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Bank Accounts and Savings – The Impact of Remittances and Migration: A Case Study of Moldova

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Abstract

In many developing countries, the formal financial sector is underdeveloped and majority of the population does not have access to it. This paper analyzes the empirical link between remittances and financial sector development on a microeconomic level. Using a unique household dataset for Moldova, we find that receiving monetary remittances has a positive and significant effect on the probability of having a bank account, thereby promoting financial sector development. Furthermore, we show that remittances tend to have an even higher positive effect on household savings, which is a sign for a hidden potential for financial sector development.

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1. Introduction

Remittances have become one the most important international capital flows after FDI worldwide. For many developing countries, especially those with high migration prevalence, they have become the major source of external finance, often surpassing exports and development assistance. As a response to this dramatic increase of remittance flows in the last years, a vast amount of research has been done on the topic. The major focus so far has been to analyze the potential development impact of remittances on developing countries. One of the areas that have received little attention is the nexus between remittances and financial sector development, especially at the microeconomic level. This is however a very important matter since it is closely linked to policy issues such as economic growth and poverty reduction.

In this paper, we start filling some of these gaps, analyzing the link between remittances and financial sector development from a microeconomic perspective, implementing Propensity Score Matching (PSM) and Instrumental Variable estimation (IV) methodologies. We use information from the CBSAXA Moldovan Household Survey 2006 (CBSAXA-2006) and find that remittance-receiving households[1] tend to use formal financial services more than non-receiving families, leading, in aggregate, to a faster financial sector development. Additionally, we show that remittances tend to increase household savings even more than bank accounts, which constitutes a key potential for financial sector development.

The remainder of the paper is structured as follows. In the second section, we summarize the literature that analyzes the link between remittances and financial sector development and present some potential microeconomic transmission channels. In the third section, we give a short overview of the Moldovan economy and describe the main characteristics of migration, remittances, bank accounts and savings. In the fourth section, we present the Propensity Score Matching and Instrumental Variable estimations results. In the fifth section, we explain the main bivariate regression results. Finally, we conclude and make suggestions for future research.

2. Remittances and Financial Sector Development

Due to the rapid growth that remittances have experienced in the last years (Ratha, 2003; World Bank, 2006a) and their important economic implications (for a good overview, see World Bank, 2006a and Shahbaz et al., 2007), a lot of research has been done on the topic. An area that has not received much attention is related to the link between remittances and financial sector development.

[1] We will also refer to them as 'receiving families', 'receiving households' or 'remittance-receivers'.

This is a relevant field of study because the financial sector performs a number of key economic functions. Its development has been shown to foster growth (e.g. King and Levine, 1993; Beck et al., 2000) and reduce poverty (e.g. Beck et al., 2004). Moreover, some argue that including receiving households into the financial sector will help multiplying the developmental impact of remittance flows (Hinojosa-Ojeda, 2003; Terry and Wilson, 2005; World Bank, 2006a).

Literature overview

Although both theoretical and empirical evidence is quite scarce, there seems to be a consensus that there is a link between remittances and financial sector development.

On theoretical grounds, Alberola and Salvado (2006) identify remittances as a potential catalyst for financial deepening because of the higher use of financial services when households receive remittances. The authors argue that banks play an important role in this process since they have the possibility to offer financial services other than transfers (in contrast to MTOs that are so far dominating the transfer market).

On empirical grounds, Aggarwal et al. (2006) show that the presence of remittances tends to increase the aggregate level of deposits and credits intermediated by banks. Moreover, they find a positive influence on the receiving country's development. The study of Gupta et al. (2007) confirms that remittances (being a stable and private transfer of financial resources) promote financial sector development and have a direct poverty-reduction effect. The authors hypothesize that formalizing these flows could lead to an inclusion of the "unbanked" into the financial system. Guilano and Ruiz-Arranz (2005) come to a slightly less optimistic conclusion. They show that in countries with an underdeveloped financial system remittances may alleviate credit constraints and act as a substitute for financial sector development, in which case there would be no positive effect.

Shahbaz et al. (2007) investigate a somewhat different question: the effect of remittances on the financial sector's performance (on a macro level), finding a significant positive relationship in the long run. Guiliano and Ruiz-Arranz (2005) as well as Mundaca (2005) analyze yet another issue, namely the impact of remittances on economic growth, depending on the level of financial sector development in a country. They reach very different conclusions. The former show that remittances may help to promote growth in less financially developed countries. The latter concludes that financial sector development potentially leads to better use of remittances, thus boosting growth.

Potential microeconomic transmission channels

Overall, the macroeconomic evidence seems to suggest that remittances *can* promote financial sector development, given the right conditions. But theoretical explanations about the potential microeconomic transmission channels do not exist yet. Based on the existing literature findings, we present some ideas about why there could be a link and what the possible channels are.

One of the most commonly used indicators of financial sector development is the level of aggregate deposits (Aggarwal et al., 2006; see also de Luna Martinez, 2005). On a microeconomic level, this can be proxied by the number of bank accounts in a country. We use this indicator for our analysis.

The factors influencing the effect of remittances on the banking sector usage can be separated into remittance-specific and general factors. The crucial *remittance-specific factor* influencing the effect of remittances on bank accounts seems to be the use of the remittances. It is clear that the disposable income of the home family increases as a consequence of receiving remittances. Evidence shows that this has a positive effect on their consumption and sometimes on their savings level (Swiss Agency for Development Cooperation, 2004). In the case that the receiving family saves or invests the money, remittances probably have a positive effect because both the demand for and the supply of banking services tends to increase.

The use of the remittances, in turn, crucially depends on the type of the migrant, the motives of the remittent and the situation of the family. In the case that the migrant is a non-family member and the receiving household serves as a pure saver of the money, remittances probably have a positive effect on financial sector development. Concerning the motives to remit, the New Economics of Labour Migration theory differentiates between altruism, loan repayment, coinsurance and/or self-interest (see Becker, 1974). Altruism seems to be closely linked to bad economic conditions in the home country (Stark, 1991), in which case the remittances tend to be used for consumption and there would be no positive effect on the use of the banking sector. Also the economic situation of the family influences the remittance use. The higher is the remittance share of the household's income, i.e. the more dependent it is, the less likely will the remittances be used for savings.

The *general factors* include all conditions that make people more or less likely to use the banking sector. Trust, risk aversion, safety, inflation compensation and cost reduction aspects all tend to increase the demand for a bank account. But in this case the actual effect on financial sector development is less clear because the supply side does not necessarily become less constrained.

In addition, it is also interesting to look at the effect of remittances on the potential of financial sector development. If the family saves a fraction of the remittances, this can either be done informally (kept at home) or formally (be put on a bank account). In the latter case, which can arise because of demand and/or supply constraints, there are no direct effects on the financial sector development, but there is a latent potential.

3. Moldova

Moldova is the poorest country in Europe with a high level of migration and remittances and a still underdeveloped, but improving financial sector. In the following section, we will give an overview of the Moldovan economy and its banking sector and then analyze the

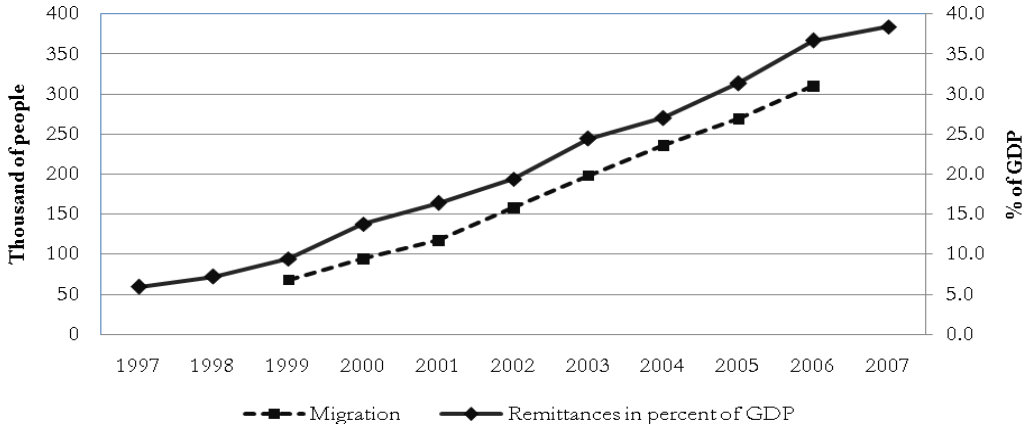
main characteristics of bank accounts, savings, remittances and migration using the CBSAXA-2006[2].

Macroeconomic conditions

After a period of relative economic stability and growth in the mid 90s, the 1998 crisis had a big negative impact on the Moldovan economy, creating a surge in inflation and a fall in GDP. As a consequence, the confidence in the local currency decreased significantly. In the meantime, the country has more or less recovered, but still has a much lower per capita GDP than its neighboring countries with a relatively high inflation rate ($US880 and 12%, respectively in 2006).

The crisis also made migration, which has been a phenomenon ever since Moldova's independence in 1991, increase enormously. According to Lücke et al. (2007), about one quarter of Moldova's active population was working abroad in 2006[3]. At the same time, Moldova has become the leading remittance-receiving country in the region and is among the top ten developing countries with remittances representing 32% of GDP (World Bank, 2007).

Figure 1 Migration and remittances evolution 1997-2007



Source: www.statistica.md.

The Banking Sector

The Russian 1998 crisis also had a big negative effect on Moldova's financial sector. It shattered the confidence in the banking sector, halving the amount of deposits in the economy in just one year (CASE, 1999).

In the meantime, Moldova's banking sector has regained stability, but is still underdeveloped and lacks competition (IMF, 2008a and 2008b). According to the National

[2] The data used for the analysis has been kindly provided to us by the Kiel Institute for the World Economy.
[3] According to our estimations based on CBSAXA-2006, the number is even more striking: almost half of the families in the country can be considered as migrant ones, i.e. having at least one member abroad.

Bank of Moldova (2008), the banking sector currently consists of 15 banks[4], which seems to be a more than adequate number considering the size of the country. Most of them are private. The six largest banks dominate the market. Nevertheless, the supply in the rural area is often times inefficiently low; only the Bank Economi has branches throughout the whole country. Many people still have no access to formal financial services. Foreign banks have only recently started to show interest and to enter the market.

Financial intermediation has been growing at an incredible speed the last years, but it is still rather limited. The public confidence in the banking sector, which was strongly shaken during the 1998 Russian crisis, is also improving (IMF and World Bank, 2005). The growth of total deposits in the five years following the crisis reached nearly 600% and one of loans about 250%. At the end of 2006, aggregate deposits have reached about 30% of GDP, which is about 10 percentage points higher than before the crisis (World Bank, 2007).

Migration, Remittances, Bank Accounts and High Savings: Survey Information

As we have already described, Moldova is a country with a high level of migration and remittances. In fact, according to our estimations, slightly more than one quarter of the families in Moldova receive monetary remittances. At the same time, the use of the banking sector is still quite low: Only about 10% of the families declare to have any kind of bank account. The share of families that have high savings (savings higher than US$500) is slightly bigger (13.9%).

When comparing the incidence of migration, remittances, bank accounts and high savings concerning the place of residence (area and locality) and selected household characteristics (living standards and education), Table 1 reveals some interesting facts. First of all, the *place of residence* has a big influence on bank accounts and high savings and a much lower one on migration and remittances. Urban areas, Chisinau and big localities are characterized by a relatively high proportion of families with bank accounts (19%) and high savings (17%), respectively. In contrast, other places present much lower shares (3%-7% concerning bank accounts and about 11% concerning high savings). Regarding remittances and migration, the incidence is only significantly lower in Chisinau and in big localities.

[4] A list of the banks and their services is included in Annex 1.

Table 1 Migration, remittances, bank accounts and high savings: Descriptive statistics

	Bank accounts	High savings	Monetary remittances	Migration
Total	10.0%	13.9%	25.5%	49.1%
Area				
Rural	4.4%	11.4%	27.7%	52.0%
Urban	17.3%	18.0%	31.1%	56.7%
Chisinau	19.4%	17.4%	14.3%	33.7%
Size of Locality				
Small (less than 2k h)	3.4%	10.7%	26.9%	49.1%
Medium	7.3%	13.8%	28.8%	53.2%
Big (more than 10k h)	19.3%	17.2%	20.8%	42.4%
Living Standards 1998				
Good	12.5%	19.7%	25.7%	45.9%
Satisfactory	10.7%	14.5%	24.9%	48.8%
Bad	8.4%	10.5%	26.6%	49.2%
Missing	4.7%	11.7%	21.1%	46.9%
Household head education				
No formal schooling	6.5%	7.3%	17.1%	33.3%
Primary complete	4.8%	4.9%	17.4%	39.9%
Secondary complete	5.4%	9.9%	27.3%	52.1%
Tertiary complete	11.3%	16.8%	29.6%	52.4%
University	22.0%	25.0%	23.0%	44.1%
Migration				
Non-migrant household	8.4%	8.2%	2.9%	-
Migrant household	11.7%	20.1%	49.7%	-
Remittances				
Non-receiving household	8.6%	9.0%	-	-
Receiving household	14.1%	28.3%	-	-

Source: Own calculations based on CBSAXA-2006.

Second of all, the household characteristics seem to have an effect on bank accounts and high savings and in the case of education even on migration and remittances. For all of the *living standard*[5] categories, the share of families that hold high savings (11.7% to 19.7%) is higher than the share of families with bank accounts (4.7% to 12.5%). Besides, lower levels of living standards go along with lower shares of bank accounts and high savings. Migration and remittances vary little across the living standards. The level of *education* of the household head, used also as an indicator of the household education, shows a significant and positive relationship with all of the variables, particularly for the two highest levels of education. Among the families where the household head has at most secondary education, only 4.8% to 6.5% have a bank account and 4.9% to 9.9% have high savings. When the household head has tertiary and university education, the share rises to 22% and 25%, respectively. Interestingly, even migration and remittances have a positive relationship with

[5] We use the information on the perception of living standards in 1998, so the variable doesn't depend on the migration or on the remittance situation in the present.

education. The incidence of both is highest for the group where the household head has either secondary or tertiary education and is quite low in the case of university education.

Finally, and most importantly, we can see that the share of families with bank accounts (or high savings) is significantly bigger for the families that have a migrant member and particularly if they receive monetary remittances.

4. Evaluation methodologies

After having reviewed Moldova's macroeconomic conditions, its banking sector as well as some characteristics that are relevant for our model, we now present the core of our empirical analysis. The statistics presented above indicate that remittances may have a positive impact on the families' use of banking services and on high savings. These first results should be taken with caution because of potential problems such as self-selection into migration, unobserved heterogeneity and simultaneity regarding the decision to migrate, to remit, to have bank accounts, and to have high savings.

In order to deal with these possible problems, we use Propensity Score Matching (PSM) and the Instrumental Variable (IV) estimation technique. In the following, we present both methodologies and the respective results.

4.1. Propensity Score Matching

PSM is a non-experimental methodology that is typically used to evaluate the impact of policy interventions, e.g. in the market labor, and to estimate treatment effects. But it can also be applied in order to evaluate outcome differences between specific groups (Caliendo and Kopeing, 2005).

The estimation of treatment effects obtained by simply comparing the treated with the untreated group can be biased because of problems such as self-selection (Dehejia and Wahda, 2002). The PSM methodology enables the evaluation of the average differences (i.e. the treatment effect) by selecting an appropriate non-experimental control group, which must have a similar propensity of participation[6] as the treated group. This pairing implies that both groups (treated and untreated) end up having the same observed characteristics[7] (Rosebaum and Rubin, 1983), which reduces the bias of the estimation of the outcome differences[8].

[6] The propensity score can be estimated using a probit or logit model with the treatment characteristic as the dependent variable.
[7] The Propensity score methodology is based on the assumption that the groups have statistically identical (balanced) characteristics. If this condition is not met, the results are not valid.
[8] For further details about the methodology review Heckman et al. (1998 and 1999).

Differences between groups

The decision to migrate and to send remittances is correlated with characteristics of the household and the place of residence. This implies that there could be some kind of self-selection into migration and / or remitting money based on observable characteristics. In order to check this, we compare three kinds of households (non-migrant, receiving migrant and non-receiving migrant) regarding various different characteristics (see Annex 4). Just as we expected, there are enormous differences between migrant and non-migrant families, so it is necessary to use the PSM methodology to reduce the bias mentioned before.

Treatment effect

To estimate the impact of migration and/or remittances on the families' use of bank services and the decision to have high savings, we differentiate four cases for the treatment and control group. The evaluation of these models will allow us to show which case, if any, has a significant effect.

Table 2 Alternative PSM specifications

Model	Treatment group	Control group
1st	Migrants	Non-migrants
2nd	Non-receiving migrants	Non-migrants
3rd	Receiving migrants	Non-migrants
4th	Receiving migrants	Non-receiving migrants

For the estimation of the propensity score we use probit models with families as the unit of observation. We treat the information of urban and rural areas as two different sub samples. As explanatory variables we use four groups[9]:

- Household head: Age and sex of the household head.
- Household: Size and composition of the family, educational level of the family and declared perception of living standards in 1998.
- Region: Size of locality and a dummy for the capital of Moldova (Chisinau).
- Other variables 1: Interaction with living standards, household migration networks (*know_mig* and *for_mem*), regional migration networks (*mig_prev*, *for_district*).
- Other variables 2 (included only in the fourth model): Number of migrants, number of seasonal migrants and number of legal migrants in the family.

Since there exist no criteria on how to evaluate and choose a specific matching methodology, we use all of the ones provided by the standard econometric software. We

[9] A list of the variables and a short description is included in Annex 2.

also use different kinds of migration concepts[10] to be able to judge the sensitivity of the results. We estimated all of the models, finding that 90% of them are balanced. In the following section we will present the key results.

Results

In the first model, there are significant differences in almost all specifications. In rural areas, migrant households present higher shares of bank accounts (3.8% higher) and high savings (7.1% higher) than non-migrant ones. In urban areas, this is only true in the case of high savings (9.8% higher).

Table 3 Treatment effect results

	Rural Area		Urban Area	
	Bank accounts	**High savings**	**Bank accounts**	**High savings**
1st model: Migrants vs. non-migrants				
Positive significant (at 5%) difference (% of cases)	100.0%	85.7%	0.0%	85.7%
Mean of differences	3.8%	6.6%	1.2%	9.1%
Median of differences	3.8%	7.1%	1.7%	9.8%
Max estimated difference	5.0%	8.9%	3.4%	12.3%
Min estimated difference	2.3%	2.2%	-2.8%	0.1%
2nd model: Non-receiving migrants vs. non-migrants				
Positive significant (at 5%) difference (% of cases)	2.4%	0.0%	0.0%	0.0%
Mean of differences	0.5%	-3.3%	-2.1%	-1.9%
Median of differences	0.5%	-2.8%	-2.0%	-0.7%
Max. estimated difference	2.2%	0.4%	0.0%	1.6%
Min. estimated difference	-1.7%	-9.4%	-4.8%	-7.7%
3rd model: Receiving migrants vs. non-migrants				
Positive significant (at 5%) difference (% of cases)	100.0%	100.0%	0.0%	100.0%
Mean of differences	6.2%	14.3%	5.4%	20.0%
Median of differences	5.9%	14.7%	5.5%	21.0%
Max. estimated difference	7.9%	16.8%	8.5%	23.3%
Min. estimated difference	4.6%	10.1%	2.1%	13.9%
4th model: Receiving migrants vs. non-receiving migrants				
Positive significant (at 5%) difference (% of cases)	100.0%	100.0%	66.7%	95.2%
Mean of differences	5.4%	17.1%	10.9%	19.3%
Median of differences	5.4%	17.4%	10.6%	18.6%
Max. estimated difference	6.2%	19.6%	16.9%	27.2%
Min. estimated difference	4.8%	12.2%	7.9%	8.2%

Source: Own estimations.

When we exclude the migrant households that receive remittances from the treatment group, the results change significantly. There is no longer a significant difference in having

[10] See Annex 6.

a bank account or holding high savings. As a matter of fact, for some cases, the estimated differences show that non-migrant families have higher shares of bank accounts and high savings.

As a direct contrast to this comparison, in the third model, we then compare receiving migrant households to non-migrant ones. For the rural area, the estimations show positive and significant differences concerning both bank accounts (5.9%) and high savings (14.7%). For the urban area, the differences are significant only for savings (20% higher).

Our last model, which compares receiving with non-receiving migrant households, shows that households that receive remittances have higher shares of bank accounts (5.4% and 10.9% for the rural and urban area) or high savings (17.1% and 19.3%, respectively).

Implications

According to the results, the finding that families that receive remittances are more likely to have high savings is very robust. In the case of bank accounts, families that receive remittances are indeed more likely to have one, but only in rural areas. In urban areas, in contrast, we find significant differences only when comparing receiving migrants to non-receiving ones, but not when comparing non-migrant families to receiving ones.

Moreover, we find that the observed relationship of migration to bank accounts and savings is only due to the presence of remittances, finding that migrants alone are even less likely to have a bank account or high savings, particularly if the family lives in the urban area.

4.2. Instrumental Variable estimation

We now turn to the second methodology. Whereas Propensity Score Matching focuses on the problem of self-selection based on observable characteristics, the Instrumental Variable estimation technique deals with unobserved heterogeneity and endogeneity (Ravallion, 2001).

As has been extensively discussed in the literature, migrants tend to be very motivated, ambitious and hard-working people. The econometric problem that arises in this case is that these characteristics might not only have influenced their decision to leave the country, but also have an effect on the probability of having a bank account and high savings. When using a simple probit model, the effect that remittances have on bank accounts (or high savings) might thus be caused by an omitted variable, in our case migration. Moreover, the migration variable itself could be endogenous: The decision to work abroad and send money back home could be influenced by the existence of a bank account. This causality seems rather unlikely, but should be considered nevertheless, in order to assure consistent estimations.

Model

In order to be able to make a statement on the effect of monetary remittances on the probability of having a bank account (or high savings) despite these problems, we use a simultaneous estimation approach (as explained in Wooldridge, 2002 and employed by Evans and Schwab, 1995). We cannot use the IV estimations provided by Stata because both of our explanatory variables (migration and bank account) are binary variables.

Instead, we employ a recursive bivariate probit model (Heckman, 1978; Maddala, 1983) of the following form, which estimates the migration and the bank account equation at the same time:

(1) $y_i = \alpha_1 + \beta_1 \, mig_hh_i + x'_i \xi_1 + \varepsilon_{1i}$

(2) $mig_hh_i = \alpha_2 + m'_i \xi_2 + \zeta z_i + \varepsilon_{2i}$

In this setup, y_i is the observed binary outcome. It takes the value of one if family i has a bank account (or high savings) and zero otherwise. A significantly positive sign of the coefficient β_1 would imply that migrant families indeed have a higher probability of having a bank account than non-migrant ones. The vectors m_i and x_i contain other observable explanatory variables at the household head, household or regional level that are relevant for migrant households and bank accounts (or high savings), respectively[11].

The variable z_i denotes the instrument used to identify migrant households. The endogeneity of mig_hh_i can be tested by H_0: $\varrho=0$. If the value of ϱ is not statistically different from 0, the estimation of (1) could be done using a standard probit model because in that case the error terms are not correlated.

The instrument must be highly correlated with migration, but be independent of the fact of having a bank account. In this paper, we instrument migration with household migration networks (*know_mig* and *for_mem*)[12]. A number of recent articles have used regional migration networks as an instrument, among them Hanson and Woodruff (2003), Mansuri (2006), McKenzie and Rapoport (2006) and Woodruff and Zenteno (2007). The reasoning is that migration networks help to facilitate migration and reduce its cost. Cuc et al. (2005) and Görlich and Trebesch (2008) show that also in the case of Moldova, access to migration networks and poverty are the main determinants of migration.

In order to check the validity of our instruments we test for over-identifying restrictions. For the instruments we use we cannot reject the null hypothesis of exogenous instruments at usual significance levels[13]. In addition, the instruments turn out to be highly significant

[11] The variables used are the same as the ones used in the PSM. A list of the variables and a short description is included in Annex 2.

[12] We also used two other groups of instruments: household living standards and regional migration networks. In order to create more variation, we interacted both with household variables, i.e. the number of adults in 1998. Both work less well than the household migration networks.

[13] See Annex 5.

(F-statistics are always higher than 10), which implies that there is no weak instrument problem.

Results

Due to the fact that the characteristics between the urban and the rural area differ a lot between each other, all the models are estimated using the proper sub samples (urban-rural). In the general bank accounts model, as can be seen in Table 4, monetary remittances have a positive and significant effect on the probability of having a bank account. This is true both in urban and rural areas and even after controlling for various other influencing factors, which will be discussed in the next section. Even the magnitude of the effect is worth noting - the probability of having a bank account increases by about 5.6% in the rural area (and by about 6% in the urban area).

Table 4 Marginal effects of remittances: Sensitivity to migration and IV

	MT 1	MT 1b	MT 2	MT 2b	MT 3	MT 3b	MT 3b with IV1 & IV2	MT 3b with IV1
Bank Accounts								
Rural Area	5.2%	5.3%	5.3%	4.7%	5.6%	**5.6%**	5.3%	5.5%
Urban Area	8.9%	8.5%	8.0%	7.9%	6.3%	**6.1%**	6.1%	7.8%
High Savings								
Rural Area	15.1%	17.0%	12.6%	13.7%	11.1%	**11.5%**	11.6%	11.6%
Urban Area	18.8%	16.3%	14.6%	13.2%	14.2%	**13.6%**	13.3%	15.1%

Source: Own estimations. All results are significant at 5%.

Also in the savings model, the fact of receiving monetary remittances is positive and significant. In addition, the magnitude of the effect is much higher than in the case of bank accounts, increasing the probability of having savings higher than $US500 by 11.5% in rural and even by 13.6% in urban areas. This indicates Moldova's latent potential for financial sector development due to remittances.

Robustness Checks and Sensitivity Analysis

In order to check the robustness and the sensitivity of the results presented above (Table 4), we rerun the regressions using other migration concepts[14] (using household migration networks as instrument) and alternative instrumental variables[15] (using the broadest concept of migration).

We find that the results, as can be seen in Table 4, are quite robust for both bank accounts and high savings. The effect of monetary remittances is always positive and significant and the magnitude varies in a reasonable range. Overall, the results seem to be more sensitive concerning the migration concepts than the instrumental variables.

[14] See Annex 6.
[15] See Annex 3. IV3 did not pass the over-identifying restriction test.

4.3. Comparison of PSM and IV results

Both methodologies - Propensity Score Matching and Instrumental Variable estimation - come to the conclusion that remittances have a positive and significant effect on the probability of having a bank account and/or having high savings. In addition, this result seems to be quite robust: in both cases, the increment on the probability of having a bank account is very similar (5% to 6%).

In contrast, the impact of migration is less clear. In the case of bank accounts, PSM concludes that migration does not have a significant impact, whereas the IV shows a significant and negative effect in the rural and a positive effect in the urban area. In the case of high savings, PSM comes to the conclusion that the effect of migration is either non-significant or negative, whereas IV indicates a significant and positive impact. One possible explanation for the contradictory results in the case of migration could be due to the use of different samples in the two methodologies.

Table 5 IV and PSM results

		Rural Area	
		IV	**PSM**
Bank Accounts	**Remittances**	Significant	Significant
	Migration	Significant (-)	Not significant
High Savings	**Remittances**	Significant	Significant
	Migration	Significant (+)	Significant for 40% (-)
		Urban Area	
		IV	**PSM**
Bank Accounts	**Remittances**	Significant	Significant
	Migration	Significant (+)	Not significant
High Savings	**Remittances**	Significant	Significant
	Migration	Significant (+)	Significant for 12% (-)

Source: Own estimations.

So although the results concerning migration are not as we expected, the impact of our principal variable of analysis - remittances - remains robust across both methodologies.

5. Regression results

Apart from the positive effect of monetary remittances on bank accounts and high savings, it is also worth looking at some of the additional influencing factors. Moreover, we will present the results of the migration model, but will not discuss them as this goes beyond the scope of the paper.

Bank Accounts: General Model

An explanatory variable that turns out to be significant in both sub sample regressions is *migration*, but with a positive sign in the urban and with a negative one in the rural area. Being a migrant family apparently only increases the usage of the financial sector in cities. In rural areas it seems to be just the opposite. The magnitude of the effect seems to be rather high, but one should consider that this variable probably also captures some of the effect of monetary remittances on bank accounts.

Table 6 General model for bank accounts

	Rural Area		Urban Area	
	Bank accounts Mfx	**Migrant household Coefficient**	**Bank accounts Mfx**	**Migrant household Coefficient**
Mig_hh	**-15.1%** ***		**30.0%** ***	
Mon_rem	**5.6%** ***		**6.1%** **	
HH sex	0.2%	-0.474 ***	4.1% **	-0.397 ***
HH age	-0.1%	-0.034 **	0.0%	-0.061 ***
HH age2	0.0%	0.000 *	0.0%	0.001 ***
HH secondary	-0.5%		11.1% **	
HH tertiary	-0.7%		20.0% ***	
HH university	0.6%		23.6% ***	
Size of household	1.0% *	0.220 ***	-1.2%	0.247 ***
Share of children (less than 6)	-0.7%	0.048	-1.3%	-0.905 ***
Nr of adults (18-50)	1.9% ***	0.230 ***	-3.4% *	0.184 ***
Share of elder (65 or more)		0.139 **		0.008
Share of married adults (18-65)		0.715 ***		0.340 ***
Share with secondary	3.5%	0.456 ***	-12.2% **	0.257
Share with tertiary	4.9%	0.667 ***	-10.0% *	0.453
Share with university	9.0% ***	0.597 ***	2.7%	0.176
Good 1998	2.1%	-0.119	5.3% *	-0.170 **
Satisfactory 1998	1.5%	-0.077	5.2% ***	0.060
Big locality	9.3% ***	-0.015	8.3%	-0.287
Small locality	-1.9% *	-0.093		***
Chisinau	8.0% **	-0.468 ***		0.600 ***
Know_mig		0.295 ***		0.076
For_mem		0.119 *		
Constant		-0.720 *		-0.037

Source: Own estimations. *** significant at 1%, ** significant at 5%, * significant at 10%.

A further variable that is important in both areas is the *number of adults* in the family. This seems to reflect the fact that both demand for and supply of bank accounts is most likely when people are in working age.

Another variable that plays a role in both sub sample regressions is *education*, but in different forms. In rural areas, the family educational level is important: The higher is the share of university education, the higher is the probability of having a bank account. This

seems to indicate that banks use this information to evaluate their clients, regarding a higher share as a positive characteristic. The underlying reason could be that these kinds of families have a high probability of receiving a regular income. In urban areas, the educational level of the household head is the crucial factor. This seems to indicate that in urban areas, where people tend to face less supply constraints, the fact of being part of the formal financial sector or not fundamentally depends on how much the household head knows about its benefits. The family educational level (secondary and tertiary) is also significant, but negative.

In addition, the *locality* only matters in rural areas. Living in a big locality or Chisinau goes along with a higher probability of having a bank account. This could be considered as a supply side proxy of the banking sector with big communities attracting more financial services. In contrast to that, the living standards of the family in 1998 (our proxy for wealth) only have a significant influence on having a bank account in urban areas. These results seem to indicate that in the rural area the supply side is more constrained than the demand side. In the urban area the opposite seems to be the case.

Bank Accounts: Specific Model

The main focus of the specific model is to find out whether certain kinds of characteristics make remittance-receivers more or less likely to have a bank account. In this case we thus work with a selected sample of households, namely those receiving monetary remittances from abroad. For savings this step is left out because we expect receivers and non-receivers to be influenced by the same factors (especially wealth) when making their savings decision.

As can be seen in Table 7, there are again some similarities between the urban and rural areas, but the differences prevail. Only very few variables are significant in both areas. One of these is the *sex* of the household head: Being male increases the probability of having a bank account. In addition to that, if the remittent is an *ex-family member* and/or if he is a *seasonal migrant*, the probability of having a bank account decreases. In both cases the home family might not need a bank account: In the first case the family might only be receiving remittances temporarily (especially in bad times, when they are probably used mainly for consumption) and in the second case the migrant returns home on a regular basis, with no need for the family to have contact with the financial sector.

Table 7 Specific model for bank accounts

Bank accounts	Rural Area Mfx		Urban Area Mfx	
HH sex	4.5%	*	7.1%	*
HH age	-0.2%		-2.2%	*
HH age2	0.0%		0.0%	
HH secondary education	-2.7%		4.1%	
HH tertiary education	-4.2%		8.2%	
HH university	-4.6%		11.9%	
Size of household	1.2%		2.5%	
Share of children (less than 6)	-3.7%		-12.9%	
Nr of adults (18-50)	2.4%		-3.1%	
Share with secondary	-3.5%		-5.8%	
Share with tertiary	5.8%		3.4%	
Share with university	4.7%		35.6%	**
Level of remittances	2.5%	**	2.9%	
Years receiving Remittances	-0.1%		0.3%	
In-kind remittances	0.2%		10.3%	*
Ex-family member	-6.0%	*	-14.7%	***
Seasonal migrant	-7.3%	***	-13.1%	***
Legal migrant	2.1%		11.8%	*
Good 1998	-0.5%		13.9%	*
Satisfactory 1998	0.2%		13.9%	**
Exchange in bank	4.6%	*	-5.5%	
Big locality	11.5%	***	10.9%	*
Small locality	-3.1%			
Chisinau	43.0%	***		
Nr of Observations	752		338	
Pseudo R2	0.1701		0.2201	

Source: Own estimations. *** significant at 1%, ** significant at 5%, * significant at 10%.

The results also support our previous finding that the supply side constraints are dominant in the rural areas, whereas the demand side factors prevail in the urban areas. In this regression *exchanging remittances* is used as an additional supply-side approximation[16], which is again only significant in rural areas. Being able to exchange the money in a bank indicates that there is one in the neighbourhood. *Big locality* is now positive and significant in both areas, but at 1% only in rural areas. In urban areas, in contrast, clear demand factors like *age, education* (share of university education in family) and *living standards* are important. Also the fact of receiving *in-kind* in addition to monetary remittances is significant only in urban areas. This could be because in this case the family is able to spend the money that they usually use for consumption goods for savings and thus have a higher demand for a bank account. In addition, households with *legal* migrants tend to have a higher probability of

[16] Almost 58% of receiving families declare to use banks for exchanging money.

having a bank account only in urban areas, which is in line with the argument that in rural areas supply constraints are the restricting aspect.

Savings Model

The savings model is of interest especially as a comparison to the general bank accounts one[17]. On the one hand, the living standards of 1998 are now important in both areas. The positive sign accounts for the fact that families that have high living standards tend to be able to save, independent of where they live.

On the other hand, in the case of rural areas, the regional variables are also no longer significant. This underlines the independence of the savings decision from supply side factors. In urban areas, in contrast, the size of the locality is significant. In addition, Chisinau is significant in both areas, but only at 10%.

6. Conclusion

As we have seen, a couple of authors have analyzed how remittances affect financial sector development. However, all of them have focused on the macroeconomic level; microeconomic evidence concerning possible transmission channels barely exists.

This paper is a first attempt at analyzing the microeconomic linkages between remittances and financial sector development. Using a detailed household survey for Moldova, we find that remittance-receiving families have a higher probability of having a bank account or high savings than non-receiving ones, even when controlling for household head, household and regional characteristics. This result holds when using Propensity Score Matching and Instrumental Variable estimations and is robust to different migration concepts and instrumental variables. Another key finding is that remittances have a bigger effect on household savings than on bank accounts in Moldova. This discrepancy creates unbanked resources that could lead to a further financial sector development if they were formalized.

Overall, our evidence thus points towards the fact that the enormous remittance inflows could have a positive impact on the financial sector development in Moldova. Apart from that, the analysis also suggests that the use of the banking sector is particularly influenced by demand factors in urban and by supply constraints in rural areas. In order to fully exploit the positive effects of remittances, it would thus be important to, on the demand side, increase the level of trust in the banking sector and improve the financial literacy, especially in urban areas. On the supply side, policies that induce financial institutions to provide attractive financial services even in remote rural areas would seem to be helpful.

[17] The results are shown in Annex 7.

Nevertheless, our analysis cannot be generalized to other countries. As a first step it would thus be important to create theoretical predictions that can be tested empirically. As discussed initially, the effect of remittances on financial sector development crucially depends, among other things, on the use of the remittances, which are in turn essentially influenced by the motives to remit. Another aspect that seems to be important, especially for the magnitude of the effect, is the remittent's decision about how to send the money back home. If the remittent uses formal methods, particularly the banking system, to send the money, the leverage effect on the financial sector is likely to be much higher. This happens because the receiving families, that are usually unbanked, get in touch with formal financial institutions that they have never used before, gaining access to financial products and services (Orozco and Fedewa, 2005). This access could lead to a higher level of financial literacy and trust. As a consequence, their demand for financial services, such bank accounts, could increase much faster. At the same time, banks would be able to identify receiving households and regard them as attractive clients. Overall, this could potentially lead to a more rapid financial sector development. In addition to these theoretical foundations, further country case studies focusing on the demand and supply factors would seem to be useful, in order to provide information for policy makers and financial institutions. Moreover, the effect of migration on bank accounts and high savings seems to be worthwhile exploring further.

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Annex 1

Banks and Services in Moldova

Name of bank	Balance sheet (MDL million; 2006)	Number of locations /a	MTO services offered
Agroindbank	4830	91	Travelex, Private Money, Anelik, Western Union
Banca de Economii	3470	512	Western Union, SWIFT
Victoriabank	2629	16	Money Gram, Interexpress, Posta Rapida, Blizko, MIGOM, Contact, Swift
Mobiasbanca	1950	71	Western Union, Swift, Contact, Anelik
Moldindconbank	1800	50	Western Union, RUS-Express, Leader-VMT, STRADA ITALIA, SWIFT
Banka Sociala	1576	23	Western Union, Anelik, Unistream, Posta Rapida, Migom
Eximbank	1376	50	Money4family, Western Union, Posta Rapida, Privat Money, Getmoney to family, Xpress Money, UNISTREAM, Anelik, Leader, MIGOM, Contact
FinComBank	1182	31	SWIFT, WESTERN UNION, Anelik
BC Rom. Chisinau	815	2	Travelex, Anelik, Posta Rapida
Investprivatbank	648	32	Unistream, Anelik, Posta Rapida, Western Union, MIGOM
Energbank	597	57	Western Union, Contact, Anelik, Unistream, Posta Rapida, Migom, Leader-VMT, InterExpress
Unibank	596	19	SWIFT, WESTERN UNION, Anelik, Unistream, Migom
Comertbank	292	n.a.	n.a.
Universalbank	292	7	Anelik, Unistream, Money Gram, Leader, Interexpress, Posta Rapida, Uno Money Transfer, SWIFT
EuroCreditBank	180	23	Western Union, Anelik, Coinstar, Contact, UNIStream, Bystraya Pochta, Migom, Leader, Blizko

Source: Bank websites, January 2008.

/a Branches, representative offices, agencies.

None of the banks in Moldova, the only exception being Mobiasbanca, has developed cross-selling products targeted to migrants and remitters. But seven commercial banks have set up intra- and inter-bank specialized transfer systems in partnership with foreign banks or through their subsidiaries in Moldova. These systems generally do not require a bank account for money transfers which is instead a requirement for most inter-bank transfers (World Bank, 2007).

Annex 2

Data description

The present analysis uses the CBSAXA Moldovan Household Survey 2006 (CBSAXA-2006), a detailed dataset on the determinants and the welfare effects of migration and remittances. The section that is of special use to us is on aspects of financial sector usage. These questions were answered by all of the families, so that we are able to compare remittance receivers with non-receivers.

During the survey, a total number of 3,940 families (13,155 individuals) were interviewed. In addition, information on 947 individuals that are not family members (ex-family members and friends[18]), but are related to the family as a migrant or remittent, is included. Most of the information concerning the migrants / remittents was gathered as a perception of actual family members.

In order to estimate the model, we consider a sub sample of 3,856 families, excluding families without a household head or with more than one, as well as observations with missing information in the explanatory variables.

For the PSM and IV estimations, we use all the information available (3,856 observations), considering households as the observation unit in the regression. In the specific bank account model, we consider only families that declare to receive remittances, using remittents and not households as observation unit (1,090 observations).

In the case of migration prevalence and the share of foreign people in the district, we use information from the Moldovan Census 2004.

[18] According to the survey, friends have never been family members, but could have been household members.

Annex 3

Variables definitions

Variable	Definition	Source
Dependent variables		
Bank account	Indicates whether the family declares to have a current or a savings account (1) or not (0)	CBSAXA-2006
High savings	Indicates whether the family declares to have savings of at least $US500 (1) or not (0); includes banked and unbanked savings	CBSAXA-2006
Mig_hh	Indicates whether the household is a migrant one (1) or not (0)	CBSAXA-2006
Explanatory variables		
Household head and household variables		
HH sex	Sex of the household head (1: male, 0: female)	CBSAXA-2006
HH age	Age of the household head (in years)	CBSAXA-2006
HH age2	Age of the household head squared	CBSAXA-2006
HH no education	Household head with no formal education	CBSAXA-2006
HH primary	Household head with complete primary education	CBSAXA-2006
HH secondary	Household head with complete secondary education	CBSAXA-2006
HH tertiary	Household head with complete tertiary education	CBSAXA-2006
HH university	Household head with complete university education	CBSAXA-2006
Share with secondary	Share with complete secondary education	CBSAXA-2006
Share with tertiary	Share with complete tertiary education	CBSAXA-2006
Share with university	Share with complete university education	CBSAXA-2006
Size of household	Number of family members	CBSAXA-2006
Share of children (less than 6)	Share of young children (0-6 years old)	CBSAXA-2006
Nr of adults (18-50)	Number of adults (18-50 years old)	CBSAXA-2006
Share of elder (65 or more)	Share of elder members (65 years and older)	CBSAXA-2006
Share of married adults (18-65)	Share of married adults (18-65 years old)	CBSAXA-2006
Good 1998	Good living standards in 1998	CBSAXA-2006
Satisfactory 1998	Satisfactory living standards in 1998	
Remittance variables		
Mon_rem	Indicates whether the household declares to receive monetary remittances (1) or not (0)	CBSAXA-2006
Level of remittances	Logarithm of the estimated amount of remittances per month per household member	CBSAXA-2006
Years receiving remittances	Number of years the household has been receiving remittances	CBSAXA-2006
In-kind remittances	Indicates whether the household receives in-kind remittances (1) or not (0)	CBSAXA-2006
Exchange in bank	Indicates whether the household exchanges the remittances in banks (1) or not (0)	CBSAXA-2006
Ex-family member	Indicates whether the remittent is an ex-family	CBSAXA-2006

	member	
Seasonal migrant	Indicates whether the remittent is a seasonal migrant	CBSAXA-2006
Legal migrant	Indicates whether the remittent is a legal migrant	CBSAXA-2006
Regional variables		
Big locality	More than 10,000 people live in the locality	CBSAXA-2006
Small locality	Up to 2,000 people live in the locality	CBSAXA-2006
Chisinau	Dummy for the capital	
Instrumental variables		
IV 1		
LS interaction	Living standards in 1998 (good and satisfactory state) times the number of adults in 1998	CBSAXA-2006
IV2		
Know_mig	Indicates whether the household knows a migrant (1) or not (0)	CBSAXA-2006
For_mem	Indicates whether the household has a member with a foreign nationality (1) or not (0)	CBSAXA-2006
IV3		
Mig_prev	Migration prevalence per district	Census-1994
Mig interaction	Migration prevalence times the number of adults in 1998	Census-1994
For_district	Share of people with foreign nationality in the district	Census-1994

Annex 4

Concerning the family structure, migrant households tend to be bigger than non-migrant ones and have a lower age average. In the case of education, the differences between migrant and non-migrant families are much smaller, although migrant ones tend to be more educated, particularly in rural areas. With respect to living standards, the statistics don't show any significant differences between the different kinds of families. But migrant families tend to be worse off than non-migrant families, especially in urban areas.

Rural area	**Non-migrants**	**Migrants**		
		Total	**Non-receiving**	**Receiving**
Household Structure				
Family members	3.16	4.33	4.22	4.43
Number of children (under 6)	0.19	0.26	0.26	0.25
Number of adults (18 - 50)	1.43	2.54	2.42	2.65
Number of elder people (over 65)	0.51	0.29	0.37	0.21
Family Education				
No education	5.2%	2.0%	2.0%	2.0%
Primary education	18.5%	7.9%	9.8%	6.2%
Secondary education	31.4%	33.3%	34.4%	32.3%
Tertiary education	20.1%	25.5%	24.9%	26.1%
University	9.6%	13.0%	12.1%	13.9%
Living Standards 1998				
Good	15.7%	15.9%	14.7%	17.1%
Satisfactory	46.0%	43.0%	44.5%	41.6%
Bad	35.0%	37.5%	36.5%	38.5%

Urban area	**Non-migrants**	**Migrants**		
		Total	**Non-receiving**	**Receiving**
Bank Accounts	16.7%	20.5%	18.4%	22.7%
High Savings	11.0%	25.5%	16.0%	35.8%
Family Structure				
Family members	2.88	3.71	3.64	3.79
Number of children (under 6)	0.16	0.17	0.15	0.19
Number of adults (18 - 50)	1.50	2.30	2.17	2.43
Number of elder people (over 65)	0.42	0.33	0.44	0.21
Family Education				
No education	2.0%	0.8%	0.9%	0.6%
Primary education	8.4%	7.5%	9.1%	5.8%
Secondary education	22.5%	22.3%	19.3%	25.6%
Tertiary education	27.1%	30.4%	29.2%	31.6%
University	27.8%	26.7%	30.4%	22.8%
Living Standards 1998				
Good	24.8%	21.4%	22.0%	20.8%
Satisfactory	36.3%	40.8%	41.8%	39.6%
Bad	35.2%	35.4%	34.1%	36.7%

Source: Own estimations.

Annex 5

Test of overidentifying restrictions: Amemiya-Lee-Newey
Command used: ivprobit and overid
(p-values)

Specification	Urban	Rural	
IV1, IV2 and IV3	0,038	0,010	Rejected
IV1 and IV2	0,231	0,275	Not rejected
IV1 and IV3	0,003	0,002	Rejected
IV2 and IV3	0,038	0,013	Rejected
IV1	0,187	0,105	Not rejected
IV2	0,269	0,354	Not rejected (Best)
IV3	0,001	0,004	Rejected

Source: Own estimations.

Annex 6

Migration Concepts

We use the following three concepts of migration in our analysis:

- Migrant households type 1 (MT1): Families that have at least one member (or relative) abroad (including seasonal migrants).
- Migrant households type 2 (MT2): Apart from the migrant households of type 1, this concept includes those families that have a member that was abroad between 2005 and 2006, but is at home at the time of the interview.
- Migrant households type 3 (MT3): Apart from the migrant households of type 2, this concept includes the families that have a member who is planning to migrate in the close future.
- Other migrant households: For each of these three concepts we also work with a second variation (MT1b, MT2b and MT3b), which takes into account those families that have a household member or a relative who is sending remittances (i.e. has a migrant abroad), but haven't been captured as a migrant family yet.

Annex 7

General model for savings higher than $US500

	Rural Area		Urban Area	
	High Savings Mfx	**Migrant Household Coefficient**	**High Savings Mfx**	**Migrant Household Coefficient**
Mig_hh	13.3% ***		29.3% ***	
Mon_rem	11.5% ***		13.6% ***	
HH sex	3.5% **	-0.469 ***	4.1% **	-0.419 ***
HH age	0.7% *	-0.032 **	0.7%	-0.061 ***
HH age2	0.0% **	0.000 *	0.0% **	0.001 ***
HH secondary education	-5.5% **	***	11.6% *	
HH tertiary education	-2.3%	***	10.8% *	
HH university	2.5%	***	10.7% *	
Size of household	-0.6%	0.217 ***	-0.6%	0.250 ***
Share of children (less than 6)	1.4%	0.106	-0.5%	-0.929 ***
Nr of adults (18-50)	0.2%	0.231 ***	-0.1%	0.171 ***
Share of elder (65 or more)		0.141 **		0.013
Share of married adults (18-65)		0.695 ***		0.417 ***
Share with secondary	2.3%	0.442 ***	-1.9%	0.232
Share with tertiary	2.0%	0.642 ***	2.0%	0.414
Share with university	7.3% *	0.586 ***	13.8% **	0.134
Good 1998	8.8% ***	-0.126	4.8% *	-0.176 **
Satisfactory 1998	4.1% ***	-0.076	2.9%	0.038
Big locality	-5.3%	0.025	7.0% **	-0.283
Small locality	0.9%	-0.094		
Chisinau	9.5% *	-0.489 ***		
Know_mig		0.345 ***		0.620 ***
For_mem		0.069		0.020
Constant		-0.778 **	***	-0.001

Source: Own estimations. *** significant at 1%, ** significant at 5%, * significant at 10%.