REMITTANCES, MIGRATION AND FAMILY BENEFITS IN ARMENIA

by

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Abstract

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In this thesis, I study the relationship between remittances and social benefits in Armenia. I am interested in whether remittances act as a substitute for social benefits. Different channels might affect the relationship. For example, the government might decide to allocate more money for social spending as remittances might allow to collect more consumption taxes and reduce the cost of the debt, which might lead to the positive relationship between remittances and the amount of social benefits money received. Second, households might decide to spend additional income from remittances on durable goods which might reveal that they are no longer eligible for social assistance. Alternatively, they might simply stop applying for the program.

In order to analyze the relationship, I am employing a Logit and Tobit model with various robustness checks. I found that the relationship is negative but economically insignificant which leads to the conclusion that the benefits system is not working efficiently in Armenia.

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GLOSSARY

- **GDP**. Gross domestic product.
- **ECM**. Error-correction model.
- IV. Instrumental variable.
- LRM. Long-run multiplier.
- FGLS. Feasible Generalized Least Squares.
- U.S. United States.
- **PPP.** Purchasing power parity.
- ILCS. Integrated Living Conditions Survey.
- **RA**. Republic of Armenia.
- OECD. Organization For Economic Cooperation And Development.
- **OLS**. Ordinary Least Squares.
- LPM. Linear Probability Model.
- AME. Average marginal effects.

Chapter 1

INTRODUCTION

Personal remittances have attracted much attention among economists since their inflow has increased drastically over the last 20 years. In lower and middle-income countries remittances have grown 40% (in relation to GDP) from 1998 until 2018 (World Bank). Ukraine, Armenia, Kyrgyz Republic, Moldova, Tajikistan and Uzbekistan are among the most remittances dependent nations in the Post-Soviet region receiving more than 10% of their GDP in the form of private international transfers.

The literature agrees that remittances act as additional financial insurance in developing countries, which helps to reduce poverty (Yoshino, Taghizadeh-Hesary, and Otsuka 2017; Adams and Page 2005; Gupta, Pattillo, and Wagh 2009 to name a few). Another source of poverty reduction is the social benefits provided by the government. I assume there should be some substitution between remittances and social benefits since they might play the same role, which is poverty reduction. Families that cannot find a well-paid job or secure themselves with additional help from the government might decide to send a member abroad and receive additional income in the form of remittances. Also, there is evidence that social benefits crowd-out private transfers (La and Xu 2017; Murrugara 2002).

In this paper, I am going to investigate the opposite effect – the impact of private remittances on the social benefits, namely the participation of the household in the benefit programs and the amount of the aid received. There is clearly a gap in the literature that studies this link.

There are different channels through which remittances may affect social benefits. They can act both on the macro and micro levels. As for the macro level, private transfers from emigrants to their families can bring higher government revenues through consumption taxes, such as value-added tax or sales tax (Singer 2012) (in developing countries remittances are mostly spent on consumption rather than investment (Chami et al. 2008)). Remittances may also positively affect government spending through their effect on the debt servicing costs. High remittances inflows appreciate the domestic currency, thus making current debt less costly to repay. The officials may, in turn, decide to reallocate the freed resources to inflate other types of expenditures (Singer 2012). However, a stronger currency disturbs investment, exports and import tariff revenues so the ultimate outcome through this channel might be ambiguous (Amuedo-Dorantes and Pozo 2004). However, the latter has become a less reliable source of revenues as a consequence of the overall trade liberalization (Chami et al. 2008).

As for the micro-level, remittances might act as additional security to households and thus reduce the need for public transfers (Doyle 2015). Families might decide not to apply for a benefit or simply reveal themselves as a category that does not need additional government help by investing in durable goods such as cars or better housing. However, they may receive additional income and hide this fact from the authorities. Furthermore, Funkhouser (1992) found that remittances reduce the incentive of nonmigrants to work but increase self-employment.

In this research, I am going to focus only on one country, Armenia, since it has a long history of migration, a high level of remittances and an elegant social benefits system that I am going to describe in the next chapters. An additional motivation for the research is the fact that only 27% of Armenians are confident that the social benefits system is fair and 37% think that the majority of people who receive poverty benefits are really vulnerable according to the Integrated Living Conditions

Survey (World Bank 2016). This fact might cause to the insignificant effect of the remittances on social benefits.

The research question is as follows: how remittances affect the probability of receiving social benefits and their amount?

The central hypothesis is that the remittances act as a substitute for government help since families might decide to finance their expenditures using only private transfers or buy goods, which affect the decision of the authority whether to provide benefits to the family.

The alternative hypothesis is that there is no significant effect since families might hide the fact that they receive additional income or decide to work less.

To answer the research question, we are going to use the micro-level survey data of the Armenian households for the years 2011-2016. This is a very comprehensive survey that covers all the household's characteristics which are essential for this research, such as migration, remittances, participation in the social benefits programs. It also provides information about monetary indicators (income and expenditures), a social group of the family members, their belongings, housing conditions and many more.

As the dependent variables, there are two measures at our disposal. First is the monetary income that a family receives as the social benefit from the government, and the second is the dummy variable of whether a household is participating in the poverty benefit program and have ever received any transfers. As the explanatory variables, I am using all the critical household characteristics and remittances. Since remittances are endogenous to family benefits (as the literature about the crowding-out effect suggests) I am instrumenting remittances with the past values of migration, namely the number of family members who migrated

before the family benefits where received. As an alternative instrument, I am using the share of families that receive remittances in that particular region in previous years.

I am employing the Tobit model for the estimation since many families do not receive any social benefit (in fact, only 12% of the respondents report being registered in the program and receiving benefits) and thus report zero values of this kind of income. The Logit model is the main estimation approach for estimating the probability of receiving social benefits.

This thesis is going to be structured as follows. In Chapter 2, I review the related literature that provides empirical evidence for the links between remittances and social benefits. Chapter 3 presents the methodology of the analysis. In Chapter 4, I discuss the data collection process and its preparation and provide descriptive statistics. The main results and findings are presented in Chapter 5. In Chapter 6, I state the conclusion of the thesis.

Chapter 2

LITERATURE REVIEW

The literature which investigates the effect of remittances on poverty and household decisions is enormous. However, there is a gap when we come to the evidence of the microeconomic impact of international private transfers on social benefits (and not vice versa).

Usually, the relationship I am interested in is studied on the macro-level. As for the household or individual level, I did not encounter any similar study. Usually, the opposite ("crowding-out") effect is investigated. There exist some studies which predict the number of government benefits, but the estimation approach is different for each country due to the legislation differences. I will describe in detail all types of works mentioned above.

2.1. Macro-level data

As for the macro-level relationship between remittances and fiscal policy, research is mostly focused on studying the substitutability nature of the relationship between remittances and government spending overall and the effect remittances have through the real exchange rate and borrowing channel. As for my specific topic, the literature is somewhat limited though it provides evidence for different types of government expenditures. For instance, Doyle (2015) explored the effect of remittances on social spending in Latin America. He found evidence that supports my central hypothesis – remittances act as additional security and substitute government social spending. He was also concerned about endogeneity since the level of social spending may affect the decision to move abroad and thus lead to the change in the value of remittances and the schedule of the remittances. Thus, he applied the instrumental variable model using the distance between the remitting and recipient countries weighted by the GDP per capita as the instrument for remittances. Like many other studies, he provided results of the error-correction (ECM) and long-run multiplier (LRM) models that allow capturing both short and long-run effects of the remittances. Even though his estimation supported the negative relationship, in the short-run, the effect does not hold.

While Doyle studied a specific group of countries, Mina (2019) provided several different model specifications and analyzed the effect of remittances on the level of social protection separately for all high income and middle-income countries. The results were mixed, depending on the countries income group and model specification. For high-income countries remittances negatively influence the level of social spending, while in the middle-income ones, the effect was rather insignificant. Fixed effects and FGLS models only captured the negative effect (though significant only at 10% level) in the latter income group but no IV could translate in statistical significance. These results were expected since high-income countries tend to have a lower fraction of the shadow economy and better income tax administration system compared to less developed economies.

Easton and Montinola (2017) did not focus specifically on social benefits and decided to look at other public goods such as health, education, and military government expenditures. While expenditures on these spheres are not considered direct poverty benefits, they still act as additional help to the households (especially health and education spending). The authors featured their model with the interaction term of remittances and political regime in the country which allows controlling for differences between autocratic and democratic establishments.

They found that in autocratic countries, remittances lead to a decrease in both health and education expenditures, in contrast to a democratic rule. For robustness check, they combined three models into two by replacing the dependent variable with the ratio of military expenditures to expenditures on education, and military to health. The results showed that remittances alone are only significant for the substitution between military and health (more inflows lead to more military expenditures relative to health spending). The combined effect of the regime and remittances brought to the conclusion that more autocratic regimes tend to substitute health and education services public provision with the military as the transfers grow. The key takeaways are as follows: population in less autocratic regimes believes that the government can be kept liable. Hence, they allow the taxes to be collected from their additional income. At the same time, communities living in the more exclusive power regimes will contribute in the form of bribes (also supported in the paper). These results contradict those obtained by Doyle (2015) to some extent. Easton and Montinola argue that social spending is slightly different in nature, although education and health expenditures are considered to be welfare transfers too. A large fraction of the population in developing countries work in the informal sector which excludes them from the social insurance programs but may still be eligible for health and education services public supply since they tend to be more universal.

At this point, the review of the literature that investigates specifically the question I am interested in on the macro-level ends. Next, I describe a couple of interesting and insightful studies that support the hypothesis that remittances positively affect government revenues (which, supposedly, leads to higher expenditures). For example, Singer (2012) indicates that the effect of remittances might be questionable. The empirical results indicated that remittances positively affect government tax revenues, presumably through consumption taxes since developing countries usually struggle to develop an efficient administrative system

for income tax collection. Singer also found that remittances might increase government spending through the borrowing channel. An increase in remittances has a significant and negative effect on sovereign debt spreads (the difference between the domestic interest rate and U.S. Treasury bonds). For the exchange channel, Chami et al. (2008) presented a theoretical model for remittances and debt sustainability. They argued that large inflows of private transfers positively affect the exchange rate (i.e., appreciate the domestic currency) which in turn helps to decrease debt servicing expenses. Drop in the costs of public debt increases the demand for it, which leads to higher government spending. These results are in line with the empirical evidence (Bourdet and Falck (2003); Hyder and Mahboob (2005); Saadi-Sedik and Petri (2006) for single-country analysis and Amuedo-Dorantes and Pozo (2004); Holzner (2006) for panel studies). Though, the results from other research were mixed, sometimes capturing no effect of the increasing remittances on the real exchange rate (Rajan and Subramanian (2005)). Chami et al. strongly emphasize that the outcomes may vary between countries, depending on their different initial conditions.

2.2. Micro-level data

As previously discussed, the literature lacks evidence for the effect of remittances on the social benefits on the household or individual level, which is a sign that this research might provide some fresh insights.

However, considerable literature exists that provides evidence for the effect on poverty and unemployment.

Adams and Page (2005) and Gupta, Pattillo, and Wagh (2009) used panel data for developing countries and found strong evidence that remittances negatively affect poverty. Adams and Page found that on average, a 10% increase in per capita remittances reduces the share of people who live in poverty by 3.5%. They accounted for a possible endogeneity using a well-established instrument – distance from donor and recipient country. Gupta, Pattillo, and Wagh moved further and used a three-stage estimation technique, instrumenting remittances with migration and migration with education (since higher education promotes migration) and distance. They found that a 10% increase in the remittances as the share of GDP leads to a 1.5% decrease in the share of population living on less that one PPP dollar per day.

Adams (2006) used survey data for Ghana households. He, on the contrary, did not find a significant effect of remittances on the headcount of poor people. However, the change in the severity of poverty in such households is affected by a much larger extent. International remittances tend to lower the squared poverty gap index by almost 35%. Adams (2004) also previously used the same methodology for Guatemala and found similar results, though, unlike in Ghana, internal remittances played a significant role in poverty reduction.

A broad scope of literature exists for the determination of the relationship between remittances and employment. Leon-Ledesma and Piracha (2004) used panel data for Eastern-European countries. They found a significant and positive effect of remittances on productivity and investment, which, in turn, leads to an increase in self-employment and business development. The nonlinear relationship was found by Jackman (2014). He found (based on Latin American countries) that remittances negatively affect unemployment (reduce it) if the amount of the transfers is large enough. Specifically, he found a threshold that the amount of remittances of around 3.5% to GDP is the turning point, above which transfers start to play a significant role in the unemployment reduction.

Many studies present a negative association between remittances and labor market participation. Airola (2008) used a multiple year survey for Mexico and found that remittances inflow reduces the number of hours worked, especially for women. Before Airola, Kim (2007) found no support for the negative association between remittances and hours worked in Jamaica, though he did establish that they negatively affect labor market participation. Quite the opposite situation is in Haiti, which was described by Jadotte (2009) – he found no significant effect of remittances inflows on the participation, though a significant effect on the hours worked. Amuedo-Dorantes and Pozo (2006) employed Tobit-IV estimation (instrumented remittances with the number of Western Union offices). They found a significant and negative link between transfers from abroad and hours worked but mostly for men.

As I mentioned, some studies investigate the relationship which is of interest to me but oppositely study the question – whether social benefits "crowd-out" private transfers. La and Xu (2017) use the data from Vietnam Household Living Standard Surveys and find crowding-out effects with regard to remittances among the poor to be consistent and robust below and above the poverty line. They suggest that this leads to deadweight losses from public transfers, which both domestic and international remittances overlap with. Insignificant results were found by Oruc (2011) for Bosnia. Murrugara (2002) found a negative relationship and supported the argument that there is the fungibility of public and private money.

A close to my interest study was implemented by Waidler et al. (2017) for Moldova. They compared social benefits transfers and remittances by not estimating the substitution between them in one equation (treating social benefits as a dependent variable) but by comparing the effects of them on different expenditures patterns by including both of the values as regressors. They argued that remittances and social benefits might be received by different types of households which would be the reason for such a discrepancy. They conducted their research in two stages, first predicting the amount of remittances and social benefits receipt using different instruments. They found that social benefits are more likely to be spent on conspicuous consumption rather than investment. In contrast, the effect of the remittances is the opposite – households instead spend them on education or health. From this study, it is hard to conclude whether those families that receive more remittances would be less likely to receive social assistance from the government but it gives some interesting insights about their separate effect on the household behavior.

Since in this research, I am going to predict the probability of participation in the social benefits program and the amount of received money, I have also focused on studies that explore these values. Although they use same general household characteristics such as age, sex, family structure, income, unemployment and others (Kasper 1968; Hancock, Morciano, and Pudney 2019), they strongly recommend relying on the local legislation when it comes to a decision upon the specific variables.

Other not entirely relevant but insightful in terms of the model specification is the research done by Rozelle, Taylor, and deBrauw (1999). While estimating the agricultural productivity in China using remittances as the main predictor of interest, they instrumented them with migration to avoid the simultaneity bias. However, since migration is endogenous, too, they also instrumented it with other predictors (they used education and past migration). This study influenced the choice of my methodology which I will describe in the next chapters. The same approach was employed by Grigorian and Melkonyan (2011) for Armenia in their analysis of the Armenian households' behavior.

2.3. Theoretical studies

Some economists tried to explain the relationship which I am interested in by building a theoretical model. The closest one was done by Kochi and Rodriguez (2010). They built a model that explains how remittances affect social benefit programs in the case of whether the latter is universal or targeted. For this purpose, they developed a "political economy model with a probabilistic voting equilibrium." The authors also assumed different effects of remittances on the redistributive policies, as I described before. In the targeted social assistance framework, they proved that if the reaction of remittances to taxes is negative and inelastic and if the reaction of taxes is elastic or unitary then an increase in remittances might reduce the income tax rate and thus reduce the amount of transfer receipts. The reason for this is that remittances change the distribution of income in the economy. If the program is targeted at the poor people in a society, those who receive remittances and are no longer eligible for the government assistance will vote for the more fiscally conservative parties (lower tax rates and lower redistribution).

On the other hand, in the case of the universal program, an increase in remittance receipts will allow the government to collect more income taxes and distribute more, leading to an increase in the receipt of the social benefit received by the family.

As we can see from the existing microeconomic literature, the most relevant studies are those connected to poverty and unemployment. The results for unemployment are mixed, while poverty estimation is quite straightforward. Macroeconomic literature is not univocal either. Hopefully, this study will bring interesting and novel insights into the existing literature.

Chapter 3

DATA DESCRIPTION

The data source for the analysis is six questionnaires for years 2011-2016 from the Armenia Integrated Living Conditions Survey (ILCS 2011-2016). In 2011, 7872 households and 30748 individuals were surveyed, however, from 2012, the data were collected only from 5184 households and approximately 19-20 thousand individuals annually. Unfortunately, this is not a longitudinal survey, so we have to conduct the analysis using only cross-sectional data. Transforming it into the panel is impossible since the data is presented on the marz (region) level and there are only 11 marzes in Armenia.

The overall number of observations is 128734, which is the number of unique individuals from 33733 households. The response variables are on the household level so the latter is the approximate number of observations that will be presented in the output of the regression.

Luckily, these surveys are designed in such a way that they cover almost all the essential family aspects. They contain questions about social benefits, migration, remittances and all the crucial household characteristics.

3.1. A short background of the Armenian social benefits system

Let me first give a brief overview of the social benefits system in Armenia before describing the variables which I am going to use for the analysis.

In 1999 the new family benefits system was introduced in Armenia. This system is aimed at protecting the poor while that which existed before was used to protect only "socially deserving members" as in the Soviet times (Karapetyan et al. 2011). This system replaced numerous-existing cash benefits, including child allowances and others. It is aimed at providing only to those who really cannot secure themselves with their own resources. The eligibility of the family is based on the overall vulnerability score of the family. It is calculated basing on various household indicators such as:

- The social group of the family members (disability, unemployment, age, parental care for children, pension, whether a person is a student, pregnancy and other);
- 2) Place of residence (one of eleven provinces (marzes));
- 3) Housing conditions (the type of a house such as own house, apartment, hostel, railcar) and availability of utilities;
- 4) Car possession;
- 5) Business activities;
- 6) Real estate operations;
- 7) Electricity and gas consumption;
- 8) Income (including that from livestock and land use);
- 9) Livestock and land possession;
- 10) Agricultural machinery possession;
- 11) Credit liabilities.

The calculation procedure is described in the Armenian legislation, specifically in the RA (Republic of Armenia) government decision on implementation of RA law on state benefits, which is in action since 2014. This calculation is quite complicated and I am not going to focus on it since it is not crucial for the study. Following Hancock, Morciano, and Pudney (2019), I am going to build my analysis, relying on the indicators which the authorities use for their decision-making upon family eligibility for the family benefits.

An improvement or increase in all the indicators listed above (starting from number 3), be it quality, amount of money, livestock headcount, is expected to decrease the probability of a family being accepted for the program or the amount of money received.

3.2. Data description

According to the information gotten from the surveys, 11.8% is the average (calculated as the mean for all the families which were surveyed from 2011 to 2016) number of families that reported that they receive social benefits. This number has grown from 2011 to 2016 from 10% to 13%.

The average amount of monthly benefits stayed in the range between 10.4 and 11 thousand drams. (All the monetary indicators were deflated and put in the per member terms weighted according to the OECD equivalence scale.) The dynamics can be seen in the graph below.



Figure 3.1. Percentage of people registered in the family benefits system and the monthly amount of benefits received

43% of the respondents said they did not register in the family benefits program because they thought they "would not get anything anyway". An interesting fact is that only 27% consider this system to be fair and only 36% think that the majority of those who earn the benefit is really vulnerable. These facts might be the indicator that the money in the system is not distributed entirely fairly which might lead to the insignificant relationship between monetary indicators and family benefits received by the households.

Among the 33733 families that were surveyed, 11.3% reported they have at least one member in their family who belongs to a vulnerable social group. There is a positive correlation between the total number of people that belong to such groups and the propensity to receive social benefits as well as the amount of the benefits. For example, only 9% of families that do not have any member belonging to a vulnerable category receive benefits. In contrast, the government supports half of the families with 6 vulnerable members. The last number might sound surprising since the government should help such families first. However, social groups might include people from such categories as pregnant women or students who might not need additional help from the government and thus might decide not to apply for the benefits.

Housing conditions also have a significant effect on the amount of received aid – those who live in railcars or containers and hostels receive the most significant amount of assistance per family member – four times and two times more respectively than those who live in an apartment. Subjective evaluation of the dwelling conditions demonstrates the same relationship – the more satisfied the family is, the less the amount of aid money they receive. Car possession leads to a four-times difference in the amount of aid comparing to the families that do not own a vehicle.

In the surveys, there is no specific question about gas or electricity consumption, but the respondents were asked about the amount of money spent on heating the house during winter. Data shows a negative correlation between the per member spending and per member family benefits.

In the analysis, I am also going to include monetary indicators such as salary, income from self-employment, real-estate, and bank credits paid. The latter variable is a proxy for the debt liabilities that are important for the evaluation of the eligibility of the family for the benefit. I assume that the outstanding credit liabilities are correlated with past payments since the family reports the amount paid during the year of the survey and might still have debts to pay.

Below is the table which presents basic descriptive statistics of the crucial household-level monetary indicators in thousands of drams (Armenian currency). They, as I mentioned about the family benefits before, are adjusted for yearly inflation and calculated in per member terms (weighted according to the OECD equivalence scale). Only nonzero values are taken into account for statistics calculation. There are many zero-values in the main variable of interest (the dependent variable), family benefits, which is a call for employing a Limited Variable Model for the estimation. I am going to discuss the methodology in detail in the next chapter. Some extreme outliers were filtered out and the table presents the values after cleaning.

Table 3.1. Descriptive statistics of household-level per-member monthly (except for the total amount of debt) monetary indicators, thousand drams

variable	Ν	mean	sd	p50	min	max	N of Os
Family benefit	3822	10.7	3.1	10.5	0.6	27.0	29908
Expenditures on heating	30872	48.0	28.2	42.3	1.7	666.7	2861
Salary	17348	61.8	53.7	47.4	0.4	682.3	16384
Self- employment	3268	49.9	43.8	36.9	0.4	399.2	30465
Real-estate	172	32.6	28.1	21.7	1.0	121.5	33554
Bank credits paid	3108	10.4	19.3	5.7	0.1	388.9	30624
External remittances	10343	35.4	39.6	24.9	0.0	1486.1	23390
Internal remittances	7802	8.3	14.4	3.3	0.1	266.6	25931

The graph below demonstrates how many zero values there are in the data. This is the sign that the data is censored and needs to apply an appropriate estimation procedure for the limited variables.



Figure 3.3. Remittances and family benefits plot

Also interesting is that 1% of the families fund their expenses from the family benefits only; 5.3 % receive remittances as their only source of income.

As expected, the distribution of the monetary indicators is skewed to the left, see the graph below. This might be the call for using them in logarithmic terms. Family benefits are the most normally distributed, so I am experimenting with both logarithmized and original forms of the latent variables. Once again, only non-zero values are presented on the graph for visibility matters. Otherwise, all the values clutter at zero.

All the monetary indicators variables that will come into regressions simultaneously as independent variables are uncorrelated, which is a good sign (see table A.1 in

Appendix A). Levels of significance are presented under the correlation coefficients.



Figure 3.2. Distribution of the monetary indicators

In the sample 10343 families or 30.7% report receiving international remittances and 7802 or 23% report receiving internal transfers. Descriptive statistics are presented in the first table too. For this analysis, I decided to take both of these indicators and not the total sum to track the effects separately. The correlation between international remittances and family benefits is negative and significant, while regional remittances and benefits have a positive association.

In the sample, among those who answered the question, 11% of individuals have migrated at least once during the past four years, and one-third of them have returned. 65% of migrants went to Russia 2.5% to Europe, almost 8% to the Nagorno-Karabakh region. Approximately 22% moved to other regions in Armenia. Among the reasons for migration, 54% indicated work, 11.5 – family reasons or visit, 3.7 – studying. 52% of migrants reported having sent remittances (in cash or in-kind) to family or friends.

I am going to use past values of migration as an instrument for remittances (I will discuss the process in the methodology in the next chapter). I will only control for past migration. Luckily there is a question in the methodology that asks individuals about the year they migrated. The table below represents the distribution of this migration by years.

For the estimation, I am going to use only past values of migration, ignoring migrants who migrated the same year the survey was conducted.

There is a positive and very significant correlation between migration and remittances.

I will also use basic household characteristics such as age, sex, education, marital status, and others the descriptive statistics of which can be found in Appendix B.

In what year did		year of the survey								
the migrant migrate?	2011	2012	2013	2014	2015	2016	Tota			
2008	191	6	4	1	0	11	213			
2009	426	78	9	1	0	14	528			
2010	997	248	120	12	0	13	1,390			
2011	1,347	602	219	94	0	6	2,268			
2012	0	738	659	269	100	17	1,78			
2013	0	0	667	672	267	120	1,720			
2014	0	0	0	784	602	227	1,61			
2015	0	0	0	0	628	683	1,31			
2016	0	0	0	0	0	763	763			
Total	2,961	1,672	1,678	1,834	1,597	1,869	11,61			

Table 3.2. Distribution of migration by years

Chapter 4

METHODOLOGY

In order to answer the research question, I am going to use two main model specifications. First, logistic regression is going to be used to estimate the probability of receiving the benefit of the family. The estimation is going to be conducted in 2 stages. Remittances are expected to be endogenous since families might decide to migrate and send remittances if they feel vulnerable but cannot receive additional help from the government. In fact, some researchers have found out that social benefits do in fact impact remittances (negatively) (La and Xu 2017; Murrugara 2002). For more details about the "crowding-out" effect please see the literature review part above. Unfortunately, cross-sectional data has a big drawback when it comes to simultaneity bias, as I cannot use past values of remittances. To cope with the simultaneity bias, I am going to instrument remittances with migration as Rozelle, Taylor, and deBrauw (1999) suggest. In their paper, where they estimated the agricultural productivity in China, they used a third stage and instrumented migration since it, in the same manner as remittances, is affected by the fact of receiving family benefits and the amount of them. Luckily, in the ILCS there is a question about the past migration the descriptive statistics of which was presented in the previous chapter. I am going to employ this variable and include only values of migration in the past (specifically, the number of people in the household that migrated before the survey was conducted). Since all the monetary income is recorded on a monthly basis and only in the year the survey is conducted, migration is expected to be unconditional of family benefits. On the contrary, the decision to migrate might be affected by the expectations of receiving family benefits, but this is beyond the scope of this research and is a potential improvement for the future study. I try lags of remittances as instruments too (by marz and type of settlement (urban/rural) that I calculated using survey data).

So, the first model may be formally presented in the following way:

$$P = \Pr[y_i = 1 | x_i, Remittances_i] == F(x_i'\beta_x + Remittances_i'\beta_R)$$
$$= \frac{\exp(x_i'\beta_x + Remittances_i'\beta_R)}{1 + \exp(x_i'\beta_x + Remittances_i'\beta_R)'}$$
(1)

where P is the probability of receiving the benefit (1 = Yes, 0 = No), x_i is the vector of all other explanatory variables except remittances, $Remittances_i$ is the predicted value of remittances from the first stage. β 's are the estimated coefficients and *i* is the subscript for a household unit.

The marginal effects are not as straightforward as in the OLS model and depend on the values of the independent variables. See the derivation of the derivative of P with respect to x_i below.

$$\frac{\partial P}{\partial x_i} = \frac{e^{x'\beta}}{(1+e^{x'\beta})^2}\beta_i \tag{2}$$

Usually, the marginal effects are estimated as the average marginal effects or at means (less often since the dummy variable cannot be estimated at means) or at specific values. We are going to focus on the average marginal effects (AME).

Formally, the first stage can be presented in the following way:

$$Remittances_i = \beta'_x \cdot x_i + \beta'_M \cdot Migration_i + \epsilon_i, \tag{3}$$

where x_i is the vector of all the exogenous explanatory variables. I am going to employ the ordinary least squares model for the first stage.

For robustness check, I am also using a linear probability model, which is basically the ordinary least squares approach for estimating the probability. It is also going to be conducted in 2 stages.

In order to estimate the amount of money received from family benefits by the household, I am employing the Tobit model, which was designed for the limited variable estimation by Tobin in 1958. Only 12% of families report receiving the benefits, meaning there are a lot of zero values which means that the problem with the censored (non-negative) data is present in our estimation which might lead to the wrong estimated coefficient if the OLS is used. In our case, the data is censored at zero since the family cannot receive a negative amount of family benefits. I am also instrumenting remittances with migration as in the stage for the probability estimation. Formally the problem can be presented in the following way:

$$Family_benefits_{i}^{*} = \beta'_{x} \cdot x_{i} + \theta'_{M} \cdot Remittances_{i} + \epsilon_{i},$$

$$Family_benefits_{i} = 0 \text{ if } Family_benefits_{i}^{*} \le 0,$$
(4)

 $Family_benefits_i = Family_benefits_i^* if Family_benefits_i^* > 0$

Let's follow the methodology described by Tobin in his paper (1958). First, let's define L as the limit for the latent (dependent) variable, x as a value of the dependent variable, FB as Family_benefits (dependent variable).

$$F(x; \widehat{FB}, L) = 0, if \ x \le L,$$

$$F(L; \widehat{FB}, L) = Q\left\{\frac{\widehat{FB} - L}{\sigma}\right\},$$

$$F(x; \widehat{FB}, L) = Q\left\{\frac{\widehat{FB} - x}{\sigma}\right\}, if \ x > L$$
(5)

where Q(x) = 1-P(x), where P(x) is the cumulative distribution function (CDF) at x.

The probability density function (PDF) looks the following way:

$$f(x;\widehat{FB},L) = \frac{1}{\sigma}Z\left\{\frac{\widehat{FB}-x}{\sigma}\right\}, if \ x > L$$
(6)

where Z(x) is the values of the PDF at x.

As defined by Tobin the expected values of the latent variable equals to

$$FB = LQ\left\{\frac{\widehat{FB} - L}{\sigma}\right\} + \int_{L}^{\infty} \frac{x}{\sigma} Z\left\{\frac{\widehat{FB} - x}{\sigma}\right\} dx =$$
$$= LQ\left\{\frac{\widehat{FB} - L}{\sigma}\right\} + FB\int_{-\infty}^{\frac{\widehat{FB} - L}{\sigma}} Z(x)dx + \sigma\int_{-\infty}^{\frac{\widehat{FB} - L}{\sigma}} - xZ(x)dx =$$
$$= LQ\left\{\frac{\widehat{FB} - L}{\sigma}\right\} + \widehat{FBP}\left\{\frac{\widehat{FB} - L}{\sigma}\right\} + \sigma Z\left\{\frac{\widehat{FB} - L}{\sigma}\right\}$$

The Tobit model employs maximum-likelihood estimation and coefficients of the regression cannot be used for inference. As in the Logit and Probit models, one should compute marginal effects, either average or at means.

The derivation of the marginal effects for the censored latent variable are well represented by Greene (2003) and were proved to be

$$\frac{\partial E[FB|\mathbf{x}]}{\partial \mathbf{x}} = \beta \times \operatorname{Prob}\left[L < \widehat{FB}\right]$$
(8)

If the censoring is at zero values and disturbances are normally distributed, then the marginal effects may be expressed in the following way:

$$\frac{\partial E[FB_i|\mathbf{x}_i]}{\partial \mathbf{x}_i} = \beta \Phi(\frac{\mathbf{x}_i'\beta}{\sigma}) \tag{9}$$

where Φ denotes CDF (to keep the notations consistent with the literature).

The general appearance of the log-likelihood function for the Tobit model is represented below:

$$\ln L = \sum_{FB_i > 0} -\frac{1}{2} [\log (2\pi) + \ln \sigma^2 + \frac{(FB_i - \mathbf{x}'_i \boldsymbol{\beta})^2}{\sigma^2}] + \sum_{FB_i = 0} \ln [1 - \Phi(\frac{\mathbf{x}'_i \boldsymbol{\beta}}{\sigma})]$$
(10)

I using OLS for robustness checks, applying it only to the non-negative values of the dependent variable.

Also, in order to catch the effect of remittances on family benefits in different quantiles, I am employing a quantile regression.

Unlike OLS, quantile regression estimates different parameters for different quantiles. It minimizes the errors using different weights.

Formally the minimization procedure can be presented as a function below:

$$Q(\beta_q) = \sum_{i:y_i \ge x_i'\beta}^N q|y_i - x_i'\beta_q| + \sum_{i:y_i < x_i'\beta}^N (1-q)|y_i - x_i'\beta_q|$$
(11)

where q stands for a quantile.

For the robustness check, I am using the dependent variables in non-logarithmic form. I also used different instruments for the first stage of the estimation and took the share of families that receive remittances and a particular marz and in particular type of settlement (urban/rural).

Since the problem with heteroskedasticity is very likely in our case, I am also clustering the standard errors by marz. Please see the scatterplot for the distribution of family benefits by remittances and marz. This evidence indicated a slight improvement in the variance unconditionality.

Chapter 5

RESULTS

The estimation is done according to the methodology described in the previous chapter. The results of the regression analysis can be found in the tables below.

In the first stage, I estimated the receipt of remittances as a function of all the exogenous explanatory variables and past migration. I decided to split the effects into two groups – internal and international remittances and, in turn, use regional and international migration as instruments. The effects of the main explanatory variables are very statistically significant. The economic effect is also very significant – one additional member abroad brings on average an additional 78.9% of remittances. For regional migration, the effect is smaller but still very significant – one more internal migrant in the family can increase household remittances by 8.3%. The effect might be smaller due to the lower amount of internal remittances and a fewer fraction of regional migrants who send remittances back home comparing to international migrants.

For the first stage, I used the OLS model and the results can be seen in table 5.1. In the model, there are also included other variables that are not of interest but play rather as control variables. Those include social groups of the family members, various interaction terms with age, sex, education, also the type of settlement (urban, rural), type of housing (own house, apartment, hostel or railcar), animals possession such as cattle, horses, poultry, pigs, agricultural machinery possession, income from the real-estate operations, car possession and health self-evaluation.

	(1) External remittances OLS	(2) Internal remittances OLS
International migration	0.789*** (48.03)	
Regional migration		0.083*** (4.68)
Age (head)	0.015*** (3.56)	-0.045*** (-20.07)
Sex (head)	0.045 (1.56)	0.020 (1.29)
rural	-0.036 (-1.60)	-0.074*** (-6.11)
Education (head)	0.023** (3.26)	0.015*** (4.03)
Log (salary)	-0.325*** (-14.66)	0.001 (0.07)
Log (self-employment income)	-0.408*** (-10.08)	-0.004 (-0.17)
Log (credits paid to banks)	0.034** (2.62)	-0.007 (-0.94)
Dwelling conditions	0.261*** (21.56)	-0.013* (-2.04)
constant	-1.365 (-0.16)	-6.771 (-1.43)
Ν	33465	33465
R-sq adj. R-sq	0.230 0.228	0.168 0.166
t statistics in parentheses * $p \le 0.05$ ** $p \le 0.01$ *** $p \le 0.001$		

Table 5.1. Regression output for the first stage estimation of external and internal remittances

Note: other variables included in the regressions: social groups of the family members, interaction term with age, sex, education, type of settlement, type of housing, animals, agricultural machinery, real-estate income, car possession, health self-evaluation.

I have presented both IV models and non-instrumented regressions for estimation of the probability of receiving remittances. Instrumented and one-stage LPM show very similar results in terms of coefficients' magnitude for exogenous variables but different for remittances. Instrumented remittances bring statistically significant results and the coefficients are larger (though still quite small when it comes to economic interpretation). Marginal effects for Logit estimation shows a bigger effect of international remittances and insignificant for the internal ones independent of whether IV was implemented or not.

Remittances affect the probability of receiving family benefits negatively which is in line with the literature. Though the magnitude is small since the remittances are put in the logarithmic terms, 50% more remittances on average decrease the probability of receiving the benefit only by approximately 1.5% for international remittances using logistic regression and the effect in even smaller for the linear probability model. An interesting result is that families that live in rural areas are less likely to receive the benefits, which contradicts the literature and the economic sense.

One more unexpected effect is observed for the possession of tractor trailers. The effect is positive and significant, leading to the conclusion that one additional tractor in the households is responsible for approximately 10-11% increase in the propensity of receiving family benefits. This might be due to the link between this kind of machinery ownership and poverty. For instance, a family might possess an old tractor trailer and use it for their own food production if they cannot afford to buy all the food on the market.

All other variables have the estimated effects that are in line with legislation and literature.

	(1)	(2)	(3)	(4)
	LPM (IV)	LPM	Logit AME (IV)	Logit AME
predicted Log (External remittances)	-0.026***		-0.031***	
	(-6.00)		(-6.87)	
predicted Log (Internal remittances)	-0.022		-0.044	
	(-0.26)		(-0.47)	
Log (External remittances)		-0.011*** (-9.48)		-0.010*** (-9.10)
Log (Internal remittances)		-0.002 (-0.71)		-0.000 (-0.07)
children	0.427*** (25.04)	0.423*** (33.94)	0.340*** (19.66)	0.333*** (30.60)
Cars	-0.068*** (-16.45)	-0.068*** (-17.01)	-0.084*** (-16.96)	-0.085*** (-17.52)
Log (salary)	-0.068*** (-13.95)	-0.063*** (-13.49)	-0.009 (-1.73)	-0.002 (-0.33)
Log (self-employment income)	-0.032*** (-3.64)	-0.024** (-2.88)	0.014 (1.38)	0.023* (2.38)
Cattle	-0.005*** (-6.95)	-0.005*** (-7.04)	-0.009*** (-8.12)	-0.009*** (-8.16)
Sheep/goat	-0.001*** (-3.48)	-0.001** (-3.23)	-0.002** (-3.20)	-0.002** (-2.99)
Tractor trailer	0.109*** (4.15)	0.106*** (4.09)	0.110*** (4.54)	0.106*** (4.53)
Dwelling conditions	-0.015*** (-4.88)	-0.019*** (-7.45)	-0.009** (-3.05)	-0.014*** (-6.25)
constant	-23.02*** (-12.25)	-22.58*** (-12.45)		
N R-sq adj. R-sq	33465 0.225 0.223	33465 0.226 0.224	33444	33444

Table 5.2. Results of estimating the probability of receiving family benefits (1=Yes, 0=No)

t statistics for LPM and z statistics

for Logit in parentheses

<u>* p<0.05</u>, ** p<0.01, *** p<0.001

Note: other variables included in the regressions: social groups of the family members, interaction terms with age, sex, education, type of housing, animals, agricultural machinery, real-estate income, health self-evaluation, expenditures on credits.

Next, let's look at the results of the estimation of the amount of the family benefits receipt.

The model which was used for this stage of the estimation is the Tobit model with IV. In table 5.3, I represented both instrumented and non-instrumented estimation results.

The effects still have very little economic significance. For example, a 50% increase in the remittances on average decreases the receipt of social benefits only by 3.7%. The marginal effect is even smaller for the non-instrumented model.

Dummy for rural/urban settlement still stays in on the negative side, meaning that families that leave in rural areas receive less additional money from the government. Salary suddenly became insignificant, but on the other hand, the effect of animal ownership became more significant. Possessing harvest combain has a very big and significant negative association with family benefits – families that own a combain should not receive benefits at all since the coefficient is larger than one (the dependent variables is presented in the logarithmic form). It makes no sense to interpret the absolute value of this coefficient since family benefits cannot be negative. All other variables have expected effects that correspond to the legislation and literature.

	(1) Tobit AME (IV)	(2) Tobit AME
predicted Log (External remittances)	-0.074*** (-6.93)	
predicted Log (Internal remittances)	-0.249 (-1.14)	
Log (External remittances)		-0.022*** (-8.88)
Log (Internal remittances)		-0.000 (-0.10)
children	0.846*** (20.03)	0.806*** (28.63)
rural	-0.040* (-2.10)	-0.020 (-1.95)
Cars	-0.200*** (-16.96)	-0.198*** (-17.32)
Log (salary)	-0.021 (-1.71)	-0.003 (-0.30)
Cattle	-0.019*** (-7.48)	-0.017*** (-7.24)
Fish	-0.158*** (-75.37)	-0.162*** (-75.43)
Sheep/goat	-0.005*** (-3.52)	-0.004** (-3.23)
Grain separator	-1.814*** (-75.37)	-1.755*** (-75.43)
Harvest combain	-1.893*** (-75.37)	-1.880*** (-75.43)
Tractor trailer	0.209*** (3.88)	0.209*** (4.00)
Truck	0.093* (2.21)	0.084* (2.08)
Dwelling conditions	-0.019** (-2.84)	-0.030*** (-5.66)
N	33461	33461

Table 5.3. Results of estimating the receipt of family benefits

* p<0.05, ** p<0.01, *** p<0.001

Note: other variables included in the regressions: social groups of the family members, interaction terms with age, sex, education, type of housing, animals, agricultural machinery, real-estate income, health self-evaluation.

In table 5.4, the results of the quantile regression are represented. I used both log form and original for the dependent variable. Family benefits are originally represented in thousands of drams per household member. Interesting is that the effect of remittances decreases the bigger the family benefits receipt is. Also, internal remittances became very significant (economically) since the estimated coefficient is more than one.

	(1)	(2)		
	Log (Family benefits)	Family benefits		
q10				
predicted Log (External remittances)	-0.123***	-0.818***		
	(-6.22)	(-6.17)		
predicted Log (Internal remittances)	1.088***	8.450***		
	(13.82)	(16.68)		
q25				
predicted Log (External remittances)	-0.111***	-0.856***		
	(-6.52)	(-7.39)		
predicted Log (Internal remittances)	1.145***	10.44***		
	(31.90)	(17.65)		
q50				
predicted Log (External remittances)	-0.084***	-0.812***		
	(-5.50)	(-5.04)		
predicted Log (Internal remittances)	1.053***	11.13***		
	(31.86)	(28.34)		
q75				
predicted Log (External remittances)	-0.067***	-0.756***		
	(-3.93)	(-4.73)		
predicted Log (Internal remittances)	0.848***	10.27***		
	(19.97)	(21.86)		
q90				
predicted Log (External remittances)	-0.068**	-0.838***		
	(-2.98)	(-6.61)		
predicted Log (Internal remittances)	0.721***	8.839***		
	(10.33)	(16.84)		
N	3800	3802		
t statistics in parentheses	* p<0.05, ** p<0.01, *** p<0.001			

Table 5.4. Results of estimating the receipt of family benefits, quantile regression

Similarly to international remittances, the negative effect of regional transfers tends to decrease with the amount of family benefits receipt. Probably, those families that receive a large amount of family benefits are so vulnerable, that the amount of remittances does not affect the decision of the government, or they hide the fact of receiving additional income.

Robustness check results in Appendix D show that clustering does not help to improve the significance of the Tobit model results. However, OLS estimated for the non-negative independent variable (also clustered) show a bigger negative but still not very economically significant effect on family benefits.

Using different proved not to improve the results – predicted remittances using the history of remittances in the region and settlement are not significant in the regressions results.

Chapter 6

CONCLUSIONS

In this research, I was interested in the effect of remittances on the family benefits in Armenia. This country has a long history of migration and a big inflow of remittances – approximately 12% to the GDP according to the World Bank data. Armenia is considered being a lower-income country with a lot of people living in poverty. In order to help the poor, in 1999 the government have developed a social benefits system which is a means-based self-identification system. Though almost 12% of the households (according to the Integrated Living Conditions Survey in 2011-2016) report receiving some amount of social benefits, only 27% are certain that the system is fair and 37% think that the majority of people who receive poverty benefits are really vulnerable.

In order to predict the probability and amount of social benefits, I looked in the local legislation which regulates the system and used all the crucial household characteristics for the estimation adding remittances as additional income. The findings showed that remittances play a small role as a substitute for family benefits.

The expectations were that people perceive remittances as additional insurance and stop applying for the benefits once they feel secured or are rejected once they buy goods that might reveal their real conditions. The effects found were negligible, showing that those who receive a significant amount of remittances might also receive additional help from the government keeping all other things equal.

Quantile regression, however, showed economically significant results, but mostly for internal remittances as 1% increase in internal remittances leads to more than

1% decrease in family benefits receipt. However, the effect fades out as the amount of family grows.

These results might be the indicator that the system most probably needs improvement in the process of evaluating the needs of the family for help. Once again, the system is aimed at helping poor families that cannot provide for themselves. Giving benefits in the form of services might not solve the problem since this type of transfers can create additional administrative costs, and increase waiting time for those who are really in need.

Improvements in the system could allow better targeting of the transfers as well as reducing government spending. The only possible way to improve targeting which can be proposed here is to better the process of family evaluation.

Of course, this research is somewhat limited in the estimation procedure and its results since I do not take into account the threshold of the poverty in Armenia – probably, those families that receive family benefits properly are studied and deserve their benefits since they are so penniless that even additional amount of remittances does not affect the government decision of paying the benefits. Also, to catch the effect to its full extent it would be useful to evaluate the relationship on the macro level as other authors have already done for other countries. However, these ideas are an impetus for future research.

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APPENDIX A

CORRELATION MATRIX

	Family benefit	Expend. on heating	Salary	Self-employ- ment	Real-estate	Bank credits paid	External remittances	Internal remittances
Family benefit	1							
Expenditures on								
heating	-0.068	1						
	0.000							
Salary	-0.208	0.094	1					
	0.000	0.000						
Self-employment	-0.053	0.070	-0.063	1				
	0.000	0.000	0.000					
Real-estate	-0.018	0.022	0.021	0.013	1			
	0.001	0.000	0.000	0.019				
Bank credits paid	-0.037	0.015	0.062	0.043	-0.004	1		
	0.000	0.007	0.000	0.000	0.513			
External remittances	-0.004	0.085	-0.245	-0.084	0.015	-0.006	1	
	0.464	0.000	0.000	0.000	0.005	0.303		

Table A.1. Correlation between monetary indicators in logarithmic terms (shaded are significance levels)

APPENDIX B

DESCRIPTIVE STATISTICS

Table B.1. Descriptive statistics of some explanatory variables

	stats	mean	sd	p50	min	max
	children	0.14	0.18	0.00	0.00	0.80
	Bad	0.34	0.64	0.00	0.00	6.00
Ч	Good	1.39	1.73	1.00	0.00	18.00
lealt	Neither good nor bad	1.54	1.63	1.00	0.00	13.00
Т	Very bad	0.03	0.17	0.00	0.00	4.00
	Very good	0.23	0.82	0.00	0.00	9.00
	Age	0.52	0.70	0.00	0.00	4.00
	Child with one parent	0.02	0.20	0.00	0.00	5.00
	Child of divorced parents	0.02	0.19	0.00	0.00	5.00
	orphan	0.00	0.05	0.00	0.00	3.00
	Disabled	0.15	0.40	0.00	0.00	4.00
	Disabled category 1	0.09	0.31	0.00	0.00	3.00
	Disabled category 2	0.08	0.29	0.00	0.00	3.00
F	Disabled category 3	0.01	0.11	0.00	0.00	2.00
gory	Disabled child	0.01	0.07	0.00	0.00	2.00
ateg	Old age, never worked	0.00	0.06	0.00	0.00	2.00
al C	Loss of bread-winner pensioners	0.01	0.14	0.00	0.00	5.00
Soci	Partial	0.00	0.06	0.00	0.00	2.00
	Pregnant woman	0.01	0.12	0.00	0.00	2.00
	Privileged	0.01	0.10	0.00	0.00	2.00
	Single mother	0.00	0.07	0.00	0.00	3.00
	Single pensioner	0.00	0.07	0.00	0.00	2.00
	Student	0.08	0.32	0.00	0.00	4.00
	Unemployed	0.01	0.13	0.00	0.00	3.00
	Unemployed (<5 yrs till pension)	0.00	0.03	0.00	0.00	2.00
	For long service	0.02	0.16	0.00	0.00	2.00
	Age (head)	58.91	14.48	58.00	17.00	111.00
	Sex (head)	0.31	0.46	0.00	0.00	1.00

Table B.1 – Continued

stats	mean	sd	p50	min	max
rural	0.38	0.49	0.00	0.00	1.00
Car possession	0.27	0.45	0.00	0.00	1.00
Cattle	0.76	2.67	0.00	0.00	220.00
Sheep/goat	0.64	6.28	0.00	0.00	500.00
Tractor trailer	0.00	0.07	0.00	0.00	2.00

Note: Health and social category is measured as number of family members that report certain health evaluation or belong to certain categories; rural (1 = rural, 0 = urban); sex (1 = female); cattle, sheep/goat and tractor is measured as the number of items the household owns.

APPENDIX C

ROBUSTNESS CHECK

	(1)	(2)	(3)	(4)
	External	Internal	External	Internal
	remittances	remittances	remittances	remittances
	OLS	OLS	OLS	OLS
lag1 share of families that				
receive external	2.388***			
remittances				
	(16.08)			
lag1 share of families that				
receive internal		0.589***		
remittances				
		(6.10)		
lag2 share of families that				
receive external			2.421***	
remittances			(1 (0 0)	
			(14.04)	
lag2 share of families that				
receive internal				0.41/***
remittances				(2, 70)
	21 46*	20 42**	110 1***	(3.70)
constant	51.40°	-20.43^{**}	118.1^{+++}	-21.64^{+}
	(2.46)	(-2.98)	(0.39)	(-2.20)
Ν	25713	25713	20629	20629
R-sq	0.179	0.161	0.179	0.160
adj. R-sq	0.177	0.158	0.176	0.157
t statistics in parentheses	* t	o<0.05. ** p<0	0.01. *** p<0.0	01

Table C.1. Estimation result	s using past	values	of share	of	families	in	the	region
receiving remittances as instr	uments							

	(1)	(2)	(3)	(4)	(5)	(6)
	LPM	LPM	LPM	Logit	Logit	Logit
	(IV)	(IV)	(IV)	AME	AME	AME
				(IV)	(IV)	(IV)
predicted Log (External remittances)	-0.026***			-0.031***		
,	(-6.00)			(-6.87)		
predicted Log (Internal remittances)	-0.021			-0.044		
remittances)	(-0.26)			(-0.47)		
predicted Log (External remittances_lag1)		-0.019			-0.016	
remittances_tagt)		(-1.54)			(-1.47)	
predicted Log (Internal remittances lag1)		0.069			-0.030	
1011111111000_1051)		(1.10)			(-0.58)	
predicted Log (External remittances_lag2)			-0.010			-0.002
1. 1 1			(-0.73)			(-0.16)
(Internal remittances lag2)			0.094			-0.019
			(0.91)			(-0.22)
constant	-23.02***	-14.54***	-17.38***			· · ·
	(-12.25)	(-5.25)	(-4.27)			
Ν	33465	25713	20629	33444	25696	20616
R-sq	0.225	0.240	0.243			
adj. R-sq	0.223	0.237	0.240			
t statistics inparentheses	* p<0.05, ** p<0.01, *** p<0.001					

Table C.2. Estimation results using predicted remittances

	(1) Tobit AME (IV)	(2) Tobit AME (IV)	(3) Tobit AME (IV)			
predicted Log (External remittances_lag1)	-0.034					
	(-1.30)					
predicted Log (Internal remittances_lag1)	-0.056					
_ 0 /	(-0.45)					
predicted Log (External remittances_lag2)		-0.005				
		(-0.18)				
predicted Log (Internal remittances_lag2)		-0.124				
		(-0.59)				
predicted Log (External remittances)			-0.073***			
,			(-6.93)			
predicted Log (Internal remittances)			-0.249			
,			(-1.14)			
N	25710	20627	33461			
t statistics in parentheses	* p<0.05, ** p<0.01, *** p<0.001					

Table C.3. Estimation results using predicted remittances, family benefits in log form as dependent variable

	(1) Tobit AME (IV)	(2) Tobit AME (IV)	(3) Tobit AME (IV)		
predicted Log (External	-0.373***				
remittances)	(-7.45)				
predicted Log (Internal	-1.366				
remittances)	(-1.34)				
predicted Log (External remittances lag1)		-0.178			
Territorio (_mg1)		(-1.45)			
predicted Log (Internal remittances lag1)		-0.292			
- 07		(-0.50)			
predicted Log (External remittances lag2)			-0.0438		
- 07			(-0.32)		
predicted Log (Internal remittances lag2)			-0.552		
			(-0.57)		
Ν	33461	25710	20627		
t statistics in parentheses	* p<0.05, ** p<0.01, *** p<0.001				

Table C.4. Estimation results using predicted remittances, family benefits in original (non-log) form as dependent variable

	(1)	(2)	(3)	(4)
	LPM (IV)	Logit AME (IV)	LPM	Logit AME
predicted Log (External remittances)	-0.026***	-0.031***		
	(-5.32)	(-7.98)		
predicted Log (Internal remittances)	-0.021	-0.044		
,	(-0.60)	(-1.05)		
Log (External remittances)			-0.010*	-0.009*
,			(-2.27)	(-2.40)
Log (Internal remittances)			-0.001	-0.000
constant	-23 02**		(-0.26) -22 58**	(-0.03)
constant	(-3.61)		(-3.56)	
Ν	33465	33444	33465	33444
t statistics in parentheses		* p<0.05, ** p<	0.01, *** p<0	0.001

Tables C.5. Estimation results after clustering

	(1)	(2)	(3)	(4)
	Log (Family	Log (Family	Family	Family
	benefit)	benefit)	benefit	benefit
predicted Log (External remittances)	-0.073***		-0.373***	
	(-7.62)		(-8.13)	
predicted Log (Internal remittances)	-0.249		-1.366*	
	(-1.83)		(-2.14)	
Log (External remittances)		-0.022*		-0.110*
,		(-2.34)		(-2.47)
Log (Internal remittances)		-0.000		-0.000
,		(-0.04)		(-0.00)
Ν	33461	33461	33461	33461
t statistics in parentheses	* p<	<0.05, ** p<0.01,	*** p<0.001	

Tables C.5. Estimation results after clustering, Tobit model

(1)	(2)	(3)	(4)	
Log (Family	Log (Family	Family	Family	
benefits)	benefits)	benefits	benefits	
-0.136***		-1.255***		
(-7.60)		(-7.97)		
-0.765*		-8.265**		
(-2.73)		(-3.55)		
	-0.020***		-0.186***	
	(-9.40)		(-9.87)	
	0.013*		0.161*	
	(2.32)		(2.70)	
-17.11**	-10.12	-178.2**	-104.9	
(-3.18)	(-1.57)	(-3.61)	(-1.78)	
3800	3800	3802	3802	
* p<0.05, ** p<0.01, *** p<0.001				
	(1) Log (Family benefits) -0.136*** (-7.60) -0.765* (-2.73) -17.11** (-3.18) 3800 * p<	$\begin{array}{c cccc} (1) & (2) \\ \text{Log (Family benefits)} & \text{Log (Family benefits)} \\ \hline & -0.136^{***} \\ (-7.60) \\ & -0.765^{*} \\ (-2.73) \\ & -0.020^{***} \\ (-9.40) \\ & 0.013^{*} \\ & (2.32) \\ -17.11^{**} & -10.12 \\ (-3.18) & (-1.57) \\ \hline & 3800 \\ & 3800 \\ & * p < 0.05, ** p < 0.01, \end{array}$	$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	

Tables C.6. Estimation results for OLS (non-negative values as dependent variables)

APPENDIX D

REGIONAL SCATTERPLOTS



Figure D.1. Scatterplots of remittances and family benefits by region