	-0.0021**	0.0014	-0.0006
	(0.0017)	(0.0026)	(0.0011)	(0.0009)	(0.0019)	(0.0013)
Healthcare district (dummy)	-0.0006	0.0035	0.0003	-0.0023**	0.0015	-0.0034***
	(0.0016)	(0.0025)	(0.0011)	(0.0009)	(0.0018)	(0.0012)
Constant	-0.0788***	1.6977***	-0.2711***	-0.0041	0.1759***	-0.3611***
	(0.0216)	(0.0337)	(0.0148)	(0.0121)	(0.0246)	(0.0164)
Observations	24,760	24,760	24,760	24,760	24,760	24,760
R-squared	0.148	0.335	0.163	0.064	0.157	0.177

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses. Reference category for education level of the household head: no education. Reference category for age group of the household head: no education:15-49. Reference category for geographical area: Costa.

Table 5 - Expenditure Elasticities derived from the Almost Ideal Demand System estimation (Equation 5).

	(1) Health	(2) Food	(3) Education	(4) Clothes	(5) Housing	(6) Transports
Expenditure Elasticity (receiving international remittance=1)	1.3334	0.7426	1.4500	1.0351	1.1301	1.4965
Expenditure Elasticity (receiving international remittance=0)	1.1848	0.7480	1.6043	1.1316	1.0004	1.5923

Table 6 - Almost Ideal Demand System Estimation – Selected variables in Health Demand Equations for different specifications of the model and estimation methods.

	(1) Full sample	(2) Full sample	(3) Full sample	(4) Full sample	(5) Health shock=1	(6) Health shock=0
Remittance status	*Exogenous*	*Endogenous (IV)*	*Endogenous (IV)*	*Endogenous (IV)*	*Endogenous (IV)*	*Endogenous (IV)*
Ln (total expenditure)	0.0168***	0.0139***	0.0135***	0.0141***	0.0230***	0.0129***
	(0.0022)	(0.0025)	(0.0026)	(0.0024)	(0.0073)	(0.0025)
Remittances	0.0054	0.1097***		0.1679***	-0.0835	0.1651***
	(0.0035)	(0.0358)		(0.0487)	(0.0732)	(0.0402)
Remittances*Ln(total expenditure)			0.0108***			
			(0.0035)			
Health shock	0.0708***	0.0704***	0.0704***	0.0753***		
	(0.0014)	(0.0014)	(0.0014)	(0.0018)		
Remittances*Health shock				-0.1774***		
				(0.0480)		
Observations	24,760	24,760	24,760	24,760	4,475	20,285
R-squared	0.18	0.15	0.15	0.13	0.112	-0.01

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors in parentheses.