How does bargaining power affect remittances?

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Abstract

This paper examines the factors affecting the amount of remittances by migrants to their home countries, in a context of a family bargaining model. Spanish data does not show the same clear relationship between remittances and migrant income that is captured in the theoretical literature and certain empirical papers. Family bargaining models emerge as a useful framework within which to study remittances, and bargaining power is a key element in determining the level of such remittances. As a consequence of the consideration of bargaining power, the effect of income levels on remittances emerges as non-monotonic.

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1.- Introduction

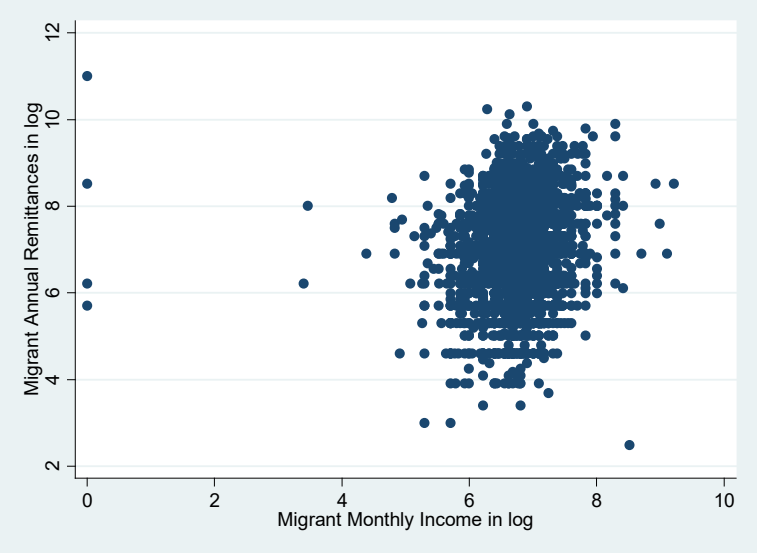
International remittances are the second largest source of external funding for developing countries, after foreign direct investment (Global Commission on International Migration 2005). The most recent estimates of the World Bank show that remittance flows to developing countries reached $328 billion in 2008, up 15 per cent from $285 billion in 2007. This increasing importance opens the way for a rich body of research.

Spanish data shows increasing remittances, in line with the growth of immigration. In the year 2000 in Spain, immigrants comprised 2% of the total population; by 2006, this measure had grown to almost 10%. Outward remittance flow has had a similar evolution: it was $2.059 billion in 2000, and 11.004 billion in 2006, a rise of more than 400%. (World Bank[1]) The social relevance of migration in Spain has led to increasing concern on the part of policy-makers to understand the dynamics of this phenomenon. To this end, the Spanish Statistical Office has made available a micro-data set of a representative sample of Spanish immigrants for 2007 (the National Immigrant Survey of Spain), which allows us to test the relationship between migrant income and the level of remittances. This survey covers demographic and social measures, migratory background, conditions of departure and arrival, and relations with the home country.

From a microeconomic perspective, it is of great significance to determine why migrants decide to send some of their income back to their country of origin. One important variable affecting remittances is migrant income. Intuition tells us that the more the immigrant earns, the more money is sent to the home country. However, the Spanish data do not allow us to draw this conclusion. Figure 1 shows no clear relationship between the immigrant monthly income received in the host country, and the annual remittances to the country of origin.

[1] www.worldbank.org/prospects/migrationandremittances.

Figure 1. *Relation between remittances and immigrant income, Spain.*



Source: Spanish Statistical Office (INE), the National Immigrant Survey of Spain (ENI), 2007

Empirical evidence in other countries presents another kind of relationship. Using data from Botswana, Lucas and Stark (1985) show that the more an immigrant earns, the higher the level of his remittances. Moreover, using survey data on United States-Mexico States remittances, Amuedo-Dorantes and Pozo (2006) also find that income increases in migrant-receiving countries significantly raise the proportion of labour earnings sent home. However, from data of Kenya, Knowles and Anker (1981) find a negative effect of migrant's income on the probability of remitting. These results are not consistent with Spanish data. The question then becomes, is this difference in empirical results captured by theoretical models?

Rapoport and Docquier (2006) provide an extended review of the recent literature on migrants´ remittances, from both microeconomic and macroeconomic perspectives. Their paper summarises the different motives to remit, and develops models based on these differences. Their review shows that, to consider one particular motive over another is absolutely relevant for the results of the model. The sensitivity of remittances to various explanatory variables can have a different sign, depending on the motives to remit. These authors classify the motives into two categories. The first refers to individual motives - in which they include altruism, buying services in the home country (such as taking care of the migrant's properties, or relatives), strategic motives

(due to positive selection of emigrants), and inheritance. The second category includes family arrangements such as insurance (e.g. to avoid the stochastic rural income) and investment (repayment of loans, for instance).

A preliminary conclusion of their study is that remittances are not driven by a single motive. Different individuals have heterogeneous motivations to remit, and these different motivations can coexist within the same individual. In this sense, recent theoretical literature in microeconomics considers the interdependencies among the motives to remit. For instance, Cox, et. al. (1998) combine altruism and exchange, whereas Docquier and Rapoport (2000) mix altruism and strategic motives. Certain motives are very similar to each other and, for example, the investment motive or the insurance motive may be seen as a specific exchange of services in a context of imperfect capital markets. However, all of these papers reach the same conclusion: the more an immigrant earns, the more money is sent to the home country, which leads us to a second question - what factors are these models omitting that lead to a conclusion inconsistent with Spanish data?

From the Spanish data, we can see that 98% of remittances sent home by Spanish immigrants have the family as the receiver. This is in line with Rapoport and Docquier (2006), who claim that remittances are better explained as family arrangements resulting from individual motivations. Therefore, it would be reasonable to consider that the level of remittances should be determined by a process of family bargaining. The studies referred to above only consider unitary models, in which the utility represents the family or individual preference. However, if the decision is taken in a family context, it should appear as the solution to a process of family bargaining, in which the migrant member of a family has a bargaining power different from that of the other family members who remain in the origin country. In fact, the sociological literature has considered intra-generational bargaining power in a context of migration (Lee et al. 1994). With respect to the economic literature, Cox et. al. (1998) introduced the effect of a bargaining power between parent and child in a model of intergenerational transfers, but they did not take into account the bargaining power between the migrant and those family members who remain in the home country; furthermore, they assume a symmetric Nash-bargaining solution.

Our paper makes two main contributions. The first, a theoretical model that considers remittances in a context of family bargaining models, in which we assume the

existence of a family good (buying services in the home country, or investment) and altruism between family members. The important feature of this approach is that the behaviour of the family depends not only on total family income, but also on the incomes controlled individually by each family member. We analyse the intra-family allocation of resources in a migration context. Specifically, we develop a bilateral bargaining model in which the threat point is defined by the non-cooperative solution (Lundberg and Pollak 1993, Chen and Woolley 2001). We find that remittances depend negatively on bargaining power of the migrant, and that this variable is crucial in determining the effect of altruism and income levels on the amount of remittances in the theoretical framework. The second contribution consists of an empirical analysis carried out with Spanish data, to test the main implications derived from the theoretical model.

The article has the following structure. In Part two, the model is presented. Part three analyses the main results of the model. Part four uses Spanish data to determine the determinants of the amount of remittances, and our main conclusions constitute Part five.

2.- Family bargaining model

Let us consider a family in which one of the members has migrated. The welfare function of this migrant, W_m depends on his own utility level, U_m and on that of the other family members left behind in the country of origin,

$$W_m = U_m + sU_h, \tag{1}$$

where $s \in [0,1]$ denotes the degree of altruism of the migrant toward his family. This specification has been given the name "caring preferences" and has been adopted by, among others, Bourguignon and Chiappori (1992). We consider that the welfare of the family members left behind in the country of origin can be represented in a similar way:

$$W_h = U_h + sU_m. \tag{2}$$

Given that the focus of our paper is the role of the bargaining power of the migrant, we treat the family members left in the country of origin as though they were a single decision-making agent. We assume that the utility of the migrant and that of the other, non-migrant family members, take the following form:

$$U_j(Q, x_j) = A(Q)x_j; j = m, h, \qquad A'(Q) > 0, A''(Q) < 0 \tag{3}$$

where x_j is the consumption of the private good and $A(Q)$ is the production function of the family good Q (the family good can be property, caring for children or parents, etc.). This preference function is a particular case of that used by Suen et al. (2003).

Following Lundberg and Pollak (1993), we assume that there is specialization in the production of the family good. The non-migrant relatives provide the family good (protecting property, building houses, caring for the children or parents). The migrant cares for those left behind by making a transfer to them, R, which can be devoted either to the family good or to their own private consumption. That is to say, R denotes the level of remittances.

The budget constraints of the migrant and his non-migrant relatives are given, respectively, as:

$$x_m = Y_m - R, \tag{4}$$

$$x_h + pQ = Y_h + R. \tag{5}$$

where Y_m and Y_h represent the income of the migrant and the non-migrant family members, respectively, and p is the price of the household public good .Without loss of generality, the price of the consumption good is normalized to one.

2.1. Utility Possibilities Frontier

We assume that the allocation of welfare between the migrant and the rest of his family is the result of a bargaining agreement. Thus, the levels of private consumption, provision of family good and remittances, are Pareto-efficient. Therefore, we begin by obtaining the utility possibilities frontier from the following conditioned optimization problem:

$$\begin{aligned}
&\underset{Q,R,x_m,x_h}{Max}\ W_h = A(Q)(x_h + sx_m) \\
&s.t.\ \ W_m = A(Q)(x_m + sx_h), \\
&Y_h - R = x_m, \\
&Y_h + R = x_h + pQ.
\end{aligned}$$

Substituting out the variable R, the above problem can be simplified to:

$$\underset{Q}{Max}.W_h = A(Q)(1+s)(Y - pQ) - W_m ; with\ Y = Y_m + Y_h . \quad (6)$$

Let Q^* be the solution to the maximization problem. This solution will satisfy the first order condition:

$$\left[A'(Q)(Y - pQ) - pA(Q)\right](1+s) = 0 . \quad (7)$$

And the second order condition given by:

$$A''(Q)(Y - pQ) - 2pA'(Q) < 0 . \quad (8)$$

From (7), the optimal level of the family good is deduced as $Q^*(Y, p)$, so that the level of family good and, hence, the utility possibility frontier, depend only on total income, $Y = Y_m + Y_h$, not on the individual components.

By applying the implicit function theorem and considering the second order condition (8), it is straightforward to deduce that:

$$\frac{dQ^*}{dY} > 0 . \quad (9)$$

Moreover, because of transferable utility (see Suen et. al. 2003) the slope of the utility possibility curve is:

$$\frac{\partial W_h}{\partial W_m} = -1 . \quad (10)$$

Therefore, the utility possibilities frontier has a constant negative slope and adopts the following form:

$$W_h = A(Q^*)(1+s)(Y - pQ^*) - W_m . \quad (11)$$

Finally, the volume of remittances associated with the Pareto efficient solution is given by:

$$R^* = \frac{Y_m + sY_h - spQ^*}{1-s} - \frac{W_m}{(1-s)A(Q^*)} . \quad (12)$$

Once we have determined the utility possibilities frontier, we deduce the optimum distribution of welfare among the migrant and his family left behind in the country of origin. We assume that this distribution is the result of the generalized Nash bargaining solution. Therefore, the first step is to define the threat point or "status quo" of the bargaining process.

2.2. Threat Point

The definition of the threat point determines the intra-family allocation in the bargaining process. We consider that the status quo of the bargaining is determined by the non-cooperative solution. Assuming that the non-migrant is the spouse, traditionally, the threat point has been identified with divorce (Manser and Brown 1980, McElroy and Horney 1981). However, more recently, a number of papers have appeared in which the status quo is defined by a non-cooperative equilibrium that does not necessarily imply the dissolution of the marriage (see, among others, Lundberg and Pollak 1993 and Chen and Woolley 2001). The assumption of non-cooperative equilibrium is more adequate for our framework, in which spouses, parents or other members of the family are receivers of remittances.

In this situation, we assume that there is no altruism between the migrant and his family, and therefore, there are no voluntary income transfers between them; that is to say, the migrant does not send money to the other members of his family remaining in the country of origin. Each agent maximizes his individual utility, subject to his own budget constraint, which gives a level of family good $\widetilde{Q}(Y_h, p)$ and the following utility levels, $\overline{W}_h = A(\widetilde{Q})(Y_h - p\widetilde{Q})$, $\overline{W}_m = A(\tilde{Q})Y_m$.

2.3. Nash-bargaining solution

We assume a bargaining process by which the agents choose a generalized Nash-bargaining solution. This means that the equilibrium can be obtained from the solution to the following maximization problem:

$$\underset{W_m}{Max}(W_m - \overline{W}_m)^{\beta}\left[W_h(Y, p, W_m) - \overline{W}_h\right]^{1-\beta}. \tag{13}$$

The parameter $\beta \in [0,1]$ denotes the bargaining power of the migrant and $(1-\beta)$ represents that of the rest of the family. The bargaining power measures the ability of one agent to influence the other. We consider parameter β as exogenous, following De Haas (2007), who concludes that migration and remittances do not necessarily have a structural impact on changing traditional roles.

Taking into account (10), the first order condition of the above problem is[2]:

$$\beta(W_h - \overline{W}_h) - (1-\beta)(W_m - \overline{W}_m) = 0\,. \tag{14}$$

Therefore, the welfare levels are the following:

$$W_m^* = \beta(1+s)A(Q^*)(Y - pQ^*) - \beta\overline{W}_h + (1-\beta)\overline{W}_m\,, \tag{15}$$

$$W_h^* = (1-\beta)(1+s)A(Q^*)(Y - pQ^*) + \beta\overline{W}_h - (1-\beta)\overline{W}_m\,. \tag{16}$$

From (15) and (16), it is straightforward to deduce the effect of altruism and bargaining power on the welfare levels of the migrant and his family. An increase in the level of altruism increases the welfare level for both. The effect of an increase in the bargaining power of the migrant does not have the same effect on both - it increases the welfare level of the migrant, and decreases the welfare of the other members of the family, as we would expect.

Substituting equation (15) into equation (12), the level of remittances corresponding to the Nash-bargaining solution is given by:

$$R^* = \frac{A(Q^*)\left\{\left[1-\beta(1+s)\right]Y_m + \left[s(1-\beta)-\beta\right](Y_h - pQ^*)\right\} + A(\tilde{Q})\left[\beta(Y_h - p\tilde{Q}) - (1-\beta)Y_m\right]}{(1-s)A(Q^*)}. \tag{17}$$

Now that we have obtained the function that defines remittances (equation 17), in the next section we will study whether the relevant determinants have a positive or negative effect on remittances.

3.- Effects of bargaining power, altruism and income on remittances

Taking into account the above equations, we can now analyse how bargaining power, the degree of altruism, and the migrant income obtained in the host country affect the level of remittances to the family.

Proposition 1

The bargaining power of the migrant has a negative effect on the level of remittances.

[2] The second order condition is fulfilled due to the concavity of utility functions.

Proof:

Differentiating equation (14) with respect to β, we obtain:

$$\frac{\partial W_m}{\partial \beta} > 0 . \tag{18}$$

Differentiating equation (17) with respect to β, the effect of the bargaining power of the immigrant on the level of remittances is given by:

$$\frac{\partial R^*}{\partial \beta} = -\frac{\frac{\partial W_m}{\partial \beta}}{(1-s)A(Q^*)} < 0 \,\square \tag{19}$$

The results are not as clear when we try to analyze the effects of altruism or migrant income on remittances.

On the one hand, differentiating equation (12) with respect to s, and after some manipulation, we obtain:

$$\frac{\partial R^*}{\partial s} = \frac{A(Q^*)(Y - pQ^*)(1-2\beta) + \beta \overline{W}_h - (1-\beta)\overline{W}_m}{A(Q^*)(1-s)^2}. \tag{20}$$

On the other, differentiating equation (10) with respect to Y_m, we deduce:

$$\frac{\partial R^*}{\partial Y_m} = \frac{A(Q^*)\left[A(Q^*) - \frac{\partial W_m^*}{\partial Y_m}\right] + \left[W_m^* A'(Q^*) - spA^2(Q^*)\right]\frac{\partial Q^*}{\partial Y_m}}{(1-s)A^2(Q^*)}. \tag{21}$$

Both (20) and (21) could be positive or negative. The sign will depend on the value reached by β and the utility associated with the threat point for each agent. The ambiguity is significantly reduced if we consider a Cobb-Douglas specification for the production function of the family good: $A(Q) = Q^{\alpha}; (0 < \alpha < 1)$. Thus, we can deduce the following propositions:

Proposition 2

Given $A(Q) = Q^{\alpha}$ *and denoting* $\rho = \frac{Y_m}{Y_h}$ *, there exists a bargaining power threshold,* $\overline{\beta}(\alpha, \rho)$*, above which altruism has a negative effect on the level of remittances.*

Proof:

The optimal levels of the family good in the cooperative equilibrium and the non-cooperative solution are, respectively:

$$Q^* = \frac{\alpha Y}{(1+\alpha)p};\ \widetilde{Q} = \frac{\alpha Y_h}{(1+\alpha)p}. \tag{22}$$

Substituting (21) into (19), we obtain the expression:

$$Sign\left\{\frac{\partial R^*}{\partial s}\right\} = sign\left\{(1+\rho)^{1+\alpha} - \rho(1+\alpha) - \left[\left(2(1+\rho)^{1+\alpha} - \rho(1+\alpha) - 1\right)\right]\beta\right\}. \tag{23}$$

Thus, we can deduce the threshold for the bargaining power as:

$$\overline{\beta}(\alpha,\rho) = \frac{(1+\rho)^{1+\alpha} - \rho(1+\alpha)}{2(1+\rho)^{1+\alpha} - \rho(1+\alpha) - 1}. \tag{24}$$

From (22), it is straightforward to show that:

$$\frac{\partial R^*}{\partial s}\begin{cases} > 0, for\ 0 < \beta < \overline{\beta}(\alpha,\rho) \\ < 0, for\ \overline{\beta}(\alpha,\rho) < \beta < 1 \end{cases} \quad \square$$

To understand the implications behind this proposition, we look to equation (12). The first addend of equation (12) shows a direct positive effect of altruism on remittances, and the second addend of this equation shows an indirect negative effect of altruism on remittances, through the migrant welfare. This indirect effect reflects that an increase in remittances decreases the migrant consumption and, therefore, the migrant welfare. Depending on the magnitude of each effect, the final outcome will be positive or negative. If the bargaining power of the migrant is greater than the threshold, it means that the migrant welfare is large, and then the indirect and negative effect will be greater than the positive effect. Therefore, the effect of an increase in altruism may decrease remittances.

Proposition 3

Given $A(Q) = Q^{\alpha}$ *and that* $\gamma = \frac{Y_h}{Y}$ *, there exists a bargaining power threshold,* $\widehat{\beta}(\alpha,\gamma,s)$*, under which the income of the migrant has a negative effect on the level of remittances.*

Proof:

Substituting (22) into equation (21), and after some manipulations, we deduce the threshold of the bargaining power:

$$\widehat{\beta}(\alpha,\gamma,s)=\frac{\gamma^{\alpha}\left[\alpha^{1-\alpha}-(1+\alpha)(1-\gamma)\right]-(1-s)\alpha^{1-\alpha}}{(1+s)(1-\alpha)^{1-\alpha}-\gamma^{\alpha}\left[1+\alpha(1-\gamma)-\alpha^{1-\alpha}\right]}\ . \tag{25}$$

From (25), it follows that:

$$\frac{\partial R^{*}}{\partial Y_{m}}\begin{cases}<0, for\ \ 0<\beta<\widehat{\beta}(\alpha,\gamma,s)\\ >0, for\ \ \widehat{\beta}(\alpha,\gamma,s)<\beta<1\end{cases}\square$$

We can check that this bargaining power threshold $\widehat{\beta}(\alpha,\gamma,s)$ increases when γ increases. As $\frac{\partial\gamma}{\partial Y_{h}}>0$, the higher the income of those who remain in the origin country, the higher the bargaining power threshold, and, hence, the more probable a negative effect of an increase of the migrant income on the level of remittances.

The effect of the migrant income on remittances can be divided into three partial effects; a direct effect of the income on remittances, and two indirect effects, the first through the influence of remittances on the family good, and the second through the migrant welfare.

$$\frac{dR^{*}}{dY_{m}}=\frac{\partial R^{*}}{\partial Y_{m}}+\frac{\partial R^{*}}{\partial Q^{*}}\frac{dQ^{*}}{dY_{m}}+\frac{\partial R^{*}}{\partial W_{m}^{*}}\frac{dW_{m}^{*}}{dY_{m}}. \tag{26}$$

As Appendix A shows, the direct effect of migrant income on remittances is positive, showing that an increase in the migrant income directly increases the level of remittances. However, the indirect effect of this income on remittances through the migrant welfare is negative since, although there is a positive effect of income on welfare, there is a negative effect of migrant welfare on the level of remittances (the greater the amount of remittances sent abroad, the less the migrant consumption and therefore, the less the migrant welfare). The indirect effect of migrant income on remittances through the family good is ambiguous, but we show, in Appendix A, that the greater the non-migrant income relative to total income, the more probable it is that this effect is negative, and thus the total effect would be negative. This relationship

between remittances and migrant income will be empirically analyzed in the next section.

4.- Empirical evidence: the Spanish case

Figure 1 has shown us that there is no clear positive or negative relationship between remittances and immigrant income, but this does not necessarily mean that there is no relationship at all between these variables. In fact, the previous theoretical model establishes a non-monotonic relationship between remittances and immigrant income, in which bargaining power plays an important role. In this section, we provide evidence of the determinants of remittances using a cross-sectional technique.

Data

Most data were obtained from the National Immigrant Survey of Spain (ENI is its Spanish acronym). ENI provides information on immigrants who have been in Spain for at least one year, or who intend to stay in Spain for that period. For the purposes of the ENI, an immigrant is a foreign-born resident of Spain, 16 years of age and older, irrespective of his nationality, and a resident is a person who is present in the country irrespective of his legal status. Exceptions to this definition are persons born abroad with Spanish citizenship from birth, who moved to Spain before the age of two. The strategy for locating respondents is based on the *Padrón Municipal*. The reliability of this source is good, since all those who appear in the records of the Padrón have the automatic right to basic medical care and to educational services, without the pre-condition of having legal status in Spain. A more detailed description of the methodology can be found at the Spanish Statistical Office web site[3].

ENI contains detailed data on socio-demographic, family and labor characteristics regarding immigrants. Unfortunately, data about the income of relatives who remain in the country of origin are not provided. We assume that the gross national income per capita (GNI per capita) of the country of origin, converted to international dollars using

[3] http://www.ine.es/en/daco/daco42/inmigrantes/inmigra_meto_en.pdf

purchasing power, may be a proxy of this variable. Data was obtained from the World Bank[4].

Bargaining power in a family context is influenced by several factors that have been studied by Agarwal (1997). For instance, in certain societies there are legal restrictions limiting the property control of women, which implies lower bargaining power for them. Similarly, some institutional practices, such as forbidding credit to women without the agreement of the male spouse, and cultural rules, such as submission to the spouse, can imply more power for the man in the bargaining process. In order to measure the bargaining power of the immigrant, we have chosen the gender empowerment measure (GEM). This variable is one of the four Human Development Indices developed by the Human Development Report. It examines progress in advancing women's standing in political and economic forums, evaluating the extent to which women and men are able to actively participate in economic and political life and take part in decision-making[5]. The source of this data is the Human Development Report, 2009, by the United Nations Development Program.[6]

Since most remittances have the family as receivers, our analysis focuses on immigrants with positive earnings, with at least one relative outside Spain, because they can be considered as potential senders of remittances. However, we do not have information about the gender empowerment measures of all countries of birth included in ENI, which brings the final number of observations used in the empirical analysis to 3,461.

Econometric specification

Equation (16) suggests that the amount of remittances R under the Nash-bargaining solution depends on the bargaining power of the immigrant β, his level of income Y_m, his relatives' level of income Y_h, and the family good Q. In order to estimate this, the amount of remittances as measured by the total amount of money sent overseas during the year 2007 in logarithms is the dependent variable. As independent

[4] http://ddp-ext.worldbank.org/ext/DDPQQ/member.do?method=getMembers&userid=1&queryId=135

[5] To obtain more information, see http://www.hdr.undp.org/en/media/HDR_20072008_Tech_Note_1.pdf

[6] Data: http://hdrstats.undp.org/en/indicators/126.html

variables, we use, first, migrant income in logarithms (Y_m), as measured by the average net monthly income derived from the main employment of the immigrant, including the monthly proportional part corresponding to extraordinary pay checks and other extraordinary income, that is regularly received. We also include the square of the migrant ($Y_m{}^2$) income in order to check if there is the non-monotonic relationship predicted by the theoretical model. GNI per capita expressed in logarithms is used to approximate to the income of the relatives who remain in the country of origin (Y_h). As mentioned earlier, the bargaining power of the migrant (β) is proxied by GEM and, since this variable refers only to women, it has been multiplied by a dummy with a value of 1 in the case of a female migrant[7]. The family good (Q) could be the migrant's assets in the country of origin (dwelling, land, own business) or caring for relatives such as children or elderly parents. For instance, Stark and Lucas (1988) show, with data from Bostwana, how migrants to South African mines remit so that their families can purchase and tend to cattle on their behalf (cattle being a major form of asset holding in Bostwana). Alternatively, altruistic remitters would be more likely to send remittances - and greater sums of remittances - to households with a greater dependency ratio (Banerjee, 1984). Initially, we considered the migrant's assets, the number of children, and having parents in the country of origin. We also added the number of children living in Spain, since that reduces the dependency ratio in the origin country. The probability and the amount of remittances may decrease if the migrant has to maintain children living with him. Taking into account all of these variables, the migrant's assets, and parents in the country of origin, are insignificant with respect to the amount remitted, being dropped from the final estimation. However, in these previous estimations, we detect that these factors do influence the likelihood of remitting.

We also introduce the level of education[8] as a control variable. The explanation is that remittances resulting from family interactions imply that more educated migrants should remit more to compensate the family for the additional education expenditures incurred (see Rapoport and Docquier, 2006; Carling, 2008).

[7] We have also used other proxies, using the level of unemployment in the origin country as a measure of the bargaining power at origin (see Rappoport and Docquier, 2006) and the main results do not change.
[8] Following Sanromá et al. (2009), we have assigned 0 years of schooling to immigrants without formal studies; 3 years of schooling to immigrants with incomplete primary education; 6 years for complete primary education; 10 years for incomplete secondary education; 15 years for incomplete tertiary education, and 17 years for complete tertiary education.

Specifically, since certain factors affecting the likelihood of remitting, and those affecting the amount remitted, are linked, we have estimated the model using Heckman's sample selection model. Implementing the Heckman model requires the selection of variables that have an effect on the discrete choice of whether or not to send remittances, but not on the amount sent. We have considered the variables used in other studies of remittances[9] (Rapoport and Docquier, 2006; Hagen-Zanker and Siegel, 2007; Carling, 2008; Stark, 2009): time since migration, a dummy if the mother or the spouse resides abroad, the number of brothers or sisters that live outside Spain, a dummy if the immigrant is in contact with his family or friends in the country of birth, a dummy to measure the intention to bring some family members to Spain, and another dummy to reflect the immigrant's plan to return to the home country during the next five years. To better account for the economic conditions of the immigrant, we have added one dummy to measure the stability of the immigrants' employment. Descriptive statistics are presented in Appendix B.

We have assumed that the number of children abroad, or having parents abroad, may affect both the decision to remit and its magnitude. However, we have considered that spouse and brothers (sisters) left behind influence the likelihood of sending remittances, but not their amount. It is plausible to think that the greater the number of children abroad, the greater the dependency ratio and, hence, the greater the amount of remittances sent. This reasoning would apply to elderly parents but it does not necessarily work for spouse and brothers (sisters) left behind. The spouse left behind in the home country may also be a primary breadwinner sharing the household's dependency burden, as the theoretical model considers. Empirically, the lack of data does not allow us to confirm or reject this point, being subject to debate. In fact, there is no consensus in the previous studies about which factors affect the likelihood of remitting, and which influence both the likelihood and the amount remitted. As Hagen-Zanker and Siegel (2007) highlight, in each country there are different motivations to remit and different types of migrants, which presents different determinants to send money abroad and different determinants to choose the amount of remittances. Similarly, Carling (2008) claims that the specific migratory and social contexts explain these differences found in the literature.

[9] In early specifications of the model, we also included other variables used in the literature, such as defraying migration costs or having the father abroad, but dropped them from the final estimates for lack of significance

As we have used two variables, GEM and GNI per capita, defined at a higher level of aggregation than the dependent variable, we have obtained robust standard errors for our remittances model by specifying clusters on these variables[10]. We also tested the hypothesis of exogeneity of the income; the p-value does not allow us to reject this hypothesis by using an instrumental variable (GMM) regression with valid and no weak instruments[11].

Econometric results

Table 1 presents the Heckman selection model (maximum likelihood).

[Insert Table 1]

Two things are worthy of attention. First, bargaining power plays an important role in determining the amount remitted to the family. The coefficient of the bargaining power variable is negative and statistically significant, indicating that the higher the bargaining power of the migrant, the lower the amount of remittances sent to the non-migrant relatives. Second, the estimation shows a significant relationship between the level of remittances and the immigrant's income. Specifically, the coefficient of the immigrant income is negative, but becomes positive in the square of the migrant income, reflecting a non-monotonic relationship between the immigrant income and the level of remittances.

The other variables present the expected sign. The number of children living abroad is positively associated with the level of remittances, whereas the number of children living with the immigrant is negatively associated with the level of remittances, in accordance with Echazarra (2010). The coefficient of the level of education is positive and statistically significant. This result is in line with Durand et al, (1996), and

[10] We present the estimations taking clusters on the GEM. The results are similar if we employ GNI per capita.

[11] We fit a regression via iterative GMM using the default heteroskedasticity-robust weight matrix. We have chosen as instruments the Y_h, β, level of education, number of children living in Spain, number of children living abroad, documented situation of the immigrant, the number of weekly working hours, a dummy if the immigrant has a permanent employment contract, and another dummy if the immigrant has his own business (we have used other variables, but they are not significant). Bargaining power is chosen as a cluster variable. The R2, Hansen´s J chi2(3) and GMM C statistic chi2(1) values allow us to conclude that instruments are relevant and not weak and, hence, we cannot reject the hypothesis that the instruments are valid, or that our model is correctly specified and we cannot reject the hypothesis that the income variable is exogenous.

Ilahi and Jafarey (1999), who also found that the amount remitted increases with educational attainment. Income levels of receiving families are not statistically significant, but they do affect the likelihood of remittances. The relationships between remittances and the income of relatives may have different signs: poorer origin families have more necessities, which would lead to greater remittances, but if a migrant sends remittances to invest in a future inheritance (of land or other assets), he will send more remittances when the parent's income is higher. These opposite signs could compensate in the Spanish case, and could be the reason for the income levels of receiving families not showing a particular sign in the econometric specification. Another reason could be the unavailability of microdata for this variable. Using data from Greece, Lianos (1997) also finds that household income has no effect on the level of remittances. Itzigsohn's (1995) analysis of four countries shows that household income has no effect on remittance receipts in Haiti and Jamaica, but a positive effect in Guatemala and a negative effect in the Dominican Republic.

Taking care of migrant's assets and relatives left behind increases the likelihood of remitting. Contacts with family and friends, or a plan to bring the family also reflect the existence of social and family ties, which makes it more likely to remit, but the strength of these ties becomes weaker the greater the duration of the migrant's stay (Knowles and Anker, 1981; Fairchild and Simpson, 2004). We also find that migrants who intend to return are more likely to remit since they have maintained stronger ties (Bollard et al. 2010).

With respect to the economic conditions of the immigrant, those migrants with stable jobs are more likely to remit, as found by Durand et al (1996). Finally, it is necessary to highlight that rho is negatively signed, and different from 0, which suggests that the error term in the selection and primary equations is negatively correlated. So (unobserved) factors that make the remittances more likely tend to be associated with lower remittances. This result also emerges in Funkhouser (1995) and Alba and Sugui (2009). The former claims that a context of political hostility could explain that factors that increase the likelihood of remitting also decrease the amount remitted. Alba and Sugui (2009) explain that Filipino giving practices imply that the social obligation is to give, but in modest amounts. In our empirical model, it is difficult to reach any conclusion because the diversity of remitters' origins does not allow us to be certain that such obligations or political issues exist.

5.-Final remarks

This paper improves on the previous literature on remittances, developing a family bargaining model in which one of the family members emigrates, and other members of the family remain in the country of origin. This model allows for the combination of several motives to send remittances with another element, bargaining power, which plays a key role in the amount of remittances sent by the migrant to the family.

We obtain two relevant empirical insights in the Spanish case, supported by the theoretical model. First, the higher the bargaining power of the migrant, the lower the level of remittances. Second, we find a positive relationship between migrant income and the level of remittances, if the migrant bargaining power is sufficiently high with respect to a critical value, and a negative relationship in the reverse case. The theoretical explanation of this negative relationship lies in the fact that the negative indirect effect of migrant income on remittances by welfare, together with the indirect effect of migrant income on remittances by the family good (which is negative the more the non-migrant income is relative to total income) are greater than the positive effect. Additionally, the theoretical model shows a non-monotonic relationship between the level of remittances and the degree of altruism. A higher level of altruism has a negative effect on the level of remittances, if the bargaining power of the migrant rises above a certain threshold, since there is an indirect negative effect of altruism on remittances through the migrant welfare.

Table 1 Heckman selection model maximum likelihood. Dependent variable Migrant annual remittances in logarithms.

Variables	**Main regresion Cluster standard error**	**Selection equation**
Monthly income of the immigrant (in natural logarithms) Y_m	-3.0306 (0.000)	1.1167 (0.064)
Square of Ym	0.2588 (0.000)	-0.0769 (0.077)
Income per capita in the country of origin (in natural logarithms) Yh	0.1549 (0.162)	-0.6147 (0.000)
Female immigrant*gender empowerment (β)	-0.1468 (0.066)	-0.0830 (0.484)
Level of education	0.0278 (0.034)	-0.0176 (0.192)
Number of children living in Spain	-0.0679 (0.001)	-0.1017 (0.000)
Number of children living abroad	0.1754 (0.000)	0.0457 (0.032)
Spouse residing abroad (yes=1)		0.1789 (0.007)
Mother residing abroad (yes=1)		0.2340 (0.000)
Number of brothers or sisters residing abroad		0.0169 (0.034)
Immigrant is in contact with his family or friends in home country (yes=1)		0.8867 (0.000)
Plan to bring the family to Spain (yes=1)		0.5115 (0.000)
Plan to return to home country in the following 5 years (yes=1)		0.4117 (0.000)
Time since migration		-0.0232 (0.000)
Owner of dwelling in country of birth (yes=1)		0.2468 (0.000)
Length of immigrant employment contract (permanent=1)		0.0824 (0.030)
Constant	14.5982 (0.000)	0.6009 (0.811)
rho	-0.7241	
sigma	1.2385	
lambda	-0.8967	
Wald chi2 (7) Wald test of indep eqns (rho = 0 Number observations	597.11 (0.000) 104.41 (0.000) 3461	

P-values between parenthesis.

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Appendix A: Migrant income effect on remittances.

By differentiating equation (11) and by applying the enveloped theorem we obtain:

$$\frac{dR^*}{dY_m} = \frac{\partial R^*}{\partial Y_m} + \frac{\partial R^*}{\partial Q^*}\frac{dQ^*}{dY_m} + \frac{\partial R^*}{\partial W_m^*}\frac{dW_m^*}{dY_m} \tag{A1}$$

Therefore, the effect of a change in migrant income on remittances can be divided into three partial effects: a direct effect of the income on remittances, and two indirect effects, the first through the influence of remittances on the family good, and the second through the migrant´s welfare.

If we consider these general expressions, we cannot conclude anything significant about the effects. The ambiguity disappears if we consider the same Cobb-Douglas specification for the production function of the family good considered in part three: $A(Q) = Q^{\alpha}$. In this case, every effect can be simplified into the following expressions:

$$\frac{\partial R^*}{\partial Y_m} = \frac{1}{1-s} > 0 \tag{A.2}$$

$$\frac{\partial R^*}{\partial Q^*}\frac{dQ^*}{dY_m} = \frac{\beta(1+s) - s\alpha^{1-\alpha} + \left[(1+\alpha)(1-\beta) - \left(1+\alpha(1-\beta)\right)\frac{Y_h}{Y}\right]\left(\frac{Y_h}{Y}\right)^{\alpha}}{(1-s)\alpha^{1-\alpha}} \tag{A.3}$$

$$\frac{\partial R^*}{\partial W_m^*}\frac{dW_m^*}{dY_m} = -\frac{\left[\beta(1+s) + (1-\beta)\left(\frac{Y_h}{Y}\right)^{\alpha}\right]}{(1-s)} < 0 \tag{A4}$$

The direct effect of migrant income is positive, and the indirect effect through the migrant welfare is negative. The problem arises when we try to conclude something about the indirect effect of migrant income on remittances through the family good. From the analysis, we can conclude that, the higher the non-migrant income participation in the family income , $\frac{Y_h}{Y} \uparrow$, the higher will be the absolute value of (A.3), then, an increase in the migrant income will decrease the remittances: $\frac{dR^*}{dY_m} < 0$.

Appendix B: Descriptive statistics.

Variables	**Mean value**	**Standard deviation**
Migrant annual remittances (in logarithms) R	7.1159	1.1506
Monthly income of the immigrant (in logarithms) Y_m	6.8397	0.5249
Income per capita in the country of origin (in logarithms) Y_h	9.2710	0.6188
Female immigrant*gender empowerment (β)	0.3264	0.3010
Level of education	11.1387	3.1001
Number of children living in Spain	1.3303	1.0043
Number of children living abroad	0.5484	1.0165
Spouse residing abroad (yes=1)	0.0734	
Mother residing abroad (yes=1)	0.6229	
Number of brothers or sisters residing abroad	2.3646	2.3793
Immigrant is in contact with his family or friends in home country (yes=1)	0.9240	
Plan to bring the family to Spain (yes=1)	0.3201	
Plan to return to home country in the following 5 years (yes=1)	0.0795	
Time since migration	10.2869	10.4969
Owner of dwelling in country of birth (yes=1)	0.3381	
Length of immigrant employment contract (permanent=1)	0.5238	

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