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# The determinants of remittances:

# A review of the literature

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## Abstract

In this paper we review the current state of literature on the determinants of remittances since it is important to understand remittance flows from a policy perspective since they affect the lives of so many people around the world. While the decision to remit may be clearly linked to the causes of migration, for example, in the theory the New Economics of Labour Migration, we take the causes of migration literature as given and broadly focus on the determinants of remittances. Most of the literature is based on empirical applications; hence we will focus on clearly summarising existing findings before comparing the results to our own. We start by giving the theoretical background of the determinants of remittances and then briefly discuss the literature that focuses on the macroeconomic level. We find the main theoretical determents of remittances to be altruism, insurance, the bequest motive, loan repayment, and the exchange motive. We then move to a more extensive section on the empirical applications of the micro-economic determinants of remittances. We conclude with a summary of findings from the literature.

Keywords: remittances, transfers

## 1 Introduction

The recorded flows of money sent home from the 191 million worldwide migrants working abroad, known as remittances, have now reached over $200 billion. We know that at least 50 per cent of remittances are sent through informal channels, which are not recorded, bringing the total remittances sent to somewhere around $300 billion (World Bank, 2006). These flows now exceed Official Development Aid (ODA) as well as Foreign Direct Investment (FDI) (World Bank, 2006). For many countries, remittances are a very important source of finance usually making up anywhere between 5 and 40 per cent of the country's GDP. These same countries are highly dependent on remittances as a source of alleviating poverty and contributing to development.

In this paper we review the current state of literature on the determinants of remittances since it is important to understand remittance flows from a policy perspective since they affect the lives of so many people around the world. While the decision to remit may be clearly linked to the causes of migration, for example, in the theory the New Economics of Labour Migration, we take the causes of migration literature as given[1] and broadly focus on the determinants of remittances. Most of the literature is based on empirical applications; hence we will focus on clearly summarising existing findings before comparing the results to our own. We start by giving the theoretical background of the determinants of remittances and then briefly discuss the literature that focuses on the macroeconomic level. We find the main theoretical determents of remittances to be altruism, insurance, the bequest motive, loan repayment, and the exchange motive. We then move to a more extensive section on the empirical applications of the micro-economic determinants of remittances. We conclude with a summary of findings from the literature.

[1] See Massey, D., Arango, J., Graeme Hugo, Kouaouci, A., Pellegrino, A., & Taylor, E. (1994). Theories of International Migration: A Review and Appraisal. *Population and Development Review,* 19(3) for a summary of the main theories on the causes of migration.

# 2 The determinants of remittances

## 2.1 Theoretical determinants of remittances

The theoretical debate about the determinants of remittances was triggered by Lucas and Stark (1985) with their ground-breaking paper "Motivations to remit: Evidence from Botswana", which is still the basis of the current discussion and extensions. Lucas and Stark studied remittances on a household level and hypothesized the main determinants to be "pure altruism", "pure self-interest" and "tempered altruism or enlightened self-interest". Any kind of contractual arrangements between the migrant and household left behind can be in the latter category, for example co-insurance, exchange-motives, loan repayment. The theoretical motives and their effects on remittances are summarised in table 2.1.We give a more detailed discussion of the motives below.

*Table 2.1. Theoretical determinants of remittances*

| *Effect of … on level of remittances* | **household income** | **migrant income** | **household shock** | **migrant risk level** | **education level of migrant** | **intent to return** | **no. of migrants in HH** | **time** |
|---|---|---|---|---|---|---|---|---|
| Pure altruism | - | + | + | | | + | - | - |
| Pure self-interest | + | + | | | | | | |
| Co-insurance | - | | + | + | | | | |
| Loan repayment | + / - | + | | | + | | | +, later - |
| Exchange motives | + / - | + | | | + | | | |
| Strategic behaviour | - | + | + | | | | | |

It is natural to assume that remittances are sent to the family left behind due to altruistic feelings of the migrant. This can be modelled in a Becker type setting where the migrant derives positive utility from the consumption of the family. The migrant thus cares about poverty, shocks, etc. of the family and consequently sends remittances. In this case, there is a positive relationship between adverse conditions of the receiving household and remittances sent, see Table 2.1. Remittances should increase with migrant income (the migrant has more to share) and altruism and decrease with recipient income (Funkhouser, 1995). However, income does not necessarily have a linear effect. As Cox, Eser and Jimenez (1997) demonstrate, income may have a different effect at different points of the income distribution.[2]

In contrast to altruism, self-interest is also a motivation to remit. In this case a migrant sends remittances with the aspiration to inherit, to demonstrate laudable behaviour as an investment for the future or with the intent to return home. If a migrant wants to invest at home, the household can be a trustworthy and well-informed agent. If a migrant intends to return home, he may already invest in housing, livestock etc. and will ask the family to be the agent. The migrant may also send remittances to invest in his reputation at home. Inheritance may be used as a blackmailing device by the household head to receive remittances. According to this theory, remittances increase with the household's assets and income, the probability of inheriting (dependent on the age of parents, number of siblings, etc.), the migrant's wealth and income, and decreases with risk aversion. Only in the case of the aspiration to inherit, can self-interest be distinguished from altruism in the migrant's behaviour and a larger income and or wealth of the household should lead to more remittances. Finally, in a three generation setting, remittances may be sent to parents to ensure that the remitter's own children also take care of him in old age (Cox & Stark, 1994), known as the demonstration effect. Care and transfers have to be visible to the grandchildren generation for maximum effect.

A less extreme view of the motivations to remit is tempered altruism. In this case the migrant and the family at home mutually benefit from migration, through some kind of implicit contractual arrangement. Altruism and self-interest can nevertheless play a role here, by making the contracts self-enforcing. The contractual arrangements discussed here are co-insurance, loan repayment and exchange for services.

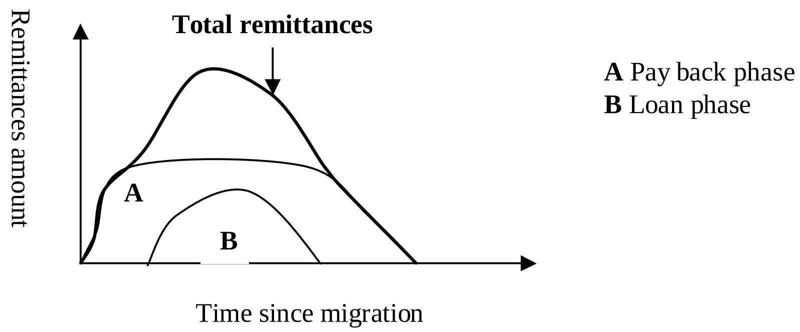
The New Economics of Labour Migration (NELM) hypothesis states that due to market failures in the source country (for example a poorly developed social protection system), a household member migrates to a non-correlated labour market, entering a type of co-insurance agreement with the household left behind. Remittances are sent home when the household experiences shocks and to enable the household to invest in new technology. At the same time, the household also supports the migrants, e.g. by paying costs of migration or during spells of unemployment. Remittances consequently increase when the household's income decreases or a shock occurs (like for altruism), but also when the risk-level of the migrant increases. Risks at home and risks in the foreign country should not be correlated for this co-insurance agreement to work properly. This agreement reduces uncertainty for all

[2] The motive may even change at different points of the income distribution.

household members. The level of development of the households' community also plays an important role here. While poor economic conditions (e.g. high unemployment) may be a cause of migration, the household's community needs to have a certain level of development for investment by the household to be effective. Consequently it is possible that fewer remittances are sent to underdeveloped communities.

Another type of contractual agreement between the household and family is loan repayment, for example repaying human capital investment or the cost of migration. A household finances a potential migrant's education if the family implicit lending rate is higher than the market interest rate and the youth borrowing rate is higher than the family implicit lending rate (Poirine, 1997). During the next time period the migrant is able to find a better-paid job in the city or abroad due to the education acquired and will send remittances to repay the family for the initial investment. At this stage the migrant might also become a lender, by financing other migrant family members, which increases overall remittances. The U-shaped time profile of remittances is shown below in figure 1. In this case, the family contract has the aim of increasing income instead of reducing uncertainty.

*Figure 1. A theoretical average remittance function in the case of loan repayment*




Source: Based on Poirine (1997)

In practice, only paying-back can be measured and there should be a positive link between the migrant's education level and remittances. This could also be interpreted as altruism however due to the close link between education and income.

A final contractual arrangement is the exchange motive (Cox, 1987). Here transfers in the wider sense are paid to the household at home for services provided (e.g. child care). The theory can also be applied to remittances, whereby remittances buy various types of services, usually by temporary migrants (Rapaport and Docquier, 2005). If the migrant's income increases, remittances increase. If the household's income increases, thus making the services more expensive, remittances can decrease or increase depending on the migrant’s elasticity of demand. If the migrant’s demand for the services is elastic, fewer services will be demanded and remittances decrease. If demand is inelastic, the same services will be bought, but at higher price, which leads to more remittances, despite the higher income of the household at home. Higher unemployment in the home country should mean fewer remittances since less money is then needed to make those at home perform their service (the opposite effect is found for altruism).

The strategic model, first explained by Stark (1995) and later by Stark and Wang (2002) stems from a strategic migration decision made because of wage differentials. Since high skilled migrants usually have a larger amount to gain by migrating, they are typically the first to go and then unskilled workers follow. As individual productivity is unobservable in the rich country, migrants are paid the average productivity of the group with which they are identified. For this reason, skilled workers may have an incentive to remit money home to keep unskilled workers in their home country, since migration of these workers may mean depressed wages for the skilled migrants (Docquier and Rapaport, 1998). The strategic behaviour extension says that remittances increase with income and education of the migrant and with low income at home (Holst and Schrooten, 2006), thus again indistinguishable from altruism.

### 2.2 Empirical determinants of remittances

#### *2.2.1 Macroeconomic empirical determinants of remittances*

While this paper focuses on the household level microeconomic determinants of remittances, it is still important to list the important literature on macroeconomic determinants to have an encompassing view of the remittances situation. Empirical macroeconomic papers usually focus on the number of workers, wage rates and economic situation in host country, economic situation in country or origin, the exchange rates and relative interest rate between the sending and receiving country and political risk and facilities to transfer funds (i.e. institutions).

The stock of migrant workers in a host country is seen to be an obvious determinant of remittances: the greater the volume of workers, the greater the volume of remittances. Freund and Spatafora (2005) estimate that a doubling of the stock of migrants would lead to a 75 per cent increase in recorded remittances.

The economic activity in the migrant workers’ host country is important because improved economic conditions in the host country allow migrants to increase their employment and earnings prospects, which in turn allows migrants to send more money home (IMF, 2005).

The state of the economy in the migrants' home country is also important since negative shocks in the home country may increase the need for remittances to be sent, which may induce current migrants to send money or cause migration in the first place (IMF, 2005).

Economic policies and institutions in the home country, like exchange rate restrictions and black market premiums, may discourage remittances from being sent and may also shift remittances from the formal to the informal sector (IMF, 2005 and El-Sakka & McNabb, 1999). Macroeconomic instability such as high inflation or real exchange rate hyperinflation may have a similar negative effect. On the other hand, financial sector development, which makes remittances easier and cheaper, should stimulate remittances (IMF, 2005).

General risks in the home country such as political instability or low levels of law and order may deter remittances, since such an environment is not conducive for investment purposes (IMF, 2005). On the other hand, in such times there may be more need for remittances so more remittances may be sent. Investment opportunities in the home and host country may also have an effect on remittances. Greater potential return to assets in the host country (as opposed to the home country) may encourage migrants to invest to in the host country and reduce remittances for investment purposes (IMF, 2005).

One of the focuses of this paper is to look at altruism as a motive to remit. While most empirical papers that test this theory are at the microeconomic level, Bouhga-Hagbe (2006) uses macroeconomic determinants to test altruism as a motive to remit. They use a measure of "hardship" to test altruistic motives in Egypt, Jordan, Morocco, Pakistan and Tunisia and find that as hardship increases so do remittances. Some macroeconomic papers also look at the investment motive of remitters by looking at the macro economic conditions for investment in both the home and host countries (Akkoyunlu & Kholodilin, 2006 and Schiopu & Siegried, 2006). When testing altruism versus investment at a macroeconomic level, Schiopu and Siegried (2006) find evidence for altruism, but little evidence for the investment motive.

Table A2 in Appendix 2 gives a summary of the major empirical papers on the macroeconomic determinants of remittances. It is clear from this table that stock of migrants and the economic situation in the home and host country seem to be the most important factors for increased remittances.

### *2.2.2 Microeconomic empirical determinants of remittances*

This section discusses the literature on the microeconomic determinants of remittances, both from a receiving and sending perspective. The empirical papers are often very creative in measuring the different determinants of remittances because, as was shown in section 2.1, it is difficult to separate other motives from altruism. Nevertheless some explanatory variables are often repeated across studies and these are listed in tables A1.1-A1.3 in Appendix 1. We show how different authors tried to measure the theoretical remittance motives discussed in section 2.1. This will be accompanied by a discussion and comparison of the results of these papers.

The estimations of the determinants of remittances are either based on household surveys that include remittance-receiving households, e.g. Gubert (2002), or specific surveys of the migrants themselves either in the home country, e.g. Amuedo-Dorantes & Pozo (2006) or the destination country, e.g. Holst & Schrooten (2006). The type of survey sometimes limits the nature of the analysis that can be done, for example, household surveys often do not have much information on the migrant. In addition some of the papers use complementary community-level data e.g. Durand et al. (1996). The countries studied most frequently are Latin-American and African countries and some Pacific and Asian countries. Eastern and Central Europe generally have not been studied much.

The existing papers on the determinants of remittances have used very different methodologies. While most papers use some kind of econometric analysis, they use everything from OLS to CLAD (See table B in Appendix 1 for an overview of the methodologies used by all papers). Although earlier papers used OLS (for example Lucas & Stark, 1985) to model the remittance decision, we now know that using such a method leads to biased and inconsistent estimates, since a substantial fraction of the migrants does not remit. In recent papers the main methodological distinction is made between modelling the determinants of remittances as a one-stage decision (Tobit) where the decision to remit and the amount of remittances are made together or as a Heckmann two-stage approach (Probit and corrected OLS) where the model separates between the decision to remit and the subsequent decision on how much to remit.

The problem of censoring was first raised in the literature by Banerjee (1984). He showed that the choice of the correct regression model depends on whether the decision to remit is a two-stage sequential process or a one-stage simultaneous process. In a two-stage process one first models the decision to remit using a probit model and then models the decision on how much to remit using the OLS method with a correction made for potential sample bias. This method of modelling the remittance decision is followed by Banerjee (1984) and Hoddinott (1992), see table B in Appendix 1. The advantage of this approach is that it allows a regressor to differently affect the decision to remit and the level or remittances. Amuedo-Dorantes and

Pozo (2006) on the other hand argue that using a two-part selection model leads to identification problems, i.e. it is hard to say which variables would matter for one decision and not the other.

Most papers measure the altruism motive by looking at the effect of higher household or migrant income on the probability and or amount of remittances (i.e. Osili, 2007). As predicted theoretically (see table 2.1) most papers find a positive relationship for the effect of the migrant's income on remittances[3] and a negative relationship for the effect of the household's income on remittances[4]. As table 2.1 shows, all theories on the determinants of remittances predict a positive relationship between migrant income and remittances and most theories allow for a negative relationship between household income and remittances. Consequently most authors also test the effect of other variables on remittances to separate altruism from other motives.

Under pure altruism, the presence of other migrants in the households might have an effect on a migrant's behaviour. More migrants in the household means that the migrant is not solely responsible for the wellbeing of the household, so there may be a negative relationship between remittances and the number of migrants in the household. As tables A1.1-A1.3 show, most papers do find this relationship[5], which is some evidence for altruism. On the other hand some papers find the relationship to be insignificant, which could mean that altruism is not a determinant of remittances or not the sole determinant.

Length of stay is often related to the altruism motive. The longer a migrant has been abroad, and the less frequently the migrant has visited the home country, the weaker the ties to the home country and household are and the lower the importance of altruism is. Most papers do not find evidence for "remittance decay"[6], which shows that generally migrants keep links to their home country.

Altruistic remitters would be more likely to send remittances and would send greater sums of remittances to larger households or households with a greater dependency ratio, as they are in greater need. This relationship generally does not hold for the probability of remittances[7], but is found by most authors for the level of remittances and the simultaneous estimation of the

[3] The sole exception is Lianos & Cavoundis (2006).
[4] Exceptions are Lucas & Stark (1985) and Itzingsohn (1995).
[5] The following authors found positive relationships: Germenji et al (2001), Hoddinott (1994) and Pleitez-Chavez (2004)
[6] The exceptions are: Banerjee (1984) and Funkhouser (1995)
[7] Agarwal & Horowitz (2002) and Osaki (2003) find a negative relationship. Banerjee (1984) and Itzigsohn (1995) find a positive relationship.

probability and level of remittances, again some evidence for altruism. Most migrants are more likely to send remittances and send more if the household head is older, which is evidence for altruism towards the elderly.

Married migrants whose spouses are left behind in the home country should also be more likely to send remittances and send greater sums of remittances due to altruistic feelings. All papers that included the marriage variable and found a significant relationship, found a positive effect on the level of remittances and the simultaneous estimation of the probability and level of remittances. All papers find a lower probability of remittances and a drop in the amount of remittances, if the spouse has joined the migrant. This means that for certain family relationships, namely marriage, altruism does play an important role.

Pure self-interest, for example the bequest motive, can be measured by looking at the effect of remittances on household wealth on the intent to return home. In theory migrants with a bequest motive should be more likely to send remittances and send greater sums of remittances if their parents are wealthy (e.g. they own land).[8] Lucas & Stark (1985) do find evidence for the bequest motive: sons in Botswana remit more to families that have larger herds and if the household has a larger income (as predicted by the theory). Brown (1997) finds that those migrants that intend to return home send more remittances, for example as investment in their assets at home. De la Briere et al (1997) also find that young males in the Dominican Sierra, who have the intent to return home, do not adjust their remittance streams as a reaction to shocks their parents experience. The authors thus conclude that their remittances are more self-interested.

Whether remittances are sent as part of a co-insurance contract between migrants and households can be measured by analysing the effect of household shocks and migrant (income, employment and living) risk on remittances. According to most studies that included household shocks, shocks of the household (e.g. illness) lead to a higher probability of remittances and larger sums of remittances.[9] Unfortunately, this cannot be distinguished from altruistic behaviour. The variable length of stay can also be used to measure the risk level of the migrant as after a longer stay the migrant generally knows the destination country better, has a steadier job, etc. As mentioned before length of stay generally has a positive effect on

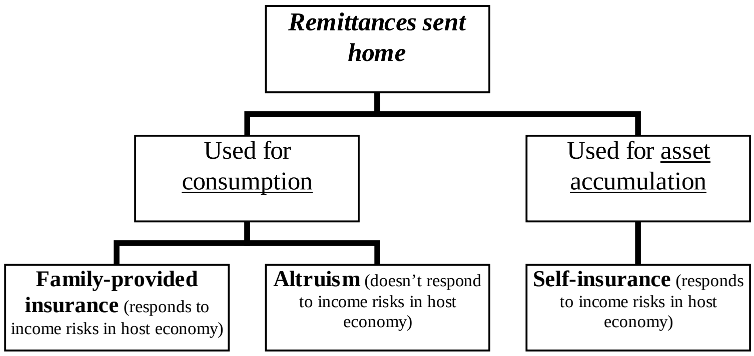
[8] Some papers do find this relationship (de la Briere et al (1997), Hoddinott (1994), Pleitez-Chavez (2004), Schrieder & Knerr (2000)), but others do not (Durand et al (1996), Germenji et al (2001), Holst & Schrooten (2006), Lucas & Stark (1985), Osaki (2003), Schrieder & Knerr (2000) ).

[9] Only Halliday (2004) finds that for an earthquake shock, less remittances are sent, unlike for an agricultural shock. He attributes this to the fact that households cope with the earthquake by retaining family members at home to help with rebuilding.

remittances. This means that lower risk is accompanied with more remittances (so more insurance), which is some evidence against remittances as insurance. On the other hand, while few papers found a significant relationship for other measures of the migrant risk level (e.g. legal employment), almost all of those that did, found a positive relationship.[10] In these cases, migrants sent home more remittances when they faced greater risks in order to insure themselves against the loss of a job, etc.

Amuedo-Dorantes & Pozo (2006) go further in measuring the insurance motive by distinguishing between self and family insurance and at the same time altruism. They do so by looking at what remittances are used for. Figure 2 outlines their hypothesis.

Figure 2. *Insurance motives for remitting*




Source: Based on Amuedo-Dorantes & Pozo (2006)

If remittances respond to income risks in the host economy and are used for consumption they are sent to the family as part of a co-insurance agreement. If they are used for asset accumulation instead, the family acts as an investor for the migrant, so it is self-insurance (like saving). The authors' findings show that those migrants with greater income risk remit more and that different types of migrants use different insurance methods. For example, young male migrants who have low levels of education and large families at home are more likely to use co-insurance (Amuedo-Dorantes & Pozo (2006)).

Durand et al (1996) and Sana & Massey (2005) measure the NELM hypothesis more generally by also including community level variables into their analysis, for example the presence of banks, the employment and business opportunities in the home community. Durand et al (1996) find that migrants are more likely to remit to economically dynamic and entrepreneurial communities, which suggests that remittances are sent as co-insurance under

[10] Only Durand et al (1996) and Konica (2006) find that those migrants with stable jobs are more likely to remit.

the right conditions. Sana & Massey (2005) confirm this finding, because their results show that the community-level variables are only significant for Mexican migrants, not Dominican migrants, where the family and economic structure is totally different.

Loan repayment can be measured by looking at migration costs and the education level of the migrant. It is possible that those migrants that received help from their family in financing migration send more remittances as a loan repayment. This is confirmed by all empirical studies that find a significant relationship. In addition migrants with a higher education level could be sending remittances to repay the investment their parents have made in their education. This relationship is less strong however, because this variable could also pick up income effects. Almost all authors find a positive relationship between the migrant's education level and remittances[11], which provides some evidence for the loan repayment motive.

The exchange motive has not been extensively tested, probably due to data restrictions. Germenji (2001) find that household heads older than fifty receive more remittances and claim that this is an exchange between the migrant and a grandparent, who could be looking after the grandchildren. However, there is no data to prove this, so it could also be another motive, for example, altruism. Secondi (1997) looks at transfers in general in rural China and finds that recipients that are aged sixty and over and have grandchildren living with them, receive higher transfers. However this study has other problems, for example, unsatisfactory proxies for income. Therefore the evidence for the exchange motives is inconclusive.

[11] Only two papers find a negative relationship between the migrant's education level and the *probability* of sending remittances: Durand et al (1996) and Osaki (2003).

## 5 Conclusions

The literature on the determinants of remittances is lively and growing. It links up with the general transfer literature and the determinants of migration. While there is agreement on some determinants, e.g. altruism towards spouses, many of the results remain controversial due to a number of methodological problems. First, the decision to remit is often linked to the decision to migrate, which comes with its own methodological problems, e.g. selection bias. Most importantly it is difficult to find variables that measure one determinant only.

With this in mind we find that the main motives to remit found in the literature are altruism, insurance, loan repayment, bequest and exchange. It is clear that different authors find different motivations to remit in different countries and at different times. The lesson we can learn form this is that it is important to assess the remittance situation of each country on its own since there are very specific aspects to the motivations to remit in each country and with different types of migrants. It is still important that researchers continue to do this so that we can help to continue and improve the alleviation of poverty and development impact of remittances.

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# *Appendix 1 Empirical results on determinants of remittances*

## *Micro determinants*

## Table A1.1 Empirical effects found for probability to remit

| *Effect of … on probability of remittances* | migrant income | migrant gender (base male) | migrant marital status | migrant age | migrant education level | migrant risk level | migration duration | whether spouse joined migrant | migration cost | HH income | HH wealth | no. HH members/ dep. ratio | no. migrants/ other migrants | neg. HH shock | age HHH | education HHH |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agarwal & Horowitz (2002)<br>Guyana, Altruism model | | x | | | + | x | +(1) | | | - | - | - | - | | x | x |
| Banerjee (1984)<br>India | + | | | | x | | + | - | | | | + | | | | |
| Durand, Kandel, Parrado, Massey (1996)<br>Mexico, [Remittances & savings] | x | | + | + | - | x(2) | x | - | + | | -(3) | x | | | | |
| Funkhouser(1995)<br>El Salvador & Nicaragua | x(4) | x | | x | x | | x | x | | | | | x | | | |
| Germenji, Beka & Sarris (2001)<br>Albania | x | x | | | | | | | x | - | x | x | + | | x | x |
| Hoddinott (1994)<br>Western Kenya | | | | | + | | | | | | + | x | | | | + |
| Holst & Schrooten (2006)<br>Migrants in Germany | +(5)/<br>x(6) | + | + | + | + | | | | | | _(7) | x | | | | |
| Itzigsohn (1995)<br>Jamaica, Haiti, Dominican Republic & Guatemala | | | x | | | | | | | _/+/<br>x(8) | | + | | | x | +/<br>x(8) |
| Konica (2006)<br>Albania | | + | | x | | - | + | - | | | | | - | | | |
| Merkle and Zimmerman (1992)<br>Migrants in Germany | + | | + | + | x | | x | - | | | | | | | | |
| Osaki (2003)<br>Thailand, [internal migration] | | - | x | + | - | | + | | | - | - | -(9) | | | | |
| Pozo (2005)<br>Latin America, Mexico | | | | | | + | | | | | | | | | | |
| Pleitez-Chavez (2004)<br>El Salvador | | | | | | | | | | - | + | | + | + | x | |
| Schrieder & Knerr (2000)<br>Cameroon | | | | + | | | | | | | +(10)/<br>-(11) | | | x | + | |
| SELA(2004)<br>US, focussed on Latin American and Caribbean, [logistic regression] | +(12) | + | x | x | x | | | +(13) | | | | x | | | | |
| Crăciun (2006) | | x | x | x | x | | +/- | | | | | | | +(14) | | |

We include those variables that are common to most papers.
+: positive effect; -: negative effect; x: included in regression but not significant;

1 > 1 year
2 taxes withheld
3 business owned
4 employment
5 Migrants in Germany
6 income
7 real estate owned
8 depends on country
9 no. children
10 property
11 other wealth variables
12 Employment
13 home visits >=1
14 Unemployment

## Table A1.2 Empirical effects found for the level of remittances

| *Effect of … on level of remittances* | migrant income | migrant gender (base male) | migrant marital status | migrant age | migrant education level | migrant risk level | migration duration | whether spouse joined migrant | migration cost | HH income | HH wealth | no. HH members/ dep. ratio | no. migrants/ other migrants | neg. HH shock | HHH age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Agarwal & Horowitz (2002)<br>Guyana, [Altruism model] | | + | | | x | x | | | | x | x | + | - | | - |
| Banerjee (1984)<br>India | + | | | | + | | - | - | | | | + | | | |
| Durand, Kandel, Parrado, Massey (1996)<br>Mexico, [Remittances & savings] | + | | x | + | + | x | + | x | + | | x | x | | | |
| Funkhouser (1995)<br>El Salvador & Nicaragua | +(1) | +(2) | | x | x | | - | -(2) | | | | | -(3)/ x(2) | | |
| Germenji, Beka & Sarris (2001)<br>Albania | + | | | | | | | | x | - | - | x | x | | +(4) |
| Halliday (2004)<br>El Salvador | | | | | | | | | | | | | | +(5)/ -(6) | |
| Hoddinott (1994)<br>Western Kenya | + | | | + | + | | | | | | + | x | + (7) | | |
| Lianos & Cavoundis (2006)<br>Albanian migrants in Greece | + | x | x | x | x | + (8) | x | - | | | | | | | |
| Lucas& Stark (1985)<br>Botswana, [Urban migrants] | + | - | | | | | + | | | + | - | + | | + (9) | |
| Osaki (2003)<br>Thailand. [Internal migration] | | x | x | + | x | | x | | | - | - (10) | - (11) | | | |
| Pozo (2005)<br>Latin America. Mexico | | | | | | + | | | | | | | | | |
| Yang (2005). Philippines | | | | | | | | | | - (12) | | | | | |
| Crăciun (2006) Moldova | + | x | x | + | x | | x | | | - | | x | | | - (13) |
| Osili (2007) US-Nigeria | | | | x | x | | | | | + | | + | | | |

We include those variables that are common to most papers.
+: positive effect; -: negative effect; x: included in regression but not significant;

1 employment
2 El Salvador
3 Nicaragua
4 HHH > 50
5 agricultural shock
6 earthquake
7 no. adult sons
8 stability employment
9 drought
10 house
11 no. elderly
12 instrumented
13 general age level in HH

## Table A1.3 Empirical effects found for the joint solution of probability & level of remittances (Tobit)

| *Effect of … on probability & level of remittances* | migrant income | migrant gender (base male) | migrant marital status | migrant age | migrant education level | migrant risk level | migration duration | whether spouse joined migrant | migration cost | HH income | HH wealth | no. HH members/ dep. ratio | no. migrants/ other migrants | neg. HH shock | HHH age |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amuedo-Dorantes & Pozo (2006)<br>Mexico | | + | | + | x | + | x | | | | | + | | | |
| de la Briere, Janvry, Lambert & Sadoulet (1997)<br>Dominican Republic | | | | x | + | | + | | | - | + | | | x | x |
| Brown (1997)<br>Tongan & Samoan migrants in Australia | + | | | | x | | x | | +(1) | | | | | | |
| Funkhouser (1995)<br>El Salvador & Nicaragua | +(2) | +(3) | | x | x | | - | -<br>(3) | | | | | -(4)/<br>x(3) | | |
| Germenji, Beka, Sarris (2001)<br>Albania | + | | | | | | | | x | - | - | x | x | | +(5) |
| Gubert (2002)<br>Mali (Male migrants) | | | + | + | + | | + | | + | x | | + | - | + | |
| Hagen-Zanker & Siegel (2007)<br>Albania<br>Moldova | | x | -<br>x | x | +<br>x | +<br>- | +<br>x | | x | -<br>x | x | x | x | x | + |
| Holst & Schrooten (2006)<br>Migrants in Germany | +(2) | x | + | + | + | | | | | | -(6) | x | | | |
| Konica (2006)<br>Albania | | + | | + | | - | x | - | | | | | - | | |
| Merkle and Zimmerman (1992)<br>Migrants in Germany | + | | x | + | x | | x | - | | | | | | | |
| Pleitez-Chavez (2004)<br>El Salvador | | | | | | | | | | - | + | | | + | + |
| Schrieder & Knerr (2000)<br>Cameroon | | | | x | | | | | | | - (7)/<br>+(8) | | | x | x |
| Crăciun (2006) | + | - | x | x | | | + | | | | | x (9) | | | -<br>(10) |

We include those variables that are common to most papers.
+: positive effect; -: negative effect; x: included in regression but not significant

1 Samoa
2 employment
3 El Salvador
4 Nicaragua
5 HHH>50
6 real estate owned
7 property
8 other wealth variables
9 children in HH
10 general HH age

## Table A2: Macroeconomic determinants for the amount of remittances

| Paper | # of workers | Wage rates/ earnings | Econ. situation in host country | Poor econ. situation in origin country | Exchange rate (restrictions)/dual exchange rate | Interest rate gap btw sending and receiving (better int. rate in host country) | Political risk | Infrastructure to transfer funds/ Financial sector development | Macroeconomic instability in home country |
|---|---|---|---|---|---|---|---|---|---|
| Akkoyunlu & Kholodilin (2006) | | | + | x | | | | | |
| Ayadas, Neyapti & Metin-Ozcan (2006) | | | + | + | - | | - | | - |
| Bouhga-Hagbe (2006) | | | | + | | | | | |
| Buch, Kuchulenz & le Manchec (2002,2004) | x | x | x | _ | x | x | | x | x/-(1) |
| Elbadawi & Rocha (1992) | + | | + | | - | - | | | - |
| Faini (1994) | | | | | + (2) | | | | |
| Freund & Spatafora (2005) | + | | + | | _ | | | - (3) | |
| Gupta (2005) | + (4) | + | + | + | x | x | x | | |
| IMF(2005) | | | + | + | - | x | x | x | _ |
| Lianos (1997) | + | + | + | x | - | + | | | - (1) |
| Lueth & Ruiz-Arranz (2006) | | | x (5) | | | | | | + |
| Lueth & Ruiz-Arranz (2007) | | + | + | + | - | | | | |
| Russell (1986) | + | + | * | * | * | * | _ | + | |
| Sayan (2006) | | | x | - | | | | | |
| Schiopu (2006) | | | + | + | | x | | | |
| Schrooten (2005) | | + | + | + | | | | x | |
| Schrooten (2006) | x(4) | | + | | | | | + | |

We include those variables that are common to most papers.
+: positive effect; -: negative effect; x: included in regression but not significant

1 Inflation
2 If host country exchange rate is good
3 High fees to send money
4 Increased immigration
5 Shock, natural disaster

**Table B: Reasons for methodology used in determinants of remittances papers:**

| Paper | Tobit | 2-stage | Both | Other |
|---|---|---|---|---|
| Agarwal and Horowitz (2002) | | First Probit for decision to remit and then Heckman procedure to correct for selection bias and then use maximum likelihood to obtain consistent and efficient estimates | | |
| Amuedo-Dorantes (2006) | Uses probit model | | | |
| Banerjee (1983) | | | Use both for better explanatory power (robust results) | |
| Brown (1997) | Because of data censored at zero Tobit is used because OLS is biased | | | |
| Cox, Eser, Jimenez (1997) | | First uses Probit and then generalized Tobit (inverse Mill's ratio used) | | |
| Crăciun (2006) | | | Uses both for comparison (Probit and 2-part Cragg's model (1971). | |
| Elbadawi and Rocha (1992) | | | | OLS to estimate log remittances<br>TSLS to avoid simultaneity bias |
| Funkhouser (1995) | | | Uses both to account for selection bias (compare results, robust) | |
| Germenji, Beka, Sarris (2001) | Tobit used: Decisions made simultaneously because there has been no distinction in the theoretical literature on factors that influence the decision to remit and level of remittances. | First model decision to remit and then use a corrected OLS : application of Heckman 2-step | Uses both | |
| Gubert (2002) | | | Uses both | CLAD |
| Halliday (2004) | | | | Logit for household's migrant investment<br>Ordered logit for southward/northward migration<br>OLS for log of hh remittances |

| | | | | |
|---|---|---|---|---|
| Hoddinott (1994) | | Probit and then OLS (paper quoted a lot as one of the fist to do this)…but has to do with selection bias more than separate decisions to remit. | | Probit for migration decision |
| Holst and Schrooten (2006) | | First use a probit for the decision to remit and then use a Tobit for the amount of remittance | | |
| Itzigsohn (1995) | | | | Logistic regression on remittance receiving households |
| Merkle and Zimmermann (1992) | Used Tobit model for remittances amount | | | Use ordinal Probit (for four groups) for savings as dependent variable<br>Also uses Probit with binary dependent variables of both remittances and savings |
| Osaki (2003) | | Logit for propensity to remit and OLS for factors determining amounts | | |
| Osili (2007) | | | OLS | |
| Schrieder and Knerr (2000) | Tobit used to see whether wealthier household members receive more remittances. | | | Probit is used to estimate determinants of remittee's access to remittances |
| Schrooten (2006) | | | | Model using first-differenced GMM estimator/ dynamic panel on lagged remittances as % of GDP (Macro paper) |
| Schrooten (2005) | | | | Model using first-differenced GMM estimator/ dynamic panel on lagged remittances as % of GDP (Macro paper) |
| Secondi (1997) | | Believes the decision to remit is made in two parts Probit for probability of receiving and transfer ant then OLS for amounts | | |
| Stark and Lucas (1988) | | | | OLS |
| Yang and Choi (2005) | | | | OLS and instrumental variables for change in HH domestic income divided by initial total HH income |

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