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Remittances and the Use of Formal and Informal Financial Services

CHRISTIAN AMBROSIUS [a] and ALFREDO CUECUECHA [b,*]

[a] *Freie Universität Berlin, Berlin, Germany*
[b] *Colegio de Tlaxcala, San Pablo Apetatitlán, Mexico*

Summary. — While recent literature has pointed to a positive effect of migrants' remittances on the financial development of receiving countries, findings with respect to access to and the use of loans have been ambiguous. This paper investigates the effect of remittances on the use of formal and informal financial services using Mexican household data and finds positive and statistically significant effects of remittances on the ownership of savings accounts, the existence of debts, and on recent borrowing. The fact that the effect of remittances on borrowing is driven by informal finance rather than by traditional bank loans points to deficiencies of the formal financial sector in addressing the financial needs of remittance-receiving households. We address methodological concerns of selection bias and reverse causality through household fixed effects and an instrumental strategy that exploits distance to train lines and labor market conditions in the US as exogenous determinants of remittances.

Key words — remittances, financial development, informal finance, Latin America, Mexico

1. INTRODUCTION AND RELATED LITERATURE

Remittances—the money migrants send home, usually to their families staying behind—are today the second most important source of foreign finance for the group of developing countries. Their continuous increase over the last two decades, interrupted only through a 5.8% decline of remittances to developing countries in 2009 following the global financial crisis (World Bank, 2010), has raised interest on their impact on economic development both in policy and academia. A large number of studies have addressed their impact on poverty and inequality (Acosta, Calderón, Fajnzylber, & Lopez, 2008; Adams & Page, 2003; Jones, 1998; Koechlin & León, 2006), spending behavior (Adams & Cuecuecha, 2010; Cox Edwards & Ureta, 2003; Massey & Parrado, 1998; Woodruff & Zenteno, 2007; Yang, 2008) and macroeconomic effects (Acosta, Fajnzylber, & Lopez, 2007; Amuedo-Dorantes & Pozo, 2004; Buch & Kuckulenz, 2010; Sayan, 2006). More recently, the effects of remittances on access to and the use of financial services has gained attention and become a primary focus in development policy. It is usually argued that linking remittances with additional financial services has important benefits by providing households with additional tools of risk management and asset accumulation and because the saving of remittances at financial institutions allows channeling savings from remittances toward the demand for credit elsewhere (see for example Orozco, 2004; Orozco & Fedewa, 2006; Terry & Wilson, 2005). However, the effect of remittances on access to and use of financial services is not straightforward. The literature on remittances and financial access has put forward two views: one view claims that remittances function as a substitute for credit. Different behavior of spending by remittance-receiving households is often explained within a theoretical framework of imperfect credit markets, where remittances help poor households overcome liquidity constraints that restrict investment in human or physical capital (Calero, Bedi, & Sparrow, 2009; Taylor & Wyatt, 1996). More explicitly, Woodruff and Zenteno (2007) refer to the substitution between remittances and credit as an explanation for their empirical findings that credit-constrained Mexican microenterprises with transnational ties invest more than micro entrepreneurs without such ties. Along a similar line of argument, Giuliano and Ruiz-Arranz (2009) find a larger impact on growth in countries with low levels of financial development because—as they argue—remittances can substitute for the lack of access to credit and enable households and enterprises to increase their investment in human and physical capital in countries with larger credit constraints, which translates into higher growth. Ambrosius and Cuecuecha (2013) find that remittances respond to households' demand for financing emergencies and make them less reliant on debt-financing when they suffer from health-related negative events.

A different line of research claims that remittances may function as a 'catalyst' for financial development. A number of empirical studies have found positive effects of remittances on savings indicators at the cross-country level (Aggarwal, Demirgüç-Kunt, & Martinez Peria, 2010; Gupta, Pattillo, & Wagh, 2009) and for case studies on Mexico (Demirgüç-Kunt, López Córdova, Martinez Pería, & Woodruff, 2011) and El Salvador (Anzoategui, Demirgüç-Kunt, & Martínez Pería, 2014). Several reasons are given for a positive impact of remittances on the amount of deposits: on the side of institutions, banks may have an interest in capturing remittances for the financial system and therefore target receivers specifically. On the side of receivers, the lumpiness of remittances may create a demand for savings options. In the case where migrants transmit 'financial knowledge' together with remittances, the knowledge of financial products could be higher. In this sense, remittances might reduce information asymmetries from the demand side and mistrust toward the banking sector that is especially widespread in Latin America (Bebczuk, 2008; Roa, 2015). Others have argued that financial institutions might include remittances in the evaluation of creditworthiness of clients (Cuecuecha & Da Rocha, 2011; Orozco & Fedewa, 2006). In a randomized control trial among Salvadoran migrants, Ashraf, Aycinena, Martínez, and Yang

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(2015) find that senders of remittances in general have a strong demand for savings accounts, and that this demand increases when the design of products allows migrants to retain control over the use of remittances. However, while all the mentioned empirical studies on remittances and financial development have identified an impact on savings and deposits, the effect of remittances on credit from formal financial institutions is either weak (Aggarwal et al., 2010; Demirgüç-Kunt et al., 2011) or has not been confirmed (Anzoategui et al., 2014).

The two perspectives on remittances and financial services are not contradictory: research based on financial diaries has shown that poor households mix and combine different financial tools and instruments to cope with expected and unexpected financial gaps (Collins, Morduch, Rutherford, & Ruthven, 2009; Rutherford, 2003). Since migration and financial services are both asset-building and risk-management tools, remittances and financial services may, in some cases, substitute for each other—for example, when family members in the US function as a source of capital from outside the regular household to cover emergency spending, or when remittances finance investment in human or physical capital in the context of absent or rudimentary financial markets in the countries of origin. In other cases, remittances and financial services may complement each other because the reception of remittances may pave the way for additional financial services such as savings accounts or function as collateral for loans.

A better understanding of how households combine formal and informal strategies of risk management and asset building is important both from a theoretical and a practical standpoint of designing adequate policy instruments. Yet, although the relationship between remittances and financial services ranks high on the development policy agenda, there are still surprisingly few systematic studies on the topic. In particular, research so far failed to provide a clear picture on whether remittances have a positive impact on access to and the use of credit. In this paper, we test the hypothesis that remittances have an effect on the use of formal and informal financial services using Mexican household data.

A positive impact of remittances on loans may operate both through a demand-driven and a supply-driven channel. From the demand side, a more flexible budgetary constraint among remittance-receiving households might reduce their risk aversions and increase the propensity of potential borrowers to take up debt. From the lenders' point of view, an additional and relatively stable source of income from outside the local economy enhances the creditworthiness of borrowers. In Mexico, 37% of the labor force was self employed in 2005 (INEGI, 2014a). Because the income of these households is not easily verifiable, they are perceived as high-risk customers. On the other hand, 97% of all remittances are received through electronic transfers (Banxico, 2013) which makes them an easily traceable source of income. The fact that remittances markets on the Mexican side are dominated by banks (i.e. Banco Azteca, Banamex and BBV Bancomer) should provide formal lenders with an information advantage when working with remittance-receiving households. The offering of savings accounts to receivers of remittances might therefore lead to the provision of additional financial services in a second step, including loans. In principle, the same argument applies to informal lenders: A printed receipt, which households could later use with informal lenders as proof of income, typically accompanies the transfer of remittances. Everything else being equal, we therefore expect to find a positive impact of remittances on borrowing by households compared to a household with equal observable characteristics and no remittances. Because poor households have limited access to formal loans and usually rely on various formal and informal sources for taking up credit, we do not restrict this hypothesis to loans from formal financial institutions. Whether remittances have effects on formal or informal lending is of high policy relevance. A positive effect on formal lending would be proof that remittances help deepening access to financial services. On the other hand, a positive effect only in informal lending indicates that although the demand for financial services rises with remittances, access to the banking sector in Mexico is limited; informing on the need for banks and regulators to find ways how to cater to receivers of remittances.

Putting forward this hypothesis does not exclude the possibility that remittances may also function as a substitute for credit, as argued elsewhere (Ambrosius & Cuecuecha, 2013). Rather, we claim that households mix and combine different formal and informal financial instruments. Although remittances function as insurance that may protect households from over-indebtedness in the face of negative events (Ambrosius & Cuecuecha, 2013), we expect that remittances and loans may also be complementary. Hence, our hypothesis implies that the collateral effect of remittances is not crowded out by a substitution effect.

The rest of the paper proceeds as follows: in the following Section 2, we introduce the Mexican case and describe our data sources. Section 3 explains our empirical strategy. Studying the effect of migration and remittances on the use of formal and informal financial services faces methodological challenges of selection bias (the observed and unobserved characteristics of remittance-receiving households differs from non-receiving households) reverse causalities (debt might itself be causal to migration, for example if migration is financed through debt or when migration is a strategy of escaping from debt, or remittances and debt may both respond to a third variable (e.g., health shocks, see Ambrosius & Cuecuecha, 2013), and specification bias (the complexity of migration and remittance decisions makes it difficult to select a reduced form equation free of it). As explained in more detail in Section 3, we employ several strategies in order to address these concerns. First, the detailed household panel data of the Mexican Family Life Survey allows us to follow the same households over time and to control for time-constant household fixed effects additional to a large number of time-varying socioeconomic characteristics and the shock history of households. Second, we employ an instrumental variable strategy, where we combine two instruments. We use exogenous variation in the labor market conditions in the US as an exogenous determinant of remittances (used similarly by Adams & Cuecuecha, 2010; Anzoategui et al., 2014; Yang, 2008 and others). As a second instrument, we follow previous studies (Demirgüç-Kunt et al., 2011; López Córdova, 2005; Woodruff & Zenteno, 2007) using distance to train lines as an instrument for migration and remittances between the US and Mexico. Access to transportation systems has been an important determinant of migration to the US during early migratory movements from Mexico. Due to the persistence of network effects, still today the migration intensity across Mexican regions is highly correlated with distance to train lines (Woodruff, 2007; cp. Demirgüç-Kunt et al., 2011, p. 230). In order to test the robustness of our results, we also employ alternative dependent variables. Section 4 presents the results. We confirm a strong effect of remittances on the ownership of savings account. Moreover, we find a strong and significant effect of remittances on the existence of debt and on recent borrowing. The instrumental strategy also reveals that the overall effect on borrowing is driven by

borrowing from informal sources, while remittances do not have an effect on borrowing from formal financial institutions when we control for the endogeneity of remittances using instruments. Section 5 highlights deficiencies of the formal financial sector in addressing the financial needs of remittance-receiving households who tend to borrow from informal institutions at higher costs and discusses implications with respect to the design of adequate policy instruments.

2. THE MEXICAN CONTEXT AND DATA DESCRIPTION

We test the hypothesis that remittances have an effect on the use of formal and informal financial services using Mexican household data. Mexico provides an interesting case study for several reasons: First, it is one of the most important emigration countries in the world with approximately 10 million Mexican-born immigrants in the US, equaling 10% of Mexico's total population. With an estimated 23.2 billion USD of remittances in 2012, Mexico was the third largest receiver of remittances in absolute terms after India and China (World Bank, 2014b). At the same time, Mexico has a low level of financial development with a private-credit-to-GDP ratio of less than 30% that lies below countries with comparable levels of per capita income (CNBV, 2011). For lower income households and those living in remote areas, access to formal financial services is severely limited: In 2011, only an estimated 27% of Mexican adults used formal financial services (World Bank, 2014a). Similarly, Hernández-Trillo (2010) shows that for all income deciles below the 90th income percentile, the percentage of households using financial services in Mexico averaged less than 30%. Mexican migrants predominantly originate from lower-income groups and from rural areas that are often excluded from access to formal finance due to information asymmetries, low competition of banks at the local level and high transaction costs. [1] In this context of a relatively limited access to finance, remittances play a potentially important role in facilitating access to financial services.

Finally, Mexico makes an ideal case study thanks to the availability of several data sources and a large variation of our key explanatory variables both at the household and regional level that we exploit in our empirical strategy. Our main household level observations come from the Mexican Family Life Survey (MxFLS), which is a prospective panel survey of individuals, households, and families; it is nationally representative and multithematic. The first wave was conducted in 2002 and was representative of the population at that time. It was carried out jointly by the *Centro de Investigación y Docencia Económica* (Center for Research and Teaching in Economics, CIDE) and the *Universidad Iberoamericana* in Mexico City, and the second (2005–06) and third (2009–11) waves by *Universidad Iberoamericana* in Mexico City. As a multi-thematic database, the MxFLS combines information on household finance with migration histories and a large number of additional socioeconomic characteristics of households and individuals. The MxFLS is a nationally representative sample of households that were selected under criteria considering 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. The same households in the MxFLS are followed over time so that changes across time can be observed for each household. This paper uses survey results for 2002 and 2005. Data for both time periods are available for 7,572 households, coming from 149 municipalities. [2]

As dependent variables, we construct several variables of financial service usage. First, we construct a binary indicator DBT whether households reported to have outstanding debt at the moment of the survey. Debt may be with formal financial institutions as well as with semi-formal or informal institutions (financial cooperatives, credit unions, NGOs, or money lenders) or through personal networks (friends, colleagues). We deliberately include the informal financial sector in the analysis in order to take account of the large institutional diversity in financial markets next to the traditional banking sector, to which lower income households and those living in rural households have only limited access. Alternatively, we ask whether at least one household member borrowed money during the twelve months previous to the survey (BOR). While the former indicator contains information about existing debt stocks, the latter indicator refers to relatively recent flows of debt. The survey allows splitting up the indicator on borrowing by the source of origin of the loan: BOR_FR refers to borrowing from formal financial institutions (traditional banks, savings funds, or governmental credit programs). BOR_IF refers to borrowing from an informal source (borrowing from money lenders or pawn houses, or personal borrowing from relatives, friends/acquaintances, or at work). BOR_PR refers to personal borrowing from relatives, friends/acquaintances, or at work. We also created a binary indicator whether households claimed to have savings (SAV), whether they kept savings at a savings account (ACC) and whether the savings account was with a traditional bank (B_ACC). Finally, DBTMNT refers to the total amount of reported household debt, BORMNT refers to the total amount borrowed during the previous 12 months, and SAVMNT refers to the total amount of household savings reported.

Our main explanatory variable REM is a binary variable that takes the value 1 when at least one household member received remittances from abroad during the previous 12 months. While households were not directly asked about receiving international remittances, this information can be constructed indirectly by combining questions on whether households received monetary transfers during the last year (and from whom) and whether they have family members that live abroad. Households are classified as remittance-receiving households if at least one household member received monetary transfers from a family member living in the US during the last year. In 2002, our measure of remittance-receiving households indicates that 5.7% of all households received remittances, while that figure was 6.3% in 2005. [3] Although the regularity of remittances receipts could potentially matter for its impact on financial development, the survey does not allow us to include information on the timing of remittance. Our analysis therefore captures average effects of remittances via a dummy variable regardless of frequency and timing. [4]

We include a number of time-varying control variables at the household level. Total monthly per capita expenditure in log terms (EXP) serves as an indicator for the income level of households. [5] Also, the age of the head of household (AGE), the years of education of the household head (EDUC), whether family members speak an indigenous language (ETHNIC), a binary variable whether the head of household gained income from work or business (WRK) are expected to be correlated with socioeconomic status and access to and use of

financial services. Variables on the number of persons living in the household (SIZ), whether the head of household was female (FEM), and whether a spouse lived within the household (CIVST) provide information on household composition. In order to capture urban–rural differences in access to and use of financial services, we include a variable whether households lived in localities with less than 2,000 habitants (RURAL).[6] We also include variables whether household members suffered from different types of shocks during the previous 5 years: Loss of job or business (SHKEC), serious accidents or diseases that required hospital treatment (SHKSK) and loss of crop (SHKCR).[7] We expect the shock history of households to have a strong effect on financial variables, in particular debt levels. We combine household-level data from the MxFLS with data at the level of the 16 (out of 32) states and 149 municipalities from which households in the MxFLS were sampled and include information on rain fall (RAIN), GDP at state level (GDPST), and an indicator on the level of financial development (FINDEV) at the level of states, measured as total bank deposits relative to state-level GDP. We expect all of these variables to be correlated with access to financial services and the cost of credit across different regions in Mexico. The variable RAIN measures annual millimeters per state lagged by one year and is included in order to capture aggregate weather shocks that affect agricultural activity and incomes.[8]

Data for state-level GDP come from the National Institute for Statistics and Geography (*Instituto Nacional de Estadística y Geografía*) INEGI (2014a), data on rain at state level come from the National Water Commission (*Comisión Nacional de Agua*) CONAGUA (2014), and data on state-level deposits come from the National Banking and Securities Commission (*Comisión Nacional Bancaria y de Valores*) CNBV (2012). We also include information on government expenditure at the municipality level (EXPMN) that comes from INEGI (2014b).

In our instrumental variable strategy, we exploit regional variation of migration patterns in Mexico. We estimate remittances from two sources of exogenous variation that are correlated with remittances: (1) distance to rail lines as a historical determinant of US–Mexican migration networks and (2) variation in job creation across US states over the last three years previous to the specific year of survey as an indicator of relatively recent US demand for Mexican migrants. TRAIN is obtained from Demirgüç-Kunt et al. (2011) and measures the distance of each municipality from the rail network as it existed in 1920 and then the distance from that point on the rail network to the US border (measuring distance along the railroad). Because the existence of rail lines could be correlated with economic conditions, we use as a control variable the distance of the head of the municipality to the nearest rail lines as they exist today (TRAIN2). We construct TRAIN2 by cross-checking information from the MxFLS on the municipality in which households reside with information from railroad depots available from Mexlist (2014). We then use Google maps to calculate the distance from the head of municipality to the nearest railroad depot.

Data on US employment at the state level come from the US Bureau of Labor Statistics 2012 USBLS (2014). We build an indicator on job creation by substracting the number of jobs in US state k (EMPUS) in year $(t-3)$ from the number of jobs in US state k in year (t). In order to generate variation per Mexican state, we multiply job creation in US states with the percentage of consular documents that were requested by individuals from Mexican state j who lived in US state k in 2008. This information is available from the Institute for Mexicans Abroad (*Instituto de los Méxicanos en el Exterior*) IME (2008). Note that the IME (2008) data are left intentionally without variation so that all time variation in the created variable is due to the fluctuations in job creation. This variable will be called from now on DUSEMP.

Table 1 shows the definition of variables, data sources, and descriptive statistics. In the next chapter, we explain our empirical strategy in more detail.

3. THE EMPIRICAL STRATEGY

Studying the effect of remittances on household debt and borrowing poses several methodological challenges. First, average socioeconomic conditions among migrant households differ from those of non-migrant households due to self-selection of migrants. Second, remittances and debt may both respond to a third variable, for example health shocks (Ambrosius & Cuecuecha, 2013). Third, the causation between remittances (or migration) and debt could go in both directions: Migration could be a household coping strategy in response to high debts, or the high costs especially of informal migration could be financed through debt. In both cases, debt would precede migration rather than the other way round. Fourth, due to the complexity of the migration and remittance decisions it is hard to find a reduced form equation that will represent correctly the decisions of the household, which may lead to specification bias.

We employ several strategies in order to respond to these concerns. First, in order to address self-selection of migrants and omitted variable bias, we control for time-constant unobservable differences (for example, different motivations or capacities that are difficult to measure but are time-constant) through household fixed effects in addition to observable control variables at the household level that are related to the socioeconomic status of households and their shock histories. We also include indicators on the level of economic development of states where households live and levels of public expenditure at the municipal level, as well as an indicator of potential weather shocks due to rain variation at the state level. Second, we employ an instrumental variable strategy in order to address issues of reverse causality. To this end, we combine two instruments for remittances to Mexico previously used in the literature: First, distance to train lines as a factor that reduced the costs of migration and was therefore closely linked to the establishment of migrant networks. Second, we use variations in labor market conditions in US states where Mexican migrants reside as exogenous determinant of remittances. Finally, we employ alternative definitions for our dependent variable. These include: borrowing during the 12 months previous to the survey (BOR), borrowing from formal sources, (BOR_FR), informal sources (BOR_IF) and personal borrowing (BOR_PR). We also employ binary indicators on the existence of savings (SAV), on the ownership of savings accounts (ACC), and on ownership of savings accounts with a traditional bank (B_ACC). We believe that concerns with respect to reverse causation are less justified in the case of recent borrowing, because migration and the sending of remittances usually occur with delays. The incurring of debt in order to finance migration of a family member should take place before migrants become senders of remittances. Studies have found that remittance-sending often follows an inverted U-curve over time (Cai, 2003; Liu & Reilly, 2004; Lucas & Stark, 1985; cp. Carling, 2008, p. 593). According to these studies, the typical remitters would be those who have resided long enough to be well-established and have a stable

Table 1. *Data description*

Variable	Description	2002	2005
Financial service indicators			
DBT[a]	Binary variable that takes the value 1 for households that reported to have outstanding debt	0.31	0.25
		(0.46)	*(0.43)*
BOR[a]	Binary variable that takes the value 1 for households where at least one household member borrowed money during the previous 12 months	0.20	0.15
		(0.4)	*(0.35)*
BOR_FR[a]	Binary variable that takes the value 1 for households where at least one household member borrowed money from a formal source (bank, savings funds, or governmental credit program) during the previous 12 months	0.04	0.04
		(0.19)	*(0.2)*
BOR_IF[a]	Binary variable that takes the value 1 for households where at least one household member borrowed money from an informal source (money lenders, pawn houses, relatives, friends/acquaintances, at work) during the previous 12 months	0.16	0.10
		(0.37)	*(0.3)*
BOR_PR[a]	Binary variable that takes the value 1 for households where at least one household member borrowed money from a personal source (relatives, friends/acquaintances, at work) during the previous 12 months	0.14	0.08
		(0.35)	*(0.27)*
SAV[a]	Binary variable that takes the value 1 for households that claimed to have savings	0.25	0.22
		(0.43)	*(0.41)*
ACC[a]	Binary variable that takes the value 1 for households that claimed to own an account (including banks, savings funds, cooperatives, and others)	0.16	0.14
		(0.37)	*(0.35)*
B_ACC[a]	Binary variable that takes the value 1 for households that claimed to own an account with a traditional bank	0.10	0.09
		(0.3)	*(0.29)*
DBTMNT[a]	Total amount of reported household debt, in current Mexican pesos	5,017	5,716
		(26,078)	*(32,855)*
BORMNT[a]	Total amount borrowed during the previous 12 months, in current Mexican pesos	8,095	7,933
		(38,242)	*(36,844)*
SAVMNT[a]	Total amount of reported household savings, in current Mexican pesos	5,214	6,105
		(38,242)	*(38,684)*
Remittances and transnational status			
REM[a]	Binary variable that takes the value 1 for households that received remittances during the previous 12 months	0.06	0.06
		(0.23)	*(0.24)*
TRN[a]	Binary variable that takes the value 1 for households where at least one household member had either a spouse, a parent, or a child in the US	0.16	0.18
		(0.37)	*(0.38)*

Household-level controls			
SIZ[a]	Number of household members	4.28	4.69
		(2.06)	*(2.33)*
EXP[a]	Log of monthly per capita spending, in current Mexican pesos	7.87	7.97
		(0.97)	*(1.09)*
ETHN[a]	Binary variable that takes the value 1 if an indigenous language was spoken in the household	0.18	0.17
		(0.38)	*(0.38)*
AGE[a]	Age of the head of household	43.85	46.58
		(15.74)	*(15.53)*
FEM[a]	Binary variable that takes the value 1 if household head was female	0.20	0.22
		(0.4)	*(0.41)*
EDUC[a]	Years of schooling of the head of household	4.97	5.26
		(2.24)	*(2.32)*
WRK[a]	Binary variable that takes the value 1 for households where the household head earned income during the previous 12 months	0.80	0.76
		(0.4)	*(0.43)*
CIVST[a]	Binary variable that takes the value 1 if the head of household had a spouse or couple that lived in the household	0.74	0.73
		(0.44)	*(0.44)*
SHKEC[a]	Binary variable that takes the value 1 for unemployment or business failure by any household member during prev. five years	0.08	0.06
		(0.27)	*(0.24)*
SHKSK[a]	Binary variable that takes the value 1 for illness or accident that required hospital treatment by any household member during prev. five years	0.13	0.11
		(0.34)	*(0.31)*
SHKCP[a]	Binary variable that takes the value 1 for total loss of crop of households during the prev. five years	0.06	0.03
		(0.23)	*(0.16)*
RURAL[a]	Binary variable that takes the value 1 for households that lived in communities with less than 2,000 inhabitants	0.43	0.43
		(0.49)	*(0.49)*
Municipal- and state-level controls			
GDPST[b]	State-level GDP in thousands of current Mexican Pesos	14.55	15.13
		(6.72)	*(6.74)*
EXPMN[c]	Per capita expenditures of the municipality government, in current Mexican Pesos	1441.29	1914.63
		(689.08)	*(858.27)*
FINDEV[d]	Total deposits relative to GDP, at the level of Mexican states	0.36	0.28
		(0.14)	*(0.12)*
RAIN[e]	Rain fall at state level lagged by one year (annual average millimeters)	758.33	920.33
		(316.59)	*(314.70)*
TRAIN2[f]	Distance from the head of municipality to the nearest railroad depot as it existed in 2012, in kilometers	66.88	66.79
		(122.45)	*(122.47)*

(*continued on next page*)

Table 1. (*continued*)

Variable	Description	2002	2005
EMPUS[g]	Indicator on the job level in US states where Mexican migrants reside. In order to generate variation per Mexican state, we generate an importance indicator based on the percentage of consular documents that were requested by individuals from Mexican state *j* who lived in US state *k* in 2008	98.58	101.90
		(77.26)	*(79.71)*
Instruments			
TRAIN[h]	Distance of each municipality from the rail network as it existed in 1920 and then the distance from that point on the rail network to the US border (measuring distance along the railroad)	701.87	701.77
		(283.45)	*(283.54)*
DUSEMP[g]	Indicator on job creation in US states where Mexican migrants reside. Job creation is calculated as EMPUS(t) − EMPUS(t − 3)	2.95	3.38
		(2.17)	*(2.48)*

Mean values and standard errors in brackets are given separately for 2002 and 2005 and for a maximum of 7,752 observations for which data were observed at both time periods. *Sources:* (a) MxFLS, (b) INEGI (2014a), (c) INEGI (2014a), (d) CNBV (2012), (e) CONAGUA (2014), (f) Mexlist (2014) and Google maps, (g) USBLS (2014) and IME (2008), (h) Demirgüç-Kunt et al. (2011).

income, but not so long that links with the home country have weakened. Within such a typical remittance cycle, it would be difficult to imagine how recent borrowing would be causal to remittances in the same time period. Also, the use of alternative definitions for the dependent variable reduces concerns about potential specification bias, since confirming results on different specifications imply that our results are not simply a random result obtained due to ad hoc specifications.

Our baseline model takes the following form:

$$FinServ_{i,t} = \beta_1 REM_{i,t} + \beta_3 X_{i,t} + v_i + u_{i,t}, \quad (1)$$

where $FinServ_{i,t}$ are binary variables that stand for different types of financial services for household i at time t. As mentioned above, the different types of financial services are: DBT, BOR, BOR_FR, BOR_IF, BOR_PR, SAV, ACC, and B_ACC. REM is the main (binary) explanatory variable. We also report estimations on the amount of household debt (DBTMNT), the amount of recent borrowing (BORMNT), and the amount of household savings (SAVMNT). By doing so, we test our results on the intensive margin. X are control variables at the household and state level, as summarized in Table 1. v_i is an unobserved household-specific fixed effect, that enables us to control for all unobserved time-constant characteristics of households additional to the time-varying covariates X. $u_{i,t}$ is the usual error term.

While household fixed effects allow us to control for self-selection of migrants and omitted variable bias (e.g., variables that would have an effect both on remittances and on borrowing or debt), it does not provide a definite answer to the direction of causality between migration and remittances on the one hand, and access to and the use of loans and savings accounts on the other hand. It could still be, for example, that correlations between remittances and debt are due to the financing of migration, because remittances are sent in order to help households pay their debts, or because households accumulate savings in order to finance migration. [9] We therefore estimate the marginal treatment effect [10] using lagged exogenous variation from employment creation in the US states where Mexican migrants reside as an instrument for the likelihood that households receive remittances. Lagged US labor market indicators are a valid instrument because employment creation is a supply-side factor in explaining remittances to Mexico (instrument relevance): An improvement in labor market conditions in the US should have a positive influence on the capacity of Mexican migrants to send remittances, everything else being equal. These effects occur with lags: Migrants do not immediately start sending remittances upon arrival to the US, because they have to first pay for the costs of migration. At the same time, we expect that lagged US labor market conditions do not have a (direct) effect on (changes in) current levels of financial indicators among Mexican households, other than through the migration and remittances channel (instrument is exogenous, that is, US labor market conditions are uncorrelated with unobserved components in Eqn. (1)). Adams and Cuecuecha (2010, 2013), Anzoategui et al. (2014) and Yang (2008) have previously used economic conditions in the country of destination as instruments for remittances, among others. As explained above, lagged US employment variation is measured via the change of employment levels in US states over the previous three years. We create regional variation of the instrument by multiplying the job creation rate in US state k with the information obtained from IME (2008), which varies by US state k and Mexican state j. [11]

In order to generate variation at the municipality level, we multiply the lagged job creation in the US by the variable TRAIN (distance to the border by rail lines). While the identifying time-varying information comes from changes in US labor market conditions, the distance to train lines allows us to provide a different weighting of US labor market effects to each municipality. Distance to train lines has been used previously as an instrument for remittances by Demirgüç-Kunt et al. (2011), López Córdova (2005) and Woodruff and Zenteno (2007). Mexican migration to the US has deep

Table 2. *First step linear regression instrumenting for the likelihood that households received remittances*

DUSEMP*TRAIN	0.0001***
	[0.00001]
TRN	0.2158***
	[0.0143]
AGE	0.0011***
	[0.0005]
ETHNIC	0.0155*
	[0.0087]
EXP	0.0132***
	[0.0034]
WRK	−0.0047
	[0.0113]
SIZ	−0.0032
	[0.0048]
EDUC	0.0010
	[0.0027]
RURAL	−0.0534
	[0.0501]
FEM	0.0228
	[0.0298]
CIVST	−0.0006
	[0.0192]
SHKEC	0.0148
	[0.0100]
SHKSK	0.0182**
	[0.0092]
SHKCR	0.0600***
	[0.0195]
RAIN*AGE^2	−5.74E−09
	[4.30E−09]
GDPST	−0.0017
	[0.0027]
EXPMN	−9.76E−06
	[8.18E−06]
EMPUS*TRAIN2	−1.52E−06**
	[7.85E−07]
FINDEV	0.0166
	[0.0586]
Constant	−0.0768
	[0.0838]
N	14,347
F	15.81***
R^2 overall	0.18
Fixed effects	Yes

Stars denote significance at 1% (***), 5% (**) and 10% (*) levels. Cluster, by folio, robust standard errors are given in brackets. The standard errors are robust to arbitrary heteroscedasticity and within group correlation.

historical roots that date back to US labor demand in the earlier parts of the 20th century, particularly during railway constructions in the 1920s. US recruiters used rail lines to attract Mexican migrants (Demirgüç-Kunt et al., 2011, p. 230) and early migration was facilitated by the proximity to railway networks that considerably reduced migration costs. Networks that emerged from this process have effects that potentially last until today, since the dynamic effects of migration networks reduce costs of migration dynamically over time, as has been shown in the Mexican case (McKenzie & Rapoport, 2007).

Tests of validity of instruments demonstrate that the combination of distance to trains and lagged US labor market conditions into a single instrument generates best results in terms of weakness of instruments tests. It is important to mention that in order to ensure the validity of our instrument we use as a control variable the level of current US employment (EMPUS) in our set of controls. The assumption is that if current US employment has an effect on current credit markets in Mexico, the lagged changes in US employment have no effect on current credit markets in Mexico, conditioning on the current level of US employment.[12] Moreover, because the distance to train lines might be correlated with economic conditions and therefore potentially violate the exogeneity assumption, we follow Demirgüç-Kunt et al. (2011) and include distance to train lines as they exist today (TRAIN2) among the control variables. By multiplying the current level of US employment with TRAIN2, we also generate variation at the municipality level in the control variable EMPUS. As mentioned above, we additionally control for differences across municipalities and states by including indicators on state-level GDP (GDPST), the state level of financial development (FINDEV), variation in rainfall at state level (RAIN), and public expenditure at the municipal level (EXPMN). Note that by maintaining household fixed effects in the instrumental regression we are also controlling for all time-invariant factors.

Because both the instrumented variable (REM) and the dependent variables are binary (DBT, BOR, ACC) or truncated (BORMNT, DBTMNT, SAVMNT), we face a problem of 'forbidden regression' (Wooldridge, 2002, p. 236). Therefore, we opt for using linear regression when including instruments. This comes at a price: For probabilities that are close to the lower or upper ends of the probability range (e.g., very high and very low levels of the dependent variable), coefficients (and marginal effects) from the linear regression tend to be biased. We accept this limitation of our strategy, since the main interest of the instrumental approach lies in confirming the existence of an effect (its sign and significance) rather than its magnitude.

In addition to the instrumental model on binary outcome variables, we report estimations on the amount of household debt (DBTMNT), the amount of recent borrowing (BORMNT), and the amount of household savings (SAVMNT). The truncated and strongly skewed distribution of these variables (a large proportion of households reported no debt or no savings) poses additional methodological challenges. We estimate the effect of remittances on amounts using a tobit fixed effects methodology as proposed by Honoré, Kyriazidou, and Powell (2007). Their methodology consists in identifying those households that show non-zero amounts in the quantities of interest. For this subset of households a first difference regression that controls for selectivity is run. The first difference eliminates fixed effects. The selectivity for these households stems from the fact that they show non-zero amounts for each period observed in the panel. Since we observe the characteristics of households with this behavior and the characteristics of households that have at least one zero in their information, it is possible to estimate a consistent estimator for the probability of being selected, by using a conditional fixed effect estimator for such probability. Later on, the probability of being selected is estimated for the two periods under study and a difference between the probability of being selected at time t and at time $t + 1$ is obtained. For this difference, a non-parametric kernel density is estimated. Conditional on this estimated density, it is argued that a household shows up in the selected sample exogenously. Moreover, households for which the estimated difference is close to zero are more likely to obey to the conditional exogeneity assumption. Consequently, the first difference estimation weighs the observations proportionally to their estimated density. Honoré et al. (2007) show that this estimator is consistent.

Table 3. *Second step linear regression instrumenting for the likelihood that households received remittances (with household fixed effects)*

	Spec. I	Spec. II	Spec. III	Spec. IV	Spec. V	Spec. VI	Spec. VII	Spec. VIII
Variables	DBT	BOR	BOR_FR	BOR_IF	BOR_PR	SAV	ACC	B_ACC
REM	1.1326***	0.5660*	−0.1903	0.8458**	0.4835*	0.9415***	0.5190*	0.3768*
	[0.4241]	*[0.3413]*	*[0.1927]*	*[0.3417]*	*[0.2933]*	*[0.3590]*	*[0.2908]*	*[0.2263]*
TRN	−0.2304**	−0.0936	0.0510	−0.1684**	−0.0795	−0.1637**	−0.0702	−0.0482
	[0.0937]	*[0.0773]*	*[0.0429]*	*[0.0784]*	*[0.0668]*	*[0.0803]*	*[0.0650]*	*[0.0512]*
AGE	−0.0024**	−0.0010	1.59E−05	−0.0017**	−0.0014*	−0.0019*	−0.0008	−0.0007
	[0.0011]	*[0.0013]*	*[0.0004]*	*[0.0009]*	*[0.0008]*	*[0.0011]*	*[0.0009]*	*[0.0007]*
ETHNIC	0.0305	0.0416**	0.0182**	0.0307*	0.0299*	0.0303	0.0206	0.0137
	[0.0219]	*[0.0008]*	*[0.0090]*	*[0.0178]*	*[0.0156]*	*[0.0195]*	*[0.0149]*	*[0.0125]*
EXP	0.0298***	0.0428**	0.0100**	0.0064	0.0054	0.0152*	0.0180***	0.0151***
	[0.0102]	*[0.0181]*	*[0.0040]*	*[0.0074]*	*[0.0062]*	*[0.0080]*	*[0.0064]*	*[0.0052]*
WRK	0.0480**	0.0331**	0.0050	0.0277*	0.0143	0.0301	0.0219	0.0128
	[0.0203]	*[0.0152]*	*[0.0082]*	*[0.0156]*	*[0.0128]*	*[0.0189]*	*[0.0147]*	*[0.0121]*
SIZ	0.0153	0.0168**	0.0061	0.0140*	0.0096	0.0147*	0.0103	0.0124**
	[0.0094]	*[0.0081]*	*[0.0038]*	*[0.0083]*	*[0.0071]*	*[0.0087]*	*[0.0069]*	*[0.0056]*
EDUC	0.0153	−0.0041	0.0026	−0.0062	−0.0038	0.0106*	0.0067	0.0065*
	[0.0094]	*[0.0050]*	*[0.0027]*	*[0.0049]*	*[0.0043]*	*[0.0055]*	*[0.0045]*	*[0.0038]*
RURAL	0.0052	0.0162	−0.0082	0.0282	0.0802	0.0042	0.0236	−0.0169
	[0.0058]	*[0.0940]*	*[0.0159]*	*[0.0971]*	*[0.0718]*	*[0.0834]*	*[0.0944]*	*[0.0848]*
FEM	0.0988	−0.0433	0.0031	−0.0312	−0.0217	−0.0248	0.0021	−0.0170
	[0.1366]	*[0.0413]*	*[0.0231]*	*[0.0408]*	*[0.0332]*	*[0.0510]*	*[0.0402]*	*[0.0357]*
CIVST	−0.0072	−0.0173	0.0163	−0.0213	−0.0264	0.0067	0.0203	0.0074
	[0.0523]	*[0.0314]*	*[0.0172]*	*[0.0303]*	*[0.0270]*	*[0.0342]*	*[0.0290]*	*[0.0249]*
SHKEC	0.0930***	0.0412*	−0.0042	0.0465**	0.0421**	−0.0445**	−0.0254	−0.0217
	[0.0256]	*[0.0214]*	*[0.0117]*	*[0.0209]*	*[0.0179]*	*[0.0206]*	*[0.0175]*	*[0.0150]*
SHKSK	0.0842***	0.0339**	0.0128	0.0221	0.0219	0.0228	0.0150	0.0083
	[0.0203]	*[0.0167]*	*[0.0088]*	*[0.0165]*	*[0.0143]*	*[0.0173]*	*[0.0139]*	*[0.0111]*
SHKCR	0.0023	0.0151	0.0280*	−0.0214	−0.0039	−0.0554	−0.0196	−0.0144
	[0.0407]	*[0.0328]*	*[0.0169]*	*[0.0347]*	*[0.0291]*	*[0.0341]*	*[0.0249]*	*[0.0195]*
RAIN*AGE^2	2.03E−08**	1.21E−08*	−9.31E−10	1.77E−08**	1.60E−08***	6.120E−09	2.83E−09	2.32E−09
	[8.96E−08]	*[6.81E−09]*	*[3.40E−09]*	*[6.97E−09]*	*[5.83E−09]*	*[9.16E−09]*	*[7.41E−09]*	*[6.24E−09]*
GDPST	−0.038***	−0.0236***	−0.0056	−0.0209***	−0.0201***	−0.0158*	−0.0116	−0.0092
	[0.0097]	*[0.0068]*	*[0.0045]*	*[0.0055]*	*[0.0049]*	*[0.0091]*	*[0.0081]*	*[0.0068]*
EXPMN	−4.18E05**	−3.40E−05**	−5.98E−06	−2.59E−05	−2.67E−05*	−5.23E−05***	−3.84E−05***	1.13E−06
	[1.98E−05]	*[1.61E−05]*	*[8.26E−06]*	*[1.70E−05]*	*[1.43E−05]*	*[1.52E−05]*	*[1.33E−05]*	*[1.08E−05]*
EMPUS*TRAIN2	−2.90E−06**	−1.42E−07	2.24E−06*	−2.33E−06*	−1.95E−06*	1.15E−06	1.92E−06	1.71E−06
	[1.98E−06]	*[1.42E−06]*	*[1.14E−06]*	*[1.25E−06]*	*[1.10E−06]*	*[1.82E−06]*	*[1.65E−06]*	*[1.38E−06]*
FINDEV	0.3672**	0.3747***	−0.0175	0.4884***	0.4281***	0.1995	0.1019	0.1756*
	0.1523	[0.1160]	[0.0614]	[0.1124]	[0.0966]	[0.1453]	[0.1233]	[0.1029]
F	*11.6***	*8.01***	*1.78***	*8.2***	*8.9***	*5.8***	*4.5***	*3.09***
N	*13,710*	*13,392*	*13,420*	*13,420*	*13,420*	*13,502*	*13,502*	*13,502*
Identifi. Test	*27.98****	*28.44****	*27.88****	*27.88****	*27.88****	*28.83****	*28.83****	*28.83****
Weak Identif.	*27.95*[a]	*28.42*[a]	*27.86*[a]	*27.86*[a]	*27.86*[a]	*28.81*[a]	*28.81*[a]	*28.81*[a]
Hausm (Chi^2)	*9.17*	*16.3*	*3.1*	*9.9*	*20.4*	*21.6*	*3.1*	*21.3*

Stars denote significance at 1% (***), 5% (**) and 10% (*) levels. The identification test is Anderson canonical LR statistic, which distributes as a chi squared with 1 degree of freedom. The null hypothesis is the existence of no identification. [a]The Weak identification test uses Crag–Donald *F* test. The values shown in the table are all above the Stock Yogo weak identification test critical value for a 10% maximal IV size, which corresponds to an approximate 10% bias in the IV estimator. Hausman (Chi^2) refers to a test performed comparing fixed effects estimation with random effects estimation. Clustered and heteroscedastic robust standard errors are given in brackets. The standard errors are adjusted for the two steps and robust to arbitrary heteroscedasticity and within group correlation.

4. RESULTS

Tables 2 and 3 show regression results for the effect of remittances on the use of financial services using an instrumental strategy. Through the use of instruments, we respond to three main concerns related to the endogeneity of remittances: First, high debt might itself be a motivation to migrate. Second, migration might be financed through debt (or through accumulated savings). In both cases, debt (or borrowing, or savings) would precede migration and remittances, rather than the other way around. Finally, it is possible that both remittances and financial variables respond to a third omitted variable we are not able to control for (for example, a shock we do not observe).

As mentioned above, we combine the distance to border by rail lines (TRAIN) and changes in labor market conditions in the US states where Mexican migrants reside (DUSEMP) into one instrument Z. Table 2 provides results for the first step fixed effects estimation where we predict remittance-receiving status of households from the instrument Z plus a set of exogenous control variables X, while maintaining the household fixed effects. [13] It is shown that a positive and statistically

Table 4. *Estimation for the likelihood of the use of different financial services (conditional logit)*

	Spec. I	Spec. II	Spec. III	Spec. IV	Spec. V	Spec. VI	Spec. VII	Spec. VIII	Spec. IX
Variables	DBT	BOR	BOR_FR	BOR_IF	BOR_PR	SAV	ACC	B_ACC	BOR_FR
REM	0.4850***	0.3480**	0.6214**	0.3048	0.2325	0.7249***	0.4916**	0.2633	0.5342*
	[0.1525]	*[0.1689]*	*[0.2861]*	*[0.1946]*	*[0.2106]*	*[0.1735]*	*[0.2005]*	*[0.2367]*	*[0.2935]*
TRN	−0.0025	0.1552	−0.0249	0.1072	0.2958*	0.1772	0.3551**	0.4787**	−0.0958
	[0.1292]	*[0.1411]*	*[0.2858]*	*[0.1554]*	*[0.1699]*	*[0.1398]*	*[0.1699]*	*[0.2053]*	*[0.2932]*
AGE	−0.0072	−0.0014	−0.0153	−0.0058	−0.0088	−0.0006	−0.0006	−0.0013	−0.0110
	[0.0509]	*[0.0071]*	*[0.0140]*	*[0.0079]*	*[0.0085]*	*[0.0057]*	*[0.0066]*	*[0.0076]*	*[0.0144]*
ETHNIC	0.2587**	0.3699***	0.5951**	0.3976***	0.3737**	0.3442***	0.3045*	0.2899	0.5852**
	[0.1172]	*[0.1368]*	*[0.2755]*	*[0.1539]*	*[0.1651]*	*[0.1284]*	*[0.1599]*	*[0.1855]*	*[0.2827]*
EXP	0.3482***	0.2311***	0.3725***	0.2121***	0.1790**	0.2628***	0.3435***	0.3582***	0.3118***
	[0.0520]	*[0.0581]*	*[0.1183]*	*[0.0646]*	*[0.0719]*	*[0.0557]*	*[0.0665]*	*[0.0779]*	*[0.1207]*
WRK	0.3368***	0.4079**	0.2629	0.3976**	0.2646	0.2451	0.2976*	0.2556	0.2356
	[0.1305]	*[0.1604]*	*[0.2869]*	*[0.1841]*	*[0.1977]*	*[0.1341]*	*[0.1598]*	*[0.1942]*	*[0.2923]*
SIZ	0.0890*	0.1263**	0.0880	0.1448***	0.1449**	0.0850*	0.0459	0.1156*	0.0037
	[0.0493]	*[0.0502]*	*[0.1156]*	*[0.0538]*	*[0.0575]*	*[0.0491]*	*[0.0580]*	*[0.0740]*	*[0.1209]*
EDUC	0.0404	−0.0256	0.0547	−0.0569	−0.0347	0.0735**	0.0674*	0.0681	0.0316
	[0.0330]	*[0.0365]*	*[0.0682]*	*[0.0414]*	*[0.0441]*	*[0.0347]*	*[0.0403]*	*[0.0470]*	*[0.0693]*
RURAL	−0.1269	−0.1114	Ne	−0.2668	1.0718	−0.9750	−0.2953	−0.6502	Ne
	[0.6783]	*[0.8315]*	*Ne*	*[0.8362]*	*[1.1837]*	*[1.2775]*	*[0.8548]*	*[0.9644]*	*Ne*
FEM	−0.0706	−0.3475	0.1396	−0.2579	−0.3261	−0.0084	0.2249	0.1524	0.2589
	[0.3746]	*[0.4351]*	*[0.7511]*	*[0.5019]*	*[0.5761]*	*[0.3872]*	*[0.4449]*	*[0.4918]*	*[0.7595]*
CIVST	−0.1223	−0.1301	0.7054	−0.2796	−0.3744	0.2778	0.3815	0.3582	0.5907
	[0.2580]	*[0.2919]*	*[0.5319]*	*[0.3474]*	*[0.3616]*	*[0.2889]*	*[0.3144]*	*[0.3708]*	*[0.5460]*
SHKEC	0.5398***	0.2741**	−0.2512	0.4278***	0.4752***	−0.1603	−0.1351	−0.2106	−0.1948
	[0.1230]	*[0.1378]*	*[0.2491]*	*[0.1546]*	*[0.1713]*	*[0.1424]*	*[0.1625]*	*[0.1903]*	*[0.2554]*
SHKSK	0.5413***	0.2759***	0.2016	0.3129***	0.3506***	0.2436**	0.1951	0.1565	0.1902
	[0.0992]	*[0.1073]*	*[0.2024]*	*[0.1209]*	*[0.1303]*	*[0.1111]*	*[0.1268]*	*[0.1579]*	*[0.2082]*
SHKCR	0.5023**	0.3351*	0.6574	0.1679	0.1529	−0.0493	0.0654	0.2180	0.6121
	[0.2055]	*[0.2026]*	*[0.4434]*	*[0.2200]*	*[0.2310]*	*[0.2096]*	*[0.2846]*	*[0.3598]*	*[0.4510]*
RAIN*AGE^2	6.73E−08	4.80E−08	6.36E−08	9.22E−08	1.33E−07	−6.36E−08	−4.49E−08	−5.52E−08	4.760E−08
	[6.14E−08]	*[7.34E−08]*	*[1.46E−07]*	*[8.31E−08]*	*[9.09E−08]*	*[5.54E−08]*	*[6.44E−08]*	*[7.29E−08]*	*[1.49E−07]*
GDPST	−0.4384***	−0.3827***	−0.2114	−0.4338***	−0.5466***	−0.1350**	−0.1326*	−0.1421*	−0.1655
	[0.0822]	*[0.0975]*	*[0.1788]*	*[0.1072]*	*[0.1185]*	*[0.0796]*	*[0.0791]*	*[0.0819]*	*[0.1830]*
EXPMN	−0.0003**	−0.0003	−0.0001	−0.0002**	−0.0002*	−0.0005***	−0.0005***	−0.0001	4.10E−05
	[0.0001]	*[0.0001]*	*[.0002]*	*[0.0001]*	*[0.0001]*	*[0.0001]*	*[0.0002]*	*[0.0002]*	*[2.33E−04]*
EMPUS*TRAIN2	6.46E−06	4.01E−05	0.0001**	2.20E−05	2.97E−05	6.78E−05**	9.08E−05***	8.85E−05***	0.0001**
	[2.17E−05]	*[2.56E−05]*	*[0.0001]*	*[2.88E−05]*	*[3.06E−05]*	*[2.32E−05]*	*[2.80E−05]*	*[3.29E−05]*	*[0.0001]*
FINDEV	1.2216	3.0659**	1.1826	4.9973***	5.3151***	1.7137	1.6770	2.6824**	1.4900
	[1.0504]	*[1.2073]*	*[2.2503]*	*[1.3934]*	*[1.5238]*	*[1.0793]*	*[1.1467]*	*[1.2164]*	*[2.2840]*
ACC	NI	NI	NI	NI	NI	NI	NA	NI	0.8881***
									[0.1916]
LR (Chi^2)	303***	175***	45.5***	203***	199***	152***	109***	70***	68.9***
N	*4,664*	*3,344*	*902*	*2,796*	*2,456*	*3,600*	*2,530*	*1,770*	*902*
Hausman (Chi^2)	*59.6****	*46.4****	*32.9****	*40.9****	*37.3****	*101.6****	*107.9****	*103.8****	*37.9****

Stars denote significance at 1% (***), 5% (**) and 10% (*) levels. Clustered and heteroscedastic robust standard errors are given in brackets. Figures in brackets are standard errors. All specifications use household fixed effects. Hausman (Chi^2) refers to a test performed comparing fixed effects estimation with random effects estimation. The test rejects that differences in coefficients between fixed and random effects are not systematic. Ne: Excluded due to collinearity. NI: not included in regression. NA: it does not apply for the equation.

significant relation exists at the 1% level between the reception of remittances and job creation in US states where Mexican migrants reside. Table 2 also portrays that households that have an older head of household (AGE), higher household expenditures (EXP), speak an indigenous language (ETHNIC), suffered a total loss of crops (SHKCR), and suffered health shocks (SHKSK) receive more remittances on average.

Table 3 shows second step results instrumenting for remittances. We find a strong and positive effect of remittances on the existence of debt (DBT), on recent borrowing (BOR), on the existence of savings (SAV), and on the ownership of accounts (ACC). Although coefficients obtained from OLS on binary outcomes should be interpreted with caution, the effects of remittances on all financial variables are large: Marginal effects are around 1 for the existence of debt (DBT) and for savings (SAV) and around 0.5 for recent borrowing (BOR) and for the ownership of accounts (ACC). Specs. III, IV and V add results for different sources of borrowing: Borrowing from formal financial institutions (BOR_FR), borrowing from informal sources (BOR_IF), and borrowing from friends, families, and acquaintances (BOR_PR). Only effects on informal borrowing and on personal borrowing are significant, suggesting that effects on borrowing are driven by borrowing from informal and personal sources, whereas the effect of remittances is not statistically significant for borrowing from formal financial institutions, including traditional banks, savings funds, or government credit programs. At the same time, we find a statistically

Table 5. *Marginal effects (change in the likelihood of the use of financial services due to remittances) for different models, with and without instruments*

	OLS with instruments (Table 3)	Conditional logit without instruments (Table 4)
DEBT	1.13***	0.12***
BOR	0.56*	0.17**
BOR_FR	−0.19	0.05**
BOR_IF	0.84**	0.15
BOR_PR	0.48*	0.13
SAV	0.94***	0.10***
ACC	0.51*	0.06**
B_ACC	0.37*	0.03

Stars denote significance at 1% (***), 5% (**) and 10% (*) levels. Marginal effects are based on Table 3 (OLS) and Table 4 (conditional logit) and use all covariates shown there. Marginal effects for the conditional logit are estimated assuming fixed effects equal zero and for groups of households that receive remittances and households that do not receive remittances.

Table 6. *Logit fixed effects estimation for the probability of showing no amounts on three financial indicators (first stage for tobit fixed effect estimation – Honoré and Kyriziadou (2000) method)*

Variables	NDBT	NSAV	NBOR
REM	−0.4850***	−0.6930***	−0.6101***
	[0.1525]	*[0.1723]*	*[0.1449]*
TRN	0.0025	−0.1756	0.0281
	[0.1292]	*[0.1390]*	*[0.1190]*
AGE	0.0072	0.0004	0.0003
	[0.0059]	*[0.0058]*	*[0.0053]*
ETHNIC	−0.2587**	−0.2934**	−0.4767***
	[0.1172]	*[0.1303]*	*[0.1096]*
EXP	−0.3482***	−0.2488***	−0.3067***
	[0.0520]	*[0.0577]*	*[0.0473]*
WRK	−0.3368***	−0.1870	−0.3075***
	[0.1305]	*[0.1355]*	*[0.1125]*
SIZ	−0.0890*	−0.1102**	−0.2333***
	[0.0493]	*[0.0502]*	*[0.0479]*
EDUC	−0.0404	−0.0743**	−0.0470
	[0.0330]	*[0.0353]*	*[0.0304]*
RURAL	0.1269	1.5683	−0.4960
	[0.6783]	*[1.2126]*	*[0.8393]*
FEM	0.0706	0.1153	0.3857
	[0.3746]	*[0.3979]*	*[0.3201]*
CIVST	0.1223	0.0913	0.2101
	[0.2580]	*[0.2951]*	*[0.2197]*
SHKEC	−0.5398***	0.0876	−0.3724***
	[0.1230]	*[0.1432]*	*[0.1272]*
SHKSK	−0.5413***	−0.1934*	−0.4902***
	[0.0992]	*[0.1110]*	*[0.0991]*
SHKCR	−0.5023**	−0.0231	−0.5381***
	[0.2055]	*[0.2154]*	*[0.1766]*
RAIN*AGE^2	−6.73E−08	1.69E−08	6.63E−09
	[6.14E−08]	*[5.66E−08]*	*[5.20E−08]*
GDPST	0.4384***	0.1884**	0.5603***
	[0.0822]	*[0.0919]*	*[0.0803]*
EXPMN	0.0003**	0.0007***	0.0003***
	[0.0001]	*[0.0002]*	*[0.0001]*
EMPUS*TRAIN2	−6.46E−06	−7.21E−05***	1.65E−05
	[2.17E−05]	*[2.41E−05]*	*[1.01E−05]*
FINDEV	−1.2216	−1.7893	−2.7927***
	[1.0504]	*[1.1967]*	*[0.8851]*
LR chi (2)	303***	159***	514***
N	4,664	3,492	5,482

Stars denote significance at 1% (***), 5% (**) and 10% (*) levels. Standard errors given in brackets. Dependent variables have been transformed to logs.

significant effect of remittances on the ownership of savings accounts with traditional banks (Spec. VII). Although households that receive remittances are more likely to own bank accounts compared to observationally equivalent households, they are not more likely to receive formal loans. This indicates that ownership of bank accounts does not necessarily translate

Table 7. *Tobit fixed effects estimation for amounts on three financial indicators*

Variables	DBTMNT	SAVMNT	BORMNT
REM	1.2149**	0.0634	1.1726*
	[0.5965]	*[0.7486]*	*[0.6058]*
TRN	0.1264	0.4412	0.6116
	[0.4673]	*[0.5812]*	*[0.4424]*
AGE	0.0152	−0.0321	−0.0734
	[0.0483]	*[0.0238]*	*[0.0522]*
ETHNIC	0.4058	0.0682	0.4061
	[0.6192]	*[0.3190]*	*[0.4995]*
EXP	0.0600	0.1099	0.1937
	[0.1387]	*[0.1266]*	*[0.1734]*
WRK	1.1424**	0.6280*	0.0643
	[0.4524]	*[0.3898]*	*[0.5334]*
SIZ	−0.0812	0.0795	−0.0066
	[0.1020]	*[0.0651]*	*[0.0931]*
EDUC	0.0663	0.0042	−0.0338
	[0.0937]	*[0.0795]*	*[0.1154]*
RURAL	−0.1144	−0.1331	0.4617
	[0.3892]	*[0.3002]*	*[0.3907]*
FEM	−0.8442	0.5989	1.3387**
	[0.5647]	*[0.6049]*	*[0.6460]*
CIVST	−0.8367	−0.1000	1.4703**
	[0.5607]	*[0.5818]*	*[0.6216]*
SHKEC	0.7299	−0.5175	−0.5974
	[1.0061]	*[0.5976]*	*[1.1374]*
SHKSK	1.5309**	0.0035	0.3346
	[0.6076]	*[0.4731]*	*[0.6580]*
SHKCR	0.2240	−0.0893	2.5207**
	[1.1205]	*[0.5772]*	*[1.0536]*
RAIN*AGE^2	−2.89E−07	3.03E−07*	6.37E−07
	[4.41E−07]	*[1.89E−07]*	*[5.36E−07]*
GDPST	1.5747***	0.0780	0.5959***
	[0.2805]	*[0.0933]*	*[0.1968]*
EXPMN	−0.0008**	−0.0004	−0.0008*
	[0.0003]	*[0.0003]*	*[0.0004]*
EMPUS*TRAIN2	6.93E−05***	−1.90E−06	1.53E−05
	[1.51E−05]	*[4.80E−06]*	*[9.76E−06]*
FINDEV	−45.76***	−0.2813	−6.4199
	[10.3984]	*[3.4303]*	*[11.7877]*
Constant	−13.61***	0.0634	−7.3843*
	[3.0785]	*[0.7486]*	*[3.3422]*
F	4.61***	1.78**	3.06***
N	*2,890*	*3,527*	*2,606*
R^2	0.09	0.04	0.04
Hausman (Chi^2)	183.9***	298.9***	277.7***

Stars denote significance at 1% (***), 5% (**) and 10% (*) levels. The model is estimated following the method proposed by Honoré et al. (2007). Hausman (Chi^2) refers to a test performed comparing fixed effects estimation with random effects estimation. Standard errors given in brackets. The standard errors are robust to arbitrary heteroscedasticity. Dependent Variables have been transformed to logs.

into the provision of additional financial services (e.g., loans) by banks. Reasons may be that households lack credit histories with banks or that the credit portfolio of banks does not match the financial needs of remittance-receiving households. Note that we observe effects for remittances even when we control for the existence of close relatives in the US (TRN), lending support to the argument that effects on financial variables do in fact operate through remittances and not (or not only) through the existence of transnational family links. In Spec. I, IV, and VI, transnational status is associated with lower probability of debt (DBT), informal borrowing (BOR_IF), and savings (SAV). Stock and Yogo (2002) test statistics indicate that our instrument is very strong since estimations are less than 10% above or below their true values (see Table 3).

The log of household expenditures (EXP) and whether the head of household earned income from work or business (WRK) have positive and significant effects for both the existence of debt and for recent borrowing. Households in states with larger levels of financial development (FINDEV) have a higher probability of owing debt or having borrowed recently. A larger level of financial development at the state level (FINDEV) is associated with more informal and more personal borrowing, suggesting that formal financial sectors coexist next to informal finance. More affluent states (GDPST) and states with higher expenditure of the municipal government (EXPMN) are associated with lower probability of debt and of recent borrowing. We also include indicators on the shock history of households. The occurrence of health-related shocks (SHKSK) and the loss of job or business failures (SHKEC)

during the previous 5 years increase the probability of the existence of debt and of recent borrowing. Economic shocks (SHKEC) also have strong effects on personal borrowing and on informal borrowing. In larger households (SIZ) and household where an indigenous language is spoken (ETHNIC), we observe more recent borrowing. In households with older heads, the probability of owing debt is larger. No difference is found for rural households (RURAL) and neither education (EDUC), nor gender (FEM), nor civil status of the household head (CIVST) is associated with a higher probability of debt or borrowing. [14] Variation in rainfall at the state level (RAIN) multiplied by age squared of the household head and the level of employment in the US (EMPUS) multiplied by TRAIN2 have positive effects in some of the specifications. Concerning the existence of household savings (SAV) and the ownership of accounts (ACC), EXP shows a positive and significant sign. No clear-cut relationship exists between household shocks and the existence of savings or the ownership of accounts: Only economic shocks SHKEC are negatively associated with the existence of savings. Regarding state-level and municipality-level indicators, higher spending by municipalities is correlated with a lower probability of savings and a lower probability of accounts. Higher state-level GDP is correlated with lower probability of savings. The level of financial development (FINDEV) is positively associated with the ownership of bank accounts, but not with accounts in general, and no relationship is found between savings and the level of financial development. No significant effect on savings or the ownership of accounts is observed for RURAL, FEM, CIVST, ETHNIC, WRK and RAIN. [15]

For the purpose of comparison, Table 4 shows results for the same outcome variables from a conditional logit model (Arellano & Honoré, 2001; Chamberlain, 1984) without instruments. [16] While the conditional logit is better suited to model probabilities and therefore discrete variables, an instrumented regression in such conditions is also subject to a potentially large specification bias as explained before (Wooldridge, 2002, p. 236). In Table 4, remittances (REM) have statistically significant effects on the existence of debt (DBT), on recent borrowing (BOR), on recent borrowing from formal sources (BOR_FR), on the existence of savings (SAV), and on the ownership of savings accounts (ACC). While size and significance of control variables change for some variables and specifications, relationships between control variables and financial outcomes confirm general patterns as found in the model using instruments in Table 3. One result stands out for its qualitative difference and deserves special attention: In the conditional logit, remittances are also associated with more borrowing from formal sources. The fact that this effect vanishes when controlling for unobserved heterogeneity in the instrumental regression could be attributed to a selection process that implicitly occurs when banks screen their clients, and not to a change in the behavior of households that receive remittances. The last column of Table 4 includes a specification in which the variable ACC is included in the regression of BOR_FR. The fact that the positive and significant effect of remittances on BOR_FR weakens lends support to the existence of such a selection bias. [17]

All coefficients in Table 4 are in logit scale. Whereas a straightforward estimation of probabilities is not possible in the conditional logit model because of the unknown fixed effects parameter v_i, we report marginal effects for the main variables of interest in Table 5, assuming fixed effects equal zero and for groups of households that receive remittances and households that do not receive remittances. Their comparison with marginal effects as obtained from the instrumented OLS regression in Table 3 shows that both regressions find statistically significant effects of remittances (REM) on the existence of debt (DBT), on recent borrowing (BOR), on the existence of savings (SAV), and on the ownership of savings accounts (ACC). Coefficients do however change in magnitude, and, for some variables, also in statistical significance. In the conditional logit model without instruments, statistically significant marginal effects marginal effects above 12% are observed for recent borrowing and for reporting debt. Weaker but still significant effects are also found for the existence of savings and for the ownership of saving accounts. In contrast to the instrumented regression, effects from the conditional logit model are significant for recent borrowing from formal institutions (BOR_FR), but not for borrowing from informal sources (BOR_IF) or for borrowing from acquaintances, from relatives, or at work (BOR_PR). Also the effect on the ownership of savings accounts with a traditional bank (B_ACC) is not statistically significant in the model without instruments. On the other hand, remittances do have a causal effect on informal borrowing in the instrumented regression, an effect that is not visible in the uninstrumented regression. Although coefficients obtained from the two models are not strictly comparable, their comparison does underline the existence of endogeneity and the need for strong instruments in order to identify causal effects. [18]

Next to the regression on binary outcome variables, Tables 6 and 7 present results on amounts of the main financial variables (debt, recent borrowing, and savings) using a tobit-type fixed effects model that takes account of the truncated and strongly skewed outcome variables, as explained above. Table 6 shows the first-step estimation for the probability of reporting zero values on the variables of interest, using the full set of control variables. Results show that remittances are correlated negatively with the probability of reporting zero debt, zero savings, or zero loans. Similarly, Table 6 reports that a negative correlation exists between the probability of observing zero debt, savings, or loans and households where an indigenous language is spoken; for households with higher level of expenditure; for households where the head is working; for larger households; for households that have suffered health-related shocks; for households that live in more affluent states; and for households that live in municipalities with higher per capita expenditure. The probability of showing zero debt is also associated with economic shocks and loss of crop. The level of financial development is correlated negatively with the probability of zero borrowing, and education levels are correlated negatively with zero savings. Finally, the table shows that the current level of employment in the US (EMPUS) is correlated with the probability of showing zero saving.

Table 7 shows the results for the second-step first difference regression that is run for amounts of debt, savings, and loans. This regression is weighted by the probability of showing similar probability of selection in the two periods analyzed, as required by the Honoré et al. (2007) methodology. [19] Each of these variables is transformed to log units, since exploratory tests revealed that a better adjustment to the data occurred with log transformed variables. Consequently, the coefficients of this table can be interpreted as percent changes produced by a unitary increase in the X variables. In all cases, Hausman tests show that the fixed effects model is preferred over random effects estimators.

Table 7 demonstrates that remittances have a positive effect on the amount of debt and on recent borrowing. The estimated coefficient indicates that remittance-receiving households increase their expected amount of debt by an average

of 120% and their amount of recent borrowing by an average of 117%. Effects of remittances on the existence and amounts of debt and borrowing are consistent: remittances seem to affect debt and borrowing both at the intensive and the extensive margin. Receivers of remittances not only have a larger probability of owing debt, they also reported larger amounts of debt. The instrumental strategy also revealed that effects on borrowing are driven by borrowing from informal sources. Since the informal sector is known to have larger borrowing costs compared to the formal financial sector, it is likely that some of the increase in debt levels can be ascribed to the higher costs of borrowing from informal sources.[20] For the case of savings, we have no evidence that amounts respond to remittances. While households are more likely to have savings and to open accounts, their outstanding savings balances are not statistically different to those observed for similar households without remittances. Households where the head gained income from work had higher amounts of debt, and higher amounts of savings. Also households that suffered from health-related shocks reported higher amounts of debt. Households with female household heads, where the head lived in a relationship, and households that reported loss of crop reported higher amounts of recent borrowing. State-level GDP shows a positive correlation with amounts of debt and borrowing, while per capita expenditure of the municipality shows a negative correlation. Rain-fall interacted with age squared has positive effects on the amounts of savings. Finally, the current level of employment in the US has a positive effect on amounts of debt, whereas the level of financial development has negative effects on amounts of debt.

5. CONCLUSION

Our results lead us to conclude from the various model specifications that there is strong evidence for an effect of remittances on the existence of debts, on recent borrowing, on the existence of savings, and on the ownership of savings accounts. What we observe is not driven by unobserved fixed effects or by reverse causality: We confirm a positive and statistically significant effect when controlling for observable and unobservable differences across households; and when using instruments in order to control for the endogeneity of remittances. Our findings using Mexican household data support previous studies that have identified an effect of remittances on savings accounts and deposits. At the same time, we do not find that remittances also facilitate borrowing from formal financial institutions, while we do find a causal effect of remittances on borrowing from informal sources. This means that receivers of remittances have a demand for financial services including savings options and loans, but the formal financial sector is not fully catering to this demand. Seemingly, informal institutions are more willing to lend against remittances, while formal institutions and traditional banks in particular are not responding to the financial demands of remittances–receivers beyond the provision of savings accounts. The ambiguous and not very clear results that have been reported in previous studies on the effects of remittances on lending and credit could be explained by their negligence of informal lending, which does not appear in data reporting and is therefore invisible in aggregate national or cross-country studies.

While the ability to take up loans may enhance risk management and asset building tools of households, the microfinance literature has also pointed toward the dangers of over indebtedness especially with respect to informal loans and moneylenders that charge high interest rates. The fact that receivers of remittances not only have a higher probability of reporting debt but also report higher total amounts of debt could be related precisely to this danger.

Linking remittances with financial sector development has become an important topic on the policy agenda. We believe that our study can make an important contribution to this debate by showing that remittances are part of a complex financial management of migrant households, in which several formal and informal instruments may exist next to each other. Because migration and financial services can both be understood as asset-building and risk-management tools, remittances and debt may, in some cases, substitute for each other—for example, when family members in the US function as a source of insurance from outside the regular household to cover emergency spending, similar to ''rainy'' day credit or insurance from financial institutions. In these cases, receivers of remittances may have less need to rely on lending when they face liquidity shortages. In other cases, remittances and lending may complement each other, because receivers of remittances may have unfulfilled lumpy investment options that cannot be financed by the regular remittance flow or because the same insurance function of remittances reduces lending constraints among risk-averse lenders and borrowers. In this sense, the two opposing views that exist in the literature—namely that remittances function as a substitute for credit but that they may also have a positive impact on the access to and the use of financial services—are not necessarily contradictory. We emphasize that much of this demand is not met by the formal financial sector and that there is a need for institutions to address the particular demand for financial services by remittance-receiving households from rural and lower income groups. Although the mismatch between the demand for financial services among remittances-receivers from lower income households and an inadequate supply by formal financial institutions has general relevance beyond the case of Mexico, institutional responses may differ from country to country, as evidenced for example by the different roles that microfinance institutions play in remittances markets in different countries (Ambrosius, Fritz, & Stiegler, 2014), or simply because the institutional framework that enables the functioning of the financial markets is country specific (Hernández-Trillo, 2010). Further research is needed to understand which institutions are best suited to provide financial services to remittance-receiving households, and whether linking remittances with additional financial services may generate social or economic change within or outside households.

NOTES

1. Financial institutions in Mexico apply mechanisms that require households to hold cash balances that are too high for their financial needs or that charge high fees for cash withdrawals. While this behavior of banks has improved their returns to assets and Tier 1 capital, it has also kept the financial inclusion at its current low levels. In 2013, Mexico had the bank with the largest return on assets in Latin America and four Mexican banks ranked among the top 10 Latin American banks in Tier 1 capital (The Banker Database., 2013). Whereas banks argue that these fees only cover operating costs, Hernández-Trillo (2010) provides evidence that operating costs in Mexico lie above those observed in countries with

similar levels of economic development. At the same time, measures of competition like the Herfindahl index or the concentration index point to a lack of competition between Mexican banks. In 2013, a financial reform has been launched in Mexico with the objective to increase levels of financial inclusion and to introduce more competition in the banking sector (Presidencia de la República, 2014). Specific government regulations force banks to reduce fees for cash withdrawals and to eliminate minimum deposit requirements for account holders with low incomes (CONDUSEF, 2012). Moreover, ceilings have been introduced for fees that banks are allowed to charge for ATM withdrawals (Kaiser & Lever, 2011).

2. For a detailed description of the MxFLS see Teruel, Rubalcava, and Arenas (2012). At the time of writing, another set of data became available. However, the third wave mixes data ranging from 2009 to 2012. Since our identification strategy uses a 3-year time lag existing between the waves of 2002 and 2005 as part of the identification strategy we decided not to include the mixed data set in this paper. In addition, regulatory reforms that were implemented after 2006, including regulations that oblige banks to offer accounts without fees or minimum deposit requirements (2006), the possibility for banks to partner with third parties through which they may offer certain financial services (2008) and the advancement of mobile banking (2011) pose problems with respect to the comparability of the financial sector in Mexico before and after 2006.

3. 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. These households are classified as remittance-receiving households although there is some uncertainty in this classification and some of these transfers might actually be national remittances. Even so, this variable can be considered to be a 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 carried out by the Mexican Statistics Institute INEGI) indicate that 5.7% of Mexican households received remittances in 2002.

4. We want to thank our anonymous referees for bringing to our attention the importance of the frequency of remittances reception. Frequency and timing of remittances are important for at least two different reasons. First, a household with monthly remittances receipts will probably make a different use of financial services compared to a household that receives remittances on a yearly base, and certainly much different compared to a household that receives remittances randomly. Second, since this information is unknown in our data, it generates another source of unobserved heterogeneity that is related to both remittance reception and the usage of the financial services. Massey and Sánchez (2012) have found that the frequency of remittances reception is not related to observable characteristics except for age. Their results imply that in order to control for the frequency of remittances it is very important to control for age and unobserved heterogeneity, which lends support to our strategy of using fixed effects, as well as instruments, to obtain the effect of remittances on credit.

5. Since household expenditure might itself be affected by remittances, we employed a non-monetary asset-based indicator on the socioeconomic status of households in alternative specifications. A poverty score was created for each household that describes the probability of the household falling below a certain poverty line, valued 0 (lowest probability) to 100 (highest probability). This index is based on Schreiner (2011) and combines information on the number of children in the household, education levels, employment situation, housing conditions, and household assets. Our results were robust to this change of variable and are available from the authors upon request.

6. Some of the variables are time-constant for the large majority of observations. We still include variables such as ETHNIC and RURAL despite household fixed effects in order to capture changes in household composition and the fact that some households resettled during 2002–05.

7. Two additional shock variables are available in MxFLS: loss of livestock (SHKLV) and natural disasters (SHKDS). Tests were carried out to determine if they should stay in our regressions but they do not make a qualitative difference to our results.

8. Since migration in Mexico is largely a rural phenomenon, controlling for agricultural productivity and incomes is potentially important. We use rain lagged by one year, because, first, weather conditions translate to agricultural income with a lag, and, second, our definition of remittance-receiving households refers to the previous 12 months. By multiplying RAIN with age squared, we generate variation of this variable at the household level. This increased always our ability to generate strong instruments. Whereas our motivation for doing so is mainly empirical, transforming the variable in this way can be justified in several ways: First, both the reliance on agricultural income as well as the vulnerability to weather conditions may be a (non-linear) function of the age of the head of household. Moreover, access to remittances and family support networks are related to age, and so is access to credit.

9. Any of these factors could change over time and be a source of time-varying unobserved heterogeneity that could not be solved by taking the fixed effect.

10. While the general objective of this paper can be recast in terms of obtaining the Average Treatment Effect (ATE), the literature on treatment effects has emphasized that the ATE is difficult to obtain especially in the presence of unobserved heterogeneity (Heckman, Ichimura and Todd, 1997), an issue that is of particular relevance with respect to migration and remittances data (Borjas, 1987). Imbens and Angrist (1994) show that an alternative estimation is feasible using a IV strategy based on discrete instruments. This alternative estimation is known as the Local Average Treatment Effect (LATE). This effect applies only to observations that comply with one given value of the instrumental variable. For the case of continuous instruments, as in our case, Heckman and Vitlacil (2005) show that the estimated effect using instruments can be thought as the limit of a weighted average of LATEs. This effect is known as the Marginal Treatment Effect (MTE). Each LATE applies to each specific value taken by the instrumental variable and the estimated effect is interpreted as a weighted average, where the density for each particular value works as weight. In the limit, this sequence of LATE does converge to the MTE.

11. We evaluated alternative indicators of US labor markets such as unemployment levels and different time lags. We settled on the change in employment levels over the previous three years because it proved to be empirically strongest, while results are robust to alternative forms of constructing the instrument. In the annex, we show t-values (for the first step) and coefficient plots (for the second step) for alternative definitions of the instrument.

12. This identification strategy is based on the strategy used in the literature of dynamic panel data models. In such models, certain lagged changes in X can work as instruments for current levels of X, for certain assumed dynamic structures. Since the only way to empirically verify such assumptions is through formal empirical tests, the validity of such models requires strict statistical tests. See Arellano and Bond (1988, 1991); Arellano and Bover (1995); Arellano and Honoré (2001) and Arellano

(2003) for further information on such techniques. In our case, which is not a dynamic panel model, we make sure that our instrument also conforms to very stringent IV tests as those explained in the main text.

13. This estimation is done using a Stata command developed by Schaffer (2012).

14. Note that these variables mostly refer to households where the composition or identity of the head of household changes; and a relatively small number of households that migrated from rural to urban areas or vice versa.

15. Due to space restrictions, we only show results for regressions using the full set of controls. However, results are robust to different specifications, the inclusion/exclusion of the variable TRN, the exchange of the variable EXP for indicators of wealth, and the inclusion or exclusion of other control variables. In the case of the estimations for debt and borrowing we included the variables ACC and SAV and results remain qualitatively similar. These results are available from the authors upon request. We opt for using household fixed effects for unobservable time-constant characteristics throughout the paper, in addition to time-varying household, municipal, and state-level variables. The use of fixed effects adds validity to the instrument and Hausman tests reject the use of random effects in most of our specifications.

16. Because households without variation in the response variable are conditioned out of the likelihood function, the number of observations from which to estimate an effect of remittances on *FinServ* is lower than the total number of households in the sample.

17. The effect of remittances on all other indicators of debt and borrowing in the conditional logit and in the instrumented regressions are maintained when controlling for the existence of an account (only statistical significance in borrowing goes slightly down, but effects on informal borrowing and on borrowing from personal sources are maintained). These results are available from the authors upon request.

18. In a strict sense, marginal effects for the conditional logit model are not identified since they do not estimate the constant of the model. Because of this, certain assumptions are required for their estimation. However, they do estimate marginal effects of probability distributions. On the other hand, the marginal effects of the two-stage linear probability model do not necessarily apply to probabilities, which makes it very hard to compare the marginal effects obtained in our two alternative empirical models.

19. The results for the estimation of the weights are shown in the appendix. They show that the estimated density for the differences in probabilities of showing no debt, savings, or loans is, in all the three cases, a single peak function with its mean near zero. This implies that for most of the households in the sample, the estimated probability of being truncated at $t = 2002$ or $t = 2005$ is almost identical, which increases the likelihood that conditional on such estimated probability the truncation problem is controlled for.

20. As one of the reviewers has pointed out to us, it would be a rational choice for households in transnational credit markets to take out loans not in Mexico but in the US where loans (including informal loans) are considerably cheaper. Empirical results are not in line with such a behavior: remittance-receiving households do take out loans in Mexico at high costs from informal sources, instead of accessing US-credit markets via migrants. One answer may lie in information asymmetries and intra-household conflicts over the use of remittances. As demonstrated by Ashraf et al. (2015), savings and consumption priorities between migrants and their families at home may differ (migrants have a higher priority for savings). Our findings suggest that remittances provide receivers of remittances with more flexibility in accessing additional loans in Mexico that do not necessarily require the consent of the migrant.

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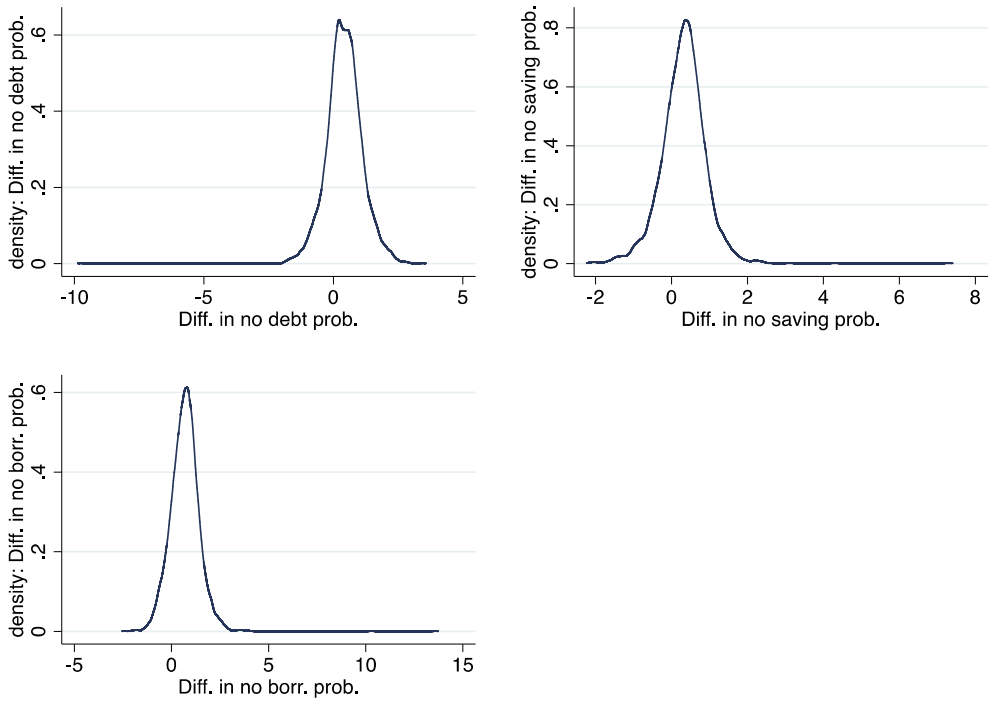
ANNEX 1. KERNEL ESTIMATES FOR FIXED EFFECTS WEIGHTS. HONORÉ ET AL. (2007) METHOD



Estimation method for kernel: Epanechnikov. Bandwidth for the density of differences in probability of no debt: 0.1181. Bandwidth for the density of differences in probability of no savings: 0.1056. Bandwidth for the density of differences in probability of no loans: 0.1199. The three non-parametric estimations show a single peak function with its mean near zero. This implies that for most of the households in the sample, the estimated probability of being truncated at $t = 2002$ or $t = 2005$ is almost identical, which increases the likelihood that conditional on such estimated probability the truncation problem is controlled for.

ANNEX 2. *T*-VALUES FROM FIRST STEP INSTRUMENTAL REGRESSION FOR DIFFERENT LABOR MARKET INDICATORS

The figure plots t-values for alternative labor market indicators for the first step linear estimation, instrumenting for the likelihood that households receive remittances. Covariates and model specification are as in Table 2. The indicator that was finally used was "change in empllev over last 3 yrs", called DUSEMP throughout the paper.

ANNEX C. COEFFICIENT PLOTS (95% CONFIDENCE INTERVALS) FOR THE SECOND STEP REGRESSION AND THREE VARIABLES: COMPARING ALTERNATIVE INSTRUMENTS FOR REMITTANCES

The figure plots coefficients from the second step linear regression with 95% (50%) confidence intervals for the binary outcomes DBT, BOR and ACC. Covariates and model specification are as in Table 3. The indicator that was finally used was "change in employment level over last 3 yrs", called DUSEMP throughout the paper.