Policy Research Working Paper 4983

Remittances and Banking Sector Breadth and Depth

Evidence from Mexico

Asli Demirgüç-Kunt
Ernesto López Córdova
María Soledad Martinez Pería
Christopher Woodruff

The World Bank
Development Research Group
Finance and Private Sector Team
June 2009

Policy Research Working Paper 4983

Abstract

Despite the rising volume of remittances flowing to developing countries, their impact on banking sector breadth and depth in recipient countries has been largely unexplored. The authors examine this topic using *municipio*-level data on the fraction of households that receive remittances and on measures of banking breadth and depth for Mexico. They find that remittances are strongly associated with greater banking breadth and depth, increasing the number of branches and accounts per capita and the ratio of deposits to gross domestic product. These effects are significant both statistically and economically, even after conducting robustness tests and addressing the potential endogeneity of remittances.

This paper—a product of the Finance and Private Sector Team, Development Research Group—is part of a larger effort in the department to understand the impact of remittances on financial development. Policy Research Working Papers are also posted on the Web at http://econ.worldbank.org. The authors may be contacted at mmartinezperia@worldbank.org and ademirguckunt@worldbank.org.

Remittances and Banking Sector Breadth and Depth:

Evidence from Mexico*

Asli Demirgüç-Kunt
The World Bank

Ernesto López Córdova
Inter-American Development Bank

María Soledad Martinez Pería
The World Bank

Christopher Woodruff
University of California, San Diego

JEL classification: F37, G21, 016
Keywords: remittances, financial development, banking sector depth and breadth

* The views expressed in this paper are those of the authors and do not represent the opinions of the Inter-American Develoment Bank or The World Bank Group. We thank Soledad López and Florencia Moizeszowicz for excellent research assistance. Corresponding author: Maria Soledad Martinez Peria, Finance Research Group, World Bank, 1818 H St., N.W., MSN MC 3-300, Washington D.C. 20433. E-mail: mmartinezperia@worldbank.org

1. Introduction

Migrants working outside their country of birth returned more than US$281 billion to family members in their countries of origin in 2007 (World Bank, 2009). Recent research suggests these remittances have important implications for the economies of remittance-recipient countries. Numerous studies analyze their impact on poverty, inequality, growth, education, infant mortality, and entrepreneurship.[1] However, surprisingly little attention has been paid to the question of whether remittances affect the financial sector in recipient economies. This issue matters because financial systems perform a number of key economic functions and their development has been shown to foster growth and reduce poverty.[2] Burgess and Pande (2005) show that the expansion of the banking sector in particular can have a very large impact on poverty levels and growth. Furthermore, the link between remittances and the banking sector is important because some argue that intermediating remittances through the banking sector can magnify the developmental impact of remittance flows (See Hinojosa-Ojeda, 2003; Terry and Wilson, 2005, and World Bank, 2006).

This paper analyzes the impact of remittances on the breadth (or outreach) and depth of the banking sector in Mexico. There are several reasons why remittances might affect banking sector breadth and depth. First, the fixed costs of sending remittances make the flows lumpy, providing households with excess cash for some period of time. This might potentially increase their demands for banking services (and, hence, foster banking outreach and depth), since banks offer households a safe place to store this temporary excess cash. Second, interbank and wire transfers that might be collected in bank branches are an important means of receiving remittances. Banks charge processing fees for these transactions, which can be a significant source of income for commercial banks in remittance-receiving countries. The potential to collect these fees might induce banks to expand their outreach and locate close to remittance recipients. Third, a substantial portion of remittances flow to households that are likely to be

[1] For a review of the literature on remittances see López Córdova and Olmedo (2006). For the specific case of Mexico, Amuedo-Dorantes, Sainz and Pozo (2007) consider the impact on healthcare expenditures; Esquivel and Huerta-Pineda (2007) look at the impact on poverty; Hanson (2007) looks at labor force participation; Hanson and Woodruff (2003) analyze the impact on schooling; Hildebrandt and McKenzie (2005) and Kanaiupuni and Donato (1999) consider infant mortality; López Córdova (2005) analyzes the impact of remittances on schooling, infant mortality and poverty; Woodruff and Zenteno (2007) and Woodruff (2007) look at entrepreneurship.

[2] See King and Levine (1993), Beck, Levine and Loayza (2000a,b), and Beck, Demirgüç-Kunt, and Levine (2007).

unbanked—households in the middle and lower parts of the income distribution. Thus, banks acting as remittance paying agents are well-positioned to offer other services to unbanked households receiving remittances. Fourth, processing remittance flows provides banks with information on the income of recipient households. This information may make banks better able to extend loans to otherwise opaque borrowers. On the other hand, since remittances might help relax households' financing constraints, the demand for and the overall level of credit might fall as remittances increase. Regardless of remittance recipients' demand for credit, overall credit levels might still increase in remittance receiving areas if banks are able to finance previously unfunded or underfunded projects as a result of the increase in liquidity due to the intermediation of remittances.[3]

Mexico is an interesting case to study the link between remittances and banking sector breadth and depth because the country is among the top recipients of remittances worldwide, with more than $27 billion in flows in 2007. Remittances also flow disproportionately to rural and semi-urban areas in Mexico, which have been traditionally unbanked. Rural households are more than three times as likely to receive remittances: 12.3 percent versus 3.6 percent of households in larger communities. Furthermore, remittance flows are geographically concentrated within the Mexican territory. Of the 1.4 million Mexican households receiving remittances, almost half (680,000) are located in the Central Western states of Aguascalientes, Colima, Guanajuato, Jalisco, Michoacán, Nayarit, San Luis Potosí, and Zacatecas. In those states, approximately 13% of all households receive remittances, more than twice the national average.[4] The geographical concentration of remittance flows, which is tied to early 20th century migration patterns, is important for identifying the impact of remittances on the banking sector. Also, while most remittances are channeled through money transfer companies such as Western Union or Moneygram, Orozco (2004) reports that 55 percent of remittance collection points in Mexico are commercial bank branches.[5] This implies that banks play a key role in the distribution of remittances and are well-positioned to offer other financial services to individuals that visit banks to collect remittances. Finally, while remittance transaction costs have declined

[3] In other words, even if remittance recipients do not have a need to borrow, the increase in loanable funds from the intermediation of remittance might allow banks to increase credit to other households.
[4] Calculations based on *Encuesta Nacional Ingreso-Gasto de los Hogares*, 2004. We are indebted to Pavel Luengas at the Inter-American Development Bank for help in processing this information.
[5] Electronic transfers accounted for almost 93 percent of all remittance transactions in 2006, up from 51 percent in 1995.

as the flow of remittances has increased, fees remain at least 3-5 percent of transfers (IMF, 2005),[6] providing a substantial incentive for banks to expand their outreach in order to capture a larger share of the remittance market and the fee revenue associated with these transactions.

To study the impact of remittances on banking sector breadth and depth in Mexico, we combine *municipio*-level data (obtained from the 2000 Population Census) on the percentage of households that receive remittances with information from the banking regulatory authority on the location of every branch of registered commercial banks in the country as of 2000, as well as data on the number of accounts and the peso value of deposits and loans at each *municipio*.[7] In our estimations, we explore the connection between remittances and the number of branches and deposit accounts per capita, both of which are measures of outreach or breadth, and the volume of deposits and credit to GDP, both traditional indicators of depth.

Of course, while remittances may lead to an expansion of banking sector depth and breadth, the causation may also go in the opposite direction. Better access to financial institutions in Mexico may lower the cost of sending remittances, leading to larger and more frequent flows. Or, remittances and banking sector breadth and depth might both be driven by a third factor. Since we are interested in showing a causal link *from* remittances *to* banking sector development, we conduct estimations instrumenting for remittances. In particular, following López Córdova (2005) and Woodruff and Zenteno (2007), we use the placement of rail lines before the first wave of migration during the early 1900s as an instrument for remittances.

The distribution within Mexico of the points of origin of early migrants to the United States is closely associated with the location of rail lines which went northward to the Texas border. These rail lines were used by US recruiters under the *Bracero* –or guest worker- *Program* to attract Mexican workers to the US. Though railroads are no longer the most important means of transport for US bound migrants, the location of the early rail lines remains

[6] http://www.imf.org/external/pubs/ft/fandd/2005/12/basics.htm.

[7] A *municipio* is the smallest geographic and administrative subdivision in Mexico to have its own democratically elected representatives. It is equivalent to a municipality in Europe, but closer to a county in the US. A *municipio* may include multiple communities which may be urban, rural, or a mixture of the two.

closely associated with modern migration and remittances, since the early migrants formed the foundation for migration networks that facilitate migration and remittances to the present day.[8]

Of course, because rail lines stimulate economic activity[9], they may also have a direct effect on the development of the banking sector. Hence, we separate the direct effect of rail lines from the migration effect, using differences in the rail network in 1900 and the rail network in 1998. Since migration flows depend on networks developed early in the 20th century, only the early rail network should affect migration, while modern rail lines constructed any time before 2000 will have an effect on the level of economic activity in the *municipio*s.

We find that remittances have produced a broader and deeper banking sector in Mexico. Our most conservative estimate suggests that a one standard deviation change in the percentage of households receiving remittances is associated with an increase of 1 branch per 100,000 inhabitants (against a mean of 1.79), 31 accounts per 1,000 residents (relative to mean of 42 accounts), and an increase of 3.4 percentage points in the deposit/GDP ratio (compared to a mean of 4.2). The results on bank credit (as a percentage of GDP) are much less robust and do not survive after we instrument for remittances.

We are aware of only one existing study that investigates the causal relationship between remittances and banking sector development. Using aggregate cross-country data, Aggarwal, Demirgüç-Kunt, and Martinez Peria (2006) find evidence that remittances are associated with banking sector development across a broad set of countries.[10] However, several concerns bear mention. First, the study only captures remittances reported in balance of payments statistics, which often neglect remittances received through means other than banks and are, therefore, measured with error. Second, the cross-country estimations in Aggarwal et al. (2006) are subject to at least one source of endogeneity which our within-country data avoid: the fact that countries

[8] For example, Woodruff (2007) shows that the correlation between migration in the 1950s (during the second Bracero program) and migration in the 1990s was 0.7.

[9] See Donaldson (2008) for an interesting analysis of the role of rail networks on early 20th century development in India.

[10] Giuliano and Ruiz-Arranz (2006) also shows a positive correlation between the level of remittance flows and measures of bank deposits, but much weaker correlations between remittances flows and bank credit. Orozco and Fedewa (2007) show that households receiving remittances in five Latin American countries are more likely than non-recipient households to have bank accounts. The differences are large in Guatemala, El Salvador, Ecuador and Honduras, but much smaller in Mexico, where 19% of remittance-receiving households have accounts compared with 16% of non-recipient households. Neither study makes any claim about the causality of the associations they report.

with more developed financial institutions may process and report a larger share of remittance flows through the formal financial system. Because our remittance data come from household surveys, they are less subject to measurement error and to reverse causation. Finally, Aggarwal et al. (2006) only examine the impact of remittances on banking depth, ignoring the implications for outreach, which our paper studies.

The remainder of the paper is organized as follows. Section 2 motivates our empirical specifications with a simple model and a discussion of the factors affecting the profitability of bank branches and the use of banking services. The data are described in Section 3, the result presented in Section 4, and concluding remarks offered in Section 5.

2. Factors affecting bank breadth and depth

In this section we sketch out a simple model of bank location and demand for financial services to analyze the role that remittances play in determining bank breadth and depth. The model is by no means comprehensive and is only intended to fix ideas and motivate our empirical specifications.

All of the branches in our data correspond to privately-owned banks. We therefore begin with the assumption that banks exhibit profit maximizing behavior, opening a branch in a given location only when the bank expects that branch to be profitable. Beginning from this supposition, we examine the factors that affect the demand for and use of banking services by households and household enterprises. We focus on households and small-scale enterprises, rather than larger enterprises, because the latter generally conduct banking transactions in Mexico City and in a handful of other large cities. Households and small enterprises are likely to be the determining factor in the placement of branches in smaller *municipios*.

The expected profitability of a given branch, and hence the decision to open it, depends on the expected costs of and revenues from operating the branch. Some of the bank's cost to open a branch will be one-time fixed costs. However, for notational simplicity, we express these costs as an annual carrying cost. We denote the sum of the up front and annual fixed operating costs as C_B. Banks also pay a variable administrative cost per client, which we denote as c. Finally, banks pay interest on money deposited by account holders at a rate of r_d. Though

theoretically r_d could depend on local conditions, in practice banks appear to pay the same interest rate at all branches. We therefore fix r_d at the national level.

The revenues of the branch come from investing the money deposited by clients and from fees charged for services. Banks can lend funds deposited in a branch to local clients, or transfer the funds to headquarters to be invested. The latter sets a floor on the returns from investing deposits. We assume the local lending is more profitable when the demand for credit is sufficient under the terms required by the bank. Denoting the return on invested funds r_L and the share of deposits which are loaned out locally as L, we refer to the earnings rate on deposits as a bank's average earnings on money deposited as $r_L(L)$, with $r_L'>0$. Note that some part of deposits is held as cash for transactions purposes, some part is loaned to clients of this or other branches, and some part is invested by headquarters in other assets. $r_L(L)$ represents a weighted average return on deposits used for all of these purposes.[11]

On deposits, net earnings depend on the interest rate spread—the difference between the rate earned on investments $r_L(L)$ and the rate paid on deposits r_d —and the total level of deposits. We denote total deposits as $N\overline{D_i}$ **,** where N represents the expected steady-state number of clients and $\overline{D_i}$ the expected steady-state average deposit per client. Banks also earn income from fees. We denote two types of fees—account fees f_a and transaction fees f_r. The account fees depend on the number of accounts opened and the transaction fees on the number of transactions, R. We assume that individuals can process remittances without opening an account, as in fact, many households in Mexico do.

Taking all of these elements together, the bank's expected profit from a prospective branch is then:

$$E(\pi) = \mathbf{[}(r_L(L) - r_d)\, N\, \overline{D_i} + f_a N + f_r R\mathbf{]} - \mathbf{[}C_b + cN\mathbf{]} \qquad (1)$$

The terms in the first set of brackets represent the bank's expected revenue. Those in the second set of brackets represent the expected cost of operating the branch. Revenues are increasing in the number of accounts, the average balance held in each account, the number of

[11] We assume that the marginal branch is small relative to the total bank operation. That is, r_L is not affected by the decision to open the marginal branch.

fee transactions, and the interest rate spread. The first three of these depend on factors which are specific to a given location. The spread has a floor level which is determined by national conditions, but local demand for credit may raise profitability at a given branch above this level. Costs depend on the fixed cost of operating in a given location.

The number of accounts is a function of the number of households near the prospective branch and the percentage of those households which choose to open an account. In the regressions discussed below, we control for the number of households near the branch by measuring the population density in the *municipio*. The percentage of households in a given *municipio* opening an account (which measures outreach), and the average balance in the accounts (which will affect bank depth) is determined by households' demand for banking services.

The demand for banking services is assumed to be a function of long-term savings, which in turn result from an excess of income over expenditures over a period of time. Long-term savings may be motivated by life cycle savings or by savings to purchase high-cost goods—housing and durable goods, for example. In either case, we expect that long-term savings are an increasing function of income levels. Wealthier households spend a smaller portion of their income on goods purchased weekly (e.g., food) or monthly (e.g., electricity, telephone), and a higher portion of their income on good purchased less frequently (e.g. housing, automobiles). The demand for banking services is therefore increasing in income. Purchases of durable goods and housing may increase the household's demand for credit as well. In our estimations, we control for income by including per capita GDP at the *municipio* level.

In the context of rural and semi-urban Mexico, household demand for banking services may also depend on how well households understand the benefits of having an account. We conjecture that this depends on the education level of household heads and on their Spanish language abilities, the latter because banks conduct most information campaigns in Spanish. In our estimations, we control for these factors by measuring schooling levels and the percentage of households in which the head speaks an indigenous language.

Familiarity with banking services, and, hence, the demand for such services might also be higher, other things equal, for households that reside closer to the US border, since banking

sector depth and breadth is significantly higher in the US than in Mexico. Thus, to account for this possibility and also to control for the fact that proximity to the US might foster overall economic development and, as a result, increase demand for services, our estimations include distance to the US border as a separate regressor.

The cost of operating a branch may also vary across *municipios*. Though we lack information on real estate prices and other factors affecting operating costs, we do know how far each *municipio* is from Mexico City, where the banks' headquarters are located. Distance from Mexico City might proxy for operating and monitoring costs. We expect these costs to affect the number of branches and credit but perhaps to be less important in terms of the number of deposit accounts and the volume of deposits conditional on there being at least one branch.

Remittances might affect the use of banking services in at least three ways. First, the fixed costs of sending remittances imply that remittances are likely to arrive infrequently. Remittances thus generate a transactions demand for financial services. Second, banks also earn fees from processing remittances, and the fee income may be an important factor in the profitability of a branch. Third, from the bank's perspective, remittances allow them to get to know and screen potential credit clients, reducing the risk in lending in the area. On the other hand, by helping to relax financing constraints, remittances might have a negative impact on the demand for credit among households receiving these flows.

In sum, in addition to our primary variable of interest, remittances, we control in some regressions for population density, GDP per capita, average education levels, the percentage of households speaking an indigenous language, the distance from Mexico City, and the distance to the US border. Of course, several of these variables could reasonably be endogenous to financial development. We don't have enough instruments to address all of the endogeneity issues simultaneously. Instead, we focus on the potential endogeneity of the variable of interest, remittances, and show that the results with respect to remittances are robust to the inclusion or exclusion of the other variables.

Also note that (1) implies that in communities which are very small, bank branches may not be profitable, even if there is a demand for accounts from households, because the profitability requires that enough households have accounts or use services to cover the fixed

cost of opening the branch. Hence, higher levels of remittances might not be associated with more bank branches in the very smallest communities. In our empirical estimations, we consider this possibility by excluding those *municipios* where the share of rural population (i.e., the percentage of the population residing in communities with less than 2,500 people) is 100 percent.

3. Data

We draw on data from various sources. Data on the number of branches, number of accounts, and volume of deposits and credit for each of Mexico's roughly 2,500 *municipios* in the year 2000 come from the *Comisión Nacional Bancaria y de Valores* (CNBV), the banking regulatory and supervisory agency in Mexico. Summary statistics for these and other key variables are shown on Table 1. We eliminate Mexico City, since many large firms maintain centralized accounts there and the aggregate data are affected by this. Also, to minimize the influence of outliers we eliminate observations in the top 1 percent of the distribution for the number of branches, number of accounts, and volume of deposits and credit.

There is an average of 1.79 bank branches per 100,000 people and 42.1 accounts per 1,000 people across all of the *municipios* in our sample**.** Also, across all *municipios*, the deposit to GDP ratio is 4.24 percent and the credit to GDP ratio is 0.65 percent.[12] But only 24 percent of *municipios* in Mexico in 2000 have one or more bank branches. The lack of bank branches is particularly notable in *municipios* in which all of the population resides in rural communities. Only 0.66 percent of *municipios* where 100 percent of the population resides in communities with less than 2,500 people have bank branches.

Data on GDP per capita in 1999/2000 come from the *Consejo Nacional de Población* (CONAPO), a Mexican government agency in charge of tracking population and other important statistics.[13] The average GDP per capita in our sample is US$ 3,388. Note that the GDP data include remittance receipts. For the country as a whole, remittances represented only about 2 percent of GDP in 2000. While the effect of remittances on income levels is clearly much higher

[12] Recall that the sample excludes Mexico City, which is the most banked city in the country, and includes *municipios* with no banking activity. This explains why the ratios are much lower than those for the country as a whole.

[13] GDP in 1999 pesos is divided by population numbers from the 2000 census converted into U.S. dollars and adjusted for purchasing power differences between Mexico and the US. See explanation provided by CONAPO at http://www.conapo.gob.mx/00cifras/6c.htm.

in some *municipios*, the 2000 data are the only GDP figures available to us. If part of the impact of remittances is operating through income, then controlling for GDP may slightly bias downward our estimate of the impact of remittances on banking development.

Our primary independent variable of interest is the percentage of households in each *municipio* receiving remittances. We measure this using the 2000 Population and Housing Census, implemented by the *Instituto Nacional de Estadística Geografía e Informática* (INEGI). We use data from a sub-sample of Mexican households that responded to an "extended questionnaire" (*cuestionario ampliado*), which, in addition to basic information on demographic and housing characteristics collected of all households, included questions on migration and non-wage sources of income, such as remittances. The sub-sample covered around 2.2 million households, or 10 percent of all households in the country, and was designed to be representative at the *municipio* level.[14] Not every household had an equal chance of being surveyed, but we use sample weights provided by the census to aggregate all information to the *municipio* level, including the percentage of households receiving remittances. The data on Table 1 indicate that on average 6.54 percent of households in a *municipio* reported receiving remittances.[15] The data show wide variance in remittance receipts among the *municipios*. Almost 7 percent of *municipios* have no households reporting they receive remittances, while in more than 23 percent of *municipios* the share of households receiving remittances exceeds 10 percent.

We also control for the density of population within the *municipio*. Some *municipios* have much larger land areas than others. For a given population, having a larger land area (that is, having lower population density) is associated with longer distances to any point in the *municipio*. Longer distances imply longer travel times to and higher costs of using a bank branch. Hence, we expect that density should be positively associated with measures of bank branch development, bank breadth and depth. Land area is taken from INEGI. The average

[14] INEGI (2000) provides a detailed description of the sampling methodology used to implement the extended questionnaire.

[15] This is an unweighted mean of the municipio level data. The percentage of households reporting remittances in Mexico is less than 6.58% because those residing in smaller municipios are more likely to say they receive remittances.

population density for Mexican *municipios* in our sample is 172 inhabitants per square kilometer.[16]

Data on the percentage of household heads who speak an indigenous language and information on the average years of schooling of household heads also comes from the 2000 census. On average, 24.2 percent of household heads speak an indigenous language. The average years of schooling received by household heads is 4.46. Finally, our estimations also control for the distance of each *municipio* to Mexico City, where most bank headquarters are located, and distance to the US border. We calculated the distances from data on the geographical coordinates of each *municipio* used by López Córdova (2005), and originally obtained from INEGI.[17] The average distance to Mexico City is 463 kilometers, while the average distance to the US border is 750 kilometers.

4. Empirical specifications and results

Our baseline empirical specifications follow equation (2) below:

$$Banking\ Breadth_i \text{ (or } Depth_i) = \alpha_0 + \alpha_2\, Remittances_i + \alpha_2 GDP\ per\ capita_i + \alpha_3\, Density_i + \varepsilon_i \quad (2)$$

where *i* refers to the *municipio* identifier. *Banking Breadth* is measured by the number of branches and, separately, deposit accounts per capita. *Banking Depth* refers to the ratio of the amount (in pesos) of deposits to GDP and loans to GDP. *GDP per capita* is measured in thousands of dollars and *Density* refers to the ratio of population to area.

We first estimate equation (2) over the entire sample of *municipios* outside of Mexico City. Because there is a mass of *municipios* without bank branches, deposits, etc., we estimate (2) using a Tobit specification. Given the fact that only a handful of the *municipios* in which all of the population resides in rural communities have bank branches, we also estimate the regressions on the sample excluding these all-rural *municipios*. We then check for robustness by including additional controls in the regressions—the percentage of household heads who speak

[16] Population density in 2000 for the country as a whole was 51 inhabitants per squared kilometer. The larger number we obtain reflects the fact that *municipios* with smaller land area are more densely populated.
[17] We calculated distances in kilometers using Stata's *sphdist* command.

an indigenous language, the average years of schooling obtained by household heads, the distance between each *municipio* and Mexico City, and the direct distance to the US border.

Table 2 columns (2.1) through (2.4) report results for each of the measures of banking depth and breadth when we include only the percentage of households receiving remittances as a regressor. The association between remittances and bank branches, accounts, and deposits is significant both statistically and economically. The coefficient on bank branches per capita is 0.16 in the first specification, indicating that a 1 point change in the percentage of households receiving remittances is associated with a 0.16 increase in the number of bank branches per 100,000 residents. A one standard deviation increase in the percentage of households receiving remittances (7.7 percentage points) is therefore associated with an additional bank branch per 100,000 residents in the *municipio* (against a mean of 1.79). Remittances have effects of similar magnitude on the number of accounts per 1,000 residents and the deposit to GDP ratio. A one standard deviation change in the percentage of households receiving remittances is associated with an increase of 31 accounts per 1,000 residents (against a mean of 42 accounts), and an increase of 3.4 percentage points in the deposit to GDP ratio (against a mean of 4.2). Hence, for deposits, branches and accounts, we find that the impact of remittances is large and highly significant. For credit, however, we find a much smaller and statistically insignificant effect.

Remittances are more likely to flow to lower-income *municipios*: there is a small negative correlation between income per capita and the percentage of households receiving remittances (-0.035). Higher income is likely to be highly correlated banking breadth and depth. Because the first results do not control for income or population density, they may understate the magnitude of the impact of remittances on the banking sector. Admittedly, we face something of a dilemma here. On the one hand, higher income causes higher bank breadth and depth. On the other hand, there is an extensive literature showing the impact of financial services on income. Later in the paper, we will suggest instruments to address the potential endogeneity of remittance receipts. But we do not have additional instruments to address simultaneously the endogeneity of income.[18]

[18] We show in the appendix that the main results hold up when we use a very course control for income per capita—a dummy variable indicating the municipio is in the top quartile of income per capita.

With this caveat in mind, columns (5) through (8) of Table 2 show the results for regressions adding controls for GDP per capita and population density. For bank branches, accounts per capita, and the deposit-GDP ratio, the controls increase the magnitude of the effect of remittances by at least 40 percent. All of these effects remain significant. Per capita GDP and density both have the expected positive sign and are highly significant. Remittances now have a significant effect on the credit to GDP ratio as well, with a measured effect more than three times larger than in the first regression. Relative to the mean credit to GDP ratio, the effect of remittances on credit is smaller than on the other dependent variables. A one standard deviation increase in the percentage of households receiving remittances is associated with a 0.43 increase in the credit to GDP ratio, about two-thirds of the mean for this variable (0.65). A similar increase results in a change of almost twice that level in each of the other three dependent variables.

While the magnitude of the effects of remittances on banking depth and breadth are clearly quite sensitive to controlling for GDP per capita, we find that a single dummy variable indicating that the *municipio* has per capita income above the 75th percentile results in measured effects of nearly identical magnitude. (See appendix Table A.1.) The presence of banks may alter the income levels in the *municipio*, but the presence of bank branches by itself is unlikely to cause a large number of *municipios* to change classification from below the 75th percentile to above the 75th percentile. This simpler control is, therefore, arguably less subject to endogeneity concerns.

In close to 40 percent of Mexico's *municipios*, the share of the population residing in communities with fewer than 2,500 residents is 100 percent. As we noted above, bank branches are very rare in these all-rural *municipios*. Though remittances tend to flow disproportionately to rural communities, the small population density in these *municipios* makes it difficult for banks to cover the fixed costs of operating a branch. For the remaining regressions, we drop the 909 *municipios* which have entirely rural populations from the sample. Table 3 shows the effect of doing so, using the same specifications reported in Table 2. We see that the coefficients are roughly 30 to 40 percent larger than those on Table 2. We note that the means of the dependent variables are also about 50 percent larger when we exclude the all-rural *municipios*. Thus, while

remittances have a larger absolute impact on bank breadth and depth in the sample excluding all-rural *municipios*, the relative impact is very similar to that which we found in the full sample.[19]

The discussion in section 2 of the factors affecting bank breadth and depth suggests that other variables aside from GDP per capita and population density might influence our banking sector indicators. Table 4 presents Tobit specifications including some of these additional controls. In particular, we control for the average years of schooling among household heads in each *municipio* and for the percentage of household heads that speak an indigenous language, since these variables might impact the ability of households to understand the benefits of using banking services. We also control for distance to the US border. Since banking services are much more developed in the United States, we might expect that households in northern Mexico would have more familiarity with the benefits of bank accounts, even if they have not migrated to the US. Finally, we include the distance between each *municipio* and Mexico City. Given that most banks' headquarters are located in Mexico City, this variable may proxy for the cost to the bank of monitoring bank operations outside of the capital. Alternatively, distance to Mexico City might serve as a proxy for the input costs of bank operations.

We find that years of schooling and indigenous language are highly significant and have the expected sign—*municipios* in which household heads have an additional year of schooling and a smaller proportion of household heads speak an indigenous language have higher measures of banking depth and breadth. Distance to the US border appears not to be associated with bank breadth nor depth, after controlling for other variables.[20] Distance to Mexico City does influence the number of branches and the volume of credit but not deposits. However, the direction of the effect is not what we would have expected if we interpret this variable as a proxy for monitoring costs. This may suggest that a more appropriate interpretation for this variable is as a proxy for operating costs, since these are lower in areas more distant from Mexico City, as rents and wages may also be lower.

[19] For the remainder of the paper, we report results based on the sample excluding all-rural *municipios*. The findings do not change in any significant way if we include these *municipios*.
[20] Log distance is similarly insignificant for three of the four measures of financial development. It is positive and significant only for deposits, and even there has no effect on the measured impact of remittances on financial breadth and depth.

Most importantly for our purposes, including these additional controls has little effect on the magnitude and has no effect on the significance of the coefficients on remittances. We continue to find that remittances have a positive impact on the number of bank branches and accounts and on the ratio of deposits and credit to GDP (compare to Table 3 columns 5 through 8).

Potential endogeneity of remittances

The results reported on tables 2-4 ignore the potential endogeneity of remittances. There are numerous sources of endogeneity, with suggested biases running in either direction. First, the presence of financial institutions may cause higher remittance flows, either because banking development allows people to finance migration, and hence increases migration flows and remittances, or because the presence of financial institutions is associated with lower costs of sending remittances, and hence a greater propensity to do so. Neither of these seems to be a first order concern. Commercial banks in Mexico are an unlikely source of credit to finance migration. While better access to financial networks might facilitate receipt of remittances, the primary channel appears to be from migration flows to banking sector depth and breadth. We check this by using *municipio* level data on migration rates rather than remittance rates. The 2000 population census asks whether any member of the household has migrated outside of Mexico in the past five years, and if so, to which country. We calculate the percentage of households with at least one emigrant to the United States. Appendix Table A.2 shows that we obtain nearly identical results when we use this variable in place of remittance flows. Thus, the effect appears to be driven by migration flows, which cause remittance flows.

Our findings are likewise unaffected by reverse causation arising from the fact that we measure bank branches and remittances at the same point in time. Data on banking breadth and depth are available from the Banco de Mexico for the 2001-2005 period. These later data exclude some of the *municipios*,[21] though the excluded *municipios* account for less than 3 percent of the Mexican population. When we regress the mean of branches and deposits per capita as well as the average deposits and credit to GDP ratios over the period 2001-2005 against our measure of

[21] There are more than 2,400 *municipios* in Mexico. However, the data provided by the Banco de México aggregate the branches, deposits and loans for some of the smaller *municipios* into a broader category labeled "others". There are 29 states which report this "other" category.

remittances for 2000, we obtain very similar results to those reported in Table 3 and 4 (see appendix Table A.3).

A second source of endogeneity is the fact that some portion of the migrants out of Mexico returns after a period abroad. These return migrants may return with knowledge of U.S. financial markets, and hence have higher demand for financial services in Mexico. We view this channel as primarily affecting the interpretation of the results. If knowledge of financial markets acquired abroad is an important factor in increasing demand for banking services in Mexico, then the coefficient on remittances should be interpreted as reflecting the broader impact of migration on bank depth and outreach.

A final source of endogeneity appears to be more serious. The lack of financial services may cause a lack of economic development, or both may be related to some omitted third factor. The lack of development, in turn, might lead to out migration and, subsequently, higher remittance flows. That is, our regression may be mis-specified because we lack a control for *municipios* with "bleak futures." In that case, we can definitively sign the direction of the bias only for the set of regressions on columns (1) through (4) of tables 2 and 3. These regressions include only remittances on the right hand side. Since the omitted variable is negatively correlated with banking development and positively correlated with migration and remittances, the Tobit coefficients for this specification will be biased downward.

If, as we expect, these unmeasured characteristics of the *municipios* are the main source of endogeneity, the Tobit results for the specification including only remittances should be interpreted as representing a lower bound of the impact of remittances on banking sector depth and breadth. These results show that remittances are positively associated with the opening of bank branches, and the number of accounts and level of deposits. The effect of remittances on credit remains somewhat ambiguous, however, because the remittances variable is significant in the credit regression only after we control for GDP per capita as well.[22] In general, the direction of bias can be determined in the presence of other independent variables only when those variables are orthogonal to the variable of interest. Because the correlation between remittances and GDP per capita is low (-0.035 in the full sample), it is unlikely that its inclusion in the

[22] The specification on tables 2 and 3 includes both GDP per capita and density, but the magnitude of the coefficient on remittances is similar in all four regressions when the density variable is dropped.

regression will switch the direction of bias on the remittances coefficient. But since the two variables are correlated to some degree, we cannot say conclusively that the bias from the excluded variable remains negative.

An alternative approach to dealing with endogeneity is with instrumental variables. Following several others (see, for example, Hildebrandt and McKenzie, 2005; López Córdova, 2005; and Woodruff and Zenteno, 2007), we exploit the fact that migration has deep historical roots in Mexico. Early migration in connection with the 1920s and 1950s *Bracero* – guest worker – Programs was centered in central-western Mexico, around the city of Guadalajara. As described in Woodruff and Zenteno (2007), the geographical origin of this early migration was related to the placement of rail lines. Our instrument is derived from this relationship. We use the distance of each *municipio* from the rail network as it existed in 1900 and then the distance from that point on the rail network to the US border (measuring distance along the railroad). Coatsworth (1972) estimates that rail travel cost one-third to one-sixth as much as other land transportation options during this period. We, therefore, multiply the distance from the *municipio* to the rail by five and add it to the distance traveled along the rail network to the border. We use as an instrument the minimum between this sum and five times the direct distance to the US border. In *municipios* near the US border but far from the rail network, migrants would have traveled over land rather than by rail. The resulting variable, which we label *minimum distance*, measures the cost of migrating in the early 1900s, when the migration networks were established.[23]

However, we should be concerned with whether the instrument meets the exclusion restriction. Rail lines might affect banking sector breadth and depth through channels other than facilitating migration north. Railroads would be expected to generate commercial activity in the towns they pass through. We address this concern by controlling for the presence of a rail line in modern times (1998). The early rail lines had a disproportionate effect on patterns of migration, because they determined the geographical pattern of the first wave of Mexican-US migration prior to and during World War I. The initial migration established migration networks which persist to the present time (See Woodruff and Zenteno 2007 and Munshi 2003). While the rail

[23] The results are not qualitatively different if we simply add the distance to the rail line and the distance traveled along the rail line.

lines constructed at a later date will still have a direct effect on demand for financial services, they will have less effect on patterns of migration. Therefore, when we use distance to the US border via the 1900 rail network as an instrument, we also include distance to the nearest rail line in 1998 as an additional control that would capture the economic benefits of being close to the railroad in modern times.

Using the historical migration network as an instrument isolates the exogenous component of remittances that comes from the historical migration patterns. We should, therefore, interpret results from this IV as identifying the long-term impact of remittances on commercial banking sector depth and breadth. Table 5A shows the results from the first-stage of the IV estimations. We report results from two specifications. The first controls only for GDP per capita, population density, and distance to the modern rail network. The second includes schooling, indigenous language, distance to the border, and distance to Mexico City as additional controls. We find that our instrument, *minimum distance*, has a negative impact on remittances. In other words, in *municipios* that are further away from the US through the 1900 rail network, a smaller share of households receives remittances. The effect of distance on remittances is significant in each specification. Furthermore, the Kleibergen-Paap F statistics for weak identification always exceed the Stock and Yogo (2005) critical values so we are able to reject the null that our instrument is weak.

Second stage IV results are shown in Table 5B. Consistent with our expectation that the Tobit results are biased downward, we find modestly larger impacts of remittances on banking breadth and depth when we instrument for remittances and use the more parsimonious specification. However, the IV results are very close in magnitude to the Tobit results when we include the measures of schooling, indigenous population, distance to the border, and distance to the rail. The standard errors are somewhat larger as well. While we continue to find that remittances have a positive impact on banking sector breadth (measured via the number of branches or deposit accounts), only the deposit indicator of banking sector depth (deposits to GDP) is statistically significant. Note that distance to the present-day rail network has generally weak effects on banking sector breadth and depth. Where significant (for deposits and accounts in the leanest specification), the coefficient indicates that banking sector breadth and depth is higher in *municipios* located closer to the rail lines, as expected.

5. Conclusion

Remittance flows are rising worldwide and are an increasingly important source of income for households in lower-income countries. Economists are just beginning to understand how remittances affect local economic outcomes in the recipient countries. Using *municipio*-level data for Mexico, this paper contributes to the literature by focusing on a question that has been largely ignored: how remittances affect banking sector breadth and depth. Mexico makes an excellent case study because remittance flows are large and geographically concentrated. Also, in Mexico, banks play an important role in the collection of remittances by recipients. They earn fees from these services and gain potential clients for other banking products.

We find that remittances are strongly associated with the depth and breadth of banking services in Mexico. The effects are significant both statistically and economically. The most robust impacts relate to the number of branches, accounts, and the deposit-to-GDP ratio. We sometimes find a positive impact on credit as well, though here the results are much less robust, and in particular, do not hold up to instrumenting for remittance receipts.[24]

Will the expansion of banking services caused by remittances result in additional development in the remittance recipient communities? This is a critical question, and an area for future research. The work of Burgess and Pande (2005) suggests that we might expect to find important effects on poverty and growth. The fact that we find some evidence of an association between remittances and credit suggests that banks may allow households to leverage remittance incomes for the purchase of durable goods or for investment in enterprises. But a more complete answer to the question will require more detailed data on the use of banking services in communities receiving remittances.

[24] Woodruff (2006) also finds a positive association between receipt of remittances and the likelihood of having a loan using household data from a sample of households which have accounts in non-bank financial institutions in Mexico.

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Table 1: Variable Definitions and Descriptive Statistics

Variable	Description	Observations	Mean	Median	Standard deviation	Minimum	Maximum
Deposits to GDP (%)	Deposit volume year 2000 to 1999 GDP in current pesos	2392	4.24	0	9.39	0	54.86
Credit to GDP (%)	Credit volume year 2000 to 1999 GDP in current pesos	2392	0.65	0	2.00	0	15.84
Branches per capita	Branches per 100,000 inhabitants	2392	1.79	0	3.84	0	22.00
Accounts per capita	Accounts per 1,000 inhabitants	2380	42.13	0	95.69	0	610.39
Households receiving remittances (%)	Percentage of households receiving remittances from overseas	2392	6.54	3.45	7.71	0	53.71
GDP per capita	GDP per capita (dollars)	2391	3,388	2,776	2,535	149	27,695
Density	Population per square kilometer	2392	172.29	46.19	757.88	0.22	19773.74
Indigenous language (%)	Percentage of household heads who speak an indigenous language	2392	24.21	2.41	35.54	0.00	100.00
Schooling	Average years of schooling completed by household heads	2392	4.46	4.23	1.62	0.00	13.57
Distance to Mexico City	Distance between each *municipio* and Mexico City	2392	462.80	357.33	370.31	7.62	2270.40
Distance to the US border	Direct distance from each *muncipio* to the US border	2392	750.12	787.85	264.42	0.50	1346.44
Distance to the modern railroad	Distance to closest railway line in 1998	2392	2443.78	2251.21	1269.08	2.50	6221.63
Minimum of distance to border along the 1920s rail and distance to border	Minimum of distance to the border along the 1920s railroad (where we consider distance to the railroad and from there to the border) and direct distance to the US border	2392	153.06	127.45	130.88	0.00	879.11

Table 2: Basic *Municipio*-Level Tobit Estimations Including All *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	(2.1)	(2.2)	(2.3)	(2.4)	(2.5)	(2.6)	(2.7)	(2.8)
	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP
Households receiving remittances (%)	0.1564	3.9704	0.4437	0.0151	0.2375	6.1426	0.662	0.0564
	[4.09]***	[4.20]***	[4.59]***	[0.89]	[6.65]***	[6.85]***	[6.84]***	[3.54]***
GDP per capita					2.1059	51.4631	4.3635	1.0399
					[16.80]***	[16.25]***	[12.14]***	[12.87]***
Density					0.0007	0.0243	0.0025	0.0006
					[3.31]***	[3.59]***	[3.93]***	[3.22]***
Constant	-8.6058	-221.3261	-21.3552	-4.4699	-15.77	-402.1896	-38.8721	-8.141
	[16.03]***	[16.26]***	[16.22]***	[15.40]***	[21.31]***	[20.76]***	[18.92]***	[17.71]***
Observations	2392	2380	2392	2392	2391	2379	2391	2391
Log Likelihood	-3020.72	-4784.71	-3522.3	-2450.55	-2736.05	-4512.17	-3320.96	-2184.21

Table 3: Basic *Municipio*-Level Tobit Estimations Excluding All Rural *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	(3.1)	(3.2)	(3.3)	(3.4)	(3.5)	(3.6)	(3.7)	(3.8)
	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP
Households receiving remittances (%)	0.2139	5.3976	0.6296	0.0184	0.307	7.89	0.8444	0.0717
	[5.14]***	[5.23]***	[5.89]***	[0.98]	[7.84]***	[8.01]***	[7.87]***	[4.05]***
GDP per capita					1.683	40.8493	2.9729	0.8759
					[13.71]***	[13.49]***	[9.54]***	[10.47]***
Density					0.0003	0.0149	0.0016	0.0004
					[2.15]**	[3.08]***	[3.34]***	[2.79]***
Constant	-3.6425	-99.0378	-9.6372	-2.1537	-11.0329	-283.6331	-24.4406	-6.1407
	[8.05]***	[8.80]***	[8.97]***	[9.29]***	[15.45]***	[15.60]***	[12.77]***	[13.59]***
Observations	1483	1470	1483	1480	1482	1469	1482	1479
Log Likelihood	-2644.19	-4391.19	-3138.59	-2136.85	-2464.38	-4220.75	-3039.52	-1972.95

Table 4: Tobit Estimations with Additional Controls Excluding All Rural *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	(4.1)	(4.2)	(4.3)	(4.4)
	Branches per capita	Accounts per capita	Deposits per capita	Credit per capita
Households receiving remittances (%)	0.3236	8.5041	0.9121	0.094
	[7.79]***	[8.12]***	[8.11]***	[5.05]***
GDP per capita	0.8283	18.7849	0.8134	0.3235
	[6.62]***	[6.57]***	[3.05]***	[4.62]***
Density	-0.0001	0.0011	0.000	0.0001
	[1.11]	[0.35]	[0.03]	[1.26]
Indigenous language	-0.0457	-1.0922	-0.1044	-0.0199
	[3.48]***	[3.22]***	[2.95]***	[2.79]***
Schooling	1.8889	51.8442	5.5458	1.297
	[7.25]***	[7.95]***	[8.55]***	[8.15]***
Distance to the US border	0.0003	0.0128	0.0039	0.0007
	[0.30]	[0.50]	[1.58]	[1.09]
Distance to Mexico City	0.0016	0.0246	0.0015	0.0013
	[2.64]***	[1.56]	[0.97]	[3.29]***
Constant	-17.3857	-461.0968	-45.6412	-11.2214
	[10.12]***	[10.39]***	[10.35]***	[10.04]***
Observations	1482	1469	1482	1479
Log Likelihood	-2406.12	-4159.8	-2977.8	-1898.88

Table 5A: First Stage Tobit Instrumental Variables Estimations Excluding All Rural *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z-statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	**Dependent variable: Households receiving remittances (%)**							
	(5A.1)	(5A.2)	(5A.3)	(5A.4)	(5A.5)	(5A.6)	(5A.7)	(5A.8)
	Branches per capita equation	Accounts per capita equation	Deposits to GDP equation	Credits to GDP equation	Branches per capita equation	Accounts per capita equation	Deposits to GDP equation	Credits to GDP equation
GDP per capita	-0.4383***	-0.4466***	-0.4184***	-0.4471***	0.0081	-0.0002	0.0205	-0.0183
	[-7.075]	[-7.133]	[-7.161]	[-7.083]	[0.112]	[-0.00207]	[0.301]	[-0.251]
Density	-0.0009***	-0.0009***	-0.0008***	-0.0009***	-0.0004***	-0.0004***	-0.0004***	-0.0004***
	[-4.100]	[-4.107]	[-4.310]	[-4.041]	[-3.678]	[-3.701]	[-3.826]	[-3.703]
Indigenous language					-0.0763***	-0.0756***	-0.0746***	-0.0773***
					[-12.20]	[-12.03]	[-12.02]	[-12.32]
Schooling					-1.5641***	-1.5437***	-1.5403***	-1.5656***
					[-10.71]	[-10.60]	[-10.73]	[-10.62]
Distance to US border					0.0228***	0.0226***	0.0226***	0.0234***
					[14.88]	[14.72]	[14.82]	[15.14]
Distance to modern railroad	0.0004	0.0004	0.0004	0.0006	0.0062***	0.0062***	0.0061***	0.0065***
	[0.321]	[0.314]	[0.321]	[0.543]	[4.611]	[4.507]	[4.566]	[4.748]
Distance to Mexico City					0.0059***	0.0059***	0.0059***	0.0063***
					[9.074]	[8.932]	[9.085]	[9.328]
Min(distance to border along 1920s railroad, direct distance to border)	-0.0017***	-0.0018***	-0.0017***	-0.0018***	-0.0059***	-0.0058***	-0.0058***	-0.0060***
	[-12.55]	[-12.68]	[-12.49]	[-12.81]	[-17.67]	[-17.53]	[-17.59]	[-18.04]
Constant	12.538***	12.604***	12.292***	12.724***	9.095***	9.126***	8.930***	9.078***
	[22.89]	[22.75]	[23.00]	[22.93]	[8.840]	[8.888]	[8.794]	[8.751]
Observations	1482	1469	1482	1479	1482	1469	1482	1479
Log Likelihood	-7370	-9083	-7933	-6885	-7118	-8837	-7681	-6612
Kleibergen-Paap F-statistic for weak identification	157.12	160.28	155.53	163.72	310.58	305.63	307.64	323.68

Table 5B: Second Stage Tobit Instrumental Variables Estimations Excluding All Rural *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z-statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	(5B.1) Branches per capita	(5B.2) Accounts per capita	(5B.3) Deposits to GDP	(5B.4) Credits to GDP	(5B.5) Branches per capita	(5B.6) Accounts per capita	(5B.7) Deposits to GDP	(5B.8) Credits to GDP
Households receiving remittances (%)	0.4815***	12.7492***	1.2127***	0.1298	0.2385***	8.5290***	1.0039***	0.0301
	[3.223]	[3.329]	[3.229]	[1.484]	[2.851]	[3.916]	[4.489]	[0.624]
GDP per capita	1.7247***	41.9738***	3.0467***	0.8903***	0.8302***	18.8893***	0.8198***	0.3230***
	[13.90]	[13.59]	[9.743]	[10.74]	[6.563]	[6.583]	[3.056]	[4.561]
Density	0.0004*	0.0170***	0.0017***	0.0004**	-0.0002	0.0008	0.0000	0.0001
	[1.850]	[2.633]	[2.796]	[2.501]	[-1.357]	[0.255]	[0.0280]	[1.014]
Indigenous language					-0.0496***	-0.9513**	-0.0840**	-0.0245***
					[-3.154]	[-2.387]	[-2.031]	[-2.634]
Schooling					1.7628***	51.8228***	5.6793***	1.2006***
					[6.558]	[7.525]	[8.255]	[7.526]
Distance to US border					0.0007	0.0288	0.0055*	0.0008
					[0.638]	[0.985]	[1.874]	[1.179]
Distance to Mexico City					0.0022***	0.0399**	0.0028	0.0015***
					[2.738]	[2.023]	[1.409]	[3.020]
Distance to modern railroad	-0.0031	-0.0998*	-0.0101*	-0.0012	-0.0031	-0.0840	-0.0068	-0.0013
	[-1.446]	[-1.669]	[-1.830]	[-0.916]	[-1.345]	[-1.431]	[-1.153]	[-0.924]
Constant	-11.929***	-306.396***	-25.704***	-6.422***	-16.272***	-470.172***	-47.968***	-10.250***
	[-8.076]	[-7.875]	[-6.981]	[-7.406]	[-7.777]	[-8.605]	[-8.825]	[-8.106]
Observations	1482	1469	1482	1479	1482	1469	1482	1479
Log Likelihood	-7370	-9083	-7933	-6885	-7118	-8837	-7681	-6612

Appendix

Table A1: Basic Tobit Estimations Replacing GDP per Capita with a Dummy for GDP per capita> than 75 Percentile

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded. Robust z-statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	(A1.1)	(A1.2)	(A1.3)	(A1.4)
	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP
Households receiving remittances (%)	0.2425	6.2940	0.6754	0.0603
	[6.51]***	[6.82]***	[6.84]***	[3.64]***
Dummy GDP per cap. 75th percentile	11.6144	286.8822	26.0744	5.8151
	[21.76]***	[20.52]***	[19.79]***	[15.56]***
Density	0.0006	0.0228	0.0023	0.0005
	[2.55]**	[2.77]***	[3.13]***	[2.65]***
Constant	-11.7566	-301.4885	-30.4166	-6.1000
	[19.69]***	[19.78]***	[20.19]***	[17.33]***
Observations	2392	2380	2392	2392
Log Likelihood	-2789.55	-4554.82	-3335.49	-2220.47

Table A2: Basic Tobit Estimations Replacing Remittances for the Percentage of Households with a Migrant
Sample Excluding All Rural *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z-statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

	(A2.1)	(A2.2)	(A2.3)	(A2.4)	(A2.5)	(A2.6)	(A2.7)	(A2.8)
	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP	Branches per capita	Accounts per capita	Deposits to GDP	Credits to GDP
Households with at least one migrant overseas (%)	0.1038	2.6173	0.3274	-0.0105	0.2238	5.7399	0.6202	0.0491
	[2.86]***	[2.92]***	[3.61]***	[0.61]	[6.70]***	[6.90]***	[6.86]***	[3.14]***
GDP per capita					2.1427	52.4208	4.4535	1.0452
					[16.70]***	[16.17]***	[12.03]***	[12.87]***
Density					0.0006	0.0233	0.0024	0.0006
					[3.20]***	[3.55]***	[3.87]***	[3.20]***
Constant	-8.3856	-215.6095	-20.9768	-4.2817	-16.0311	-408.686	-39.5045	-8.1464
	[15.32]***	[15.65]***	[15.68]***	[14.87]***	[20.85]***	[20.47]***	[18.40]***	[17.50]***
Observations	2392	2380	2392	2392	2391	2379	2391	2391
Log Likelihood	-3025.09	-4789.29	-3527.07	-2450.69	-2738.22	-4514.93	-3323.45	-2185.32

Table A3: Basic Tobit Estimations Where Measures of Depth and Breadth are Averaged over 2001-2005
Sample Excluding All Rural *Municipios*

Regressions exclude outliers (observations in the top 1 percent of the distribution for the dependent variables). Mexico City is excluded.
Robust z-statistics are in brackets. The symbols *,**, and *** denote significance at 10, 5 and 1 percent levels, respectively.

Variables	(A3.1)	(A3.2)	(A3.3)	(A3.4)	(A3.5)	(A3.6)	(A3.7)	(A3.8)
	Branches per capita Average 2001-2005	Accounts per capita Average 2001-2005	Deposits to GDP Average 2001-2005	Credit to GDP Average 2001-2005	Branches per capita Average 2001-2005	Accounts per capita Average 2001-2005	Deposits to GDP Average 2001-2005	Credit to GDP Average 2001-2005
Households receiving remittances (%)	0.1383	3.5939	0.8169	0.0107	0.2006	6.546	1.0653	0.0358
	[4.28]***	[3.52]***	[6.32]***	[0.79]	[6.03]***	[6.31]***	[7.90]***	[2.59]***
GDP per capita	1.1119	38.308	1.5281	0.3767	0.4206	14.895	-0.3959	0.085
	[12.00]***	[11.78]***	[6.33]***	[7.31]***	[4.29]***	[4.53]***	[1.52]	[1.93]*
Density	0.0001	0.0145	0.0012	0.0004	-0.0003	-0.0068	-0.0007	0.0001
	[0.57]	[2.17]**	[1.99]**	[2.32]**	[2.47]**	[1.51]	[1.56]	[0.73]
Indigenous language					-0.0115	0.1733	-0.0087	-0.0062
					[1.17]	[0.43]	[0.23]	[1.22]
Schooling					1.8589	77.7116	6.8221	0.9197
					[9.68]***	[11.41]***	[10.20]***	[8.59]***
Distance to US border					-0.0001	0.0574	0.0078	0.0003
					[0.11]	[2.20]**	[3.05]***	[0.68]
Distance to Mexico City					0.0014	0.0016	0.0002	-0.0003
					[2.78]***	[0.10]	[0.11]	[1.15]
Constant	-2.1912	-85.5148	-1.3966	-1.2167	-9.658	-446.0059	-35.3478	-4.8304
	[4.04]***	[4.58]***	[0.80]	[4.43]***	[7.44]***	[9.79]***	[7.67]***	[7.44]***
Observations	1003	1004	1003	1003	1003	1004	1003	1003
Log Likelihood	-2548.67	-5021.59	-3463.48	-2014.39	-2493.31	-4952.15	-3417.8	-1964.92