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# Are Remittances a ‘Catalyst’ for Financial Access? Evidence from Mexico<sup>1</sup>

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## Abstract

In policy discussions, it has frequently been claimed that migrants’ remittances could function as a ‘catalyst’ for financial access among receiving households. This paper provides empirical evidence on this hypothesis from Mexico, a main receiver of remittances worldwide. Using the Mexican Family Life Survey panel (MxFLS) for 2002 and 2005, the results from the treatment-effect-model at household level show that a change in remittance status has an important impact on ownership of savings accounts and the availability of borrowing options. This effect is significant for rural, but not for urban households and important for microfinance institutions, but not for traditional banks.

Keywords: Remittances, Mexico, Financial Access, Microfinance

JEL Classification: G21, O16, F24

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## Introduction

More than 10 percent of Mexico's circa 110 million population live outside their country of birth, forming the largest group of immigrants in the US (Pew 2009). With more than 22 billion USD of remittances transferred by Mexican migrants to their home country in 2009, Mexico is one of the main receivers of remittances worldwide, after China and India (World Bank 2011). Despite a 16 percent decrease following the US financial crisis in 2008, remittances play an important role for in Mexican economy. They were about the same size as foreign direct investment to Mexico in 2008 and contributed to 2.4 percent of Mexican GDP (World Bank 2010). At the regional level, remittances are even more important: Michoacán und Zacatecas, the states with the highest emigration rates, had an income of remittances to GDP of 13.2 percent and 9.2 percent in 2006 (Banco de México 2007).

My research turns around a question, which has - although popular in policy discussions - received relatively little attention in the academic literature: Remittances and access to financial services among receivers. Looking at the direct effects of remittances on households and the use of these funds alone ignores important aspects of how remittances influence receiving countries. This paper draws attention to some of these indirect effects of remittances on the economies of receiving countries via financial intermediation. Moreover, it aims to improve the understanding of financial markets in developing countries, and how they relate to financial management of migrant households.

A large part of the population in developing countries has no access to financial services. In most Latin American countries, only one-fourth of the population owns savings accounts, compared to shares above 90 percent for most Western European countries (Honohan 2008). The lack of access to financial services among poor households limits their strategies for risk management and asset accumulation. Poor households often save cash or in the form of fixed assets like land and cattle and they have limited opportunities of receiving credits from formal financial institutions in order to face unforeseen shocks, finance larger purchases or to invest in small businesses (for a general discussion see Armendáriz de Aghion/Murdoch (2005) and for a literature review focusing on rural markets see Conning/Udry (2005). In Mexico, as in many other countries, many

remittance-receivers belong to the lower-income groups excluded from the (mainstream) financial system. Remittances are in most cases sent and received in cash, and are generally not regarded as a means of accessing other financial services, like credits. In this context, linking remittances with additional financial services can have positive indirect effects on receiving countries and has therefore become an important issue on the policy agenda (see for example Orozco 2004; Terry and Wilson 2005; Orozco and Fedewa 2006). First, receivers themselves may benefit from more efficient options of asset building through access to financial services. Beyond these direct benefits to receivers, linking remittances with financial services has potentially wider economic effects. Savings from remittances can be channeled to their most productive use and be matched with the demand for credit elsewhere, and also benefit those who do not receive remittances themselves. There is wide consensus among development economists that financial institutions play a crucial role in the process of economic development (see Levine 1997 for an overview). Cross-country studies have shown that a relative increase in savings and credit is associated with an increase in growth and per capita income (Goldsmith 1969; King and Levine 1993; Beck et al. 2000b, a). Access to financial services is a key dimension of financial development, because a more inclusive financial sector is capable of generating higher absolute levels of savings and investment, reduces dependence on foreign capital, and leads to more equitable development (Jalilian and Kirkpatrick 2002; Beck et al. 2007).

This paper is organized as follows: Section I summarizes the state of the art on remittances and financial intermediation. Section II introduces the Mexican Family Life Survey (MxFLS), a nationally representative panel data set at the individual and household level that allows combining information on remittances with access to and usage of financial services. Section III specifies the treatment-effect model of a change in remittance status on a change in financial access. Section IV discusses the results. I find an important impact of remittances on access to financial services, both measured as a change in ownership of savings accounts as well as on a change in the availability of borrowing options. This effect is important for rural households, but not significant for urban households and more important for microfinance institutions, than for commercial banks. The final section summarizes and interprets these findings.

## Remittances and Financial Access: State of the Art

In recent years, much research has been done on the manifold impacts of remittances on receiving countries<sup>2</sup>. This paper focuses on the indirect effects remittances have on receiving countries via financial intermediation, a debate strongly dominated by policy papers and practitioners' perspectives presenting case studies on financial institutions that have included remittances into their product portfolio and offer additional financial services to remittance receivers. Most of these case studies refer to institutions from the microfinance sector that focus on lower income clients (Orozco and Hamilton 2005; Hastings 2006; Orozco 2008). Their bottom line is that microfinance institutions match the profile of the typical clients of microfinance institutions better than those of commercial banks; and linking remittances with microfinance institutions therefore has important positive effects on receiving countries. While providing insights into the possibilities and potential of linking remittances with additional financial services, these studies allow little generalization of findings, do not systematically assess the remittance-receivers' demand

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<sup>2</sup> Research on the impact of remittances on the receiving countries has focused on reducing poverty (Adams and Page 2003), the creation of growth through multiplier effects (Durand et al. 1996; Glytsos 2002), and their ambiguous effects on inequality in remittance-receiving countries (Jones 1998; Koechlin and León 2006; Acosta et al. 2008; Arslan and Taylor 2010). More pessimist authors have criticized that remittances reduce incentives for productive investment of resources in the countries of origin, (Chami et al. 2003) may lead to a loss in international competitiveness through the appreciation of the exchange rate (Amueda-Dorantes and Pozo 2004b; Acosta et al. 2007), and are spent on luxury goods with few benefits for the local economy (Lipton 1980; Lazaar 1987; Binford 2003). Recently, more optimistic positions have dominated research. A number of studies have found empirical evidence that receivers of remittances spend a larger share of their income on education (Cox Edwards and Ureta 2003; Hanson and Woodruff 2003; Yang 2005; Görlich et al. 2007; Adams and Cuecuecha 2010), health (Amueda-Dorantes et al. 2007; Adams and Cuecuecha 2010) and entrepreneurship (Massey and Parrado 1998; Yang 2005; Woodruff and Zenteno 2007). Other studies have addressed the impact of remittances on the balance of payments of remittance-receiving countries (Buch et al. 2002; Sayan 2004; Bugamelli and Paternò 2005; Apana-Okello and Aguyo 2006; Sayan 2006). As a cyclical source of external finance, they help to stabilize the balance of payments and can play a strategic role in the prevention of financial crises. Also, in the wake of the recent global financial crises, remittances have proven to be more stable than other private capital flows like private lending, foreign direct investment or portfolio investment (Chami et al. 2009; Ratha and Mohapatra 2009).

for financial services or the success of such initiatives and do not quantify linkages between remittances and financial intermediation.

In spite of figuring so prominently in development policy, academia has remained relatively silent on the issue and few studies have systematically approached the impact of remittances on the financial sector. Using a panel data set of 99 countries from 1975 to 2003, Aggarwal et al. (2010) provide global-level evidence that remittances have led to deeper financial sectors in receiving countries, measured as savings and, to a lesser degree, credit in relation to GDP. Following a similar methodology, these findings were confirmed by Martinez-Pería et al. (2008) for Latin America, and by Gupta et al. (2009) for Sub-Saharan Africa. Several arguments as to why remittances could be beneficial to financial development are brought forward by these authors. First, through remittances, banks operating as transfer providers and previously unbanked remittance-receivers might 'get to know each other', paving the way for further financial services. Second, remittances may create demand for financial services from receivers, because remittances are sent periodically and receivers need a safe place to store their savings. Finally, banks can earn income from remittance fees, creating an incentive to locate bank branches near remittance-receivers (Aggarwal et al. 2010; Demirgüç-Kunt et al. 2011). Other authors stress cases where remittances might be accepted by financial institutions as a substitute for the lack of formal incomes (Orozco and Fedewa 2006). Cuecuecha/de la Rosa (2010) argue that changes in remittances not only affect income and poverty rates directly, but also indirectly by facilitating access to credit among receivers. Financial institutions paying remittances could build a financial history based on remittances for receivers who otherwise lack a formal income. Remittances could then be included as an additional income into a client's evaluation when requesting credit. Moreover, remittances are sent out of altruistic motives and tend to increase and stabilize households' income (Buch et al. 2002; Sayan 2004; Bugamelli and Paternò 2005); thereby reducing the default risk of credit takers. Because remittance receivers have additional 'insurance' in the form of remittances, they are less risky debtors from the bank's point of view.

Because remittances are sent out of altruistic motives and respond to families' needs, remittances could also function as a substitute for credit and insurance from formal financial institutions. Several studies underline that a large part of remittances is spent on

health and other ‘emergency’ spending (Amueda-Dorantes and Pozo 2004a; Amueda-Dorantes et al. 2007; Yang and Choi 2007). Remittance-receivers who demand financing – due to loss of work, illness or other sudden income shocks – are able to rely on an additional and relatively stable source of income, unavailable to non-receivers. Woodruff/Zenteno (2007) and Giuliano/Ruiz-Arranz (2009) explicitly argued that remittances function as a substitute for a lack of access to productive credits and play an important role in financing investment by micro-entrepreneurs. In this way, remittances compete with formal financial services, possibly reducing demand for credits and other financial products like insurance.

Studies on the impact of remittances on the financial sector – as other research on remittances that rely on time series Central Bank data – are constrained by the quality of macro data. First, reducing transfer costs for formal money transfers shifted transfers from unregistered informal channels (friends, families, couriers, others) to formal transfers (MTO, banks). Second, Central Banks follow different methods of data collection and have changed their methodologies over time. Part of the strong rise in remittances is therefore due to a formalization of remittance flows and changes in data registration (Luna Martinez (2005), see Tuirán et al. (2006) and Canales (2008) for a discussion of the Mexican case). Empirical research conducted with Central Bank data must be interpreted with caution, especially for time series.

Demirgüç-Kunt et al. (2011) took an alternative approach to studying the impact of remittances on financial development on a micro-level in their case study on Mexico. They crossed financial data with remittance data at the municipal level and found that the share of households receiving remittances in a municipality is correlated positively with deposits and, to a minor degree, with credits to GDP. In order to control for possible endogeneity between remittances and financial development (because a more developed financial sector might either induce the sending of more remittances or more migrants come from more financially developed regions), they additionally ran an instrumental variable regression using distance to railways as an instrumental variable for remittances.

This paper contributes to the research questions and findings pioneered by Demirgüç-Kunt et al. and Aggarwal et al. and includes important additional issues. First, the MxFLS

provides a data source at the individual and household level, including information on the migration history, monetary transfers and the financial service usage of households. This allows me to take into account a broader set of socioeconomic variables correlated with financial service usage and remittances and to differentiate the impact of remittances according to different groups. Unlike Demirgüç-Kunt et al., I do not lose information by aggregating data to the municipal level. Second, most research on the impact of remittances on the financial sector has been restricted to the impact of remittances on the commercial banking sector, because generally only institutions under national banking regulation report data to the national financial authorities. The MxFLS includes financial service usage on formal and informal financial services. This allows me to include the non-traditional banking sector in the analyses, and to differentiate the impact of remittances on the financial sector by different kinds of institutions. Especially for poorer households in rural areas, where much of the Mexican migration originates (in 2002, around 40 percent of remittance-receiving households lived in rural communities with less than 2,000 inhabitants, see below), non-traditional banking institutions are much more important, because commercial banks rarely open branches in rural communities. Third, the same households in MxFLS are followed over time, allowing me to exploit the panel structure of the data set by running regressions on the differenced data (what is the effect of a *change* in remittance status on a *change* in financial access status?) and control for pre-‘treatment’ differences across groups. This makes my analysis less vulnerable to endogeneity concerns.

## **The Data**

The MxFLS is a panel data survey jointly realized by the *Centro de Investigación y Docencia Económica* (CIDE) and the *Universidad Iberoamericana* in Mexico City. As a multi-thematic database, it allows the combination of information on financial service usage, migration histories, monetary transfers and a large number of additional socioeconomic characteristics of households and individuals. The raw data is organized in several thematic books. Data used for the present study rely on information from Book 1 (household consumption), Book 2 (information on type and value of assets owned by the household, household shocks related to health, job/income loss or natural disasters), Book 3a (ethnic composition, employment situation), Book 3b (migration history of household



members, transfers, use of financial services) and Book C (general household characteristics like the geographic location of the households and the number, gender and age of households members). MxFLS is a nationally representative sample of households that were selected under the criteria of national, urban-rural and regional representations on pre-established demographic and economic variables, undertaken by the National Institute of Geography Statistics and Information (*Instituto Nacional de Estadística, Geografía e Informática* INEGI). The approximate sampling size is 8,440 households with approximately 35,000 individual interviews in 150 communities throughout the Mexican Republic. Out of a total of four survey rounds that are planned until 2012, survey results for 2002 and 2005 were available at the time of writing. The same households in the MxFLS are followed over time, so that changes across time can be observed for each household. Some households fell out of the sample because they could not be located the second time period for various reasons (they migrated, were deceased, etc). New households entered the sample when households from 2002 split into different households in 2005 (when household members left the household e.g. in the case of marriage or when household members moved away for other reasons). I am interested in the change in the access to financial services from 2002 to 2005 and therefore use a balanced data set, where I only include the 7,572 households that have been observed at both time periods (868 households of the 2002 sample were not included in the 2005 sample, an attrition rate of 11.5 percent).<sup>3</sup>

Questions regarding the use of financial services were asked individually to all adult household members. Based on this information, I create a dummy variable that takes the value '1' when at least one household member owns a savings account with a financial institution (commercial banks, credit unions, savings banks or other formal or semi-formal institutions from the microfinance sector). Concerning credits, I proceed in the same way: The question of access to and use of credit are asked to individual household members. I create dummies for each household based on whether at least one household member knows a financial institution where he/she would be able to obtain a credit. A relatively large number of interviewees did not answer the questions on financial service usage and

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<sup>3</sup> See below for statistical measures that adjust for attrition bias

borrowing options, which reduces the number of observations available for the regression analysis (see Table 3 on the number of available observations for each of the variables).

Households are not asked about receiving international remittances directly, but this information can be constructed by combining questions on whether households received monetary transfers during the last year (and by whom) and whether they have family members that live abroad. If at least one household member has received monetary transfers from a family member living in the US during the last year, I classify this household as a remittance-receiving household.<sup>4</sup> According to these calculations, 6.1 percent of the households in 2002 received remittances and 6.8 percent of households in 2005. In 2002, 43 percent of the remittance-receiving households lived in rural communities with less than 2,000 habitants (the definition applied by the national statistics office INEGI for rural households).

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<sup>4</sup>In some cases, households could not be clearly classified into remittance-receiving households. Respondents only replied if they received transfers from a sibling, an uncle/aunt, parents, etc. For example, if a respondent has two brothers, one living in the US and another living in a different household in Mexico, it is not possible to know from the survey data whether the respondent received the transfer from the brother living in Mexico, or a different brother living in the US. I classify these households as remittance-receiving households, although there is some uncertainty in this classification and some of these transfers might actually be national remittances. Even so, I consider this variable to be a very good proxy for international remittances. The estimates for the share of remittance-receiving households based on this procedure are very similar to the estimates on remittances from other sources. According to (Esquivel and Huerta-Pineda 2007), estimations based on ENIGH 2002 (*Encuesta Nacional de Ingreso y Gasto de los Hogares*, a biannual household survey realized by the Mexican Statistics Institute INEGI) indicate that 5.7 percent of Mexican households received remittances in 2002. These have been 5.9 percent households in 2008, with 41.1 percent of remittances going to rural households (based on ENIGH 2008, according to (Sánchez Ruiz 2010)).

**Table 1: Share of Households with Access to Savings Accounts and Borrowing Options, for Remittance-Receiving and Non-Receiving Households (2005)**

	receivers	non receivers
savings account with a financial institution ( <i>a commercial bank</i> )	0.18 (0.10)	0.15 (0.11)
borrowing options with a financial institution ( <i>a commercial bank</i> )	0.38 (0.19)	0.35 (0.23)

Source: Own calculation based on MxFLS 2005

Table 1 compares access to savings accounts and to borrowing options for receivers and non-receivers of remittances in 2005. Relatively few households in Mexico (around 15 percent) own a savings account. More households (around 38 percent) have borrowing options with a financial institution. These data include savings accounts and borrowing options with non-commercial institutions and are lower when we look at savings accounts and borrowing options with commercial banks only (numbers in brackets). Although numbers are slightly higher for remittance-receivers, financial access among receivers is not fundamentally different from the average Mexican households. These data provide a static picture on access to financial services among Mexican households and do not allow any causal interpretation. The empirical testing below refers to *changes* in financial access between 2002 and 2005 and how they were influenced by a change in remittance status.

Access to financial services and the reception of remittances can be influenced by a number of factors, related to the socioeconomic status and geographic location of households. In order to control for differences across households, I include additional variables in the regression. First, I create a poverty score index for each household describing the probability of the household falling below a certain poverty line, valued 0 (lowest probability) to 100 (highest probability). The index is based on Schreiner (2009) and combines information on the number of children in the household, education levels, employment situation, housing conditions and household assets (see Annex 1 for a more detailed description). The score is used as a proxy for the socioeconomic status of a household through a one score summary. This allows controlling for a number of household characteristics at once, without including them separately in a regression. An index based on a combination of household characteristics is preferable to a measurement based on

monetary income, because a combination of different household characteristics accounts for more dimensions of poverty than an indicator based solely on income. Moreover, many households either do not report or underreport their monetary income in household surveys (Hurst et al. 2010). Next to this non-monetary poverty indicator, I also include monthly per capita spending of households as an indicator for income levels.

Further variables included in the analysis are gender and age of the household head, whether the household head was working in the 12 months prior to the survey, an indicator whether households belong to an indigenous community, and whether households have suffered any shocks in the five years preceding the survey. These can be either economic shocks (loss of job or business failures), shocks related to health of household members (illness or death of household members), or natural disasters. I also include a dummy variable for whether households have received government support in 2002 through conditional cash transfers or other support programs. Some of these programs pay benefits through financial institutions and might therefore be correlated with changes in financial access. Finally, variables on the location of households are included: Whether households are situated in a rural area with less than 2,000 habitants, and the state in which the household is located (households in MxFLS are sampled from 16 out of the 32 Mexican states). In order to take into account differences in the supply of financial services across Mexican municipalities, I add an indicator for financial depth (the amount of per capita savings at commercial banks) as a covariate at the municipal level. Data for this indicator is available for commercial banks only and comes from the *Comisión Nacional Bancaria y de Valores* (CNBV), the Mexican financial supervision agency. This indicator takes the value zero for 2,610 households (35 percent) living in municipalities without bank presence. See Table 2 for a summary of the variables and some descriptive statistics.

**Table 2: Description of Variables and Summary Statistics**

variable	description of variables	year	source	mean	median	st. dev.	min	max	no. of obs.
treatment (household becomes remittance-receiver)	dummy variable that takes the value '1' for households that received remittances in 2005, but did not receive remittances in 2002	change 2002/2005	MxFLS <sup>1</sup> 3b	0.1	0	0.2	0	1	7,290
change in savings accounts	dummy variable that takes the value '1' for households where at least one household member owned a savings account in 2005, but no household member in 2002	change 2002/2005	MxFLS 3b	0.1	0	0.3	0	1	5,973
change in borrowing options	dummy variable that takes the value '1' for households where at least one household member knows a financial institution where he could obtain a credit in 2005, but no household member in 2002	change 2002/2005	MxFLS 3b	0.2	0	0.4	0	1	7,043
shock	dummy variable that takes the value '1' for households that suffered any kind of negative shocks during the five years prior to the survey, either economic (loss of jobs, business failure), natural (floods, disasters, etc.) or personal (disease or death of household members)	2002	MxFLS	0.3	0	0.5	0	1	7,276
rural	dummy variable that takes the value '1' for households that live in locations with less than 2,000 inhabitants	2002	MxFLS C	0.4	0	0.5	0	1	7,571
household size	number of household members	2002	MxFLS	4.3	4	2.1	1	17	7,572

*continued on next page*

**Table 2: Description of Variables and Summary Statistics - Continued**

variable	description of variables	year	source	mean	median	st. dev.	min	max	no. of obs.
ethnic	dummy variable that takes the value '1' for households where an indigenous language is spoken	2002	MxFLS 3a	0.2	0	0.4	0	1	7,221
female	dummy variable that takes the value '1' when the household head is female	2002	MxFLS C	0.2	0	0.4	0	1	7,569
age	age of the household head	2002	MxFLS C	48	46	16	15	101	7,562
government support	dummy variable whether the household benefitted from government support programs	2002	MxFLS 2	0.3	0	0.4	0	1	7,233
monthly per capita spending	total monthly per capita spending of households, in Mexican pesos	2002	MxFLS 1	1,125	707	1,510	0	23,320	7,211
working household head	dummy variable whether the household head had income-earning activities in the 12 months previous to the survey	2002	MxFLS C	0.8	1	0.4	0	1	7,569
poverty score	one score summary for the probability that the household falls below a certain poverty line. The index is adapted from Schreiner (2009) and combines information on the number of children, education levels, employment situation, housing conditions and household assets (see annex for a detailed description)	2002	MxFLS 2, C, 3a	58	60	17	0	100	7,266
financial depth	total bank deposits in thousand Mexican pesos divided by total population, at municipal level	2002	CNBV <sup>2</sup>	0.94	0.72	1.29	0	7.03	7,571

<sup>1</sup>Mexican Family Life Survey<sup>2</sup>Comisión Nacional Bancaria y de Valores

## Model Specification: Treatment-Effect Model of Remittances on Financial Access

I am interested in the impact of belonging to a remittance-receiving household on the improvement of access to financial services among remittance-receivers. In order to test this link, I choose a treatment-effect setting where I run a cross-sectional regression on first differences of the explanatory and the outcome variable: How does a change in remittance status affect financial access? The model to be estimated is

$$\Delta FinAcc_i = \beta_0 + \beta_1 \Delta Rem_i + \beta_2 X_{i,2002} + u_i,$$

where  $\Delta FinAcc$  stands for a change in access to financial services for household  $i$ ,  $\Delta Rem$  is the treatment variable and refers to a change in the remittance-receiving status of household  $i$  and  $X_{2002}$  is a vector of pre-treatment control variables for households  $i$  from 2002.  $\beta$  are the estimated coefficients and  $u$  stands for the usual error term.

Mean differences on the outcome variable  $\Delta FinAcc$  are compared between households that received the treatment  $\Delta Rem$  (379 households of the sample that received remittances in 2005, but not in 2002) and the control group of all other households. Financial services include different forms and different kinds of services; ‘financial access’ can therefore be understood and measured in different ways. For example, a household might have access to semi-formal savings banks or credit unions, but not to traditional banks; or might have access to credit, but not to savings options. Here, I use two alternative indicators to measure financial access: First, whether at least one household member owns a savings account with a financial institution, a measurement frequently used in literature on financial access (for example Honohan 2008). Alternatively, I use access to borrowing options from financial institutions as an indicator for financial access. Households can ask for credits without owning a savings account. Many institutions in microfinance, such as the most important player in the Mexican Microfinance sector ‘Compartamos’, focus on lending only and do not offer savings. In the case of credits, I ask for the theoretical availability of credit, rather than its actual use. Because I want to measure access, it is more interesting to know

whether households *could* receive a credit if they wanted to, not if they really did: Households simply might not have demand for a credit. In the case of savings, I am not able to measure the availability of savings options and instead measure the actual use (ownership) of savings accounts.<sup>5</sup> Using two alternative indicators for financial access allows me to draw a more nuanced picture on the impact of remittances on different dimensions of financial access. Both indicators for savings and borrowing options are measured as dummy variables that take the value ‘1’ for households that improved their financial access status between 2002 and 2005. 478 households gained access to savings accounts in this time period and 1,603 households gained access to borrowing options between 2002 and 2005. Next to these ‘improvers’, a large number of households also ‘lost’ access to financial services: 635 households in which at least one household member owned a savings account in 2002 did not own savings accounts in 2005; and 950 households that had borrowing options in 2002, no longer had borrowing options in 2005. These negative changes may have different reasons, such as when members with access to financial services split into different households or when the socioeconomic situation of households worsens. The average share of households with access to financial services changes much less when looking at both, the ‘improvers’ and on those that ‘lose’ access. I am interested in the effect of remittances on gaining access to financial services and therefore focus only on improvements in access to financial services<sup>6</sup>. In order to measure the impact of remittances on the binary outcome variable, I use a logit model.

‘Treatment’ is a term that originally comes from biostatistics, where treatment conditions are applied randomly and can be controlled by researchers. In social sciences, research usually relies on observational data where treatment is not a random factor and households

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<sup>5</sup> Of course, households that have borrowing options can still be denied a credit. For robustness, I will also test the impact of a change in remittance status on the actual use of credit from financial institutions.

<sup>6</sup> In a previous version of this paper, the effect of remittances on both dependent variables was run: A regression for those who ‘gained’ access and a second model for those who ‘lose’ access. In the second model, the hypothesis to be tested would then be if it is less probable for remittance-receiving households to ‘lose’ access. Although the basic story remains the same, for the sake of clarity of the argument and simplicity, the empirical model focuses only on the positive impact of remittances on financial access.



self-select into either treatment or control groups. As a result, there can be systematic differences between units of ‘treatment’ and units of ‘control’. Therefore, all pre-treatment variables associated with both the assignment of a treatment condition (change in remittance status) and with the expected outcome (change in financial access) should be controlled for (cp. Gelman and Hill 2006: 183ff). Instead of making the unrealistic assumption of random treatment assignment, the weaker assumption of ‘ignorability of treatment assignment’ or ‘selection on observables’ is made. Under this assumption, the distribution across treatment and control groups is random with respect to outcomes, conditional on the confounding covariates. The panel data set allows taking into account systematic differences across groups before they receive the ‘treatment’ and to control for the confounding covariates. A vector  $X_{2002}$  of pre-treatment controls is included in the regression referring to socioeconomic status of households  $i$  in 2002 (see Table 2 for an overview). Variables for the geographic location of households intend to capture important differences between rural and urban households. Financial indicators may have developed differently in rural, as compared to urban, households between 2002 and 2005. Controlling for the state where a household is located captures region-specific differences that can not be explained at the household level, such as regional shocks, regionally different evolutions of financial markets and differences in growth rates across Mexican states. Finally, I control for selection bias that may arise from households dropping out of the sample between 2002 and 2005. Following the two-step procedure proposed by Heckman (1979), a variable that measures the probability for each household to fall out of the sample in 2005 is used as additional predictor in the regression below.

In the literature on treatment-effect-models, matching techniques between treatment and control groups (such as propensity scores) are popular in order to improve the balance between treatment and control groups. Even if ‘ignorability of treatment assignment’ can be achieved by including observed pretreatment covariates, estimations can be biased when the distribution of variables differs strongly across treatment and control groups (King/Zeng (2006); Cochran/Rubin (1973); cp. Gelman/Hill 2006: 206ff). However, imbalance or lack of overlap among groups of treatment and control is not a strong concern in this specific context. The comparison of key variables between the two treatment groups and the control group show no evidence of a very strong imbalance between the groups’

socioeconomic profile (see Annex 1). In Mexico, migration is a phenomenon of low to middle income groups and the profile of remittance-receiving households is not radically different from the ‘average’ Mexican households. I therefore discard propensity scores or other methods of exact matching between treatment and control groups to get a better balance across groups, because this would mean ignoring much information contained in the complete data set.

## **Regression Results**

After evaluating different fits to the data (by significance of the variables, residual deviance, Akaike Information Criteria and the distribution of residuals), I finally settled on the models presented in Table 3. Table 3 gives regression results for two alternative outcome variables: Positive changes in the ownership of savings accounts (Estimations I to III), and positive changes in the availability of borrowing options (Estimations IV to VI). Each of the two outcome variables is specified alternatively with subsets on rural households only and on urban households only, next to a pooled regression on all households with an interaction term between treatment and rural. All covariates in the table are pre-treatment variables from 2002.

Coefficients for the two indicators of financial access - ownership of savings accounts and availability of borrowing options - follow, in general, similar tendencies. In both pooled specifications on all households (Regression I and IV in Table 3), the coefficients for ‘rural’ are negative and significant, meaning that rural households had a lower probability of improving their access to financial services between 2002 and 2005. The probability of improving access to savings accounts and borrowing options in the following period was also lower for poorer households. This is true when measured via the monetary poverty indicator (log of monthly per capita spending) as well as via the non-monetary poverty indicator (poverty score). This correlation is as expected, because poor households face more obstacles in gaining access to financial services. Also, households that received any kind of government support in 2002 had a lower probability of gaining access to borrowing options between 2002 and 2005. Although, in principle, government support programs could positively impact access to financial services when paid through financial institutions, the negative sign might reflect a negative correlation of targeted government

programs with households' income levels. The larger the household size in 2002, the higher the probability was that at least one household member gained access to savings accounts and borrowing options in the following period. While there was no clear and significant change in access to savings accounts for households that suffered any kind of personal, economic or natural shock previous to the 2002 survey, rural households that experienced a shock in 2002 showed a more restricted access to borrowing options in 2005. In some specifications the age of the household head is significant, with households headed by older persons having a lower probability of gaining access to financial services in the following period. Belonging to an indigenous community shows a negative sign, but this variable is only significant in Specification IV. Income-earning activities of the household head in 2002 was not an important predictor for a change in financial access in most specifications. In rural households, when households were headed by a woman in 2002, they had a higher probability of a positive change in owning a savings account compared to households headed by men, but there was no gender difference with respect to the availability of borrowing options. On the other hand, urban households headed by women had a *lower* probability of improving access to borrowing options. Interestingly, the development of the formal banking sector (measured as average amount of savings per capita in the municipality) shows no significant correlation with a change in financial access in the following period. Finally, the table includes state fixed effects (dummies for each of the 16 states included in the sample, with Baja California Sur as a baseline) for each specification. The output table shows important regional variations across states with regard to the change in financial access from 2002 to 2005, with respect to both owning a savings account and access to credit.

**Table 3: Logit Regression Results**

dependent variables explanatory Variables	savings with a financial institution			borrowing options with a fin. inst.		
	I pooled	II rural subset	I pooled	II rural subset	I pooled	VI urban subset
<b>(Intercept)</b>	-4.597 *** (-0.697)	-7.525 *** (-1.372)	-3.303 *** (-0.893)	-2.104 *** (-0.424)	-3.639 *** (-0.785)	-1.459 *** (-0.553)
<b>treatment (“household becomes remittance-receiver”)</b>	-0.011 (-0.287)	0.988 *** (-0.284)	-0.028 (-0.289)	-0.075 (-0.184)	0.493 *** (-0.187)	-0.047 (-0.186)
<b>treatment:rural</b>	0.964 ** (-0.391)			0.656 ** (-0.255)		
<b>rural</b>	-0.584 *** (-0.167)			-0.504 *** (-0.096)		
<b>female</b>	0.094 (-0.14)	0.487 * (-0.272)	-0.003 (-0.166)	-0.146 * (-0.087)	0.036 (-0.155)	-0.236 ** (-0.107)
<b>working household head</b>	0.01 (-0.167)	0.6 * (-0.318)	-0.304 (-0.219)	-0.068 (-0.101)	-0.14 (-0.17)	-0.02 (-0.141)
<b>ethnic</b>	-0.071 (-0.163)	-0.199 (-0.279)	-0.095 (-0.209)	-0.18 * (-0.095)	-0.192 (-0.148)	-0.031 (-0.133)
<b>age of household head</b>	-0.01 (-0.006)	0.002 (-0.012)	-0.022 ** (-0.01)	-0.012 *** (-0.004)	-0.023 *** (-0.007)	-0.006 (-0.006)
<b>shock</b>	-0.036 (-0.117)	-0.27 (-0.226)	-0.015 (-0.148)	-0.089 (-0.07)	-0.306 ** (-0.122)	-0.015 (-0.093)
<b>household size</b>	0.153 *** (-0.033)	0.229 *** (-0.056)	0.105 ** (-0.046)	0.101 *** (-0.02)	0.114 *** (-0.033)	0.091 *** (-0.027)
<b>financial depth</b>	0.05 (-0.069)	-0.194 (-0.207)	0.106 (-0.082)	-0.038 (-0.042)	-0.073 (-0.111)	0.016 (-0.051)
<b>poverty score</b>	0.023 *** (-0.005)	0.024 *** (-0.009)	0.025 *** (-0.006)	0.008 *** (-0.003)	0.024 *** (-0.005)	-0.004 (-0.004)
<b>log of monthly per capita spending</b>	0.17 ** (-0.072)	0.268 ** (-0.128)	0.149 (-0.093)	0.136 *** (-0.042)	0.234 *** (-0.07)	0.09 (-0.055)
<b>government support</b>	-0.183 (-0.157)	-0.019 (-0.225)	-0.335 (-0.275)	-0.338 *** (-0.09)	-0.21 * (-0.123)	-0.592 *** (-0.174)
<b>state</b>						
<b>Coahuila</b>	-0.689 ** (-0.327)	-1.081 (-0.893)	-0.671 * (-0.358)	0.2 (-0.198)	0.118 (-0.414)	0.213 (-0.23)
<b>Distrito Federal</b>	0.096 (-0.512)	1.571 (-1.511)	-0.085 (-0.57)	0.74 ** (-0.335)	1.98 ** (-0.829)	0.124 (-0.387)
<b>Durango</b>	-0.519 (-0.323)	-0.407 (-0.649)	-0.573 (-0.4)	-0.465 ** (-0.216)	-0.245 (-0.395)	-0.537 ** (-0.271)

Continued on next page

**Table 3: Logit Regression Results - Continued**

dependent variables explanatory variables		savings with a financial institution			borrowing options with a fin. inst.		
		I pooled	II rural subset	III urban subset	IV pooled	V rural subset	VI urban subset
<b>state</b>	<b>Guanajuato</b>	0.487 * (-0.282)	0.52 (-0.626)	0.546 * (-0.33)	0.522 *** (-0.196)	1.211 *** (-0.374)	0.218 (-0.24)
	<b>Jalisco</b>	-0.298 (-0.314)	0.494 (-0.677)	-0.386 (-0.379)	0.362 * (-0.202)	0.33 (-0.437)	0.266 (-0.245)
	<b>México</b>	-0.815 ** (-0.345)	-0.359 (-0.672)	-1.027 ** (-0.43)	-0.188 (-0.203)	0.429 (-0.371)	-0.546 ** (-0.256)
	<b>Michoacán</b>	-0.389 (-0.303)	-0.099 (-0.616)	-0.453 (-0.37)	0.412 ** (-0.189)	0.464 (-0.359)	0.582 ** (-0.234)
	<b>Morelos</b>	-0.458 (-0.327)	-0.195 (-0.691)	-0.674 * (-0.397)	0.43 ** (-0.202)	1.076 *** (-0.376)	-0.13 (-0.266)
	<b>Nuevo León</b>	-0.264 (-0.315)	-0.165 (-0.678)	-0.143 (-0.412)	0.084 (-0.205)	0.904 ** (-0.388)	-0.273 (-0.276)
	<b>Oaxaca</b>	0.06 (-0.302)	-0.101 (-0.682)	0.144 (-0.342)	0.308 (-0.202)	0.846 ** (-0.38)	0.059 (-0.248)
	<b>Puebla</b>	-0.024 (-0.343)	0.336 (-0.734)	0.027 (-0.434)	-0.084 (-0.23)	0.855 * (-0.441)	-0.479 (-0.294)
	<b>Sinaloa</b>	-0.053 (-0.272)	0.16 (-0.601)	-0.103 (-0.313)	0.351 * (-0.184)	0.377 (-0.362)	0.317 (-0.218)
	<b>Sonora</b>	-0.771 ** (-0.305)	-1.056 (-0.734)	-0.66 * (-0.34)	0.309 * (-0.186)	0.505 (-0.362)	0.28 (-0.222)
	<b>Veracruz</b>	-0.393 (-0.296)	0.555 (-0.631)	-0.725 ** (-0.351)	0.287 (-0.189)	0.954 ** (-0.373)	0.113 (-0.225)
	<b>Yucatán</b>	-0.09 (-0.333)	0.773 (-0.742)	-0.267 (-0.381)	-0.478 ** (-0.242)	0.637 (-0.461)	-0.954 *** (-0.291)
	<b>Heckman attrition correction</b>	-1.947 (-1.67)	0.931 (-7.817)	-3.943 (-2.538)	-1.113 (-1.001)	-10.256 ** (-4.46)	0.668 (-1.498)
<i>residual deviance</i>	2928	935	1963	6801	2515	4186	
<i>degrees of freedom</i>	5646	2584	3036	6662	2967	3669	
<i>AIC</i>	2988	991	2019	6861	2571	4242	

Standard errors in brackets. Stars denote significance at 1 percent (\*\*\*), 5 percent(\*\*) and 10 percent(\*)

The main interest lies on the coefficients for the treatment effect (households that report a positive change in their remittance-receiving status). Concerning the change in savings accounts, the treatment shows an important and significant impact on a change in financial access. As expected by theory, households that ‘improved’ their remittances status had a higher probability of becoming owners of a savings account in 2005. However, this effect holds for rural households only and not for the subset on urban households. Also, when measuring financial access as the availability of borrowing options, households in the treatment group show a positive and significant probability of improving their access status in 2005. Again, as in the case of savings accounts, the estimated effect on borrowing options holds for rural households, but is not significant for the subset of urban households.<sup>7</sup>

In addition to the regression output in Table 3, Graph 1 plots the coefficients and confidence intervals for the treatment effect in order to summarize graphically how a change in remittance status on a change in financial access differently affects subgroups and outcome variables. The black lines show the treatment effect for all six specifications from Table 3. As mentioned, treatment effects are most important for the subset of rural households, for both a change in ownership of savings accounts and a change in borrowing options.

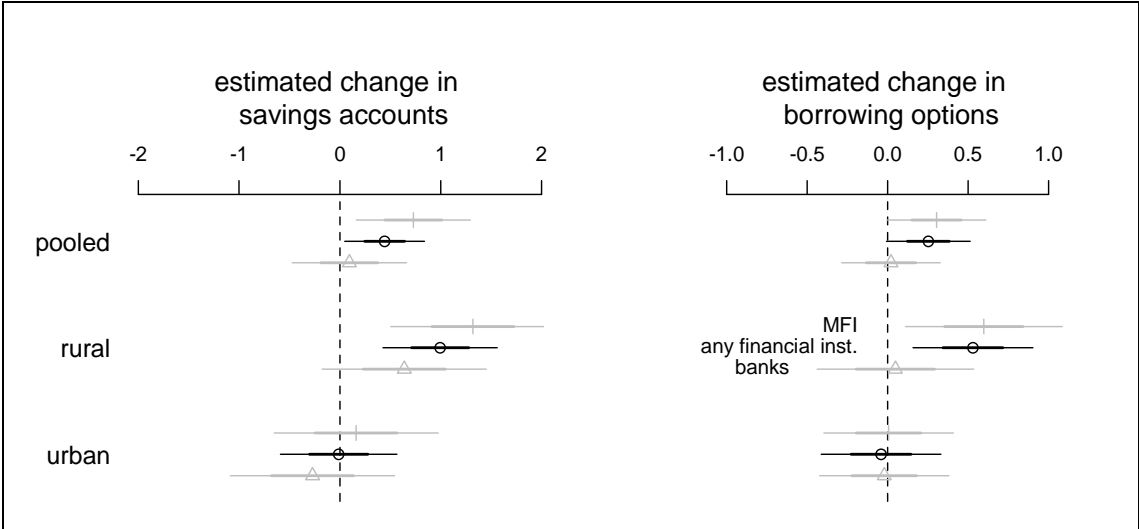
Additionally, the graph plots estimates for the same specifications, but for different types of financial institutions. Regressing the treatment effect on non-traditional banking institutions only (credit unions, savings banks and other institutions from the microfinance sector), increases the magnitude as well as the significance of the effect (upper grey lines). However, in the regression on the commercial banking sector only, a positive change in

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<sup>7</sup> As mentioned above, the availability of borrowing options does not mean that households really make use of credits. For robustness, I also tested the effect of a change in remittance status on actual borrowing. In this case, the overall effect of remittances is also positive and significant, but it is not significant for the subset on rural households, which indicates that rural households use savings options much more than credits. Explanations could be that rural households in general demand less credit compared to urban households and are net providers of savings to the financial system. It also points to the possibility that, as discussed above, remittances function as a substitute for credit from formal financial services, especially in rural households.

remittance status does *not* have a significant effect on financial access. This suggests that the impact of remittances is more important for non-traditional financial institutions from the microfinance sector, than for the commercial banking sector. These results support the argument made by (Orozco and Hamilton 2005; Hastings 2006; Orozco 2008), among others, that institutions from the microfinance sector are often ‘closer’ to remittance receivers both socially and geographically and are therefore better positioned to link remittances with further financial services.

**Graph 1: Estimated Effects of a Change in Remittance Status on a Change in Financial Access for Different Indicators and Subgroups**



The graph plots estimates for the treatment effect (becoming a remittance-receiving household in 2005) on a positive change in ownership of savings accounts and availability of borrowing options with 50 percent and 95 percent confidence intervals for all (upper plotted lines), rural (middle) and urban (lower plotted lines) households. The black lines in the middle of each set of plotted lines show estimates and confidence intervals for the regression on all types of financial institutions as given in Table 3. Alternatively, I also provide estimates for a regression on microfinance institutions only (upper grey lines) and on commercial banks only (lower grey lines). Estimates are given in logit scale.

All coefficients are given in the logit scale. In order to provide an idea of the magnitude of the effect on the original scale, I calculate the probabilities for a change in financial access for the treatment group and predict the effect of treatment on a change in financial access for those coefficients that are significantly different from zero, while fixing all other variables at their median<sup>8</sup>. In the specification estimating the effect of remittance status on an improvement of ownership of savings accounts for all households (the pooled Regression I in Table 3), the predicted probability of improving financial access is 4.2 percentage points higher for households in the treatment group compared to the control group. For borrowing options, the predicted difference is at a similar magnitude (4.4 percentage points). For rural households (Regression II and IV in Table 3), these differences are even larger: In the treatment group, the predicted probability of improving access to financial services is 7.4 percentage points higher for borrowing options compared to the control group, and 6.8 percentage points higher for savings accounts. These differences are important considering the relatively low absolute number of households with access to financial services (in 2005, only 15 percent of households owned savings accounts and 38 percent had borrowing options at financial institutions, see Table 1 above).

## Conclusion

This paper contributes to understanding how remittances influence economic development in receiving countries by focusing on a relatively neglected research topic, the impact of remittances on access to financial services. The results are important because they underline some of the indirect effects of remittances on receiving countries. Focusing solely on the spending of remittances misses an important part of the picture.

As the results show, remittances have an important effect on access to financial services among receiving households in Mexico. A change in remittance status has a statistically significant positive effect on both the ownership of savings accounts and the availability of borrowing options. Going beyond previous research, the detailed panel data of the multi-thematic MxFLS allows the differentiation of the impact of remittances on the financial

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<sup>8</sup> I fixed covariates at their median and not at their mean, because the median can be interpreted more easily for the dummy variables in the regression.



sector according to different types of financial institutions and by rural vs. urban households. With a probability of improving their access status seven percentage points higher than the control group, the treatment effect of remittances on financial access is important and statistically significant for rural households, but small and not statistically significant for urban households. Next to this rural-urban difference, a different impact according to different types of institutions can be observed. The estimated effect of a change in remittance status on financial access is more important for non-traditional banking institutions, compared to commercial banks. These findings support the argument that microfinance institutions are particularly well suited for linking remittances with further financial services (Orozco and Hamilton 2005; Hastings 2006; Orozco 2008). Initiatives aiming to strengthen linkages between remittances and microfinance institutions, often lacking the infrastructure and access to global payment systems needed to offer remittance payments, could therefore generate additional benefits for receiving countries. Remittances are private income of transnational households. Institutional frameworks that open monetary savings and borrowing options and provide more efficient use of remittances for families are therefore more promising than a paternalistic debate on the 'correct' use of these incomes.

My own findings, based on household survey data, partly contrast previous studies that found a positive correlation between remittances and commercial banking. These studies used either municipal level bank data (Demirgüç-Kunt et al. 2011) or cross-country Central Bank data (Aggarwal et al. 2010; Gupta et al. 2009), but did not take into account non-traditional financial institutions, which fall outside banking regulations and are therefore not captured by official data. Nevertheless, they are the most important financial service providers for low-income groups in developing countries. At least in the case of Mexico, traditional banks do not seem the most adequate institutions for linking remittances with further financial services, though technically better prepared for including remittances into their product portfolio. Many banks in Mexico do pay remittances: 'Bancomer' alone has an estimated share of 60 percent in the Mexican remittance market (Hernández-Coss 2005). However, in most cases, remittances are sent and received in cash, with bank branches functioning as paying agents to US-based money transfer operators. In the Mexican case, commercial banks apparently do not use their market power for gaining new clients among

remittance-receivers. Due to the differences of financial and remittance markets and differing socioeconomic profiles of migrants between countries, future research must demonstrate whether the results from the Mexican case can be generalized to different contexts.

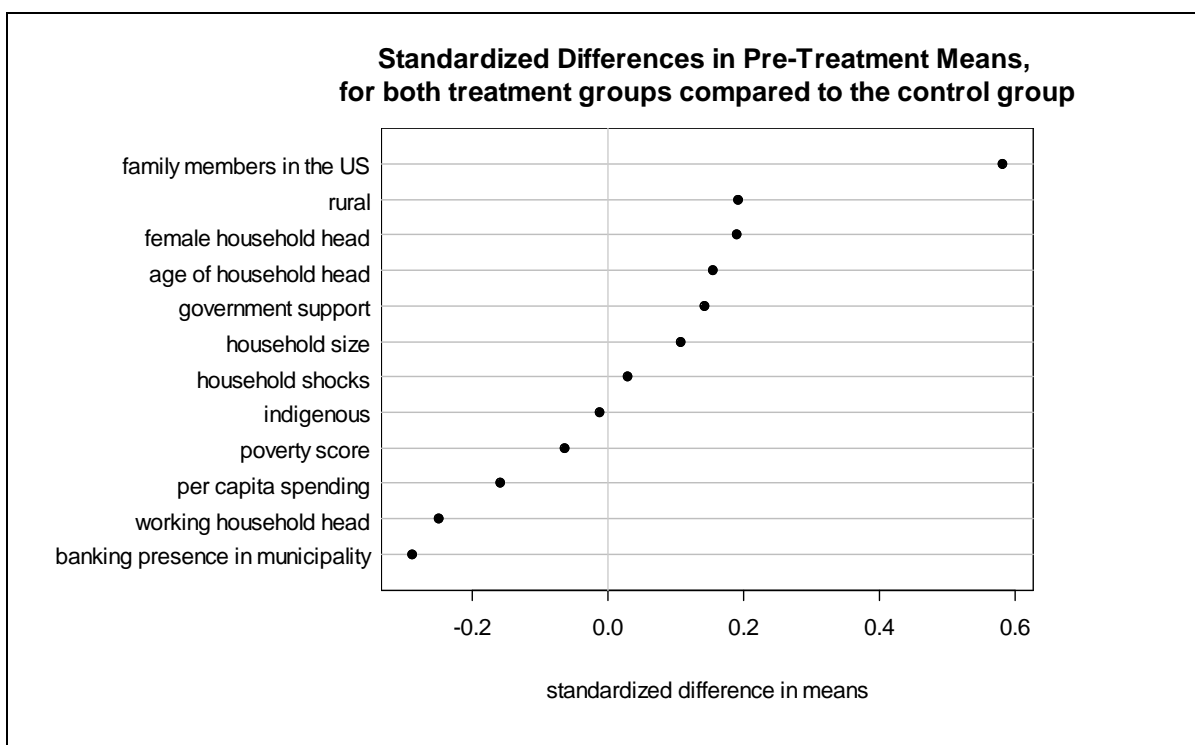
## Annex

### Annex 1: Creation of a Poverty Score for Mexican Households, adapted from Schreiner (2009)

	Scoring Indicator	Book	Answers	Points
1	Number of household members aged 0 to 17	C	four or more	0
			three	7
			Two	15
			one	22
			none	29
2	Highest educational grade among household members	C	college preparatory or less	0
			normal/technical/comercial	4
			professional or graduate	10
3	Number of household members with a written employment contract	3a	none	0
			One	7
			two or more	14
4	Main flooring type used in residence	C	Dirt	0
			cement/concrete	8
			other	12
5	Tap water inside the house	C	Yes	3
			No	0
6	Fuel usually used to cook or heat food	C	firewood	0
			other	5
7	Household has domestic appliances (blender, iron, microwave, toaster, etc.)	2	Yes	7
			No	0
8	Electric appliances used in the household (radio, TV, VCR, computer, etc.)	2	Yes	7
			No	0
9	Household has other assets like dryer, washing machine, stove, or refrigerator	2	Yes	13
			No	0
			maximum value	100

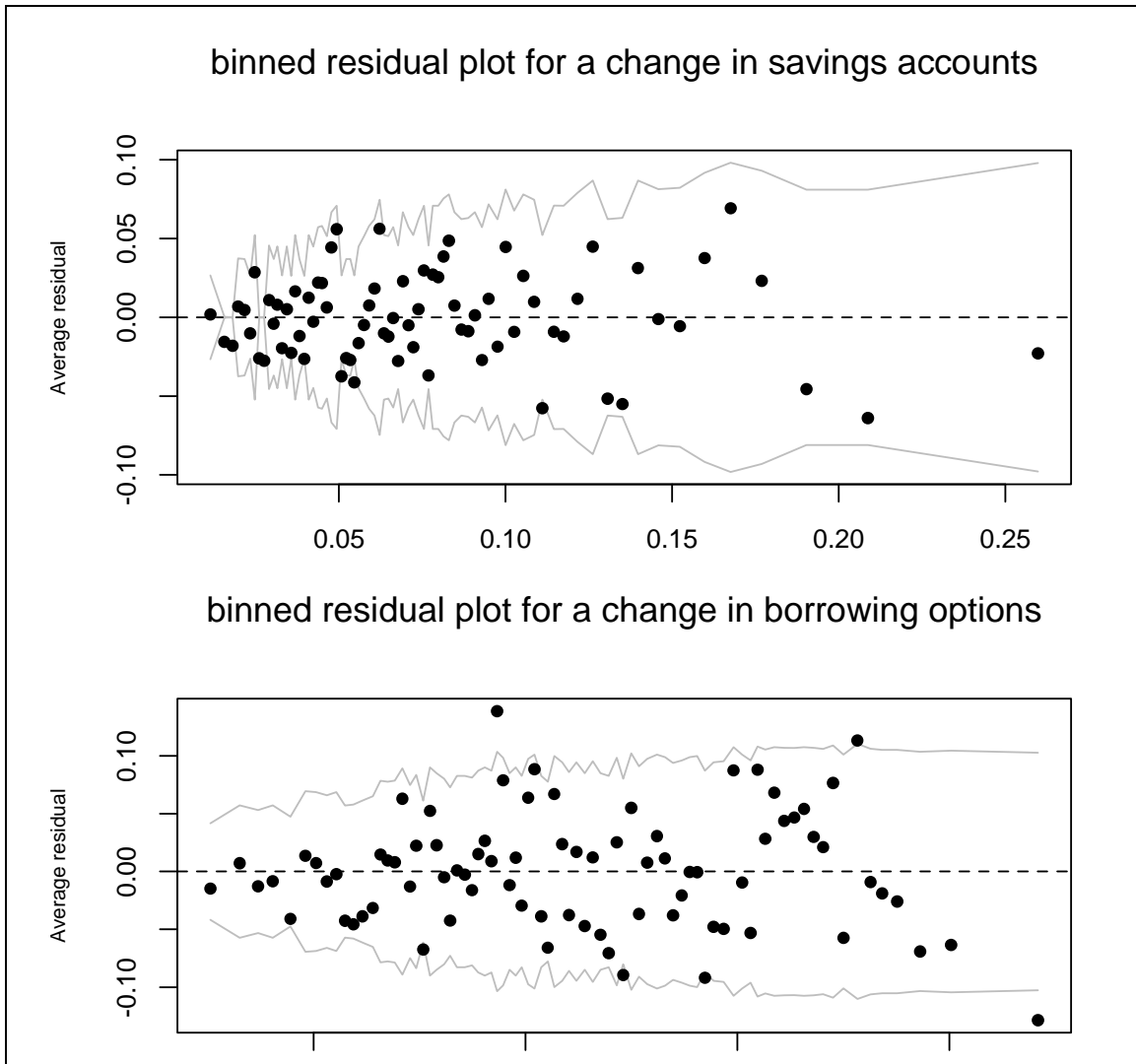
*Creation of a 'poverty score' for each household: A score of '100' indicates the lowest probability of belonging to a poor households and a score of '0' indicates the highest probability of belonging to a poor household. The scoring is based on Schreiner (2009) and has been developed in order to allow a quick and easy assessment of the socioeconomic conditions of households. Questions 7 to 9 have been adapted to the availability of data. Incomplete data on some variables have been imputed using the 'mice' package (Buuren and Groothuis-Oudshoorn 2010) in the statistical software R (R Development Core Team 2009)*

## Annex 2: Examining Balance of Treatment and Control Group



The graph shows differences in pre-treatment means in order to see how much the treatment group differs from the control group on variables expected to predict both treatment and outcome. Differences in means have been standardized (differences in averages of the two groups divided by the pooled standard deviation for the treatment and control groups) and are given in standard deviation units to make them comparable. The variable that varies most between treatment and control groups is the number of family members in the US. It is worth noting that the data refers to means in 2002 while the treatment group received remittances only in 2005, but not in 2002. Many households in the treatment group already had family members in the US in 2002, but received remittances only in the following period. Other variables that differ between treatment and control groups are households' location (rural or urban), as well as gender and age of the household head. In the treatment group, less household heads were working in 2002 and fewer households lived in municipalities that had banks. The graphical representation is based on Gelmann/Hill (2006: 202).

### Annex 3: Binned Residual Plots



The graphs show residual plots from Regressions II and VI in Table 4. The residuals follow no obvious patterns and are apparently randomly distributed. Because the data is discrete, dividing the data into categories (bins) is more appropriate for examining the distribution of residuals. Each bin represents an equal number of data points and shows their average residual against their average expected value. The lines indicate plus/minus 2 standard error bounds, where 95 percent of the residuals should fall. The plot is based on the function `binnedplot()` in the package 'arm' (Gelman et al. 2010) from the statistical software R (R Development Core Team 2009), see also Gelman/Hill (2006: 97f).

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