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Globalization, Migration, and Development: The Role of Mexican Migrant Remittances

Ongoing debates on the merits and shortcomings of globalization mainly focus on the consequences of increased capital and goods flows for economic development. Until recently, international migration has received relatively little attention in such discussions.[1] This is somewhat surprising, since accounts of the first wave of globalization, toward the end of the nineteenth century, highlight the impressive movements of people around the world.[2] In part, the oversight reflects the paucity of reliable data on migration.

This paper contributes toward filling this gap. It explores whether the movement of people across borders fosters development, just as capital and trade flows might do. In particular, the paper focuses on the role played by migrants' remittances to families in their countries of origin.

The magnitude of remittance flows is substantial. For instance, the Multilateral Investment Fund (MIF) uses careful household surveys to measure remittance flows to Latin America and the Caribbean.[3] The results indicate that these exceeded U.S.$45 billion in 2004, which is more than the combined flows of foreign direct investment and development assistance. The region is thus the largest remittance recipient in the world. Worldwide, remittance flows to developing countries grew from U.S.$31 billion in 1990 to an esti-

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1. For example, see the articles in Harrison (2005), which focus only on trade and financial liberalization.
2. See, for example, O'Rourke and Williamson (1999).
3. MIF (2005).

mated U.S.$126 billion in 2004.[4] Beyond having grown rapidly, remittances are less volatile than other private capital flows, they are less procyclical (and might even be countercyclical), and they partially accrue to households with dire needs. All this makes them a potentially important tool for promoting development in recipient nations.

To test some of these notions this paper analyzes the case of Mexico, a country that has experienced a fast integration with the global economy not only through trade and capital flows, but also through migration. Mexico is the second-largest remittance recipient in the world, after India, and is followed by China, Pakistan, and the Philippines.

Specifically, the paper looks at a cross-section of Mexican municipalities and analyzes whether development indicators improve as the fraction of remittance-receiving households in a municipality rises.[5] I pay particular attention to schooling and health status, with a secondary focus on poverty and a marginalization index that summarizes several welfare measures. The results suggest that an increase in the fraction of households receiving remittances reduces infant mortality and illiteracy among children aged six to fourteen years, while at the same time alleviating some dimensions of poverty and improving living conditions. Remittances seem to improve school attendance among young children, although the opposite seems to be the case among teenagers.

To address the potential endogeneity of remittances, I estimate two-stage least-squares models using municipal rainfall patterns and the distance to Guadalajara as instrumental variables. Since these instruments may have shortcomings, I also incorporate a rich set of controls that are potentially interesting in and of themselves.

The results on the impact of remittances hold even after I account for migration more broadly. This is relevant because remittances and migration may affect development outcomes in independently and possibly conflicting directions. For example, migration may disrupt family life and have a negative impact on child schooling, while remittances may relax liquidity con-

4. World Bank (2005, p. 28). Most data on remittances are fraught with problems. The figures usually cited in international reports rely on balance-of-payments statistics that probably underestimate true remittance flows, as migrants often make transfers through informal channels. National data are most likely subject to similar shortcomings.

5. Mexico has thirty-two states, including the Federal District, which encompasses most of Mexico City. States are subdivided into municipalities (or *delegaciones,* for the Federal District), and there are 2,443 municipalities in the country. About 2 percent of them were dropped from the nationwide regressions because of missing data. As explained below, I report regression results for rural municipalities only (around 1,750). The results using the full sample are qualitatively similar.

straints and allow households to invest in education.[6] On the other hand, migration may give households access to better healthcare information, and that positive impact may be reinforced by health expenditures financed with remittance income.[7]

Isolating the impact of remittances from that of migration is very difficult, particularly if one wants to identify exogenous variation in both. To control for the separate impact of migration, I use state dummies that capture the existence of historical migration networks, and in some specifications I also use a proxy for historical migration at the municipal level. The latter is defined as the sum of the distance from the municipality to the 1920s railroad network plus the distance from that point to the U.S.-Mexico border. Despite these efforts, the results below are best interpreted as reduced-form estimates that capture both the effects of migration and remittance flows.

The work presented here contributes to an incipient literature that finds evidence of a causal impact of remittances on development outcomes. My findings, which are based on aggregate data, should be viewed as complementary to recent microeconomic studies using household-level information.

The rest of the paper is organized as follows. The next section provides an overview of the importance of international migration and remittances for Mexico. I subsequently discuss how remittances and migration might affect developmental outcomes and review the incipient empirical literature on the subject. The paper then delineates the empirical strategy and presents the results. The final section recommends avenues for future research.

Migration, Remittances, and Globalization in Mexico

During the last decade and a half, Mexico experienced a rapid shift from an inward-looking, closed economy to one with tight global links. Table 1 shows that standard globalization indicators changed drastically between 1970 and 2000. Trade in goods and services jumped from 17 percent of GDP in 1970 to 64 percent in 2000, with a 26 percentage point leap from 1990 to 2000. Foreign direct investment (FDI) remained under one percent of GDP through 1990, reaching 2.4 percent in 2000. At the same time, international migration—which for Mexico is essentially equivalent to migration to the United States—continued to gain importance. Using U.S. census figures, Schmidley shows that in 1970 Mexican-born individuals amounted to fewer

6. Hanson and Woodruff (2003).
7. Hildebrandt and McKenzie (2004).

TABLE 1. Mexico's Global Links, 1970–2000
Percent of GDP, unless otherwise noted

Indicator	*1970*	*1980*	*1990*	*2000*
Trade in goods and services	17.4	23.7	38.3	64.0
Foreign direct investment	0.9	1.0	1.0	2.4
Tourism receipts	n.a.	2.4	2.1	1.4
Mexican-born U.S. population (million)	0.8	2.2	4.3	7.8
As percentage of foreign-born population	8.2	16.7	22.7	27.6
As percentage of Mexico's labor force	3.0	n.a.	11.0	16.0
Remittances (millions of current U.S.$)	n.a.	698	2,492	6,572
As percent of GDP	n.a.	0.3	0.9	1.1

Source: World Bank, *World Development Indicators;* Schmidley (2001); Mishra (2003).
n.a. Not available.

than 800,000, or 8.2 percent of the total U.S. foreign-born population.[8] This share climbed to 16.7 in 1980, 22.7 in 1990, and 27.6 (7.8 million people) in 2000. Schmidley points out that "Mexico's proportion in 2000 is the largest recorded share any country has held since the decennial census in 1890, when about 30 percent of the foreign-born population was from Germany."[9]

An increasing fraction of Mexico's population now lives and works in the United States. Mishra estimates that Mexican workers in the United States increased fivefold, from 3 percent of Mexico's labor force in 1970 to 16 percent in 2000.[10] Furthermore, Mexico's 2000 census shows that between 1995 and 2000, 4.1 percent of all households saw at least one member migrate to the United States, while an additional 1.8 percent had family members migrating back and forth or returning to Mexico.[11]

Not surprisingly, remittance flows to Mexico have also grown rapidly, from less than U.S.$700 million, or 0.3 percent of GDP, in 1980 to over U.S.$6.5 billion, or 1.1 percent of GDP, in 2000. Official estimates set 2004 remittances at U.S.$16.6 billion (2.5 percent of GDP), which is 24 percent higher than in 2003. The 2004 remittances slightly exceeded FDI inflows and equaled about 80 percent of crude oil exports.[12]

A substantial and rising number of Mexican households benefit from these funds. According to census figures, 4.4 percent of households (out of approx-

8. Schmidley (2001).
9. Schmidley (2001, p. 12).
10. Mishra (2003).
11. CONAPO (2002, table A).
12. Bank of Mexico, "La balanza de pagos en 2004," 22 February 2004. Available at www.banxico.org.mx/fBoletines/Boletines/calendario2005/22feb2005balpagos.pdf.

imately 22.6 million) received remittances in 2000.[13] Household surveys show that the fraction of families receiving remittances rose steadily throughout the 1990s, from 3.7 percent in 1992 to 5.7 percent in 2002. The increase was particularly striking for rural households, in that the share of recipients roughly doubled, from 6.2 to 12.6 percent. Remittances also grew in importance relative to total household income. For the country as a whole, they rose from 0.9 to 1.7 percent of total household income between 1992 and 2002; as a share of rural household income, they went from 2.7 to 6.5 percent.

While migration and remittance flows are important for the country as a whole, they vary substantially across states. In 2003, five Mexican states received almost 45 percent of all remittances (see table 2). Remittances represented 8.3 percent of state GDP in Michoacán, 5.6 percent in Guerrero, and 5.2 percent in Nayarit. This is relative to 1.6 percent for the country as a whole and a mere 0.4 percent in Mexico City or Nuevo León.

Table 2 further shows that more than 10 percent of households in the central states of Zacatecas and Michoacán sent migrants to the United States between 1995 and 2000, whereas fewer than one percent did so in Campeche and Chiapas. Zacatecas, Michoacán, and Guanajuato exhibit the highest historical rates of migration: Woodruff and Zenteno report that between 1955 and 1959, 6.0, 4.0, and 3.0 percent, respectively, of these states' populations migrated to the United States.[14] They argue that these migration patterns have their origins in the early part of the twentieth century, as U.S. recruiters traveled by rail to Guadalajara, Jalisco, to hire Mexican workers residing in the surrounding areas. Past migration establishes networks of migrants that make it easier for future generations to emigrate, and it is therefore highly correlated with current migration. Munshi, for example, shows that Mexican migrants from communities with historically high rates of emigration have better labor market outcomes than migrants from other regions.[15]

Despite the persistence of historical migration patterns, remittances have been flowing fast to states that traditionally did not send many migrants to the United States (see table 2). For instance, Veracruz, on the Gulf of Mexico, and Chiapas, along the Guatemalan border, saw remittances rise at an annual

13. Data on remittances reflected in existing household surveys must be handled with care. Combining the fraction of remittance-receiving households reflected in Mexican household-survey data with Bank of Mexico statistics would suggest that migrants send around U.S.$700 a month. The latter figure is at odds with surveys indicating that migrants send around U.S.$300 a month.

14. Woodruff and Zenteno (2001).

15. Munshi (2003).

TABLE 2. International Remittances to Mexico, by State, 1995 and 2004

	Remittance flows						*Percent of households 2000*	
	Millions of U.S.$		*As % of state GDP*		*Per capita (U.S.$)*			
State	*1995*	*2004*	*1995*	*2004*	*1995*	*2004*	*Receiving remittances*	*With migrants in the U.S.*
Aguascalientes	114	297	4.0	3.3	133	274	11.4	10.4
Baja California	31	149	0.4	0.6	15	57	9.2	9.6
Baja California Sur	4	17	0.3	0.5	12	39	7.7	6.5
Campeche	4	37	0.1	0.6	6	49	2.1	2.6
Chiapas	68	155	0.8	0.7	31	62	7.9	6.8
Chihuahua	22	127	1.6	3.3	45	214	2.7	3.2
Coahuila	20	500	0.4	3.9	5	117	1.7	1.6
Colima	64	220	0.6	0.8	23	67	4.1	4.8
D.F.	196	954	0.3	0.7	23	107	3.3	4.0
Durango	77	278	2.2	3.0	53	175	5.1	7.1
Estado de México	376	1,532	4.3	6.3	84	294	6.4	7.5
Guanajuato	224	826	4.8	6.9	76	247	8.2	7.4
Guerrero	72	615	2.1	6.9	33	253	3.6	3.0
Hidalgo	467	1,419	2.9	3.5	77	207	4.6	3.6

Jalisco	161	1,385	0.6	1.8	14	98	0.8	0.8
Michoacán	597	2,196	9.7	13.6	152	492	9.7	7.3
Morelos	131	400	3.7	4.3	91	234	13.0	12.2
Nayarit	58	238	3.9	6.1	64	238	4.3	3.7
Nuevo León	38	282	0.2	0.4	11	69	9.6	6.8
Oaxaca	159	804	3.8	7.6	47	215	3.7	4.8
Puebla	178	956	2.0	3.7	38	175	3.4	2.2
Querétaro	71	337	1.7	2.3	57	218	3.2	1.6
Quintana Roo	3	72	0.1	0.8	5	79	4.0	2.4
San Luis Potosí	120	393	2.5	3.5	54	154	2.5	1.9
Sinaloa	110	315	2.0	2.4	45	124	6.7	6.7
Sonora	28	147	0.4	0.7	13	62	7.3	5.6
Tabasco	5	95	0.1	1.0	3	46	2.2	2.7
Tamaulipas	47	241	0.6	1.1	18	83	0.6	0.6
Tlaxcala	27	174	2.1	4.3	31	164	1.4	1.0
Veracruz	76	950	0.6	3.4	11	130	1.0	0.7
Yucatán	11	80	0.4	0.6	7	45	1.0	0.9
Zacatecas	114	422	5.2	8.3	84	279	1.1	1.0
Total	3,673	16,613	1.4	2.4	40	158	4.4	4.1

Source: Author's compilation, based on data from Bank of Mexico, INEGI, and CONAPO.

rate of 35 and 46 percent, respectively, compared with an average national rate of only 13 percent.

In sum, millions of Mexican nationals have migrated to the United States over the last three decades. They have not only become the largest immigrant group in the United States, but represent an increasingly large share of the Mexican labor force. Their remittances have grown rapidly and have surpassed FDI in magnitude. Nearly a million Mexican households benefit directly from U.S.-based remittances.[16] While they are not the poorest of the poor, many of these households are concentrated in municipalities with dismal welfare indicators. To the extent that the additional income allows them to improve their living conditions, international migration may turn out to be an important development tool in Mexico.

Remittances and Development: Existing Literature

Interest in the impact of remittances has grown rapidly in the past few years. This might reflect either their strong growth or the increased availability of household-level data that contain information on overseas transfers. Docquier and Rapoport provide an extensive survey of the motivations to remit and of some of the implications for human capital formation, entrepreneurship, and inequality.[17]

Less work addresses the empirical effects of remittances on development.[18] A few recent papers consider whether remittances, by relaxing households' liquidity constraints, allow investment in education. Cox Edwards and Ureta analyze household schooling decisions in El Salvador; they conclude that receiving remittances reduces the likelihood of quitting school among individuals aged six to twenty-four years.[19] Yang, who looks at money sent by Filipino workers, finds that a rise in remittances of 10 percent of initial income increases the fraction of seventeen- to twenty-one-year-old children attending school by more than 10 percentage points, while child labor hours decline by almost three hours a week.[20] Hanson and Woodruff review Mexico's 2000

16. Figures are for 2000. See note 13.
17. Docquier and Rapoport (2006).
18. For a more detailed description of the discussion that follows, see López-Córdova and Olmedo (2005).
19. Cox Edwards and Ureta (2003).
20. Yang (2003).

census data and conclude that "children in migrant-sending households complete significantly more years of schooling."[21]

Only a few studies examine the link between remittances and health outcomes. Kanaiaupuni and Donato suggest that infant mortality is more acute in communities with historically high migration rates.[22] Nonetheless, they argue that the disruptive effect of migration is offset by household-level remittance flows. A drawback of their paper is that it is based on only twenty-seven communities in five Mexican states. In the same vein, Frank and Hummer show that membership in a migrant household reduces the risk of low birth weight.[23]

Neither of the last two papers addresses the potential endogeneity of remittances. Hildebrandt and McKenzie do so by instrumenting current migration levels with the interaction of historic migration networks and the development pattern of the railroad system in the early 1900s.[24] They investigate indirect channels between migration and infant health—for example, in the form of health information that can be passed from migrants to their families in the origin country. They find that children in migrant households have a lower mortality rate and higher birth weight than children in nonmigrant households, mainly thanks to remittances. Duryea, López-Córdova, and Olmedo, in turn, use a large cross-section of Mexican households and control for a number of individual and community characteristics; they suggest that remittances have a positive effect on infant survival through improvements in living conditions (such as better housing).[25]

Regarding entrepreneurship, Woodruff and Zenteno conclude, based on a sample of small Mexican firms, that "remittances are responsible for almost 27 percent of the capital invested in microenterprises" in Mexican cities, and that this share reaches 40 percent in states with high emigration rates to the United States.[26]

On poverty, Adams and Page analyze a cross-section of seventy-four low- and middle-income countries. They find that a 10 percent increase in the number of international migrants, or in the amount of remittances received, reduces the fraction of people living on less than a dollar per day by 1.9 per-

21. Hanson and Woodruff (2003).
22. Kanaiaupuni and Donato (1999).
23. Frank and Hummer (2002).
24. Hildebrandt and McKenzie (2004).
25. Duryea, López-Córdova, and Olmedo (2005).
26. Woodruff and Zenteno (2001). Docquier and Rapoport (2006) cite works on Tunisia, Turkey, and Pakistan with related findings.

cent in low-income countries and 1.6 percent in middle-income countries.[27] Finally, McKenzie and Rapoport present a model suggesting that international migration initially deepens inequality, as the poor cannot afford to cover the cost of migration.[28] As migration networks grow, however, the costs of migration fall for future migrants, and inequality is reduced. They find empirical support for these predictions in Mexico.

Remittances and Development in Mexico

This section addresses issues discussed in the previous section using a detailed municipal-level database for Mexico; the data are described in the appendix. I begin by describing some welfare indicators and other relevant characteristics to provide a first glance at how remittances may affect living conditions.

Municipal Welfare and Remittances

Table 3 explores which types of municipalities receive the most remittance income, focusing on three important correlates—GDP per capita, indigenous population, and urban/rural status. The table shows that the share of remittance-receiving households rises with the fraction of nonindigenous people and that it is higher in rural municipalities than in urban ones. Moreover, the share of remittance recipients exhibits an inverted U-shape relative to per capita GDP.

Per capita GDP and the shares of indigenous and rural populations are strong predictors of poor living conditions. It is not surprising, then, that infant mortality, illiteracy, and poverty levels are inversely correlated with the percent of households receiving remittances (see table 4). This evidence has important implications for the econometric exercises below. While municipalities for which remittances are important have substandard welfare indicators, they also exhibit some characteristics—namely, low per capita income and large rural and indigenous populations—that have a strong impact on those indicators and on the propensity to migrate. Empirical analyses should therefore incorporate as many controls as possible, ideally using instrumental variables to isolate the causal effects of remittances.

27. Adams and Page (2003).
28. McKenzie and Rapoport (2004).

TABLE 3. Municipal Characteristics and Remittances, 2000
Percent of remittance-receiving households by per capita GDP, indigenous population, and rural status

A. Urban municipalities

Quintiles of fraction of nonindigenous population	*Quintiles of municipal GDP per capita*					
	1	*2*	*3*	*4*	*5*	*All*
1	1.6	2.6	1.9	1.8	0.9	1.8
2	0.0	2.5	4.3	3.4	3.5	3.6
3	0.0	8.4	3.0	4.5	3.5	3.9
4	0.0	2.0	8.1	7.9	5.2	6.3
5	4.9	12.5	12.2	12.8	7.0	9.6
All	2.3	4.4	6.5	6.6	4.7	5.5

B. Rural municipalities

Quintiles of fraction of nonindigenous population	*Quintiles of municipal GDP per capita*					
	1	*2*	*3*	*4*	*5*	*All*
1	3.4	3.0	3.1	2.5	2.3	3.3
2	4.0	5.0	5.9	3.9	3.1	4.7
3	5.9	7.5	9.6	6.9	5.5	7.5
4	6.5	10.7	6.6	8.5	8.2	8.1
5	10.5	15.8	13.0	12.0	7.2	12.4
All	4.7	7.7	8.3	7.8	6.6	6.9

C. All municipalities

Quintiles of fraction of nonindigenous population	*Quintiles of municipal GDP per capita*					
	1	*2*	*3*	*4*	*5*	*All*
1	3.4	3.0	2.9	2.2	1.2	3.1
2	4.0	4.9	5.5	3.7	3.4	4.4
3	5.9	7.6	9.0	5.6	3.9	6.0
4	6.5	10.1	6.9	8.2	6.2	7.5
5	10.3	15.8	12.9	12.3	7.1	11.6
All	4.7	7.5	7.9	7.3	5.2	6.5

Econometric Strategy

To address these challenges, I estimate equations of the form

$$Y_{ij} = \gamma \ln\left(\mathrm{RRH}_{ij}\right) + \mathbf{X}'_{ij}\mathrm{B} + \varepsilon_{ij}, \tag{1}$$

where Y_{ij} represents an outcome Y (for example, infant mortality) in municipality i and state j; RRH_{ij} is the fraction of remittance-receiving households

TABLE 4. Municipal Welfare and Remittances, 2000
Correlation coefficients

Variable	*Remittance-receiving households (%)*	*State migration rate, 1955–59*	*Infant mortality*	*Child illiteracy*	*Child school attendance*	*Extreme poverty*	*Poverty*	*Marginalization index*
Remittance-receiving households (%)	1.0000							
State migration rate, 1955–59	0.3761*	1.0000						
Infant mortality	−0.2544*	−0.2319*	1.0000					
Child illiteracy	−0.2967*	−0.2289*	0.7714*	1.0000				
Child school attendance	0.0373	−0.0131	−0.5127*	−0.6622*	1.0000			
Extreme poverty	−0.3989*	−0.3970*	0.6493*	0.5447*	−0.2702*	1.0000		
Poverty	−0.2101*	−0.3881*	0.7312*	0.5298*	−0.3042*	0.7812*	1.0000	
Marginalization index	−0.2488*	−0.3337*	0.9533*	0.7722*	−0.5002*	0.7149*	0.8342*	1.0000

* Statistically significant at the 5 percent level.

in municipality *i;* and $\mathbf{X}_{ij}$ is a vector of additional variables that might explain Y_{ij}, with a corresponding vector of coefficients, B.

In some specifications, $\mathbf{X}_{ij}$ includes a proxy for historical migration at the municipal level. I use a measure of the cost of emigrating from a given municipality in the 1920s, proxied by the distance from the municipality to the railroad network in existence in the 1920s plus the distance from that point to the U.S.-Mexico border. Because migration is highly persistent, it is likely to affect long-term development prospects. Using historical data to measure the propensity to emigrate captures both the impact of current migration flows and migration's long-term effects.[29] The estimated coefficient on the migration proxy ideally captures migration's impact on *Y* other than through remittances (for example, disruption of family life and local labor market effects); the effect of remittances on the outcome of interest is then captured by γ.

A key concern is that remittances could be correlated with the error term. First, unobserved variables may be affecting both the number of households receiving remittances and the outcome variable of interest. For example, adverse shocks to the local economy may increase migration while simultaneously having a deleterious impact on, say, school attendance. Consequently, ordinary least squares (OLS) estimates of equation 1 may be biased.

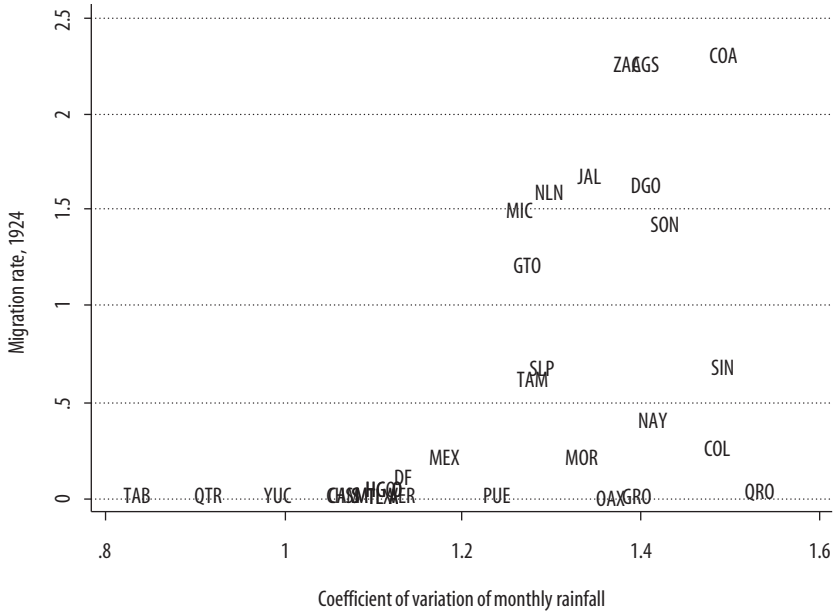
To address this issue, I also estimate equation 1 using instrumental variables (IVs) and two-stage least-squares (2SLS). My first IV comes from rainfall patterns at the municipal level.[30] Using monthly data for most of the twentieth century, I calculated the coefficient of variation in rainfall for each weather station in Mexico, assigning to each municipality the coefficient of the weather station closest to it. This measure captures the concentration of rainfall within a calendar year: a low coefficient means that rainfall is relatively constant throughout the year, whereas a high one means it is concentrated in a short period, typically during the summer. In states where rainfall is concentrated, most agricultural income would be derived from spring and summer crops and would accrue over a limited period.

Such settings may generate an incentive to smooth consumption by looking for alternative sources of income, such as remittance transfers. The incentive to complement agricultural income would probably have been higher in the past, when a larger fraction of the population lived in the countryside and

29. Also, as mentioned in note 13, there are problems in using the 2000 census data on migration.

30. Munshi (2003) also uses rainfall patterns to instrument for emigration from a number of Mexican communities. He focuses on lower-than-average rainfall as a determinant of migration, however, whereas I focus on the concentration of rainfall throughout the year, as explained next.

FIGURE 1. Historical Migration and Rainfall Patterns



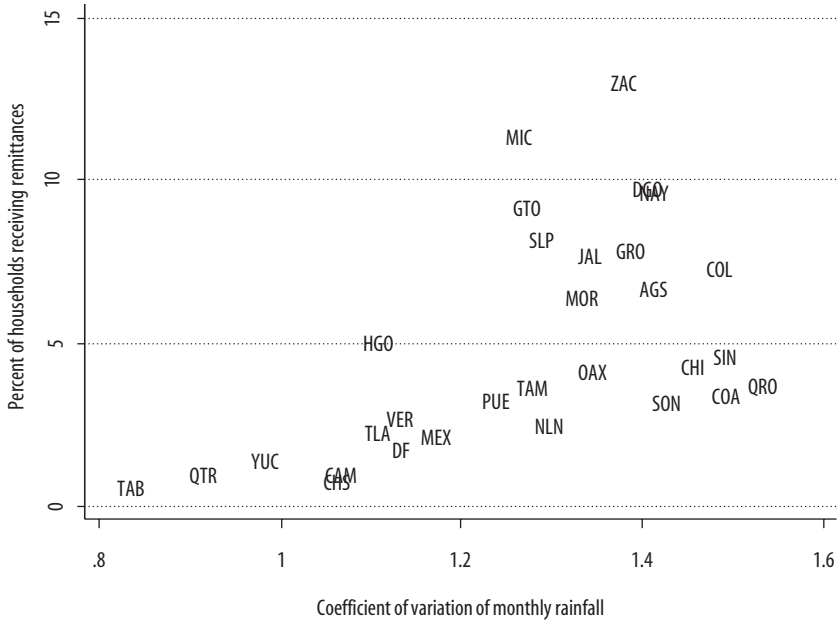
relied on agriculture and when irrigation infrastructure was scarce. As figures 1 and 2 illustrate, both the rate of migration in the 1920s and the percent of households receiving remittances in 2000 are positively correlated with the coefficient of variation of rainfall at the state level.[31]

The validity of my instrument rests on the assumption that rainfall concentration affects the outcomes of interest only through remittances and other included control variables. In particular, the above discussion establishes a link between rainfall concentration and municipal income. Another variable that is closely correlated with rainfall concentration is the fraction of the population whose housing has running tap water. Including this and several other controls mitigates the concern that the exclusion restriction may not hold.[32]

This IV performs well when I include regional dummies, but the introduction of state dummies reduces its power considerably. State dummies are

31. I exclude Baja California and Baja California Sur, which are outliers in both measures.
32. Other omitted variables may also be correlated with the instrument.

FIGURE 2. Remittance-Receiving Households and Rainfall Patterns



important because they capture unobserved state-level factors that may affect both the outcome of interest and the likelihood of receiving remittances, such as historical migration from the given state or public spending by state authorities (for example, on schooling or health programs). I therefore include state dummies in all reported regressions. I also use distance to Guadalajara as an additional IV. As mentioned earlier, there are historical reasons why communities in central Mexico, such as Guadalajara, have high migration rates and hence receive remittances.[33]

Table 5 presents the first-stage results for both IVs. They are always statistically significant, and tests on excluded instruments show *F* statistics greater than 11. Sargan-Hansen tests for overidentification are rejected in all regressions dealing with infant mortality, schooling, and marginalization. However,

33. One of the discussants pointed out that including the municipal migration proxy as a control when the distance to Guadalajara is used as an instrument may be problematic. The 2SLS regression results remain essentially unchanged when I exclude this variable.

TABLE 5. First-Stage Regression Results for Tables 6 through 13[a]

	Tables 6–10			*Tables 11–12*	*Table 13*
	(4)	*(5)*	*(6)*	*(6)*	*(6)*
Monthly rainfall (coefficient of variation)	0.7738	0.2266	0.3066	0.3069	0.2313
	(0.1413)***	(0.1306)*	(0.1358)**	(0.1364)**	(0.1312)*
Distance to Guadalajara (km, logs)	–0.6301	–0.4244	–0.3780	–0.4269	–0.4433
	(0.1027)***	(0.0818)***	(0.0827)***	(0.0806)***	(0.0810)***
Rural (< 2,500) population (%)		0.0010	0.0013	0.0009	0.0009
		(0.0010)	(0.0011)	(0.0011)	(0.0011)
Indigenous population (%)		–0.0095	–0.0094	–0.0092	–0.0092
		(0.0013)***	(0.0013)***	(0.0013)***	(0.0013)***
Schooling		–0.0298	–0.0830	–0.0506	–0.0466
		(0.0349)	(0.0395)**	(0.0396)	(0.0393)
Female-headed households (%)		0.0916	0.0907	0.0903	0.0905
		(0.0067)***	(0.0069)***	(0.0069)***	(0.0068)***
Agricultural employment (%)		–0.0049	0.0005	–0.0036	–0.0042
		(0.0021)**	(0.0024)	(0.0022)	(0.0022)*
Public sector employment (%)		–0.0373	–0.0422	–0.0355	–0.0396
		(0.0147)**	(0.0148)***	(0.0150)**	(0.0147)***
Unemployment rate		0.0041	0.0045	0.0106	0.0079
		(0.0272)	(0.0267)	(0.0289)	(0.0280)
Homicide rate		–0.0821	–0.0795	–0.0778	–0.0832
		(0.0174)***	(0.0176)***	(0.0178)***	(0.0176)***
Border state dummy		–0.5301	–0.5142	–0.5767	–0.1464
		(0.1746)***	(0.1685)***	(0.1685)***	(0.2143)
Income per capita (log)			–0.0303	0.0965	0.1068
			(0.0781)	(0.0710)	(0.0699)
Municipal income Gini coefficient			0.2978	0.2337	0.1369
			(0.2911)	(0.2947)	(0.2897)
Population in poverty (%)			–0.0202		
			(0.0045)***		
Population in housing without tap water			–0.0035	–0.0031	
			(0.0017)**	(0.0017)*	
Water-delivery infrastructure			0.0066	0.0058	0.0165
			(0.0199)	(0.0197)	(0.0183)
Bank branches per 1,000 people			–0.0792	0.1092	0.1053
			(0.3143)	(0.2958)	(0.2909)
Historical municipal migration proxy			0.0661	0.0585	0.0546
			(0.0192)***	(0.0186)***	(0.0181)***
Constant	4.8902	3.4585	4.3857	2.3279	2.4813
	(0.5935)***	(0.5709)***	(0.9003)***	(0.7464)***	(0.7379)***
Summary statistic					
No. observations	1,762	1,751	1,720	1,720	1,749
R squared	0.3619	0.5043	0.5230	0.5167	0.5073
Test of excluded instruments (*F* statistic)	34.29	14.82	12.72	16.25	16.41

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is the percent of remittance-receiving households, in logs. The sample covers rural municipalities. Only nonredundant regression results are reported. State dummies are included. Robust standard errors are in parentheses.

overidentification may be an issue in regressions on poverty, which casts doubt on the validity of the instruments in the latter regressions.[34]

Econometric Results

In addition to using these IVs, I incorporate a set of controls that includes an estimate of the municipal GDP per capita, the percent of the population in rural communities (those with fewer than 2,500 inhabitants), the fraction of indigenous people, an estimate of the Gini coefficient, the percent of female-headed households, average years of schooling among people fifteen years of age and older, the share of employment in agriculture and government, the unemployment and homicide rates, a measure of governance quality, the fraction of the population in poverty (in the infant mortality and schooling regressions only), the percent of the population without piped potable water inside the dwelling, the availability of banking services and water facilities, and state and border dummies. The appendix provides summary statistics.

The econometric estimates discussed below generally confirm my prior beliefs about the impact of these controls. For instance, infant mortality is higher in low-income municipalities, and it rises with inequality and the fraction of rural and indigenous inhabitants. It is inversely related to adult schooling.

Tables 6 through 13 present estimates of equation 1 using as dependent variables infant mortality, child illiteracy, school attendance, two poverty measures, and a broad marginalization index. I report results using a sample consisting of municipalities with no localities greater than 15,000 inhabitants (henceforth, rural municipalities).[35] I focus on these because they are less likely to bring up sample selection issues—rural household members are less likely than urban ones to join their migrant members in the United States, and surveys do not capture households who have emigrated in their entirety.[36] In any case, results obtained using the full sample do not differ qualitatively from those based on this rural sample.[37]

INFANT MORTALITY. I first consider the impact of remittances on municipal-level infant mortality, defined as the number of children, out of every 1,000

34. See Baum, Schaffer, and Stillman (2003).

35. I exclude municipalities that are part of metropolitan areas with more than 100,000 inhabitants, even though on their own they may meet the criteria defining the sample.

36. I thank Gordon Hanson for this insight.

37. Unreported results are available on request.

live births, who die within the first year of life. Remittances have a statistically significant negative impact on this measure in both the OLS and 2SLS specifications. Although the impact decreases in both cases as I include additional controls, my preferred specification (regression 6) suggests that a 1 percent increase in the share of remittance-receiving households reduces infant deaths by 1.2 lives.

The World Bank's *World Development Indicators* reports that infant mortality in Mexico fell by 20 percent from 1990 to 2000. The figures presented earlier in the paper show that the share of households with remittance income increased by 54 percent from 1992 to 2002, or by more than 100 percent for rural households. Thus, the point estimates presented in table 6 might be a bit high and warrant some caution. Nonetheless, the direction of the effect appears robust.

EDUCATIONAL OUTCOMES. On educational outcomes, I focus on illiteracy among children between six and fourteen years of age (table 7), as well as on school attendance at different age ranges: five years old (table 8), six to fourteen years old (table 9), and fifteen to seventeen years old (table 10). The latter variables are always expressed as fractions of the relevant population.

Remittances appear to have a significant effect in reducing illiteracy, irrespective of the estimation technique, although the point estimates are larger in absolute terms under 2SLS than under OLS. In my preferred specification (regression 6, table 7), a 1 percent increase in the fraction of households receiving remittances reduces illiteracy among children by almost three percentage points.

The results on school attendance are more complex and depend on the age group considered. Remittances have a substantial and statistically significant impact on the proportion of five-year-olds attending school. In the 2SLS results, attendance rises by 11 percent in response to a 1 percent increase in remittance reception. However, the impact becomes insignificant among six- to fourteen-year-olds, and it is negative among adolescents between the ages of fifteen and seventeen. For the latter group, school attendance drops by more than 7 percentage points.

The last two results are at odds with findings in the existing literature. Data limitations do not allow further exploration of the reasons behind the low or even negative impact among older children. One possibility is that educational infrastructure in remittance-receiving communities is insufficient for that age group. Another is that the results are an indication of the complex interaction between remittances and migration. In high-migration communities, remittances may create disincentives to invest in schooling and may be

TABLE 6. Migration, Remittances, and Infant Mortality[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	−1.7548 (0.1326)***	−0.7535 (0.0826)***	−0.5794 (0.0675)***	−3.9343 (0.6154)***	−2.6610 (0.7751)***	−1.1701 (0.5734)**
Rural (< 2,500) population (%)	0.0160	0.0097 (0.0028)***	(0.0024)***	0.0179	0.0102 (0.0036)***	(0.0025)***
Indigenous population (%)		0.0402 (0.0037)***	0.0386 (0.0030)***		0.0210 (0.0088)**	0.0325 (0.0065)***
Schooling		−3.2607 (0.1108)***	−2.4870 (0.0999)***		−3.3330 (0.1274)***	−2.5383 (0.1137)***
Female-headed households (%)		−0.0994 (0.0198)***	−0.0693 (0.0161)***		0.0809 (0.0751)	−0.0139 (0.0551)
Agricultural employment (%)		0.0374 (0.0062)***	0.0113 (0.0059)*		0.0785 (0.0085)***	0.0116 (0.0460)
Public sector employment (%)		0.1561 (0.0499)***	0.0964 (0.0390)**		0.0275 (0.0659)	0.0691 (0.0060)*
Unemployment rate		0.1585 (0.0666)**	0.0048 (0.0435)		0.1684 (0.1093)	0.0086 (0.0464)
Homicide rate		0.4803 (0.0599)***	0.3609 (0.0502)***		0.3160 (0.1033)***	0.3109 (0.0734)***
Border state dummy		−0.4810 (0.8667)	0.1279 (0.7701)		−0.4875 (1.0975)	−0.2402 (0.8442)
Income per capita (log)			−1.0210 (0.1992)***			−1.0479 (0.2023)***
Municipal income Gini coefficient			1.1040 (0.7376)			1.3148 (0.7567)*
Population in poverty (%)			0.0468 (0.0116)***			0.0348 (0.0173)**
Population in housing without tap water			0.0854 (0.0041)***			0.0834 (0.0048)***
Water-delivery infrastructure			−0.1974 (0.0329)***			−0.1904 (0.0339)***
Bank branches per 1,000 people			−2.5843 (1.1227)**			−2.6231 (1.1894)**
Historical municipal migration proxy			0.1765 (0.0532)***			0.2105 (0.0640)***
Constant	30.1233 (0.7000)***	47.0424 (1.1482)***	47.4162 (2.2945)***	35.7829 (1.7416)***	49.9624 (1.7112)***	49.1542 (2.8936)***
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.2675	0.7699	0.8518	0.1150	0.6803	0.8436

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Statistically significant at the 1 percent level.

a. The dependent variable is infant mortality (children under one year of age) per 1,000 live births, in natural logs. The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

TABLE 7. Migration, Remittances, and Child Illiteracy[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	−1.9466 (0.1506)***	−0.8836 (0.1237)***	−0.8455 (0.1228)***	−4.4424 (0.7666)***	−3.6951 (1.1562)***	−2.8830 (1.0824)***
Rural (< 2,500) population (%)		−0.0159 (0.0044)***	−0.0072 (0.0045)		−0.0131 (0.0052)**	−0.0048 (0.0050)
Indigenous population (%)		0.0384 (0.0064)***	0.0421 (0.0063)***		0.0098 (0.0129)	0.0212 (0.0123)*
Schooling		−3.4621 (0.2013)***	−3.4658 (0.2058)***		−3.5620 (0.2197)***	−3.6482 (0.2295)***
Female-headed households (%)		−0.1933 (0.0403)***	−0.1642 (0.0407)***		0.0700 (0.1182)	0.0242 (0.1132)
Agricultural employment (%)		−0.0058 (0.0131)	0.0051 (0.0160)		0.0006 (0.0151)	0.0069 (0.0862)
Public sector employment (%)		0.1124 (0.0686)	0.0748 (0.0662)		−0.0192 (0.0943)	−0.0163 (0.0171)
Unemployment rate		0.1112 (0.0965)	0.0400 (0.0730)		0.1269 (0.1595)	0.0519 (0.1089)
Homicide rate		0.5458 (0.0779)***	0.4633 (0.0733)***		0.3008 (0.1483)**	0.2909 (0.1272)**
Border state dummy		−0.6386 (0.8163)	−0.5348 (0.9865)		−4.0045 (1.3978)***	−2.6965 (1.3938)*
Income per capita (log)			−0.1450 (0.3999)			−0.2532 (0.4291)
Municipal income Gini coefficient			−0.5717 (1.3869)			0.1295 (1.4929)
Population in poverty (%)			−0.0537 (0.0240)**			−0.0976 (0.0368)***
Population in housing without tap water			0.0064 (0.0089)			−0.0015 (0.0109)
Water-delivery infrastructure			−0.5232 (0.0954)***			−0.5021 (0.0968)***
Bank branches per 1,000 people			−1.8386 (1.7999)			−1.9912 (2.2019)
Historical municipal migration proxy			0.0198 (0.0717)			0.1422 (0.0996)
Constant	14.2476 (0.5765)***	36.9863 (1.9854)***	41.0948 (4.4513)***	20.7285 (2.0718)***	41.2537 (2.5660)***	47.3653 (5.6671)***
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.3490	0.6310	0.6593	0.2098	0.4950	0.5903

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is Illiteracy among children aged six to fourteen years. The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

TABLE 8. Migration, Remittances, and School Attendance among Five-Year-Old Children[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	1.3981 (0.3068)***	0.3625 (0.3084)	0.3088 (0.3110)	7.2302 (1.8072)***	13.7069 (3.8238)***	10.4821 (3.4780)***
Rural (< 2,500) population (%)		0.0912 (0.0111)***	0.0667 (0.0120)***		0.0782 (0.0175)***	0.0544 (0.0165)***
Indigenous population (%)		0.0406 (0.0145)***	0.0433 (0.0143)***		0.1755 (0.0419)***	0.1469 (0.0387)***
Schooling		6.6994 (0.4290)***	7.3966 (0.4532)***		7.2253 (0.6424)***	8.3638 (0.6886)***
Female-headed households (%)		0.2639 (0.0866)***	0.1629 (0.0849)*		−0.9921 (0.3697)***	−0.7835 (0.3336)**
Agricultural employment (%)		0.0400 (0.0250)	−0.0239 (0.0284)		0.3916 (0.0428)**	0.6047 (0.0374)
Public sector employment (%)		−0.1352 (0.2095)	0.1514 (0.2103)		0.1097 (0.3234)	−0.0266 (0.2945)**
Unemployment rate		−0.4141 (0.4102)	−0.3413 (0.3243)		−0.4723 (0.7360)	−0.3838 (0.5610)
Homicide rate		−1.0988 (0.1797)***	−0.8070 (0.1623)***		0.0544 (0.4657)	0.0419 (0.3817)
Border state dummy		−12.8195 (2.5371)***	−11.3913 (2.9192)***		6.1892 (4.8331)	0.7239 (4.5524)
Income per capita (log)			−2.4692 (0.8844)***			−1.9314 (1.2590)
Municipal income Gini coefficient			10.1243 (3.3125)***			6.6133 (4.7172)
Population in poverty (%)			0.1831 (0.0562)***			0.4010 (0.1120)***
Population in housing without tap water			−0.0836 (0.0184)***			−0.0426 (0.0283)
Water-delivery infrastructure			0.7718 (0.2479)***			0.6677 (0.3337)**
Bank branches per 1,000 people			10.6771 (4.4903)**			11.5473 (6.5610)*
Historical municipal migration proxy			−0.1181 (0.2464)			−0.7386 (0.3996)*
Constant	76.3593 (2.1350)***	27.0602 (4.0662)***	31.1590 (9.8286)***	61.2153 (5.2128)***	6.4365 (8.1323)	−0.4776 (17.3871)
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.1334	0.3265	0.3745	−0.0906	−0.5525	−0.1295

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is school attendance among five-year-old children. The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

TABLE 9. Migration, Remittances, and School Attendance among Six- to Fourteen-Year-Old Children[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	0.4346 (0.1122)***	0.0530 (0.0947)	0.0859 (0.0958)	0.3717 (0.4680)	–0.4994 (0.7748)	–0.8805 (0.8072)
Rural (< 2,500) population (%)		0.0316 (0.0035)***	0.0248 (0.0035)***		0.0322 (0.0036)***	0.0260 (0.0037)***
Indigenous population (%)		0.0172 (0.0045)***	0.0166 (0.0045)***		0.0117 (0.0092)	0.0068 (0.0097)
Schooling		2.8589 (0.1645)***	3.1972 (0.1631)***		2.8481 (0.1642)***	3.1189 (0.1772)***
Female-headed households (%)		0.0995 (0.0318)***	0.0732 (0.0330)**		0.1514 (0.0839)*	0.1630 (0.0874)*
Agricultural employment (%)		0.0328 (0.0114)***	0.0101 (0.0139)		0.0304 (0.0693)**	0.1632 (0.0677)**
Public sector employment (%)		0.1820 (0.0635)***	0.2071 (0.0608)***		0.1583 (0.0116)***	0.0109 (0.0139)
Unemployment rate		–0.1123 (0.0762)	–0.1232 (0.0694)*		–0.1079 (0.0671)	–0.1169 (0.0578)**
Homicide rate		–0.2777 (0.0616)***	–0.2320 (0.0636)***		–0.3260 (0.0910)***	–0.3132 (0.0936)***
Border state dummy		0.0736 (0.8511)	0.5766 (1.0274)		1.1983 (1.2007)	0.3099 (1.3066)
Income per capita (log)			–0.6940 (0.3135)**			–0.7476 (0.3234)**
Municipal income Gini coefficient			1.5061 (1.0762)			1.8471 (1.1181)*
Population in poverty (%)			0.0614 (0.0206)***			0.0409 (0.0283)
Population in housing without tap water			0.0012 (0.0070)			–0.0026 (0.0084)
Water-delivery infrastructure			0.1928 (0.0627)***			0.2023 (0.0641)***
Bank branches per 1,000 people			0.9247 (1.3638)			0.8422 (1.4987)
Historical municipal migration proxy			0.0063 (0.0839)			0.0646 (0.0981)
Constant	90.0503 (0.4494)***	68.1503 (1.7165)***	68.4904 (3.7205)***	90.2137 (1.2617)***	68.9255 (1.9076)***	71.4076 (4.4502)***
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.2338	0.4950	0.5237	0.2328	0.4829	0.4879

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is school attendance among six- to fourteen-year-old children. The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

TABLE 10. Migration, Remittances, and School Attendance among Fifteen- to Seventeen-Year-Old Adolescents[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	−1.0231 (0.2829)***	−1.6011 (0.3029)***	−1.5998 (0.3130)***	−4.7113 (1.5123)***	−8.0367 (2.8023)***	−6.5473 (2.9115)**
Rural (< 2,500) population (%)		0.0432 (0.0114)***	0.0422 (0.0123)***		0.0490 (0.0134)***	0.0475 (0.0136)***
Indigenous population (%)		0.1019 (0.0146)***	0.1051 (0.0151)***		0.0369 (0.0326)	0.0548 (0.0339)
Schooling		7.2508 (0.3744)***	7.3751 (0.4286)***		7.0616 (0.4472)***	6.9797 (0.5448)***
Female-headed households (%)		0.2938 (0.0846)***	0.3091 (0.0878)***		0.8991 (0.2786)***	0.7710 (0.2836)***
Agricultural employment (%)		0.0437 (0.0238)*	0.0483 (0.0291)*		0.0137 (0.2841)**	0.4813 (0.2825)*
Public sector employment (%)		0.8794 (0.2270)***	0.7150 (0.2243)***		0.6120 (0.0301)	0.0531 (0.0301)*
Unemployment rate		−0.1375 (0.1588)	−0.1685 (0.1727)		−0.1089 (0.1896)	−0.1457 (0.1595)
Homicide rate		0.4279 (0.1394)***	0.3377 (0.1413)**		−0.1323 (0.3023)	−0.0836 (0.2916)
Border state dummy		−4.7993 (2.8509)*	−5.2306 (2.7781)*		4.9310 (4.0221)	5.9614 (3.8149)
Income per capita (log)			0.5728 (0.9203)			0.3597 (1.0138)
Municipal income Gini coefficient			0.2515 (3.1621)			1.7954 (3.6252)
Population in poverty (%)			−0.0442 (0.0516)			−0.1467 (0.0874)*
Population in housing without tap water			0.0534 (0.0184)***			0.0371 (0.0232)
Water-delivery infrastructure			0.1865 (0.2996)			0.2455 (0.3015)
Bank branches per 1,000 people			−6.1984 (5.3160)			−6.4142 (6.2741)
Historical municipal migration proxy			0.9178 (0.2666)***			1.2077 (0.3380)***
Constant	39.0680 (1.8806)***	−16.8667 (3.6942)***	−23.3290 (9.5811)**	48.6454 (4.2456)***	−7.3292 (6.1346)	−8.9471 (14.2521)
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.1160	0.3479	0.3656	0.0305	0.1484	0.2514

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is school attendance among fifteen- to seventeen-year-old children. The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

used to cover other expenses, including the cost of other household members' emigration. That would be in line with McKenzie and Rapoport's finding that sixteen- to eighteen-year-old boys in migrant households have lower schooling levels.[38] The authors argue that their results are consistent with those in Chiquiar and Hanson, who show that the returns to schooling in Mexico are larger than in the United States, so potential migrants might have reduced incentives to stay in school in Mexico.[39]

POVERTY AND MARGINALIZATION. To assess whether remittances reduce poverty, I use as dependent variables the fraction of the population whose income is equivalent to the minimum wage or less, which I label extreme poverty, and the fraction whose income is at most two minimum wages, which I label poverty. Nationally, roughly 17 percent of the population lives in extreme poverty, while around 53 percent lives in poverty. While these are not the standard definitions, the poverty rates they produce are close to official statistics. For instance, 24.2 percent of all Mexicans do not earn enough income to cover their food requirements satisfactorily; and 53.7 percent cannot cover their needs regarding health, clothing, transportation, housing, and education, in addition to food.[40]

Table 11 shows that remittances do not seem to dent the incidence of extreme poverty in a statistically significant way. This might reflect the fact that migration is a costly endeavor, and households at very low income levels might not be able to defray the costs. In other words, only households with income above some given level are able to emigrate and remit; this is consistent with the evidence presented in tables 3 and 4.

Table 12 supports this line of reasoning. When I consider the fraction with income equivalent to at most two times the minimum wage, I do find negative effects, although the 2SLS results are not always significant.

In addition, for 2000 I use a marginalization index that Mexico's National Population Council calculates using a principal components method.[41] This index summarizes municipal schooling, housing, demographic, and income characteristics. It thus captures some of the dimensions already considered piecemeal. Table 13 suggests that remittances indeed reduce average municipal marginalization.

38. McKenzie and Rapoport (2005).

39. Chiquiar and Hanson (2005).

40. Figures from Comité Técnico para la Medición de la Pobreza (2002) and Cortés Cáceres and others (2002).

41. CONAPO (2001).

TABLE 11. Migration, Remittances, and Extreme Poverty[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	−3.9735 (0.3170)***	−2.9279 (0.3153)***	−2.8224 (0.3206)***	−4.5919 (1.5951)***	0.3316 (2.3481)	−1.8780 (2.1394)
Rural (< 2,500) population (%)		0.0410 (0.0113)***	0.0216 (0.0113)*		0.0384 (0.0117)***	0.0216 (0.0113)*
Indigenous population (%)		0.1076 (0.0158)***	0.1019 (0.0163)***		0.1407 (0.0269)***	0.1115 (0.0255)***
Schooling		−2.6547 (0.4150)***	−1.7796 (0.4449)***		−2.5212 (0.4342)***	−1.7253 (0.4604)***
Female-headed households (%)		0.2595 (0.0924)***	0.2327 (0.0950)**		−0.0520 (0.2438)	0.1391 (0.2227)
Agricultural employment (%)		0.1829 (0.0308)***	0.1525 (0.0332)***		−0.3170 (0.0335)***	0.1549 (0.2037)
Public sector employment (%)		−0.4337 (0.1935)**	−0.3184 (0.1933)*		0.1978 (0.2112)	−0.2914 (0.0337)***
Unemployment rate		−0.2513 (0.2412)	−0.3688 (0.2254)		−0.2639 (0.2862)	−0.3749 (0.2332)
Homicide rate		−0.6522 (0.1326)***	−0.4858 (0.1400)***		−0.3705 (0.2437)	−0.4075 (0.2171)*
Border state dummy		−0.4995 (1.4958)	0.7185 (1.2794)		8.2608 (3.0932)***	5.4851 (2.7937)**
Income per capita (log)			−4.7499 (0.9853)***			−4.7975 (1.0167)***
Municipal income Gini coefficient			−1.1905 (3.4071)			−1.4493 (3.4925)
Population in housing without tap water			0.0229 (0.0211)			0.0246 (0.0234)
Water-delivery infrastructure			0.5512 (0.2148)**			0.5377 (0.2144)**
Bank branches per 1,000 people			5.6091 (3.4571)			5.4555 (3.4699)
Historical municipal migration proxy			−0.2932 (0.1893)			−0.3459 (0.2224)
Constant	19.7683 (1.0184)***	24.8491 (3.8504)***	62.2691 (8.6707)***	21.3741 (4.1890)***	19.9134 (5.0938)***	61.5520 (8.5577)***
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.4829	0.6365	0.6555	0.4826	0.6073	0.6530

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is the population with income equivalent to less than the minimum wage (in percent). The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

TABLE 12. Migration, Remittances, and Poverty[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	−1.4465 (0.1781)***	−0.6838 (0.1379)***	−0.6855 (0.1351)***	−1.6831 (1.0399)	−2.8836 (1.6116)*	−3.7816 (1.4330)***
Rural (< 2,500) population (%)		0.0393 (0.0060)***	0.0206 (0.0058)***		0.0414 (0.0068)***	0.0231 (0.0068)***
Indigenous population (%)		−0.0058 (0.0059)	−0.0168 (0.0059)***		−0.0281 (0.0175)	−0.0477 (0.0158)***
Schooling		−2.8503 (0.1931)***	−1.6224 (0.1995)***		−2.9368 (0.2222)***	−1.8132 (0.2541)***
Female-headed households (%)		0.1216 (0.0343)***	0.0786 (0.0338)**		0.3290 (0.1574)**	0.3652 (0.1398)***
Agricultural employment (%)		0.2550 (0.0132)***	0.2002 (0.0132)***		−0.4931 (0.1344)***	0.1882 (0.0156)***
Public sector employment (%)		−0.4033 (0.1196)***	−0.3525 (0.1144)***		0.2441 (0.0164)***	−0.4654 (0.1286)***
Unemployment rate		−0.0548 (0.1314)	−0.2962 (0.1220)**		−0.0455 (0.0992)	−0.2622 (0.0745)***
Homicide rate		−0.3045 (0.0899)***	−0.1302 (0.0705)*		−0.4969 (0.1674)***	−0.3841 (0.1462)***
Border state dummy		−6.7020 (2.4731)***	−4.0543 (2.0858)*		3.5914 (2.2948)	1.5949 (1.9346)
Income per capita (log)			−6.1570 (0.4044)***			−5.9146 (0.4541)***
Municipal income Gini coefficient			3.1546 (1.5482)**			4.0247 (1.7599)**
Population in housing without tap water			−0.0209 (0.0083)**			−0.0329 (0.0112)***
Water-delivery infrastructure			0.0373 (0.0887)			0.0649 (0.1165)
Bank branches per 1,000 people			−9.7404 (3.3959)***			−9.2702 (3.6159)**
Historical municipal migration proxy			0.4347 (0.1772)**			0.6053 (0.1975)***
Constant	62.8329 (1.6080)***	70.0733 (2.0976)***	114.5741 (3.8046)***	63.4472 (3.1018)***	73.4663 (3.2928)***	116.6394 (4.2399)***
Summary statistic						
No. observations	1,774	1,763	1,732	1,762	1,751	1,720
R squared	0.5113	0.8005	0.8310	0.5116	0.7740	0.7793

* Statistically significant at the 10 percent level.

** Statistically significant at the 5 percent level.

*** Statistically significant at the 1 percent level.

a. The dependent variable is the population with income equivalent to than less two times the minimum wage (in percent). The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

TABLE 13. Migration, Remittances, and Marginalization[a]

	OLS			*2SLS*		
Explanatory variable	*(1)*	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*
Remittance-receiving households (%)	−0.1923 (0.0144)***	−0.0793 (0.0087)***	−0.0771 (0.0082)***	−0.4482 (0.0751)***	−0.3718 (0.0999)***	−0.3233 (0.0820)***
Rural (< 2,500) population (%)		0.0025 (0.0003)***	0.0023 (0.0003)***		0.0028 (0.0005)***	0.0025 (0.0004)***
Indigenous population (%)		0.0040 (0.0004)***	0.0037 (0.0004)***		0.0011 (0.0011)	0.0013 (0.0009)
Schooling		−0.3982 (0.0115)***	−0.3386 (0.0115)***		−0.4091 (0.0150)***	−0.3514 (0.0149)***
Female-headed households (%)		−0.0090 (0.0021)***	−0.0096 (0.0020)***		0.0187 (0.0096)*	0.0134 (0.0079)*
Agricultural employment (%)		0.0055 (0.0007)***	0.0028 (0.0007)***		0.0040 (0.0082)	0.0052 (0.0072)
Public sector employment (%)		0.0176 (0.0056)***	0.0156 (0.0051)***		0.0056 (0.0011)***	0.0016 (0.0009)*
Unemployment rate		0.0217 (0.0076)***	0.0055 (0.0059)		0.0232 (0.0145)	0.0078 (0.0108)
Homicide rate		0.0543 (0.0060)***	0.0509 (0.0059)***		0.0291 (0.0126)**	0.0295 (0.0111)***
Border state dummy		−0.3819 (0.0942)***	−0.2585 (0.0917)***		−0.4685 (0.1334)***	−0.4334 (0.1094)***
Income per capita (log)			−0.2004 (0.0222)***			−0.1778 (0.0284)***
Municipal income Gini coefficient			0.4769 (0.0855)***			0.5221 (0.1056)***
Water-delivery infrastructure			−0.0510 (0.0053)***			−0.0459 (0.0063)***
Bank branches per 1,000 people			−0.5534 (0.2018)***			−0.5157 (0.2346)**
Historical municipal migration proxy			0.0413 (0.0078)***			0.0533 (0.0103)***
Constant	−0.2290 (0.0839)***	1.7599 (0.1257)***	2.8656 (0.2070)***	0.4355 (0.2126)**	2.2072 (0.2146)***	3.0068 (0.2514)***
Summary statistic						
No. observations	1,774	1,763	1,761	1,762	1,751	1,749
R squared	0.4370	0.8535	0.8759	0.3219	0.7376	0.7940

* Statistically significant at the 10 percent level.
** Statistically significant at the 5 percent level.
*** Statistically significant at the 1 percent level.

a. The dependent variable is the marginalization index. The sample covers rural municipalities. The estimation method in regressions 1, 2, and 3 is ordinary least squares; in regressions 4, 5, and 6, it is two-stage least squares. Remittance-receiving households (percent, in logs) are instrumented with the coefficient of variation of monthly rainfall and distance to Guadalajara (km, in logs). State dummies are included, but not reported. Robust standard errors are in parentheses.

Final Remarks

This paper presents evidence that international migration and the remittances it brings may play an important role in improving living conditions in migrant-sending regions. Evidence from a large cross-section of Mexican municipalities suggests that development outcomes improve as the proportion of households receiving remittances rises. Specifically, infant mortality, child illiteracy, and some school attendance and poverty measures tend to improve as the fraction of remittance-receiving households increases. While I do not have truly exogenous variation in the extent of remittances, the econometric exercises implemented include a substantial number of controls and two instrumental variables. Moreover, my results complement and confirm some of the findings of an incipient literature based on detailed household data that explores how remittance income results in improved welfare indicators.

The findings in this paper and in the related literature lend support to the notion that international migration is an important dimension—and a potentially welfare-enhancing one—of global economic integration. Discussions regarding the virtues and vices of globalization should not focus exclusively on the role of trade and capital flows, but should explicitly incorporate migration. Perhaps more importantly, policymakers in both home and host countries must understand migration in order to harness its potential as a development tool. Proposals to ease restrictions on the international movement of people may not be realistic, since migration is a thorny political issue in both host and home countries. The fact is, however, that it takes place despite legal restrictions and open opposition in some quarters. Understanding its consequences is important.

The key issue is how countries, within their political constraints, can regulate migration flows in a way that promotes development in the home regions as a long-term solution. If remittances, by allowing for better educational opportunities and healthier lives, break the cycle of poverty and social exclusion that forces people to look for opportunities abroad, they may reduce pressures for future migration. In addition, policies that facilitate cross-border income transfers should be a politically palatable channel for exploiting the development potential of migration.

Transfer fees have dropped significantly in recent years, by as much as 50 percent in some cases. This is partially the result of entry and competition in the market for remittances. At the same time, financial institutions increasingly rely on new technologies and provide migrant families with a greater array of financial instruments to carry out international transfers. They include

access to mortgage credit backed by remittance income. In addition, efforts are being made to establish automated clearinghouses that would allow cross-border bank transfers at a fraction of the current costs. Mexico and the United States have recently established such a scheme. Host countries should also consider ways to ease immigrants' access to the financial sector, while at the same time reducing the room for illicit operations. In turn, migrant-sending countries should avoid the temptation to sap the large inflows of remittances and should instead consider ways in which these may promote development. In sum, national policymakers and international organizations will need to devote considerable energy to harness the potential of remittances.[42]

Appendix: Data

Data are collected from a number of sources, most of which use Mexico's 2000 population and housing census as a basis. The 2000 census applied an extended questionnaire to a 10 percent sample of all Mexican households, resulting in more than 2 million observations. The extended questionnaire collected data on schooling, housing conditions, income, migration, and vital statistics, among others. Table A-1 summarizes the variables I use and their sources. Unless otherwise noted, all data are at the municipal level. Table A-2 provides descriptive statistics.

42. López-Córdova and Olmedo (2005) summarize some of the existing recommendations regarding policies to facilitate remittance flows and to take advantage of their development potential.

TABLE A-1. Variable Description and Sources

Variable	*Description*	*Source(s)*
State migration rate, 1955–59	Migration rate, 1955–59, by state	Woodruff and Zenteno (2001)
State migration rate, 1924	Migration rate, 1924, by state	Foerster (1925) and INEGI (2000a)
Remittance-receiving households	Percent of all households reporting remittance income in 1999	CONAPO (2002)
Infant mortality	Number of deaths in the first year of life per 1,000 live births	CONAPO (2001)
Marginalization index	Index summarizing municipal performance on schooling, housing quality, and demographic and income characteristics, using a principal component method	CONAPO (2001)
GDP (income) per capita (log)	Municipal income per capita as estimated by CONAPO	CONAPO (2001)
Child illiteracy	Percent of children aged six to fourteen years who cannot read	Author's calculation, based on data from INEGI's *Sistema Municipal de Bases de Datos* (SIMBAD) (available at www.inegi.gob.mx)
Child school attendance	Percent of children aged five, six to fourteen, or fifteen to seventeen who attend school	Author's calculation, based on data from SIMBAD
Schooling	Average years of school in the population aged fifteen years or older	Author's calculation, based on data from SIMBAD
Extreme poverty	Percent of population with income equivalent to the minimum wage or less	Author's calculation, based on data from SIMBAD
Population in poverty	Percent of population with income equivalent to at most two times the minimum the wage	Author's calculation, based on data from SIMBAD
Female-headed households	Percent of households headed by women	Author's calculation, based on data from SIMBAD
Population in housing without tap water	Percent of all dwellings that lack access to tap water	Author's calculation, based on data from SIMBAD
Agricultural employment	Percent of employment in the agricultural sector	Author's calculation, based on data from SIMBAD
Public sector employment	Percent of public sector employment	Author's calculation, based on data from SIMBAD
Rural population	Percent of the municipality's population living in communities with 2,500 or fewer inhabitants	Author's calculation, based on data from SIMBAD
Indigenous population	Percent of population belonging to an indigenous group	Author's calculation, based on data from SIMBAD
Homicide rate	Number of homicides per year (average for 1998–2000) divided by the population	Author's calculation, based on data from SIMBAD
Bank branches per 1,000 people	Bank branches per 1,000 people	Based on data provided by Soledad Martínez Peria, World Bank

TABLE A-1. Variable Description and Sources (*continued*)

Variable	*Description*	*Source(s)*
Water delivery infrastructure	Number of workers on water treatment and supply facilities at the municipality as a fraction of the population	Based on census data from INEGI (1999)
Municipal income Gini coefficient	Gini coefficient	Author's calculation, based on census data from INEGI (2000b)
Historical municipal migration proxy	Measure of the cost of emigrating from a given municipality in the 1920s, proxied by the distance from the municipality to the railroad network in existence in the 1920s plus the distance from that point to the U.S.-Mexico border	Author's calculation, based on geographical coordinates and historical railroad maps
Monthly rainfall	Coefficient of variation of monthly rainfall for each weather station in Mexico from around 1913 to 1994	Author's calculation, based on data from the National Meteorological Service
Unemployment rate	Fraction of the economically active population that is unemployed	Author's calculation, based on data from SIMBAD

TABLE A-2. Descriptive Statistic

	Total sample					*Rural sample (population < 15,000)*				
Variable	*No. obs.*	*Mean*	*Std. dev.*	*Min.*	*Max.*	*No. obs.*	*Mean*	*Std. dev.*	*Min.*	*Max.*
Remittance-receiving households (%)	2,277	1.232	1.360	−3.912	3.984	1,774	1.270	1.415	−3.912	3.984
Historical municipal migration proxy	2,271	0.123	0.209	−0.436	1.089	1,772	0.120	0.195	−0.375	1.054
Infant mortality	2,277	29.822	6.712	17.200	66.900	1,774	31.525	6.390	19.700	66.900
Child illiteracy	2,277	15.165	7.344	0.000	69.014	1,774	16.127	7.668	0.000	69.014
Child school attendance (5-year-olds)	2,277	71.463	13.611	0.000	100.000	1,774	70.365	14.251	0.000	100.000
Child school attendance (6- to 14-year-olds)	2,277	90.089	4.938	47.894	100.000	1,774	89.587	5.103	47.894	100.000
Child school attendance (15- to 17-year-olds)	2,277	44.491	14.774	4.000	96.774	1,774	42.106	14.357	4.000	96.774
Extreme poverty	2,277	29.383	18.892	1.897	94.456	1,774	32.987	19.064	2.275	94.456
Population in poverty (%)	2,277	71.842	16.499	18.410	98.880	1,774	76.750	13.514	25.650	98.880
Marginalization index	2,277	−0.083	0.963	−2.449	3.390	1,774	0.183	0.861	−1.814	3.390
Rural (< 2,500) population (%)	2,277	60.527	35.708	0.000	100.000	1,774	71.149	31.830	0.000	100.000
Indigenous population (%)	2,277	16.938	29.205	0.000	99.762	1,774	20.223	31.639	0.000	99.762
Schooling	2,277	5.504	1.528	1.000	12.000	1,774	5.041	1.221	1.000	10.000
Female-headed households (%)	2,277	19.543	5.171	2.510	46.094	1,774	19.405	5.468	2.510	46.094
Agricultural employment (%)	2,265	41.766	23.187	0.117	98.283	1,763	48.836	20.181	2.753	98.283
Public sector employment (%)	2,265	3.074	1.974	0.000	21.104	1,763	2.853	1.867	0.000	21.104
Unemployment rate	2,265	0.997	1.204	0.000	37.234	1,763	0.935	1.331	0.000	37.234
Homicide rate	2,277	2.880	8.178	0.000	119.000	1,774	1.020	1.790	0.000	29.750
Border state dummy	2,277	0.120	0.325	0.000	1.000	1,774	0.111	0.314	0.000	1.000
Income per capita (log)	2,277	7.953	0.717	5.004	10.480	1,774	7.762	0.651	5.004	9.935
Municipal income Gini coefficient	2,277	0.573	0.103	0.291	0.964	1,774	0.583	0.109	0.291	0.964
Population in housing without tap water	2,247	18.604	20.175	0.020	100.000	1,745	20.752	21.204	0.020	100.000
Water-delivery infrastructure	2,277	1.011	1.835	0.000	31.564	1,774	1.080	1.923	0.000	28.436
Bank branches per 1,000 people	2,277	0.023	0.056	0.000	1.138	1,774	0.012	0.052	0.000	1.138
Coefficient of variation of monthly rainfall	2,260	1.251	0.258	0.641	2.792	1,762	1.257	0.261	0.641	2.792
Distance to Guadalajara (km, logs)	2,277	6.303	0.720	0.000	7.536	1,774	6.344	0.668	2.859	7.459