Remittances and Gender-Specific Employment Patterns in Peru - a longitudinal Analysis

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Abstract

This study examines the role of migrant's remittances on labor supply in Peru. A gender-specific labor choice model outlines the possible impacts especially on the self-employement sector. Unlike earlier studies, fixed effects estimations as well as an instrumental approach are applied. Estimates are provided for both participation and hours. Strong evidence is provided that remittances increase self-employment at the extensive margin for women. Overall, no robust effect of reduced labor supply in response to remittances is found.

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1 Introduction

Emigration from Peru is a relatively recent phenomenon, and it hardly existed prior to 1970. After several crises beginning in the 1980s and therefore high poverty and few economic prospects the emigration rate increased strongly (see for a comprehensive review Takenaka and Pren (2010)). Peruvians emigrated to whichever countries they could enter which resulted in a dispersed migration pattern. In general, they come from urban areas and in particular Lima as it has the only international airport. Rural migrants typically migrate first to Lima where they work for several years to save money. Peruvian migrants are of both gender, diverse ages and varying motivations. They have a very high education level (52 percent in the United States have some college education), which stands in sharp contrast to migrants from Mexico. While the educational level in Peru is very high this is not matched with adequate employment opportunities thus resulting in low returns to schooling and a high incentive for the educated to migrate. As a consequence of the rising emigration flows, remittances have more than tripled in Peru since 2000. In 2010 they are expected to be US$ 2.5 bn which accounts for 2 percent of GDP thus resulting in a relevant impact on the local economy. Remittances have the potential to reduce poverty and liquidity constraints and boost economic growth via multiplier effects. On the other hand, remittances can undermine the incentives to work by increasing the recipients' income and raising the reservation wage according to the neoclassical model of labor-choice. However, the financial transfers can facilitate the start-up of a new enterprise which may increase the likelihood of working in the self-employment sector. If invested into existing firms, remittances raise the implicit self-employment wage which affects the amount of hours worked. Remittance receipt may hence not only influence the decisions of whether to work and how much to work (the extensive and intensive margin of labor suppy, respectively) but also the type of work performed. Moreover, the effect may vary among the genders (Amuedo-Dorantes and Pozo (2006)). It is usually assumed that women's labor supply is more wage elastic than men's. Explanations range from innate gender characteristics to culturally induced gender roles.

The impact of remittance receipt on the labor supply in receiving households has been examined before, but this study differs from previous ones in three important respects. (1) A simple labor choice model is presented for the self-employment sector which distinguishes between gender. (2) Using a unique five-year panel data set, this study employs fixed effect estimations as well as an instrumental variable approach to calculate the effect of remittances on male and female labor supply. (3) The data set stems from Peru, a country which has not been analyzed in this regards so far.

The remainder of the paper is organized as follows. In the second section the basic theoretical framework is developed. The subsequent section provides an overview of the corresponding literature. Section four illustrates the data used for the econometric approach in this study, which is described in section five. The results are presented in section six, and the final section concludes.

2 Remittances and labor supply: theoretical considerations

In the static neoclassical model of labor supply, each individual maximizes a utility function

$$U_j(C_j, 1 - N_j), \tag{1}$$

with respect to a budget constraint

$$C_j = W_j N_j + V_j, \tag{2}$$

where C_j, N_j, W_j and V_j represent real consumption, labor supply, the real wage and real non-labor income, respectively. The index $j = m, f$ identifies the gender, unless not indicated otherwise it is suppressed in the following for brevity. The utility function is assumed to have the conventional properties $U_C > 0, U_{1-N} > 0$. Maximization yields the usual first order condition determining the optimal labor-leisure decision:

$$\frac{U_{1-N}}{U_C} = W. \tag{3}$$

Under the assumption that the utility function (1) is homothetic we linearize (2) and (3) by taking the total differential (see the appendix for details),

$$\tilde{C} = \gamma_{WN}\left(\tilde{W} + \tilde{N}\right) + (1 - \gamma_{WN})\,\sigma_V \tilde{R}, \tag{4}$$

$$\sigma_C \tilde{W} = \tilde{C} + \frac{1}{\omega_L}\tilde{N}, \tag{5}$$

where variables with a tilde represent proportionate changes $\left(\tilde{X} \equiv \frac{dX}{X}\right)$, $\gamma_{WN} \equiv \frac{WN}{C}$ represents the labor income to consumption ratio, $\sigma_V \equiv \frac{\partial V}{\partial R}\frac{R}{V}$ is the non-labor income elasticity with respect to remittances, and $\omega_L \equiv (1 - N)/N$ is the initial ratio of leisure to labor supply.[1] The parameter σ_C represents the substitution elasticity between consumption and leisure, defined as

$$\sigma_C \equiv \frac{d\log\left(C/(1-N)\right)}{d\log\left(U_{1-N}/U_C\right)} \geq 0, \tag{6}$$

and represents the ratio between the percentage change in $C/(1 - N)$ due to a percentage change in the marginal rate of substitution between leisure and consumption U_{1-N}/U_C. Individuals with a high σ_C are consumption-loving and are happy to substitute consumption for leisure. Combining (4) and (5) gives the labor supply curve:

$$\tilde{N} = \Omega\left(\sigma_C - \gamma_{WN}\right)\tilde{W} - \Omega\left(1 - \gamma_{WN}\right)\sigma_V \tilde{R}, \tag{7}$$

where $\Omega \equiv \frac{\omega_L}{\gamma_{WN}\omega_L + 1} > 0$. According to (7) remittances decrease the labor supply due to its impact on the income: the receipt of remittances increases the non-labor

[1] In general $\partial V/\partial R$ is equal to one. In what follows, we will argue that a part of the received remittances may be invested. As a consequence the non-labor income used for consumption increases to a smaller extend than the amount of remittances and $\partial V/\partial R$ is smaller than one.

income V, which relaxes the budget constraint and - given that leisure is a normal good - should increase the consumption of all goods including leisure.

However, if remittance income is used as cheap credit, allowing individuals to invest in starting or expanding enterprises, it should be associated with an increase in the self-employed wage.[2] Considering only the self-employment sector, the raise in wage extends the impact of remittances of (7) to

$$\tilde{N} = \Omega\sigma_W \left(\sigma_C - \gamma_{WN}\right) \tilde{R} - \Omega \left(1 - \gamma_{WN}\right) \sigma_V \tilde{R}, \tag{8}$$

where $\sigma_W \equiv \frac{\partial W}{\partial R} \frac{R}{W}$ is the wage elasticity with respect to remittances. The increase in wage has two contradictory effects. On the one hand, the price for leisure increases which should result in a lower demand for leisure. On the other hand, labor income increases which should imply a higher demand for all goods including leisure. If $\sigma_C > \gamma_{WN}$ the substitution effect dominates the income effect and a higher real wage leads to a higher labor supply. The different effects of an increase in remittances are

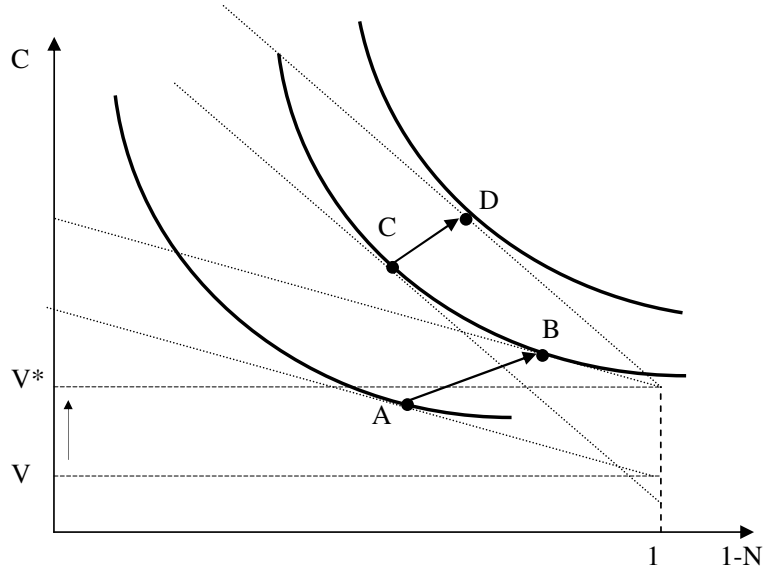

Figure 1: Impacts of remittances on the number of hours worked

analyzed graphically in Figure 1. Note that with a high σ_C the indifference curves are rather flat. The wealth effect due to the increase in non-labor income is characterized by an upward shift in the budget constraint. Starting from point A the optimal labor-leisure margin moves to point B. The increase in wage has two effects. The substitution effect is due to the change in the relative "price" of consumption and leisure (the real wage): Individuals substitute leisure for consumption and increase the labor supply (point C). Finally, the income effect is given by the movement from

[2]Remittance flows are - in contrast to other sources of non-labor income - explained as part of familial contracts between the migrant and the remittance receiver. In face of poorly developed credit markets in developing countries, sending a family member abroad and receiving remittances may be a possibility to raise capital to finance business. In Peru empirical evidence in microenterprises indeed suggests the presence of severe credit constraints (Göbel et al. (2011)).

C to D and is due to the change in labor income, which leads to a clockwise rotation of the budget constraint.

Following Figure 1, it is a priori ambiguous, whether remittances lead to a fall in the labor supply. By rearranging (8) we derive

$$\frac{dN/N}{dR/R} = \underbrace{\Omega\sigma_W\sigma_C}_{SE} - \underbrace{\Omega\sigma_W\gamma_{WN}}_{IE} - \underbrace{\Omega\left(1-\gamma_{WN}\right)\sigma_V}_{WE} > 0 \tag{9}$$

$$\Leftrightarrow \quad \sigma_C > \gamma_{WN} + \left(1-\gamma_{WN}\right)\frac{\sigma_V}{\sigma_W} \tag{10}$$

or with gender suffix:

$$\sigma_{Cj} > \gamma_{WNj} + \left(1-\gamma_{WNj}\right)\frac{\sigma_{Vj}}{\sigma_{Wj}}. \tag{11}$$

Remittances result in an increase in labor supply if σ_{Cj} is higher than the right hand side of (11). This is more likely

- **if a big part of the remittance is invested.**
  As a result, the effect of remittances on non-labor income σ_{Vj} is rather low, and the effect of remittances on real wage σ_{Wj} is high, leading to a small $\frac{\sigma_{Vj}}{\sigma_{Wj}}$ ratio.
- **the bigger σ_{Cj} compared to γ_{WNj} is, which is more likely for women.**
  To illustrate this point, assume that remittances are completely invested, and consequently $\frac{\sigma_{Vj}}{\sigma_{Wj}}$ is zero. The condition reduces to $\sigma_{Cj} > \gamma_{WNj}$, which holds if the substitution effect outweighs the income effect or in other words if the wage elasticity of labor supply is positive. Empirical evidence suggests that the wage elasticity of women is positive and fairly large while the wage elasticity of men is small (see the next section).

Due to it's possible impact on the wage remittance receipt may not only affect the decision of whether to work and how much to work, but also the type of work performed. The considerations above lead to the following hypotheses to be tested subsequently: Remittances decrease the (1a) likelihood of employment as well as (1b) the amount of total hours worked in each occupation except self-employment. (2a) The probability of being self employed as well as (2b) the number of hours worked in the own firm may increase if the remittance income is used as cheap credit which then would increase the self-employed wage. This would imply that the substitution effect dominates the income and wealth effects. (3) These effects may differ among the genders, in particular the potentially positive effect on self-employment might be stronger for women.

3 Literature review

There is a growing literature on the impact of migration and remittances on employment outcomes. Funkhouser (1992) finds in his earlier empirical study in Nicaragua that labor supply responds negatively to remittances, although self-employment increases. The main difficulty in measuring impacts of migration on a certain outcome

is endogeneity. Migration of one household member is a precondition for the receipt of remittances. The occurrence of one member migrating depends heavily on household characteristics, and consequently variables that may "explain" migration may also be correlated with the dependent variable. These variables may include observable characteristics such as the educational level, as well as unobservable characteristic like the degree of risk aversion, entrepreneurial prowess or ambition. In the absence of random assignment, an estimation strategy that allows for identification of the treatment effect has to be employed. Gibson et al. (2009), for instance, use a quasi natural experiment - a migration lottery program - to estimate the impacts of international migration and remittances on several outcomes of remaining household members. The authors find the labor supply to be unaffected. In his Philippines case study Yang (2008) exploits information from favorable exchange rate shocks that increase income in remittance receiving households. While the amount of hours worked seems to remain unaffected, the author provides evidence of increasing hours in self-employment. In addition, household become more likely to start relatively capital-intensive enterprises after a positive shock. Applying propensity score matching, Cox-Edwards and Rodríguez-Oreggia (2009) detect no significant effect of remittance receipt on labor force participation in Mexico. The authors explain their findings with remittances being the income contribution of the migrant abroad thus leaving total household income unchanged. Some empirical studies also incorporate a gender dimension. After using propensity score matching as well as networks as instruments to correct for selection Acosta (2006) observes a significant decline in women's labor supply, while men's labor force participation remains unaffected. Amuedo-Dorantes and Pozo (2006) address the endogeneity concern by instrumenting remittances with information on Western Union offices in the state. They find no effect on the overall labor supply of males but, the type of work is altered by remittance receipt. Female labor supply decreases slightly, but only in rural areas. The study of Binzel and Assaad (2011) is one of the few that draws on panel data. They use both an instrumental variable approach as well as a random effects model to identify the effects of migration and remittances on the labor supply of women. Their findings suggest that women in migration households decrease their wage work while female self-employment increases.

Once endogeneity is appropriately addressed, labor supply seems to respond only marginally to remittance receipt on average. An important aspect appears to be the gender of the individual. In labor economics women's labor supply is generally identified to be more elastic than men's. In the developed world, wage elasticities of men are often found near +0 and women's are around 0.8 while the income elasticity are close to -0 and -0.2, respectively (see for a comprehensive review Blundell and Macurdy (1999)). Empirical evidence on wage elasticities in developing countries and in particular Peru is scarce. Some exceptions are e.g. Mizala et al. (1999) who find wage elasticities of 1.7 for men and 1.9 for women in Chile. Gong and van Soest (2002) find income and wage elasticities of women in Mexico City of about -0.17 and 0.87, respectively. Nevertheless, we believe that there is little reason to assume that the gender elasticity differential found in developed countries should not be present in Peru. This also follows its possible causes which range from innate

gender characteristics to culturally induced gender roles. Traditional theories assume that men have a comparative advantage in market production and women in home production which is why women participate in both home and market production. Any change in the wage should then have a stronger effect for women as they have a closer substitute for wage work (e.g. Mincer (1962) or Killingsworth and Heckman (1987)). More recent theories assume basic characteristics and preferences to be equal and claim the difference in the wage elasticity to be the result of intra-family bargaining power (Alesina et al. (2011)). If men have more bargaining power, they choose wage work over unpleasant home duties. Therefore, they can engage more in their careers, get promoted and earn higher wages. While they receive an intrinsic value from their employment, women only work for their wage which makes them more sensitive to changes in the wage than men. Once we assume the income and wage elasticity of women to be higher in Peru, remittances should exibit both a stronger negative income effect and a positive wage impact for women.

4 Data

We use data from the nationally representative Peruvian household survey (ENAHO) collected by the National Statistic and Informatics Institute (INEI) between 2002 and 2006.[3] The ENAHO comprises around 20000 households each year, and it entails a panel sub-sample of about 5000 to 6000 households (again nationally representative) of which 55-80 percent of the interviewed households are re-visited in the following year (see Table 1).[4]

Table 1: Panel survey

Year	Hh. visited	Hh. not interviewed	Hh. observed in prev. period	Hh. interviewed
2002	6257	847	.	5410
2003	4217	688	3068	3529
2004	6490	1141	2787	5349
2005	6778	1469	4146	5309
2006	6593	1182	4496	5411

The survey provides detailed information on individual socio-demographic and employment characteristics. Most individuals that are identified as independent workers or as employers (in principal or secondary employment) and that are not working in

[3]In 2002, the survey took place during the 4th quarter (Oct-Dec). Starting from May 2003, the survey is permanent (the whole sample is distributed monthly along the year). The survey captures an impressive growth period, which started in 2002 with average annual growth rates of 5.7 percent.

[4]Around 18 percent of the visited households are not interviewed as the household refuses, is absent, the house is unoccupied or other reasons (miscellaneous category). This leads to an unbalanced panel with 719, 1435, 1153, 1870 and 2096 households being observed in one, two, three, four and five years, respectively. The fact that this number is increasing reflects increased effort by INEI to create a larger panel dataset. Quite a number of panel households were not interviewed in consecutive years.

Table 2: Structure of employment and remittances in Peru

				Urban		Rural	
	Total	Male	Female	Male	Female	Male	Female
Wage employment	0.391	0.451	0.314	0.544	0.426	0.353	0.188
of which: Informal sector	0.518	0.538	0.463	0.412	0.357	0.732	0.726
Self-employment or employer	0.386	0.399	0.368	0.330	0.383	0.471	0.351
Unpaid family work	0.171	0.101	0.262	0.052	0.110	0.151	0.432
Unemployed	0.049	0.046	0.052	0.070	0.077	0.021	0.023
Remittance receipt	0.008	0.007	0.010	0.012	0.016	0.002	0.002
Household remittance receipt	0.025	0.024	0.026	0.041	0.043	0.005	0.007
Observations	49590	28063	21527	14362	11383	13701	10144

Source: Authors' calculation based on the panel subsample of the ENAHO data, 2002-2006.

the primary sector are interviewed in an Informal Sector Module that captures the characteristics of the entrepreneurs and their production unit.[5]

We restrict our analysis to individuals aged 16 to 64. Table 2 illustrates the employment structure of those which are in the labor force. The importance of the informal sector is remarkable, even compared to Latin American averages. More than a third of the Peruvian workforce is self-employed. Another almost 30 percent work as paid worker in informal firms defined as firms without written accounts or unpaid family aid. Compared to men, women are less likely to be wage-employed and more often engaged as unpaid family aid. Overall, around 1 percent of the labor force receives remittances and around 3 percent live in a remittance receiving household. The probability of receiving remittances is slightly higher for women and significantly higher in urban areas i.e. in cities with at least 4000 inhabitants.

Unfortunately, the survey is not a specialized survey of remittances or migration. Therefore it does not contain any information on household members that migrated which would allow for estimating of the disruptive effect of migration on labor supply often found in the literature. Roughly 6 percent of the 7618 households included in the sample receive remittances at least in some years. Households that never received remittances have a higher proportion of small and very small children and a lower proportion of elderly household members than households that at least receive remittances once (see Table 3). While households that always receive remittances have a similar labor income as non-remittance receiving households, those that either gain or lose remittance receipt earn significantly more. The non-labor income of households which receive at least once is about three times higher than of those that never received remittances. Consequently, the former are significantly wealthier. The wealth index is derived from principal component analysis based on household assets including only non-business assets, such as color televisions or the condition of the house, for example the state of the walls and the quality of sanitary facilities.

[5]In rural areas 35 percent and in urban areas only 5 percent of all individuals working self-employed in other sectors than the primary sector are not interviewed in the Informal Sector Module. The selection into the Informal Sector Module appears not to be systematic in terms of observable characteristics such as age, education or wealth, and is (at least in urban areas) most likely due to non-reporting or firms with more than 10 staff members.

Table 3: Household and individual characteristics

Remittance receipt	No	Yes	Change
Household characteristics			
Number of households	11496	83	754
Number of members	4.47	4.15	4.49
Members aged 0 to 5	0.50	0.34^b	0.35^b
Members aged 6 to 15	1.07	0.89	0.85^b
Members aged 16 to 64	2.62	2.47	2.77^b
Members aged 65+	0.28	0.45^b	0.51^b
Total labor income	3030	3067	3973^b
Total nonlabor income (excl. rem)	512	1298^b	1505^b
Amount remittances	0	2183^b	497^b
Wealth index	-0.20	3.01^b	2.23^b
Individual characteristics			
Number of individuals	22884	172	1660
Number of observation	59817	328	4342
Male	0.50	0.46	0.48
Years of education	9.65	11.51	11.51
Employed	0.69	0.47	0.58
Employed if in labor force	0.90	0.80	0.84
Hours worked	120	78^b	106^b
Income: labor	3924	3931	5198
Income: nonlabor (excl. rem.)	477	1501	1009
Amount remittance	0	1898	606

Source: Authors' calculation based on the ENAHO, 2002-2006.
Notes: Income and remittance are measured annually in Soles and monetary values are deflated on the basis of the Consumer Price Index, base: dec. 2001 (INEI). The difference between the households or individuals that never received rem. and other types of households are significant ^{b} at 5%.

Individuals who live in remittance receiving households have a significantly higher educational level. They are significantly less likely to be employed, although the impact is more nuanced when only individuals in the labor force are considered. Overall (i.e. including non-working individuals), the monthly average of hours worked is 120 for individuals in non-remittance receiving households which is much higher than for those in remittance receiving households. Being less likely to be employed and working less hours the latter receive more labor and non-labor income. Figure 2 shows the age patterns in employment for men and women. Individuals seem to start with unpaid work in their early age, aged 25 they are mostly wage employed and with around 35 years self-employment starts to be the dominant employment situation. There is little difference between men and women. Individuals from remittance receiving households seem to be less likely to be either self-employed or working as unpaid family help while the probability of wage employment seem to increase. Remittance receipt seem to have an impact on labor supply, but in a direction which is at odds with the theoretical considerations made previously. A comprehensive econometric analysis will be applied in the following to analyze this relationship in more detail.

Figure 2: Age patterns in employment

5 Methodology

The aim of this study is to examine whether remittance receipt alters the employment probability and the amount of hours worked in a specific employment category. Labor supply depends on the real wage and real non-labor income including remittances given the attributes X of the individual $N = N(W, V(R); X)$, which involves the following empirical specification:

$$y_{iwt}^{o*} = X_{it}\gamma + R_{it}\beta + \epsilon_{iwt}, \tag{12}$$

where the dependent variable measures participation (y_{iwt}^{p*}) or hours of work (y_{iwt}^{h*}) of individual i in period t in employment w. The wage rate is typically highly endogenous, moreover we do not observe it directly in our data. It would generate a spurious negative correlation between the dependent variable to construct it. The vector X_{it} contains variables that may serve as proxies for the wage rate as well as for employment behavior which include age, age squared, family size, number of household members who are aged < 5, aged 6-15, aged > 65, and log non-labor income. The variable R_{it} is a dichotomous indicator of remittance receipt and might be endogenous. Due to the longitudinal nature of the data the error term ϵ_{ijt} may be decomposed into

$$\epsilon_{ijt} = \alpha_i + t_t + u_{iwt}, \tag{13}$$

where α_i is a time-invariant effect unique to individual i which includes both observable and unobservable characteristics that do not change over time such as human capital and taste factors. The term t_t is a time effect common to all individuals in period t, which are captured by a set of year dummies T, and u_{iwt} is an i.i.d. error term. Treating α_i and t_t as parameters is known as the two way fixed effects (FE) model. It will absorb all individual-specific and period-specific determinants of labor

supply. Only the variation within an individual over time is used and the estimates are unbiased under the assumption of the unobserved individual-specific effects being time-invariant. But, as the within-variation tends to be much lower than the cross-sectional variation FE-coefficients may be weakly identified and consequently biased towards zero. The difficulty in nonlinear panel models is that estimators can be severely biased due to the incidental parameters problem and the individual effect α_i which in contrast to linear models cannot be overcome by differencing. The most widely used solution to address this problem was proposed by Mundlak (1978).

$$\alpha_i = \omega_i + \overline{Z_i}\lambda \tag{14}$$

The idea is to parameterize the individual effect using the individual mean of a sub-set Z_i of the regressors X_i that are thought to be correlated with the individual effect. Age and its squared are not included as individuals grow older independently of any circumstances. The term ω_i is an error term.

Rewriting (12) by incorporating the individual and time fixed effects and with $\xi_{iwt} = \omega_i + u_{iwt}$:

$$y^{o*}_{iwt} = X_{it}\gamma_X + R_{it}\beta + \overline{Z_i}\lambda + T_t\rho + \xi_{iwt} \tag{15}$$

We first examine the probability of participation employing a random effects logit model. The amount of hours worked is either positive or zero if the individual is not working in the specified employment category. To account for the censored nature of the dependent variables a random effects tobit is applied.[6] Additionally, the model could be estimated by means of a fixed effects logit model (Chamberlain (1980)). But, this procedure comes at the cost that only individuals which change participation status are considered and no marginal effect can be estimated and will therefore only serve as a robustness check. A fixed effects conditional tobit estimation is not feasible as no sufficient statistic exists which would allow the fixed effects to be conditioned out of the likelihood.[7] All estimates are either clustered at the indiviudal level where applicable or bootstrapped (with 500 replications).

6 Empirical results

6.1 Remittances and labor supply

Full tables of results appear in Table **??** in the Appendix. For brevity, Table 4 summarizes the main results of interest pertaining to the effect of remittances receipt. The first set of results show estimates and marginal effects optained from a random effects logit estimation conditional on the Mundlak-variables. Remittances exhibit a neither

[6]Note that although the models are estimated using a random effects procedure the results display fixed effects coefficients as we utilize a Mundlak-type specification.

[7]The estimation of an unconditional tobit fixed effects model by including dummy variables suffers from the incidental parameter problem and is not consistent. Using Monte-Carlo methods Greene (2004) finds that the slope estimators for the fixed effects tobit models seem not to be biased beyond five time periods. However, the dispersion is underestimated which results in an upward bias in the marginal effects.

Table 4: The effect of remittances on labor supply

	Men				Women			
	Empl.	Self-emp.	Wage-emp.	Unpaid	Empl.	Self-emp.	Wage-emp.	Unpaid
Dependent variable: participation								
R	-0.171	-0.127	-0.091	0.178	-0.056	0.379^{b}	-0.232	-0.472^{c}
	(0.161)	(0.187)	(0.158)	(0.372)	(0.141)	(0.177)	(0.173)	(0.283)
$\frac{\partial P(Y>0)}{\partial R}$	-0.008	-0.023	-0.019	0.001	-0.010	0.044	-0.011	-0.012
Dependent variable: monthly hours worked								
R	-3.512	-14.150	-0.469	42.073	5.941	23.384^{c}	0.823	-22.499
	(5.962)	(11.202)	(11.393)	(34.532)	(6.506)	(12.267)	(13.006)	(16.365)
$\frac{\partial E[Y\|Y>0]}{\partial R}$	-2.366	-4.049	-0.144	5.556	2.818	5.763	0.171	-4.142

Notes: Regressions include: a constant, year dummies, log non-labor income, the Mundlak-variables, age and its age squared, family size, number of household members who are aged < 5, aged 6-15, aged > 65, and a dummy indicating whether the individual is the head of the household or her partner, respectively. Full tables of results appear in Appendix X. In the upper panel $\partial P(Y > 0)/\partial R$ is the marginal effect of remittance receipt on the likelihood of employment, and in the lower panel the term $\partial E[Y|Y > 0]/\partial R$ represents the marginal effects for the expected amount of hours worked conditional on being uncensored. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%.

significant nor strong impact on labor force participation on average and in almost any employment category. But, the likelihood of female self employment increases. On average, women who live in a remittance receiving household are 4 percentage points (which equals 15 percent) more likely to work in her own enterprises. The lower panel presents results for random effects tobit models conditional on the Mundlak-terms. The pattern for the intensive margin appears to be very similar. Remittances seem to have only a notable and significant effect on female self-employment. The hours in self-employment increase by 6 hours for women. This implies a moderate rise of 5 percent, conditional on participation.

Several biases may have contaminated our estimations. One source of potential concern is that we measure remittance receipt by a dummy. As a robustness check we substitute the dichotomous variable by the log amount of remittance (see Table **??** in the Appendix). Our results appear to be very robust regarding the measurement of remittance receipt, the likelihood of female self-employment appears to increase by 4 percentage points upon remittance receipt. A rise in the amount of remittance has a rather moderate effect. If yearly remittances increase from 300 US Dollar (the first quartile) to 2000 US Dollar (the last quartile) the likelihood of female self-employment increases by 1 percentage point. To investigate whether the choice of the estimation procedure with Mundlak-variables is crucial, Table **??** and Table **??** in the Appendix present the full estimation results from our specification from a fixed effects logit model (Chamberlain (1980)), respectively. Both regression results appear to be very similar. A more critical point is the way we address endogeneity. The FE estimator uses only the variation within individuals over time, consequently estimates may be insignificant even when they are economically significant. Regarding female self-employment, this source of bias does not give rise to major concerns in light of the significant strong effects which, if anything, may be underestimated. Nevertheless,

Table 5: First stage estimates (IV-regression)

Dependent variables: log amount of remittance		
	Men	Women
Ratio of rem. rec. hh. in the department in 1998 ⊗	0.176^a	0.220^a
no. hh. members with sec. education	(0.030)	(0.028)
Ratio of rem. rec. hh. in the department in 1998 ⊗	0.282^a	0.273^a
no. hh. members with tert. education	(0.036)	(0.037)
$D_{\text{Internal migration experience of the head of the hh.}}$	0.002^c	0.001
	(0.001)	(0.001)
F(3,N)	115.50	108.55

Regressions include: a constant, year dummies, log non-labor income, the Mundlak-variables, age and its age squared, family size, number of household members who are aged < 5, aged 6-15, aged > 65, and a dummy indicating whether the individual is the head of the household or her partner, respectively. Table 11 in the Appendix shows full estimation results. We also included the interactions of internal migration experience of the head of the household with the educational dummies in previous estimations. As the coefficients are not significant the interactions were excluded in the analysis. The ratio of remittance receiving households in the department in 1998 drops automatically from the estimation as department dummies were included. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%.

the insignificant results in all other categories might be driven by this bias. Alternatively, we may employ an instrumental variable (IV) approach. McKenzie et al. (2010) have shown that the IV approach performs best among the non-experimental methods when analyzing the impacts of migration and remittances. However, this method relies heavily on the exogeneity assumption. Variables which explain remittance receipt but are uncorrelated with labor supply have to be employed. In this study identification of the casual effect relies on IVs that exploit the ratio of remittance receiving households in the province in 1998, as well as internal migration experience of the head of the household. These instruments are interacted with the number of household members with secondary and tertiary education, respectively, to allow for the variability of the instrument at the household level (Amuedo-Dorantes and Pozo (2006); Hanson and Woodruff (2003)). Justification of the former IV lies in the fact that historical migration developed networks which can promote future migration. On the other hand it is often stated in the literature that historical migration rates are exogenous as they have been in the past, and therefore are not affecting current labor supply (Pfeiffer and Taylor (2008)). Unlike in the prominent Mexican case, however, migration is a rather recent phenomenon in Peru which cast some doubt on the validity of this instrument. Province dummies are included to control for unobservable effects at the province level. The second instrument, internal migration experience of the head of the household, is defined as the head of the household living in a province other than the province of birth, and serves as a proxy for migration will. To account for the nature of the dependent variable, we will estimate an IV-probit and IV-tobit model in the following.

Table 5 highlights the first stage estimates. The key instruments to identify casual effects are mostly highly significant, and with the expected sign. The first stage F-statistic of the instruments is well above the critical values outlined by Stock and Yogo (2002) to detect weak instruments. This suggests that the instrument provides strong support for identification. Moreover, Wu-Hausman tests confirm the necessity to address endogeneity as remittances are highly correlated with the error term in

Table 6: The effect of remittances on labor supply - IV estimates

	Men				Women			
	Empl.	Self-emp.	Wage-emp.	Unpaid	Empl.	Self-emp.	Wage-emp.	Unpaid
Dependent variable: participation								
R	-1.077	5.434^a	-5.408^a	-5.528^a	2.531^a	1.871^b	-3.963^a	-6.159^a
	(1.008)	(0.371)	(0.358)	(0.388)	(0.884)	(0.936)	(0.542)	(0.212)
$\frac{\partial P(Y>0)}{\partial R}$	0.306	0.620	-0.461	-0.148	0.339	0.642	-0.242	-0.423
$\frac{\partial P(Y>0)}{\partial R_D}$	0.012	0.024	-0.018	-0.006	0.013	0.025	-0.010	-0.017
Dependent variable: monthly hours worked								
R	-862.642^a	472.986^a	-2148.955^a	-2531.675^a	-150.339	-54.330	-1517.021^a	-37.083^a
	(119.501)	(169.490)	(329.048)	(419.206)	(95.149)	(517.134)	(280.286)	(7.724)
$\frac{\partial E[Y\|Y>0]}{\partial R}$	-73.413	158.095	-741.743	-530.513	-522.637	-13.253	-384.368	-8.410
$\frac{\partial E[Y\|Y>0]}{\partial R_D}$	-2.791	6.009	-28.195	-20.166	-20.694	-0.525	-15.219	-0.333
Sargan	76.8012	77.4363	81.8801	49.1432	69.4787	39.0755	54.59	423.706
Wu-H.	57.8345	180.137	134.115	138.325	5.64861	16.3171	23.5324	10.3254

Notes: Regressions include: a constant, year dummies, age, age squared, family size, number of household members who are aged < 5, aged 6-15, aged > 65, and log non-labor income. In the upper panel $\partial P(Y > 0)/\partial R$ is the marginal effect of log remittances, and $\partial P(Y > 0)/\partial R_D$ is the approximate effect due to a change in remittance receipt status. This is evaluated by comparing probability of remittance receipt $\hat{R}$ of a non-remittance receiving household with that of one that receives remittances. In the lower panel the term $\partial E[Y|Y > 0]/\partial R$ represents the marginal effects for the expected amount of hours worked conditional on being uncensored, and $\partial E[Y|Y > 0]/\partial R_D$ evaluates a change in remittance receipt status as explained above. The Sargan and Wu-Hausman tests are significant at the 5 % level in each regression. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%.

most regressions (see Table 6). A range of Sargan test, however, reject that the error term is uncorrelated with the instruments which cast some doubt on the validity of our instruments. In Table 6 we show the estimates nonetheless to contrast their results with those of the FE-estimator. The results undermines our FE-results regarding the positive impact on the likelihood of female self-employment, although the effect is here a little weaker. In addition and in contrast to the previous results, male self employment seems to increase as well. On the other hand, the likelihood and the amount of hours spend in wage employment and as unpaid family help respond negatively to remittance receipt. For example, the hours spend in wage employment decrease by 28 hours for men and 15 hours for women. These results should be interpreted with caution, however, due to the rather poorly performing instrument. The significant and negative estimates for both gender and in these two employment categories nevertheless suggest than the FE-estimates might be zero-inflated.

6.2 Remittances and entrepreneurial activity

Our results suggest that self-employment activities may respond positively to remittance receipt. A logical next step is then to determine how the capital stock of firms is altered. Our empirical analysis departs from the following functional form

$$k_{it} = X_{it}\gamma + R_{it}\beta + \epsilon_{iwt}, \tag{16}$$

Table 7: Capital stock of existing firms

	Dependent variables: *Log capital stock*		
	All	Women	Men
D_{before}	-0.566^b	-0.416	-0.659^c
	(0.264)	(0.369)	(0.370)
$\partial E[Y\|Y>0]/\partial D_{\text{before}}$	-0.332	-0.223	-0.443
$\varnothing\partial E[Y\|Y>0]/\partial D_{\text{before}}$	-15 US$ (-28%)	-7 US$ (-20%)	-60US $ (-35%)
D_{after}	0.340	0.860^b	-0.039
	(0.275)	(0.403)	(0.368)
$\partial E[Y\|Y>0]/\partial D_{\text{after}}$	0.213	0.511	-0.027
$\varnothing\partial E[Y\|Y>0]/\partial D_{\text{after}}$	13 US$ (25%)	22 US$ (65%)	-4 US$ (-3%)

Notes: Regressions include: age and its squared, log non-laobr income, wealth index, a constant, year dummies and sector dummies, and Mundlak-terms. $\partial E[Y|Y>0]/\partial D_{\text{j}}$ is the marginal effect of being in period j, and $\varnothing\partial E[Y|Y>0]/\partial D_{\text{j}}$ is the approximate effect evaluated for a firm with mean log capital stock. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%.

where k_{it} is the log capital stock of firm i at time t, X_{it} are individual and household characteristics that may influence the capital stock, and ϵ_{iwt} is an error term. The term R_{it} stands for remittances, its concrete definition will vary in the following: First, we evaluate whether and when an already existing firm increases its capital stock upon remittance receipt. To get insights of the timining of the investment, we introduce two dummies: D_{before} which equals 1 until the household receives remittances, and D_{after} which equals 1 from the moment the household does not receive remittances anymore. The baseline (and omitted) category is R wich equals 1 in the period(s) the household receives the international transfer. We estimate a twoway FE-model applying Mundlak terms as explained in section 5 to address the potential endogeneity of remittance receipt. Table 7 presents the key results of tobit regressions of equation (16). The capital stock responds positively to remittance receipt. For example, an average firm increases its capital stock from 40 US Dollar to 55 US upon remittance receipt. Although this seems not to be very relevant in absolut terms, this number implies that without remittances the capital stock is 28 % lower. In addition, the investment appears to have a permanent effect. In subsequent periods the capital stock shows up to be even slightly (though insignificantly) higher. Furthermore, the results sugggest than men invest earlier than women. The negative effect of D_{before} is stronger and significant for men, although the difference is not significant. While for men capital stock remains constant upon remittance receipt, women invest a considerable amount in the subsequent period(s), and here the difference is significant.

In a second step, we analyze if start-ups begin with a different level of capital stock if the household receives remittances. As a new firm is the unit of interest a FE-estimator is not applicable. We therefore apply an IV approach as described in section 6.1. To allow for the variability of remittances at the different wealth levels, we additionally perform regressions with the interaction of wealth as an additional variable. Enterprises from wealthy entrepreneurs start with a higher capital stock, but remittances seem not to alter the capital stock of new firm on average (see Table 8). Once we include the interaction, remittances have a significant positive effect on

Table 8: Capital stock of new firms

	Dependent variables: *Log capital stock*					
	All		Women		Men	
R	6.677	17.736^{b}	7.693	17.029	3.098	20.787^{c}
	(6.347)	(7.199)	(9.298)	(10.431)	(9.085)	(10.706)
R $\otimes$ wealth		-3.186^{a}		-2.493^{b}		-4.777^{a}
		(0.988)		(1.270)		(1.551)
Wealth	0.137^{a}	0.245^{a}	0.149^{a}	0.233^{a}	0.118^{b}	0.287^{a}
	(0.038)	(0.050)	(0.048)	(0.065)	(0.059)	(0.080)

Notes: Regressions include: a constant, year dummies and sector dummies, log non-laobr income, age and its squared and a dummy indicating whether the person has primary/secondary/tertiary education. Household characteristics were insignificant in earlier insignificant estimations and are therefore excluded to keep more degrees of freedom. Bootstrapped standard errors in parentheses (with 500 reps.): * significant at 10%; ** at 5%; *** at 1%.

the capital stock which decreases with the level of wealth. While the positive shift due to remittances is similar for both gender, the negative wealth effect is much stronger for men.[8] Remittances tend to increase the capital stock of an asset-poor men from 35 to 73 US Dollar and for an asset-poor women from 5.5 to 9 US Dollar, respectively.[9]

Summing up, the evidence suggests that remittances are at least partly invested into new or existing firms. The increase in capital stock seems not to be temporarily but permanent. The negative effect of an interaction with wealth hints as remittances serving as a substitute for wealth. It appears that remittances allow asset-poor individuals to start with a higher than average level of capital stock. This is a strong sign of credit constraints.

7 Conclusion

This study analyzes the impact of remittances on male and female employment patterns. A gender-specific labor choice model outlines the possible impacts especially on the self-employement sector. Remittances can undermine the incentives to work by increasing the recipients' income and raising the reservation wage. On the other hand, if invested, these transfers can raise the self-employment wage which may have a positive effect on self-employment. The implications of the model are tested using a unique five-year panel data set that stems from the Peruvian household survey. Unlike earlier studies, fixed effects estimations are applied to estimate the effect of remittances both on the decision whether to work and how much to work. To check the sensitivity of the results an instrumental variable approach is presented. Overall, the impact of remittances on labor supply is inconclusive. While the FE-results suggest

[8]The positive shift is not significantly different between gender, the lower significance is only due to the smaller sample size.

[9]We define asset-poor as having a wealth index in the first quartile. The marginal increase in log capital stock is calculated as follows:
$\text{Diff}_{\text{remittance probability}} * R + (\text{Diff}_{\text{remittance probability}} * wealth) * (R \otimes wealth)$. The term $\text{Diff}_{\text{remittance probability}}$ is the probability of remittance receipt of an remittance receiving household minus that of a non-remittance receiving household. The marginal increase is then added to the average log capital stock evaluated at the low wealth level and separately by gender.

that labor supply responds marginally to remittance receipt on average the estimates from the instrumental variable approach suggest a negative impact. In constrast, strong evidence is found that remittances increase at least female self-employment. Women who live in a remittance receiving household are 5 percentage points (which equals 20 percent) more likely to work in her own enterprises.

A subsequent analysis reveals that remittances are at least partly invested into new or existing firms. The increase in capital stock appears not to be temporarily but permanent. Remittances seem to serve as a substitute for wealth allowing asset-poor individuals to start with a higher level of capital stock. This is a strong sign of credit constraints which are alleviated by remittances.

From a policy perspective, our findings may be taken as an argument for providing households with credit. This will certainly improve the well-being of those that are credit constraint and do not receive remittance. Such a program should address women in particular. While we observe that both gender tend to invest a part of the remittance, only women do increase their labor supply in self-employment which reflects how strong their work success is contraint by liquidity shortage. An additional argument might be that migration is often at least partly motivated by the desire for sending transfers to household members. Migrants remit for a variety of reasons, and one motivation is to allow the household to overcome credit constraints. Well-functioning credit markets could then have the additional effect of reducing households' motivation to encourage members to migrate.

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8 Appendix

A 1. Derivation of Equation (4)

Take the total differential of (2):

$$\begin{aligned} dC &= \frac{\partial WN}{\partial N}dN + \frac{\partial WN}{\partial W}dNW + \frac{\partial V}{\partial R}dR \\ dC &= WdN + NdW + \frac{\partial V}{\partial R}dR \\ C\frac{dC}{C} &= WN\frac{dN}{N} + WN\frac{dW}{W} + R\frac{\partial V}{\partial R}\frac{dR}{R} \\ \tilde{C} &= \frac{WN}{C}\left(\tilde{N} + \tilde{W}\right) + \frac{V}{C}\frac{R}{V}\frac{\partial V}{\partial R}\tilde{R} \\ \tilde{C} &= \gamma_{WN}\left(\tilde{W} + \tilde{N}\right) + (1 - \gamma_{WN})\,\sigma_V\tilde{R} \end{aligned}$$

where $\gamma_{WN} \equiv \frac{WN}{C}$.

A 2. Derivation of Equation (5)

Take the total differential of (3):

$$\begin{aligned} d\log(U_{1-N}/U_C) = \tilde{W} &= \frac{d\log\left(U_{1-N}/U_C\right)}{d\log\left(C/(1-N)\right)}\left(\tilde{C} - \widetilde{(1-N)}\right) \\ \frac{d\log\left(C/(1-N)\right)}{d\log\left(U_{1-N}/U_C\right)}\tilde{W} &= \tilde{C} + (1/\omega_L)\,\tilde{N} \end{aligned}$$

where $\omega_L \equiv (1-N)N$.

Table 9: Baseline Estimates

Dep. variable	**Participation (dichotomous)**								**Amount of hours worked**							
	Men				Women				Men				Women			
Dummy: Rem.	-0.171	-0.127	-0.091	0.178	-0.056	0.379^{b}	-0.232	-0.472^{c}	-3.512	-14.150	-0.469	42.073	5.941	23.384^{c}	0.823	-22.499
	(0.161)	(0.210)	(0.158)	(0.372)	(0.141)	(0.180)	(0.173)	(0.283)	(5.962)	(13.858)	(11.393)	(34.532)	(6.506)	(12.267)	(13.006)	(16.365)
No. hh. mem.	-0.087^{b}	0.007	-0.077^{b}	0.063	-0.068^{b}	-0.012	-0.096^{b}	-0.007	-3.107^{a}	0.820	-7.536^{a}	6.818	-3.646^{a}	-3.909^{c}	-7.063^{b}	-0.205
	(0.039)	(0.037)	(0.032)	(0.057)	(0.029)	(0.036)	(0.038)	(0.040)	(1.141)	(2.046)	(2.242)	(5.292)	(1.266)	(2.360)	(2.880)	(2.268)
No. hh. mem.	0.151^{c}	0.003	0.145^{b}	-0.221^{c}	-0.036	-0.002	-0.028	-0.005	5.025^{b}	-0.908	14.553^{a}	-25.553^{b}	-1.347	3.381	-4.130	-1.644
aged 0-5	(0.091)	(0.080)	(0.068)	(0.129)	(0.062)	(0.075)	(0.083)	(0.080)	(2.424)	(4.272)	(4.783)	(11.873)	(2.664)	(4.946)	(6.315)	(4.540)
No. hh. mem.	0.121^{c}	0.015	-0.016	0.118	0.088^{c}	0.124^{b}	0.078	-0.058	4.901^{a}	1.887	4.231	6.638	4.300^{b}	11.151^{a}	5.823	-2.769
aged 6-15	(0.069)	(0.061)	(0.053)	(0.101)	(0.050)	(0.060)	(0.066)	(0.065)	(1.891)	(3.480)	(3.761)	(9.281)	(2.121)	(3.869)	(5.046)	(3.660)
No. hh. mem.	0.124	0.019	0.185	-0.128	0.097	0.111	-0.013	0.022	3.269	-1.812	11.302	-9.555	6.286	9.039	2.570	2.367
aged +65	(0.137)	(0.125)	(0.115)	(0.194)	(0.103)	(0.128)	(0.132)	(0.141)	(4.178)	(7.581)	(7.997)	(17.895)	(4.471)	(8.886)	(9.571)	(8.065)
Log non-labor	0.009	-0.015^{c}	0.017^{b}	0.007	0.009	-0.007	0.006	0.015^{c}	0.872^{a}	-0.496	2.356^{a}	0.894	0.814^{a}	-0.000	1.671^{b}	0.388
income	(0.009)	(0.008)	(0.007)	(0.013)	(0.007)	(0.008)	(0.009)	(0.009)	(0.257)	(0.460)	(0.519)	(1.210)	(0.291)	(0.526)	(0.700)	(0.499)
Age	0.334^{a}	0.239^{a}	0.230^{a}	-0.289^{a}	0.292^{a}	0.300^{a}	0.374^{a}	-0.198^{a}	11.139^{a}	16.572^{a}	15.292^{a}	-24.834^{a}	14.282^{a}	23.997^{a}	25.171^{a}	-10.067^{a}
	(0.017)	(0.023)	(0.019)	(0.028)	(0.016)	(0.021)	(0.024)	(0.023)	(0.583)	(1.277)	(1.380)	(2.695)	(0.762)	(1.629)	(1.837)	(1.406)
Age squared	-0.004^{a}	-0.002^{a}	-0.003^{a}	0.004^{a}	-0.003^{a}	-0.003^{a}	-0.005^{a}	0.003^{a}	-0.137^{a}	-0.149^{a}	-0.240^{a}	0.326^{a}	-0.169^{a}	-0.255^{a}	-0.370^{a}	0.148^{a}
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.007)	(0.015)	(0.017)	(0.034)	(0.009)	(0.019)	(0.023)	(0.017)
$D_{\text{head of the hh}}$	0.500^{c}	0.376	0.032	-1.398^{a}	0.297	1.028^{a}	0.146	-3.539^{a}	10.432	25.523^{c}	2.484	-130.993^{a}	16.227^{c}	59.230^{a}	15.925	-211.121^{a}
	(0.270)	(0.247)	(0.206)	(0.448)	(0.226)	(0.280)	(0.267)	(0.443)	(7.468)	(14.619)	(14.152)	(41.186)	(9.620)	(17.764)	(19.910)	(25.110)
$D_{\text{partner of head of the hh}}$	-0.509	-0.783^{c}	0.264	0.611	-0.492^{b}	-0.007	-0.434	-0.343	2.650	-23.661	13.937	91.488	-7.203	-4.158	-12.673	-13.525
	(0.578)	(0.446)	(0.437)	(1.063)	(0.212)	(0.278)	(0.267)	(0.322)	(16.164)	(34.106)	(30.087)	(97.976)	(9.362)	(17.505)	(20.116)	(18.917)
⊗ Dummy: Rem.	-1.555^{a}	-0.377	-0.532^{c}	-2.789^{a}	-1.395^{a}	-1.385^{a}	0.368	-2.656^{a}	-37.554^{a}	-4.745	-32.895	-304.103^{a}	-68.610^{a}	-94.694^{a}	8.815	-181.193^{a}
	(0.272)	(0.404)	(0.312)	(0.677)	(0.259)	(0.369)	(0.351)	(0.553)	(10.486)	(26.737)	(23.062)	(66.089)	(13.044)	(27.195)	(27.568)	(34.009)
⊗No. hh. mem.	-0.027	-0.095^{b}	0.099^{b}	-0.057	-0.077^{b}	-0.057	0.071	-0.103^{b}	0.984	-5.586^{b}	6.462^{b}	-6.545	-0.783	-2.241	5.291	-5.104^{c}
	(0.045)	(0.047)	(0.041)	(0.069)	(0.036)	(0.046)	(0.049)	(0.052)	(1.401)	(2.823)	(2.970)	(6.553)	(1.656)	(3.255)	(3.749)	(3.081)
⊗No. hh. mem.	0.337^{a}	0.490^{a}	-0.177^{c}	0.087	0.074	0.069	-0.518^{a}	0.547^{a}	7.086^{b}	31.861^{a}	-12.154^{c}	13.023	-4.391	4.051	-39.767^{a}	29.011^{a}
aged 0-5	(0.110)	(0.105)	(0.092)	(0.162)	(0.080)	(0.099)	(0.111)	(0.109)	(3.099)	(6.217)	(6.666)	(15.275)	(3.631)	(7.155)	(8.566)	(6.406)
⊗No. hh. mem.	0.116	0.112	-0.068	-0.064	0.156^{b}	-0.027	-0.253^{a}	0.523^{a}	-3.787	2.613	-7.691	-2.566	1.980	-4.192	-15.876^{b}	27.270^{a}
aged 6-15	(0.081)	(0.080)	(0.069)	(0.121)	(0.062)	(0.076)	(0.084)	(0.084)	(2.319)	(4.579)	(4.950)	(11.370)	(2.749)	(5.308)	(6.476)	(4.907)
⊗No. hh. mem.	0.071	0.437^{a}	-0.573^{a}	0.424^{c}	-0.025	-0.213	-0.400^{b}	0.500^{a}	-5.231	27.830^{a}	-41.387^{a}	38.107^{c}	-13.050^{b}	-18.020	-38.996^{a}	23.902^{b}
aged +65	(0.158)	(0.164)	(0.146)	(0.229)	(0.126)	(0.162)	(0.166)	(0.179)	(5.028)	(10.250)	(10.388)	(21.511)	(5.710)	(11.746)	(12.426)	(10.560)
⊗Log non-labor	-0.146^{a}	-0.327^{a}	0.229^{a}	-0.189^{a}	-0.144^{a}	-0.077^{a}	0.173^{a}	-0.351^{a}	-3.929^{a}	-19.985^{a}	13.664^{a}	-18.714^{a}	-6.953^{a}	-6.483^{a}	10.857^{a}	-21.788^{a}
income	(0.014)	(0.014)	(0.013)	(0.021)	(0.011)	(0.014)	(0.016)	(0.017)	(0.419)	(0.897)	(0.952)	(2.055)	(0.531)	(1.057)	(1.251)	(1.020)
⊗$D_{\text{head of the hh}}$	0.956^{a}	0.798^{a}	0.340	-1.846^{a}	0.013	1.037^{a}	-0.551^{c}	-1.014^{b}	24.271^{a}	46.019^{a}	21.481	-175.665^{a}	-5.105	87.219^{a}	-40.818^{c}	-63.178^{b}
	(0.293)	(0.283)	(0.239)	(0.483)	(0.262)	(0.324)	(0.323)	(0.483)	(8.373)	(17.121)	(16.780)	(44.955)	(11.545)	(21.987)	(24.509)	(28.203)
⊗$D_{\text{partner of head of the hh}}$	0.490	0.268	0.642	-1.885	-0.231	0.470	-1.561^{a}	0.554	25.297	11.495	65.504	-219.382^{c}	-25.591^{b}	51.261^{b}	-144.612^{a}	22.426
	(0.677)	(0.634)	(0.566)	(1.265)	(0.232)	(0.302)	(0.300)	(0.354)	(19.666)	(43.633)	(40.139)	(119.221)	(10.441)	(19.957)	(22.796)	(20.942)
No. of obs.	25873	25873	25873	25873	26664	26664	26664	26664	25873	25873	25873	25873	26664	26664	26664	26664
No. of individ.	7883	7883	7883	7883	7999	7999	7999	7999	7883	7883	7883	7883	7999	7999	7999	7999
Log likelihood	-8456.872	-11942.35	-14086.5	-4529.989	-14455.19	-12135.26	-10363.83	-9385.069	-134852.5	-70907.5	-73281.9	-13915.3	-116282.8	-53378.15	-41660.85	-38271.81

Notes: Additional variables include year dummies and a constant. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%

Table 10: Results Chamberlains' FE estimator

Dependent variable: Participation (dichotomous)								
	Men				Women			
Dummy: Rem.	-0.217	-0.147	-0.089	0.223	-0.080	0.362^{b}	-0.226	-0.521^{c}
	(0.163)	(0.190)	(0.154)	(0.378)	(0.145)	(0.172)	(0.170)	(0.290)
No. hh. mem.	-0.100^{b}	0.008	-0.077^{b}	0.057	-0.072^{b}	-0.007	-0.092^{b}	-0.011
	(0.040)	(0.036)	(0.032)	(0.056)	(0.029)	(0.035)	(0.039)	(0.040)
No. hh. mem.	0.183^{b}	-0.004	0.150^{b}	-0.221^{c}	-0.017	0.001	-0.021	-0.012
aged 0-5	(0.093)	(0.077)	(0.068)	(0.127)	(0.062)	(0.075)	(0.084)	(0.079)
No. hh. mem.	0.135^{c}	0.011	-0.015	0.091	0.106^{b}	0.135^{b}	0.080	-0.068
aged 6-15	(0.070)	(0.065)	(0.054)	(0.102)	(0.049)	(0.060)	(0.068)	(0.063)
No. hh. mem.	0.102	0.031	0.185	-0.113	0.091	0.079	-0.012	0.050
aged +65	(0.143)	(0.137)	(0.117)	(0.196)	(0.107)	(0.129)	(0.136)	(0.140)
Log non-labor	0.008	-0.013^{c}	0.014^{b}	0.007	0.008	-0.007	0.003	0.016^{c}
income	(0.009)	(0.008)	(0.007)	(0.013)	(0.007)	(0.008)	(0.009)	(0.009)
Age	0.378^{a}	0.342^{a}	0.237^{a}	-0.412^{a}	0.156^{a}	0.168^{b}	0.314^{a}	-0.116^{c}
	(0.065)	(0.069)	(0.053)	(0.104)	(0.053)	(0.076)	(0.071)	(0.070)
Age squared	-0.005^{a}	-0.004^{a}	-0.003^{a}	0.004^{a}	-0.002^{a}	-0.001^{c}	-0.004^{a}	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
$D_{\text{head of the hh}}$	0.457	0.284	0.033	-1.295^{a}	0.334	1.010^{a}	0.214	-3.169^{a}
	(0.279)	(0.229)	(0.200)	(0.501)	(0.231)	(0.295)	(0.267)	(0.504)
$D_{\text{partner of head of the hh}}$	-0.434	-0.693	0.217	1.042	-0.488^{b}	0.082	-0.419	-0.266
	(0.519)	(0.471)	(0.410)	(1.252)	(0.216)	(0.278)	(0.272)	(0.324)
No. of obs.	6602	8459	10442	3031	11922	9128	7135	6868
No. of individ.	1933	2350	2966	868	3305	2446	2025	1824
Log likelihood	-2328.09	-3104.78	-3854.55	-1086.04	-4328.50	-3353.32	-2603.85	-2507.96

Notes: Additional variables include year dummies. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%

Table 11: First stage estimates (IV-regression)

Dependent variables: Remittance receipt		
	Men	Women
Ratio of rem. rec. hh. in the department in 1998 ⊗	0.176^a	0.220^a
no. hh. members with sec. education	(0.030)	(0.028)
Ratio of rem. rec. hh. in the department in 1998 ⊗	0.282^a	0.273^a
no. hh. members with tert. education	(0.036)	(0.037)
$D_{\text{Internal migration experience of the head of the hh.}}$	0.002^c	0.001
	(0.001)	(0.001)
$D_{\text{prim. education}}$	0.009^a	0.005^a
	(0.001)	(0.001)
$D_{\text{sec. education}}$	0.018^a	0.011^a
	(0.002)	(0.001)
$D_{\text{tert. education}}$	0.019^a	0.014^a
	(0.002)	(0.002)
No. hh. mem.	-0.003^a	-0.002^a
	(0.000)	(0.000)
No. hh. mem.	0.003^a	0.001^b
aged 0-5	(0.001)	(0.001)
No. hh. mem.	0.005^a	0.003^a
aged 6-15	(0.001)	(0.001)
No. hh. mem.	0.015^a	0.016^a
aged +65	(0.002)	(0.002)
Log non-labor	0.001^a	0.001^a
income	(0.000)	(0.000)
Age	-0.001^b	-0.001^a
	(0.000)	(0.000)
Age squared	0.000^a	0.000^a
	(0.000)	(0.000)
$D_{\text{head of the hh}}$	0.000	-0.010^a
	(0.003)	(0.002)
$D_{\text{partner of head of the hh}}$	-0.012^a	-0.005
	(0.002)	(0.005)
No. of obs.	106641	104817
F(3,N)	115.50	108.55
Log likelihood	47873.02	53545.08

Notes: Regressions include: a constant, year dummies and department dummies. We also included the interactions of internal migration experience of the head of the household with the educational dummies in earlier estimations. As the coefficients are not significant these interactions are excluded. The ratio of remittance receiving households in the department in 1998 drops automatically from the estimation as department dummies were included. Bootstrapped standard errors in parentheses (with 500 reps.): ^{c} significant at 10%; ^{b} at 5%; ^{a} at 1%.