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International Migration, Remittances and Development: An Overview

J. Ernesto López-Córdova and Alexandra Olmedo

Both authors had the opportunity to study the development impact of remittances when they worked at the Inter-American Development Bank (IDB). The opinions expressed herein are those of the authors and do not necessarily reflect the views of the World Bank Group, the IDB, nor their respective member countries.

I. Introduction [1]

Until very recently, debates on the globalization of the world economy focused primarily on the flow of goods and capital, while population movements across borders had remained relatively under-studied. In the last couple of years, however, scholars, national governments, and international organizations are coming to realize that international migration is a central aspect of globalization, one with important implications for economic development and welfare, both in receiving and in sending nations. It is safe to say that the growing recognition about the significance of international migration is to a good extent the result of the impressive volume of income transfers from migrants to their families back home -international remittances. In the case of Latin America and the Caribbean, for example, the Inter-American Development Bank (IDB) estimates that remittance flows reached 62.3 billion dollars in 2006, exceeding foreign direct investment and overseas development assistance to the region.

Given the growing prominence of remittances, it is natural to ask whether they improve development prospects in migrant-sending regions and, in particular, raise living standards among remittance-receiving households, or whether they may simply be a "new development mantra" (Kapur [2004]), a fad that may soon subside. Remittances of course are not the silver-bullet that, by themselves, will raise receiving countries' development indicators to those seen in developed countries. Yet, as pointed by Rapoport and Docquier [2003], "the marginal value of a dollar of remittances is likely to be quite large", and as such they may help address some of the factors hindering economic development. Indeed, remittances may ameliorate some of the problems that plague developing countries, such as credit market failures, inequality in income and in opportunities, income volatility, and poverty. At the household level, remittances help to overcome such problems by supplying the resources necessary to acquire a house, open

a business, and pay for education or health expenses, all of which are usually beyond the reach of vast segments of the population in recipient countries.

Since remittances could have important implications for welfare in Latin America and the Caribbean, in 2004 the IDB launched a project aimed at assessing the extent to which migrant transfers translate into positive development outcomes. Eight articles, from among almost 50 proposals, received funding from the IDB to explore the impact of remittances on poverty and inequality, human capital, labor markets, investment and savings, among other topics. The emphasis of the project was to apply rigorous econometric techniques on micro-level data to measure how remittances affect development. The papers, published in this volume, were written by scholars at the forefront of the study of remittances and benefited greatly from comments by an academic advisor.[2] As such, the papers represent, in our opinion, important contributions to our knowledge on the subject.

In assessing the developmental impact of remittances, two initial issues come to mind. First, is the study of remittances in essence any different from that of migration (Rapoport and Docquier [2003])? Or, more precisely, should we strive to understand the impact of remittances separately from that of migration more generally? And, second, how is the study of the impact of remittances different from studying the impact of any other source of additional income? The first issue arises since the two processes are intertwined: remittances cannot happen without migration. Yet, there are important technical challenges that make it difficult to disentangle the effect of remittances from those of migration. In addition to the scarcity of reliable data, "migrant economic opportunities are in general not randomly allocated across households, so that any observed relationship between migration or remittances and household outcomes may simply reflect the influence of unobserved third factors" (Yang [2005]).

In view of these challenges, Mckenzie [2005] argues that attention should be broader and focus on characterizing the overall effects of migration, instead of concentrating only on remittances. While we agree with Mckenzie [2005] that remittances are part of the larger migration phenomenon and that the international and academic communities should strive to understand migration as a whole, we believe that does not preclude efforts to understand remittances by themselves. Indeed, one may want to devote particular attention to remittances, as policies aimed at facilitating international income transfers and at harnessing their developmental potential are likely to be more politically palatable than policies seeking to facilitate (or curtail) migration flows. In host countries, migration policy reform is controversial because immigration has a redistributive impact, usually affecting unskilled workers; because of fiscal considerations; because of the fear that an inflow of migrants may tear the social fabric; and, in recent years, because of the fear of international terrorism.[3] In sending countries, fear of losing the most entrepreneurial or best-educated members of society is always a consideration in the mind of policy makers. Such considerations -whether justified or not- should not deter the international community from bringing the debate on migration to the forefront. In the meantime, we stress that it may be easier for countries to establish mechanisms and adopt policies in order to take full-advantage of remittances flows, even under the current migration environment.

On the second issue, it is tempting to think that the study of remittances is not different in any substantive way from the study of any other source of income, in particular government transfers. There is an extensive literature in the field of public economics that analyzes the impact of government entitlement programs, especially in developed countries. More recently, developing countries that have adopted conditional

cash-transfer programs (e.g., Mexico's *Progresa* or *Oportunidades*, or Brazil's *Bolsa Scola*) have evaluated the effectiveness of such transfer in improving living conditions among recipient households (child nutrition, school attendance, etc.). Why should we expect that the impact of remittances on, say, school attendance would be any different than that from a government transfer? What is new or different from what we already know from the existing literature? On this issue, we first point out that remittances may be countercyclical or less procyclical than other sources of household income, such as wages or government transfers, allowing households to diversify risk and smooth consumption. Indeed, insurance against income shocks may be one of the reasons for migrating and remitting income. In addition, the way remittances are used may differ to the extent that migration affects who makes spending decisions in the household. Mothers, who are less likely to migrate than fathers, may place more weight on spending on education or on saving.[4] Remittance transfers may be also earmarked for specific uses such as education or housing.

This article presents an overview of the main and most recent contributions to the literature on the development impact of remittances. The goal is to put into context the rest of the papers in the present volume. We also review existing policy recommendations aimed at influencing the flow of remittances and harnessing their development potential.

II. The Development Impact of Remittances

In this section we review some of the existing studies that aim at assessing the impact of international migrant remittances on development. We pay particular attention to findings regarding household welfare. We should note that we do not attempt to survey a vast and often old literature, but choose to concentrate instead on more recent studies. In part this is the case because the latter often tend to rely on more comprehensive datasets, representative of larger segments of society, and apply advances in econometric techniques that yield more conclusive evidence on the subject at hand.

One must recognize from the outset that in drawing conclusions about the impact of remittances on household welfare one must deal with a number of challenging issues. First, there are data limitations arising from the inability of official sources to account for transfers using informal channels, affecting remittances statistics based on balance of payments and household surveys. Leaving aside the fact that remittance data are often inaccurate, it is the case that nationally-representative household surveys rarely contain detailed information on migratory patterns or remittance income. For example, they may capture only recent migration behavior without specificity about the identity of the migrant member of the household. Moreover, national household surveys typically consist of a cross-section of households which are rarely followed over time, preventing researchers from analyzing changes in behavior in response to changes in migratory and income transfer patterns. Although there exist surveys that collect extensive information on migration and remitting patterns for a sample of households, they typically focus on high-migration areas and are therefore not nationally representative. In addition, some of these surveys rely on retrospective information provided by respondents to obtain individual migration histories and are therefore subject to inaccuracies. Despite these limitations, studies based on this subject provide a wealth of useful information on the impact of remittances.

A second challenge that researchers must grapple with is disentangling the effect of remittances on a given aspect of household welfare or development, from that of migration more broadly, as suggested earlier. The latter has an impact on development and household

welfare through channels other than remittances, such as the disruption of family life, effects on the labor market, the so-called "brain drain", or the acquisition of knowledge in the host country that is then transferred to the sending region. Indeed, remittances and other aspects of migration could either reinforce each other or work in opposite directions. For example, overseas transfers relax income constraints that in turn allow families to invest in the schooling of children. On the other hand, the disruption of family life from migration of one or both parents or a reduction in the cost of emigrating for youths as networks of migrants are created could reduce the incentives for children to continue their education. Isolating the specific impact of remittances is made difficult not only by the data limitations discussed before, but by the fact that remittance-receiving families are typically the ones in which a family member has emigrated. In the context of an econometric exercise, the latter is bound to result in multicollinearity problems that make it difficult to draw reliable inferences.

A third issue has to do with the difficulty in identifying a causal relationship from remittances to household well-being. In all likelihood, causality runs in both directions. While the cost of emigration are not trivial and therefore prevent the poorest members of society from migrating, the perceived need to improve their families' living conditions is one of the factors that drives migrants to move to another country and to send remittances back home. In addition, there may be unobserved reasons -such as pressing medical needs, for example- why households may opt to send one of its members to work abroad or why an existing migrant may decide to remit some of its income back home. It follows therefore that the decision to emigrate or to remit may be heavily influenced by the living conditions of the household and that migrants and remitters do not constitute a random sample of the larger population. This poses important hurdles to empirical researchers who want to understand how remittances, and migration more broadly, affect household welfare. A strategy to deal with that problem is to find a variable that is correlated with remitting behavior, but not with the outcome of interest -an "instrumental variable", using the terminology of econometricians- in order to identify the causal impact of remittances on the outcome of interest. Unfortunately, finding such instrumental variables proves not to be trivial and much of the recent work on the subject, as in much of current applied econometric work, revolves around the search for the best identification strategy.

Keeping in mind the challenges that researchers on this subject must face, we now turn to summarizing some of the findings regarding the impact of remittances on development and household welfare.

The Use of Remittances

International evidence indicates that remittances cover, first and foremost, current or daily expenditures, followed by education and health care expenses. Surveys in Latin America and the Caribbean show that daily household expenses (food, rent, utilities) absorb between 46% (Brazil) and 84% (El Salvador) of remittances; education expenses take between 2% (Ecuador) and 17% (Dominican Republic); investment in a business use between one percent (Mexico) and 10% (Brazil, Guatemala) of remittance income. Remittances going to saving can reach as high as 11% (Guatemala) and those for acquiring property 7% (Brazil).[5]

Regarding the intended use of remittances, Amuedo-Dorantes and Pozo [2004] report that in Mexico the main (declared) reason migrants send money back home is to cover health expenses (46% of remitters), food and maintenance (30%), construction or repair of the dwelling (8%), and debt payment (6%).[6] Cerrutti and Parrado's study on Paraguayan migrants in Argentina, included in this volume, also shows that remittances are

intended to be spent primarily on household expenditures, education and health care, with the category "household expenditures" being the largest.

The fact that existing evidence consistently shows that only a small fraction of remittances is used for enterprise financing has led some to question the ability of remittances to serve as a catalyst for development. Such views are unfounded, in our opinion, as spending on education, nutrition or health, for example, are important investments that may promote long-term economic growth. As we will see in the next section, there is a growing body of evidence that remittances indeed help promote investment in human capital, as well as having a positive impact on other development areas.

Poverty and Inequality

A first question that naturally arises is whether remittances lead to reductions in poverty among recipient households. Such question goes beyond mere academic interest as it is the subject of debate in policy circles.[7] Despite its importance, few authors have ventured into analyzing the subject. Existing findings suggest, however, that remittances unambiguously reduce poverty but that their impact is small, with its magnitude depending on how poverty is measured. Adams [2004] and Adams and Page [2005] use three different measures of poverty calculated relative to the definition of the national poverty line: the poverty headcount index or incidence of poverty, that is the share of the population whose income or consumption is below the poverty line; the poverty gap index or depth of poverty which provides information regarding how far off households are from the poverty line; and the squared poverty gap which measures the severity of poverty by taking into account not only the distance separating the poor from the poverty line, but also the inequality among the poor.[8] Although the two studies differ in that they use different data sources-with Adams [2004] using national survey data on Guatemala and Adams and Page [2005] macro-data for a panel of 74 low -and middle-income developing countries- they reach similar conclusions, except for the poverty line. Both studies show that international remittances have a statistically significant impact on the poverty headcount index albeit the magnitudes are small. In the country panel study, a 10% increase in the share of international remittances in a country's GDP leads to a decline in the incidence of poverty of 1.6%. In Guatemala, international remittances actually increase the level of poverty by 1.1%. However, in both studies international remittances have a much larger impact on reducing both the depth and severity of poverty. In Guatemala, the severity of poverty (the squared poverty gap) is reduced by 20% when remittances are included in household expenditures. When considering the country panel the authors show that both poverty measures decline by 2%.

Looking at the case of Mexico, Esquivel and Huerta-Pineda use the national household survey on income and expenditures for the year 2002 to investigate the impact of remittances on poverty. The authors use Mexico's official definition of poverty, which is based on whether households can afford three different baskets of goods and services, distinguishing between urban and rural areas. The first basket considers only expenditures in food; the second includes food, health and education expenditures; while the third one adds in expenses in dressing, home and public transportation. Their results show that remittances recipients households are less likely to be poor.

López Córdova [2005] uses a cross-section of Mexican municipalities and studies the correlation between the fraction of households whose income is below two alternative thresholds -less than two or less than one times the minimum wage- and the percent of remittance-receiving households. Those thresholds roughly coincide with

official figures on the incidence of poverty and extreme poverty, respectively. He finds that as more households in a given municipality receive remittances, the incidence of poverty declines, although extreme poverty remains unaffected. The latter results are consistent with the idea that the poorest families cannot afford to defray the cost of emigration and therefore do not benefit from overseas income transfers.

An understanding of the impact of remittances on poverty would be incomplete without knowledge on how the former affect the distribution of income and/or assets in the receiving country. This is particularly true for Latin America and the Caribbean, where income distribution is worse than in any other region of the world. The IDB [1998] estimates that poverty in Latin America would be significantly lower if the distribution of income were similar to that of other regions. Inequality also affects poverty levels to the extent that it hampers growth and, further, to the extent that it reduces the marginal impact of growth on poverty abatement [De Ferranti *et al.* [2003]]. Therefore, remittances may affect poverty to the extent that they change distributional patterns in the receiving country.

What is the relationship between remittances and inequality? Theoretically, this relationship should be viewed as a dynamic process, with an early increase in inequality followed by decreases over time. As Mckenzie and Rapoport [2004] argue, when migration to a new destination starts taking place, the cost of emigrating is usually high, implying that, in the presence of liquidity constraints, only high-income members of the population can afford the move. As the number of migrants in that destination increases, however, the cost of emigration declines giving individuals in lower-income households the opportunity to emigrate. This is because migration costs include not only transportation and border-crossing fees, but information costs about the specific destination to choose, the search for a job, shelter and so on. Such information costs are significant and tend to decrease as the size of a network of migrants augments.[9] As a result, over time remittances should accrue to low-income households, thereby reducing income inequality at the origin.

Theoretical and empirical conclusions are not straightforward, however, as the impact of remittances on inequality may be negative even in the long run as other factors come into play (see Rapoport and Docquier [2003]). Studies that find that remittances may lower inequality of household income distribution in the origin country include Stark, Taylor and Yitzhaki [1986] and Taylor [1992]. They both find support for the process described above in that inequality in Mexico, as measured by different Gini indices, decreases with remittances coupled with the village's migration history and, in the case of Stark *et al*. [1986], with the extent to which 'migration information' spreads across the village. In addition, Taylor [1992] finds that, over time, remittances allow for the accumulation of productive assets that increase the productivity of the farm, so that the long run impact of remittances on lower inequality are increased.

One criticism to the two studies is that they take remittances as exogenous income that simply adds to the household's current income. Adams [1989] and Barham and Boucher [1998] adopt an alternative approach which views remittances as a substitute for the labor income that the household would have earned had the migrant stayed home. Their reasoning is that, in computing what the Gini index would be in the absence of remittances, if one does not consider what the household would have earned had the migrant stayed, then the inequality among households appears to be higher and, consequently, the gap with the Gini index-cum-remittances appears to be wrongly larger. Thus, remittances would seem to have a larger role in reducing inequality. Following this approach, Adams [1989] in the case of Egypt and Barham and Boucher [1998] for Nicaragua find that remittances raise inequality in the home country.

More recently, Unger [2005] using a different and more aggregated approach finds a positive and significant relation between per capita income growth and the percentage of households that receive remittances across communities. The author concludes that there is convergence in per capita income of the Mexican municipalities that can be associated with remittances.

Labor Markets

A second question of interest is how international remittances affect the labor market in the receiving country. Aside from other channels through which migration may influence labor market outcomes, remittances would have an effect of their own through their direct impact on the decision of individuals to join the labor force or by facilitating investment in new enterprises that result in net job creation. There can also be indirect effects. For instance, many studies show that remittances increase consumption of non-tradables, in particular in housing. The consequences for employment creation in the construction sector could be significant. Indirectly, remittances could have an effect on labor markets in the longer run through their impact on schooling decisions, although here the effects are more ambiguous.

There exist a handful of studies that investigate the effects of migration in the recipient country labor market, but only few that consider the specific effect of remittances. Funkhouser [1992] used data from a survey in the capital city of Managua, Nicaragua, and found that remittances contribute significantly to a decrease in the labor force participation of women (5.0 percentage points) as well as men, although to a lesser extent (2.1 percentage points). The author also found that remittances increase, albeit slightly, the probability of self-employment, 1.2 percentage points for men and 1.1 for women. Hanson (this volume) uses the 2000 population census survey in Mexico and presents evidence showing that international remittances are associated with lower female labor supply. Again the results for males are similar but weaker, although the author points to potential estimation problems.

Chami, Fullenkamp and Jahjah [2005] set up a model in which remittances give rise to a moral hazard problem: recipient household members use transfers sent by migrants to reduce work effort. The authors go on to argue and to present evidence that such disincentives to work may translate into reduced growth in a cross-country regression. But a reduction in labor force participation could have positive effects. For example, Duryea, López-Córdova and Olmedo [2005] show that the decline in mothers' labor force participation lowers the incidence of infant mortality. In addition, Yang [2003] shows that remittances reduce labor force participation and increase schooling among Filipino children.

Human Capital

A particularly important question is whether remittances allow households to increase their investment in human capital, either in the form of greater schooling or health care expenditures, particularly on young children. An answer to this question is relevant as it affects not only today's well-being, but also since it allows future generations to break the cycle of poverty and since human capital improves a country's growth prospects.

Remittance transfers may improve education and health outcomes as they relax income constraints that limit optimal human capital investment. The impact is blurred, however, by other effects on household decisions as migration takes place, as discussed before. Analyzing the impact on schooling decisions is particularly complex as population movements

alter the returns to education across countries, as the possibility of emigrating leads people to compare those returns in the sending and host countries, as remittance income may be used instead to defray the cost of emigration, among other reasons. The specific impact of remittances on education is therefore an empirical question and may be in all likelihood country specific, preventing us from extrapolating conclusions from one context to another.

A number of studies indicate that remittances improve educational attainment among children in recipient households. Cox Edwards and Ureta [2003] estimate the probability of dropping out of school in El Salvador and find that remittances, irrespective of the amount, lower the likelihood of leaving school. Interestingly, the authors find that remittances have a much larger impact on reducing the chances of dropping out of school than labor income and that the latter effect is more important in urban than in rural areas. In urban areas, US$ 100 of remittances (the median level in their sample) lowers the hazard of leaving school while enrolled in the 1st through 6th grades by 54% (14% in rural areas). In grades 7th through 12th the hazard is lowered by 27% which is 10 times (2.6 times in rural areas) the effect of other sources of income. Yang [2003] studies the case of the Philippines and finds that for children aged 17-21, a rise in remittances equal to 10% of initial household income leads to a 10.3% increase in enrollment rates. Interestingly, the author uses the exchange-rate turmoil of the Asian crises and differences in the destination of migrants as a source of exogenous variation in remittance income, allowing him to identify the causal impact of remittances on schooling.

Kugler and Lotti also look at the case of Central America. They look at the impact of remittances on human capital in a general equilibrium framework that considers not only remittance-receiving households, but non-recipients as well. In their view, remittances can have two opposing effects. On the one hand, recipients have enhanced schooling opportunities but they may eventually emigrate. On the other hand, non-recipients may see greater schooling incentives, accompanied by increased incentives for consumption and leisure. They conclude that remittances can increase human capital and reduce unemployment when education costs and the brain drain are sufficiently low.

López Córdova [2005] shows that illiteracy rates among children 6-14 years old are lower, other things equal, as the fraction of remittance-receiving households in a given Mexican municipality increases. Moreover, he finds an impact on improving school attendance among children aged five, but no such effect on children 6 to 14, and a disincentive to stay in school among teenagers 15 to 17 years old. The latter is consistent with findings by Hanson and Woodruff [2003] and Mckenzie and Rapoport, both looking at the impact of migration more broadly. Hanson and Woodruff [2003] find that migration improves school attendance among boys and girls aged 13 to 15. The result for girls is particularly important as they are usually at risk of dropping out of school.

Mckenzie and Rapoport consider how migration affects education inequality in Mexico. This is an important issue, as the literature on inequality has gone beyond looking at the distribution of outcomes, such as income, to emphasizing the distribution of assets and opportunities. As De Ferranti *et al.* ([2003] p. 3) argue, the latter are "crucial determinants of outcomes". Education is an important asset directly linked to future income. Education inequality in Mexico is one of the largest among Latin American countries.[10] Mckenzie and Rapoport show that migration reduces educational inequality, especially for girls, by perversely reducing schooling at the top of the education distribution.

Beyond their impact on education outcomes, remittances can play an important role in countries where the public healthcare system is not able to provide universal health

insurance and adequate treatment or preventive care. Latin America is a notable case in this regard, as reflected by the need to rely on out-of-pocket expenditures to finance health care. Latin Americans out-of-pocket expenditures amount to 75% of all private expenditures on health,[11] compared to less than 40% in OECD countries; the figures for the Dominican Republic, El Salvador and Mexico, three large remittance-receiving countries, stand at around 90% or more.[12] It is not surprising, then, that migrant surveys show that an important motivation for transferring income to their families in their countries is to cover health expenditures, as we saw earlier.

Amuedo-Dorantes, Pozo, and Sainz look at the role played by remittances in health expenditures in Mexico, where approximately 50% of the population is uninsured. Their results indicate that healthcare expenditures rise in response to the receipt of remittances, and that such expenditures are more responsive to increases in remittance than non-remittance income.

The studies we are aware of on the impact of remittances on health outcomes look at the case of Mexico and focus on infant health. The earliest study, by Kanaiaupuni and Donato [1999], finds that in Mexican communities experiencing high rates of migration, infant mortality is higher. However, the disruptive effect of migration is ameliorated through remittances' flows. Frank and Hummer [2002] analyze how the migration process affects the risk of low-birth weight -an important indicator of child survival and brain development- and find that membership in a migrant household provides protection from the risk of low birth weight largely through the receipt of remittances. A recent study by Hildebrandt and McKenzie [2005] overcomes some concerns about the robustness and representativeness of the two preceding studies. Hildebrandt and McKenzie [2005] confirm that children in migrant households have a lower mortality rate and higher birth weight, mainly thanks to remittances but also to the spread of information on healthcare that migration involves. Similarly, findings by Duryea *et al*. [2005] suggest that remittances have a positive impact in reducing infant mortality that may work through better housing conditions, by allowing mothers to stay home and care for their children, or by improving access to public services (e.g., potable water). Finally, López Córdova [2005] shows that infant mortality across Mexican municipalities declines as the percent of remittances-receiving households increase.

Investment and Saving

It is often argued that remittances are mainly used for conspicuous consumption and that little is left to undertake productive investments. So far we have seen that remittances help households move out of poverty, lower mortality rates, and increase educational attainments. In addition, empirical studies show that remittances are invested in productive activities when profitable. Not surprisingly, Durand, Kandel, Parrado and Massey [1996b] show that migrants prefer to remit to economically dynamic and entrepreneurial communities than to stagnant areas. Remittances also appear to respond to a community's access to the main transportation network, which is important in order to get products delivered to the market on time. Fortunately, many communities in remittance-receiving countries have the conditions needed to start a business and, in those where opportunities exist, remittances appear to be invested in productive activities. Remittances have the potential to help entrepreneurs overcome credit market failures prevalent in most migrant sending countries. In the latter, where access to credit by low-income households is often difficult to obtain, (short-term) migration is often the solution to accumulate the necessary capital to start a business.

In a study by Massey and Parrado [1998] focusing on 30 communities in the six largest migrant-sending states of Mexico, an average of 21% of businesses were initially financed with U.S. earnings. At the household level, a unit increase in the log of remittances increases the probability of investing in a business by 16%. Using a cross-section of more than 6,000 self-employed workers and small firm owners located in 44 urban areas of Mexico, Woodruff and Zenteno [2004] show that remittances are a significant source of capital for microentreprises. Estimation results display a much larger impact of remittances on microentreprise development than had previously been estimated in community-level surveys. Finally, although investment in productive activities seems to be larger in urban areas, the results suggest that the impacts spread well beyond the rural areas from which migrants have traditionally come. Woodruff (this volume) expands on the previous study by looking at the connection between migration and microenterprises over time, allowing him to derive conclusions about the causal link between the two. He finds that investment and employment is associated with migration among female-owned microenterprises. For males, evidence about a causal impact of migration on investment and employment is stronger. He also finds that entrepreneurs in high-migration regions of Mexico have higher earnings.

Dustmann and Kirchkamp [2001] in a study using data from a survey on returned Turkish immigrants,[13] show that about half of the returning population of immigrants becomes active as an entrepreneur after return, and that the capital for starting a business stems from savings and capital acquired abroad. In this sample, 32% of all returning migrants create jobs through entrepreneurial activity, and 12% of returning migrants employ non-family members as workers. McCormick and Wahba [2001] also found, for the case of Egypt, that total overseas savings (and time spent overseas) have a positive and significant effect on being an entrepreneur. Finally, Adams [1998] looks at the effects of international remittances on rural asset accumulation in Pakistan and show that remittances have a more important statistical effect on the accumulation of rural assets than total labor income has.

Yet another form in which remittances can facilitate saving is through investment in housing. Parrado [2004] analyzes the impact of remittances on home ownership and housing quality in Mexico. The author cites a report by the *Centro de Información Para el Desarrollo* [1991] that confirms, as mentioned above, that the main factor limiting house ownership in Mexico, as in other Latin American and Caribbean countries, is "an almost total lack of access to credit or access only at very high interest rates." The latter obviously prevents low- and middle-income families to obtain any type of credit, especially those households that do not possess any assets that may be used as collateral. Under such circumstances, migration may be in part conceived as a strategy to accumulate the necessary capital to buy a house or to improve existing ones. Using data from the Mexican Migration Project, Parrado [2004] shows that having been in the United States during the previous year increases the likelihood of home acquisition by 1.2 times. Also, every additional year of work experience in the United States rises the likelihood of home ownership by another 2.8%. When looking at the improvement of already owned dwellings, the author finds that migrants' houses back in Mexico are more likely to be in better conditions (as refers to floors) and to have a larger number of rooms regardless of the household size. As suggested above, Duryea *et al.* [2005] find that improved housing conditions may have an important impact on reducing infant mortality. Interestingly, Parrado [2004] finds that migration increases the likelihood of financing the purchase of a home through a bank loan.

III. Policy Recommendations

As the previous section suggests, there is ample evidence that indicates that remittances have a positive and significant impact on development outcomes. In this section we present a compendium of policy recommendations made by different international organizations, think-tanks and scholars working on remittances in order to harness the full development potential of remittances. Recommendations are grouped according to the following objectives: lowering the cost to remit; bringing both senders and receivers into the financial system and increasing the benefits migrants can extract from the financial system; increasing the inflow of remittances and its circulation through official channels; counteracting negative macroeconomic impacts; enhancing local development by increasing and directing remittances inflows to particular projects; improving the collection of remittance data.[14]

Lowering the cost to remit: Even though costs have fallen substantially in recent years, they remain quite high. The remittances market has some features that make it special. Transactions involve inevitably agents located in different countries; costs are generated in both countries; and, costs are influenced by the exchange rate, a component that agents do not control directly and the level of which is not always known to consumers so that sellers can mask part of their fees behind it. Given this scenario, practically all institutions and authors call for a reduction of fees and deliver advice as how to succeed in the task. De Luna Martínez [2005] argues that efforts to tackle costs down have to be undertaken in both sending and receiving countries and that a common approach and coordination between authorities of both these countries is needed to fight the failures that operate against a reduction in the fees. In general, measures proposed in the literature to lower costs refer to overcoming low competition among service providers (De Luna Martínez [2005], G8 [2004], Spatafora [2005], Kapur [2004], IDB [2004b]); poor information disclosure for senders and recipients (De Luna Martínez [2005], IDB [2004b]; poor payments-system infrastructure that discourage migrants from using formal financial institutions to send money home [De Luna Martínez [2005], G8 [2004], Kapur [2004], IDB [2004b]); restrictions for cross-border operations (De Luna Martínez [2005], G8 [2004], IDB [2004b]); regulatory impediments, for example, governments should ensure non-discriminatory access to payment systems for the private sector, consistent with strong supervisory standards (G8 [2004], IDB [2004b]); and, to seek partnerships and alliances [IDB [2004b]).

Increasing the use of and benefits from the banking system: With respect to the banking system, political authorities should act not only at the consumer level but also at the banking system level. At the consumer level (remitters and recipients), governments can promote the use of the banking system by increasing financial literacy (De Luna Martínez [2005], IDB [2004b], Spatafora [2005], Lowell and De la Garza [2000]) which entails both raising awareness of the benefits of being banked -for instance access to credit or mortgages- and informing consumers of their rights involving transfer transactions. However, one of the reasons a large part of the population is unbanked in Latin America, in particular, lies within the banking system itself. In effect, not only is there a lack of infrastructure in rural and remote areas, but also they are often less competitive than other available intermediaries. Here, political authorities could encourage financial institutions to enlarge their presence in rural areas as well as the range of services proposed to consumers (Kapur [2004], G8 [2004], IDB [2004b], Puri and Rizema [1999]). In cases where associations are not spontaneous, governments should encourage cooperation

between remittance service providers and local financial institutions as, for instance, microfinance entities and credit unions (G8 [2004], IDB [2004b]). Orozco offers a detailed look at the case of nine financial institutions in the region in order to understand the scope of services they offer to potential remitters.

Increasing the remittance flows: The IDB [2004a] has called on public authorities to do no harm by avoiding to tax or to overregulate remittance flows.[15] Other actors have made proposals that are highly desirable in their own even if no remittances flows are involved. These are to pursue sound macroeconomic policies, in particular with regard to exchange and interest rates (Spatafora [2005], Puri and Rizema [1999], Addy, Wijkström and Thouez [2003]).

Managing macroeconomic impacts: Spatafora [2005] suggests that countries receiving large flows of remittances should accept a greater degree of flexibility of their exchange rate than would otherwise be necessary in order to avoid undesirable effects on their exporting sectors. Kapur [2004] proposes that remittances inflows could be used to securitize future receivables so as to augment foreign credit ratings.

Enhancing local development: Few international organizations have engaged their efforts to foster the developmental impact of remittances in recipient communities. The IDB's Statement on Remittances (IDB [2004b]) stresses the importance of promoting activities in local development. The G8 [2004] advocated for more coherence and better coordination among these international organizations in order to find synergies and also to prevent unnecessary redundancies of efforts. They also recommend creating market-oriented local development funds and credit unions that would offer remittance-receiving individuals larger options to invest in productive activities. Lowell and De la Garza [2000] advocate for the support of Hometown Associations and, in particular, their involvement in local development. Both Puri and Rizema [1999] and Lowell and De la Garza [2000] propose to pay more attention to return migrants, for instance, through projects that help them to get acquainted with regulations or to select an appropriate area of investment.

Improving data collection: Numerous international organizations, think tanks and scholars have called for an improvement in the collection of data on remittances. Kapur [2004] goes further and specifically suggests that concerned governmental agencies or ministries should become part of the IMF's Special Data Dissemination Standards to both address the severe problems of consistency and timeliness of remittance data. Also, the author urges political authorities to create a spatial mapping of their overseas communities, not just by country but also by specific geographical location. This would allow financial intermediaries to better target these communities.

IV. Concluding Remarks

As we have seen, despite analytical challenges and data limitations, there is an emerging body of evidence indicating that international migrant remittances may have a positive impact on economic development and household welfare. The evidence is not free of controversy and further work is still needed, however. But we believe that the international and scholarly communities should take note of the importance of improving data collection and expanding our knowledge about how international migrant transfers affect the development prospects of receiving countries. More generally, the preceding discussion should support calls for bringing discussions on international migration more vigorously into debates on the globalization of the world economy.

We have also seen that a number of policy initiatives and recommendations have been launched in recent years to address the growing flow of remittances. Remittance institutions, public authorities, and civil society should strive to facilitate and reduce the cost of remittance transfers, mainstreaming remittance flows through the financial sector and leveraging their development impact. The Inter-American Development Bank has been at the forefront of these efforts in the Western Hemisphere. We stress that progress in these areas is perhaps more feasible politically than migration policy reform. Thus we believe that remittances deserve specific consideration, without losing sight of the larger potential of international migration to promote development.

Notes

[1] The present article is based on a lengthier working paper by López-Córdova and Olmedo [2006].

[2] Prof. Gordon Hanson, at the Department of Economics of the University of California, San Diego, was the academic adviser.

[3] Hanson [2005b] offers a recent account of the debate regarding immigration reform in the United States, emphasizing public finance considerations.

[4] Mexico's *Oportunidades* conditional cash-transfer program is structured in such a way that it is the mother, not the father, who receives transfer payments.

[5] See Bendixen and St. Onge (2005), Table 3.2, for a summary.

[6] Amuedo-Dorantes and Pozo [2005] use data from the Mexican Migration Project, which may not be nationally representative.

[7] For example, representatives from the Mexican Ministry of Social Development have argued that remittances have a minimal impact in reducing poverty, based on the observation that poor households receive only a modest fraction of the overall transfer of income to Mexico ("Remesas no disminuyen pobres.- Sedesol", *Reforma*, 20 June 2005)

[8] The second measure captures the mean aggregate income or consumption shortfall relative to the poverty line across the whole population, whereas in the third higher weight is placed on those households further away from the poverty line.

[9] Munshi [2003] presents empirical evidence about the importance of such social networks, showing that Mexican immigrants from high-migration communities enjoy better labor market outcomes (higher wages, lower unemployment spells) that similar migrants from other regions.

[10] Mexico ranks just second behind Ecuador in education inequality among students 13 to 17 years-old [De Ferranti et al [2003], p. 3]. In Mexico, on average someone in the lowest fifth of the population has only 3.5 years of school against 11.6 years for someone belonging to the richest fifth of the population.

[11] According to the World Development Indicators definitions, private health expenditures includes direct household (out-of-pocket) spending, private insurance, charitable donations, and direct service payments by private corporations.

[12] Data and definition from the World Bank's *World Development Indicators*.

[13] Note that at the macro level there is not that much difference between remittances and repatriated savings. In fact the two are generally confounded in international statistics.

[14] For the case of Latin America and the Caribbean, the Inter-American Development Bank (IDB [2004a]) has issued a statement outlining a set of core recommendations to facilitate remittance transfers to the region and to channel those transfers through the financial system.

[15] Kapur [2004], IDB [2004b] and Spatafora [2005] have recommended that remittances-services providers be appropriately regulated and supervised to minimize the potential risk of money laundering and terrorist financing.

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Remittances of Paraguayan Migrants to Argentina: Their Prevalence, Amount and Utilization

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Summary

During the last two decades, Latin American countries have increasingly experienced an internationalization of their labor markets accompanied by a growing flow of remittances, among which, one of the most prominent is that of Paraguay to Argentina. Several social, economic and political forces operating at both sides of the border have influenced upon this migration to Argentina, being one of the key factors the Paraguayan productive structure.

This paper is based on information from two successive researches, the first, carried out between 1999 and 2000 "Paraguayan labor migration to Argentina" funded by the Mellon Foundation through the Population Studies Center, Pennsylvania University; and the other, carried out between 2003 and 2004 "Dynamics and Impact of Paraguayan and Peruvian Migration to Argentina" funded by the Mac Arthur Foundation.

I. Introduction

During the last two decades, Latin American countries have increasingly experienced an internationalization of their labor markets accompanied by a growing flow of remittances. About twenty million people born in Latin America and the Caribbean have emigrated and the United States (US) is, no doubt, the preferred destination for most of them (CELADE [2005]). Currently, 10 m out of the 16.7 million migrants residing in the United States send remittances to their countries of origin for an estimated amount of US$ 30 billion (IDB - MIF [2004]). Although quantitatively less important, intra-Latin American migration has also been significant. In 1990, it was estimated that about three million people migrated within Latin America (Martínez Pizarro and Villa [2005]).

Despite its relevance, little is known about intra-Latin American remittances. This may be attributed to the scarcity of data that has constrained our ability to understand remitting behaviors as well as the impacts of remittances in South-South migration flows (Weiss Fagen and Bump [2005]).[1]

Within Latin America, one of the most prominent flows is Paraguayan migration to Argentina. Currently Paraguayan migrants represent the largest foreign-born group in Argentina (INDEC [2004]). Between 1990 and 2000 the number of Paraguayan migrants residing in Argentina increased by 30%, that is to say, there were 325.054 more by the end of the decade. Paraguayans nowadays account for 21.2% of total migrant population in Argentina and 31.2% of those of Latin American origin. As a result, the equivalent of over 6% of Paraguay's population currently resides in Argentina.

There is some evidence on the relevance of remittances to the Paraguayan economy. Data from the Inter-American Development Bank (IDB) show that, in 2005, Paraguay received 550 million dollars in remittances. This figure represents 32.6% of Paraguayan total exports and 6.6% of Gross Domestic Product (GDP).[2] However, no studies have addressed remittance behaviors, motivation to remit and the impact of remittances made by Paraguayan migrants.

Paraguayan Migration to Argentina

Several social, economic and political forces operating at both sides of the border gave rise to Paraguayan migration to Argentina. Economic opportunities and the demand for agricultural labor force initially attracted Paraguayans to the Northeastern region of Argentina. Later on, political turnover in Paraguay, especially during the Chaco War (1936) and the Civil War (1947) fueled further migration that, in many cases, was politically motivated. During this period the place of destination also became more diverse, with increasing population flows coming to Buenos Aires. This trend was later reinforced during the 1960's, when labor opportunities in the construction, manufacturing and domestic services sectors promoted by the Import Substitution Industrialization (ISI) model of growth (Marshall [1981] pp.491-510), attracted low-skilled internal as well as international migrants to Buenos Aires. Since then, Buenos Aires has become the preferred place of residence of Paraguayan migrants. Currently 73.3% of migrants from Paraguay reside in the Buenos Aires metropolitan area (INDEC [2004]).

One of the key factors explaining the composition and consolidation of the migration flow to Argentina has been the Paraguayan productive structure. Historically, the process of urbanization in Paraguay has been one of the slowest in Latin America. The percentage of urban population grew only from 34.6% in 1950 to 37.4% in 1972 and today reaches only 56.7%. Galeano [1982] -two decades ago- associated the slow expansion of the urbanization process in Paraguay with two main factors: the lack of industrial development and the relatively small size of the services sector. Paraguay's economic structure is dominated by a sizeable, but not very dynamic agricultural sector that combines a highly unequal land distribution (*latifundios*) with a significant proportion of the population working in small scale, subsistence agriculture (*minifundios*). To illustrate the above, in 1991 while 40% of the agricultural productive units were smaller than five hectares, they occupied only 1% of the agricultural land. A dynamic and productive craft industry (*artesanías*) has been the main source of added income for some agricultural communities and small towns. However, its size is not large enough to absorb population growth.

Given that the occupational opportunities in the non-agricultural sector were insufficient to absorb an abundant and increasing labor force, workers territorial mobility, especially international migration to Argentina, emerged as one of the most viable survival alternatives for some regions of Paraguay.

Traditionally, Paraguayan migrants found low-skilled jobs as household servants and in the construction sector in Buenos Aires. However, the size of this flow over time has also been affected by short-term macroeconomic trends. In a previous study Parrado and Cerrutti ([2003] pp. 101-132) showed that macroeconomic variables (relative *per capita* GPD and exchange rates in both countries and Argentina's unemployment rates) were strong predictors of male heads of household migration probabilities in two Paraguayan districts (Carapeguá and San Roque González).[3]

Throughout the 1990's the considerable overvaluation of the Argentine *peso*[4] acted as a powerful attraction for many migrants. The significant increase in the purchasing power of remittances and savings generated in Argentina help to explain why migration from Paraguay continued growing, although the unemployment rate in Argentina reached a record high. The considerable gap between the potential incomes in Argentina and real incomes in Paraguay was a powerful incentive to migrate.

The 2001 economic crisis accompanied by the considerable devaluation of the Argentine *peso* affected both migration flows and remittances. Weiss Fagen and Bump [2005] pointed out that a significant number of migrants residing in Argentina decided to return home. At the same time, an increasing number of Argentines decided to emigrate.

The case of Paraguayan migration to Argentina has specific traits that can affect family migration decisions and, therefore, migration remitting patterns. One salient characteristic is that migration moves between Paraguay and Argentina are easier, cheaper and less risky than in other contexts where borders are significantly more protected. For Paraguayan migrants it is relatively easy to cross the border back and forth. Therefore, migrants' decision to move independently or with their families is less affected by other considerations, such as the fear of suffering abuses while crossing or being deported, prevalent in particular in migration flows from less to more developed countries, as is the case of Mexico-US migration.

Furthermore, in Argentina, undocumented migrants have easy access to public health care and basic education. Although in Argentina undocumented migrants will not obtain fringe benefits on the labour market and will be forced to work in informal activities, this situation is not confined to them. Many Argentine workers share the same situation. Another important difference is that wage differentials between Argentina and Paraguay are not as pronounced as in the case of South-North migration (particularly to the US), and the purchasing power of migrants' earnings is considerably lower in Argentina. This situation may affect not only migrants' probability of remitting and the amount remitted but also their remitting patterns.

With limited primary data, this paper attempts to provide a first portray of these aspects. It has three specific objectives: (1) to characterize migrants who send remittances against those who don't and to provide a few hypothesis on the motivations to remit; (2) to describe transfer mechanisms and their evolution over time; (3) to describe how these resources are spent in the recipient communities. Taking into account that this migration system is characterized by its great dynamism and circularity, we also extend our analysis to the use of migrant savings in promoting development in Paraguay.

Data

In this article we use two sources of data. The first, a survey collected among 261 Paraguayan migrants residing in the Buenos Aires Metropolitan Area, which was conducted between 2003 and 2004. A difficult challenge in conducting surveys among the foreign-

born population in Buenos Aires is the lack of an appropriate sampling frame from which to draw a random sample. To overcome this limitation, we followed targeted random sampling methods applicable when dealing with small and difficult-to-reach populations. In our case, the methodology basically involves identifying areas of immigrant concentration and then obtaining a random sample from these areas.[5] Even though more established migrants residing outside areas of immigrant concentration are likely to be underrepresented in the sample, the methodology provides a more adequate approximation of the population under study that compares favorably to other alternatives (Parrado, McQuiston, and Flippen [2005]).

The questionnaire contains information on a broad range of topics, including remittance behaviors (transfer methods, sending frequency, recipients and intended use of remittances). It also collects information on migratory, family and labor history; as well as on the socio-demographic, socioeconomic and legal situation. Furthermore, it enquires about ways of assimilation into the Argentine society, the reception and social networks, in general, and the migrants' intent to return to their country of origin. It also includes information on migrants' business and properties and how they acquired them.

The second source of data comes from a survey to a random sample of 600 households in four Paraguayan districts (Carapeguá, San Roque González, Paraguarí and Piribebuy). Information was collected in two stages between 1999 and 2000 in Carapeguá and San Roque González, and in 2003 in Paraguarí and Piribebuy. These samples were supplemented with a smaller purposive sample of Paraguayan migrants from the same districts, residing in Argentina (90 cases).

The communities include both urban and rural populations. The urban population corresponds to the area around the center of the town, with higher population density and more commercial activity, as well as better transportation. The rural areas are farther from downtown, and more difficult to access given the poor quality of mainly dirt roads.

The research plan followed ethno-survey methodology[6] and information was collected both at the migrants' place of origin and destination. By carrying out surveys both at the place of origin and destination, this plan addresses many of the selection problems arising from studying only the Paraguayan population in Argentina. The surveys collected information from all household members and included an event history calendar that registered retrospective information on the migration, employment, and family histories of all household heads and their spouses on a yearly basis. Additional components of the survey enumerated the economic resources available to the household, such as housing, land, and business ownership, and also the prevalence of migration within the family. The survey collected information about the first, last, and temporary migration trips for all household members. Information on migration and place of residence was also collected for the immediate family of the household heads and spouses, such as parents, siblings, and other relatives. If the person had migratory experience, he or she was asked about remittance sending and use.[7] Given that Paraguay is a bilingual society, trained assistants fluent in both Guaraní and Spanish conducted the interviews in Paraguay.

II. Patterns, Transfer Mechanisms and Use of Remittances

The process of remitting involves four somewhat sequential dimensions. (1) the act of remitting; (2) the transfer mechanisms that migrants use, either formal or informal; (3) the characteristics of remittance recipients; and, (4) how remittances are used (consumption, investment or savings).

In relation to remitting practices, Amuedo-Dorantes, Bansak and Pozo [2004] have systematized related literature, pointing out five conceptualizations to explain international money transfers by immigrants. The first and most popular stresses migrants' *altruism* towards the family left behind. Based on this model, studies should expect remittance flows to respond to both host and home country economic circumstances. Remittances will increase as a result of an increase in migrants' earnings as well as by income shortfalls in their home-based families. Under this model, remittances are expected to decrease over time, due to a weakening of household ties.

The second is the *consumption smoothing* model, under which migrants remit to alleviate households' unanticipated income shortfalls. In other words, migration develops as a strategy to diversify household earnings. In this model, as in the previous one, remittances are expected to increase with a negative income shock in the home community.

The third model, *target savings*, states that some individuals migrate with the predetermined motive of making a specific investment or purchase. This model predicts that migration will be temporary, and that migrants will tend to remit and carry large sums home.

The fourth model stresses that remitting is considered an *insurance* for migrants who plan to return home. Sending money home is a way to secure a "good standing with the family" should they face difficulties during the migration process. Alternatively, migrants may accumulate precautionary savings back home as a self-insurance. From this perspective, migrants gain the confidence of host societies thus reducing risks of deportation, or income risk exposure) and will reduce money transfers.

Finally, the fifth model emphasizes *loan repayment* as the main motive to remit. Many migrants remit in order to repay loans to cover migration charges (transportation and smuggling charges, etcetera) and, therefore, it is expected that money transfers will diminish over time.

Many of the propositions derived from these conceptual perspectives have been tested in several contexts. As Docquier and Rapoport [2003] pointed out, at the micro level, remittances are now well recognized as part of an informal family arrangement that goes well beyond altruism, with benefits in the realms of mutual insurance, consumption smoothing, and alleviation of liquidity constraints. Different types of migrants may remit for different reasons.

Unfortunately, none of these conceptual perspectives has been empirically evaluated for the specific case of Paraguayan migration to Argentina. The scarce literature has supported the idea that this migratory flow has developed as a strategy to decrease household risks by diversifying income sources. Galeano and Morínigo [1982] analyzed the breakdown process of the peasant economy and stated that territorial mobility (internal and external) as well as the search for remunerated work have been the main alternatives to supplement meager income from agricultural production. However, there are no empirical studies on the patterns and motivations to remit.

In relation to remittance transfer mechanisms, the predominant perspective considers that there are several benefits associated with the use of a formal financial system (mainly, through banks) in contrast with the use of informal means. However, it has been argued that these benefits only materialize under certain conditions, such as a decrease in costs and less regulations, and the implementation of specific programs, among others. If migrants prefer to remit using informal transfer mechanisms, it is because they still find them more advantageous (Lozano [2000] pp. 149-166).

There is evidence for the case of Mexican migration to the United States that the vast majority of Mexican migrants (more than 70%), use money transfer firms to remit. Only a minority uses informal methods such as friends, family and cash mail (13%); or else transfers (10%) (Amuedo Dorantes, Bansak and Pozo [2004]). In the case of Paraguayan migration to Argentina, informal transfer methods were predominant in the past (through friends, next-of-kin or land transportation). However, our evidence is showing that sending patterns are changing; migrants are increasingly using formal transfer mechanisms, mainly money transfer firms.

Money transfer (regular or occasional), however, is only one of the many methods used to transfer resources generated by migration. As was pointed out by Avila *et. al*. [2000], there are other transfer forms such as sending goods, or returning with savings (in the case of circular or returning migrants). These forms seem to be particularly extended in the case of Paraguayan migrants.

The third key topic is the use of remittances in the communities of origin. This involves a discussion about the intended use by the sender and the effective use made by remittance recipients, as well as the effect of remittances on economic growth and income inequality in the communities of origin.

Regarding the use of remittances, existing literature stresses monetary transfers render greater benefits when applied to "productive" activities than when used only for consumption purposes. Remittances can have long-run beneficial effects if they promote productive projects (Amuedo-Dorantes and Pozo [2004a]). However, in their literature review, Martine, Hakket and Guzmán [2000], argued that most evaluations on the productive impact of remittances have shown discouraging results. This is mainly due to the fact that only a few families use remittances for investment and productive purposes. Studies conducted in several sites showed that the bulk of remittances are used for basic consumption; they do not necessarily improve productive capacity and may also generate dependency relations (Díaz, Briquets [1991]; Papademetriou and Martín [1991]).[8] Still, it has been empirically tested for the case of Mexico that when remittances are used to purchase consumption goods, they have a positive impact due to the multiplier effect of these expenditures (Durand, Parrado and Massey [1996] pp. 423-444). Besides this positive multiplier effect of consumption, other studies have also shown the positive impact of remittances when they provide education for children. Hanson and Woodruff [2003] found that in Mexico, children in migrant households complete significantly more years of schooling. In the same line, Cox and Ureta [2003] established that remittances have a large and significant effect on school retention in El Salvador.

It has also been stated that the contributions of remittances to development and to decrease income inequality is tightly linked to the context. The productive utilization of remittances is frequently limited by the economic environment of recipient communities -for example, the macroeconomic stability of the country, or the level of economic development of specific communities (Lozano [2000]; Sana [2003]; Docquier and Rapoport [2003]) pointed out that studies on remittances and inequality are not conclusive, due to the "diversity of the environments studied in terms of initial inequality, as well as in the empirical methodologies implemented" (p.4)-.

Not only do the economic circumstances of the communities of origin seem to be relevant in order to assess the importance of remittances for economic development but also their actual benefits depend on the demographic characteristics of the receiving households. In the case of Mexico, Corona [2000] has shown that the impact of remittances is related to

the life cycle of the receiving families. Younger families are more willing to invest remittances productively than older families, which generally use remittances for subsistence.

Using our primary data, we seek to contribute to the knowledge on remitting patterns, transfer methods and use of remittances of Paraguayan migrants in Argentina. Firstly, with information collected from Paraguayan migrants residing in the Buenos Aires Metropolitan Area, we describe how many migrants remit and how frequently, the characteristics associated with remitting behaviors, transfer methods, the amount of money transferred, who the recipients are, and the expected use of remittances in Paraguay. Secondly, with information collected in four communities in Paraguay, we estimate the relative number of households that receive remittances from Argentina, their characteristics, and how they use these transfers. Furthermore, in the case of returning migrants, we examine their remittances and saving patterns while living in Argentina.

III. Remittance Behavior of Paraguayan Migrants Residing in Buenos Aires

Remitting Patterns

This section describes how many Paraguayan migrants remit and how remitting patterns differ depending on migrants' characteristics. As was pointed out earlier, migrants may remit for a variety of reasons, including altruism, accumulating precautionary savings, accumulating and diversifying assets, and/or for family or self-insurance. Migrants' motives to send money home are not necessarily exclusive, and they may remit for more than one purpose. In this section we describe the characteristics of those migrants who will most likely be active remitters. This exploratory analysis may shed some light on differences and similarities in remitting behaviors of Paraguayan migrants compared to other migratory flows.

Table 1 shows that almost two out of every three adult migrants residing in the Buenos Aires Metropolitan Area have never sent remittances to Paraguay (63.6%). However, a significantly smaller number is currently sending remittances (32.2%). This percentage is somewhat, although not dramatically, lower than the 42% found among foreign-born Latinos in the US (Pew Hispanic Center [2003]).

Another significant feature is how frequently migrants send money home. This information is particularly important for estimating total annual flows. Only four out of every ten active remitters send money on a monthly basis. Among past remitters, this percentage was even lower.

Regarding socio-demographic characteristics, women are a little more likely to send remittances, to be active remitters, and also to send money more regularly. Middle-aged migrants are more likely to send remittances than younger and older migrants. These age differences in remittance behavior are surely due to the fact that household and family responsibilities vary greatly at different stages of life. For example, while almost half of migrants aged 35 to 44 are currently sending money to Paraguay, only 16.1% of those aged 55 and over do so.

Similarly to what has been found in other migration streams (for example Mexican migration to the United States), a significant characteristic to predict migrants' probability of being active remitters is the place of residence of close relatives. Migrants who have either a spouse or children living in Paraguay are much more likely to be active remitters. Whereas 62% and 63% of migrants with only their children or both with children and spouse living in Paraguay are active remitters, only 29% of those who have their spouse and children in Argentina currently send money back home. Migrants in any other family situation have even a

lower probability of being active remitters. Having parents residing in Paraguay is also a strong predictor of active remitters: 42% against 13% of those with no parents living in Paraguay.

Along this same line, the percentage of active remitters among migrants who have property in Paraguay is also larger than those who have property only in Argentina or who have no property at all. Interestingly enough, those who have properties in both countries are most likely to send money home (53% *vs.* 28% of those who have property in Argentina).

As is also to be expected, recent migrants, circular migrants, undocumented migrants and those who have intentions of returning to Paraguay are also more prone to be active remitters. Considering their last trip to Argentina, 46% of those who have spent less than five years in Argentina are active remitters whereas among those who have stayed longer the proportion is much lower (29% of those who have spent more than 10 years). Among those who have made at least three trips, the percentage of active remitters is 44%, while among those who have made only one move, it is only 29%. Undocumented migrants are also a little more likely to be active remitters than documented migrants (38% *vs.* 30%). Finally, those who have intentions of returning to Paraguay are more inclined to send remittances home than those who plan to stay in Argentina (42% *vs.* 26%).

Regarding the relationship between remitting behaviors and job characteristics, wage earners are considerably more likely to be active remitters than those working free lance (either as self-employed, family workers or employers). Interestingly enough, there is a positive relationship between migrants' income and the percentage of active remitters. That is, while 51% of those who earn more than US$ 250 a month currently send money home, only 27% of those who earn less than US$ 150 are active remitters. Our analysis is in this respect limited, since our survey only gathered information on respondents' income and not on the total household income.

Remittance Amounts

Monthly amounts sent by migrants residing in Argentina are relatively small. While conducting field work both in Argentina and in Paraguay in 2003, migrants frequently mentioned that they kept sending the same amount of Argentine *pesos* after the devaluation, thus the purchasing power of remittances in Paraguay was significantly reduced as from 2002.

Table 3 shows the amounts of remittances currently sent -monthly or sporadically- by migrants. Only a small minority (12.5%) sends monthly amounts of less than $ 100 and about a quarter of migrants send $ 100 (about US$ 35). On the other hand, only a small minority (3.1%) sends more than $ 300 (about US$ 100). Most migrants who send money home regularly remit about US$ 33 to US$ 65 a month. It is interesting to note that migrants who remit only sporadically also send small amounts of money.

Remitting Patterns and Amounts Remitted. A Multivariate Analysis

With the purpose of establishing the net effect of each of the characteristics on migrants' probabilities of being active remitters as well as the amount transferred by them, we firstly estimated a binomial logistic regression model and, secondly, an OLS regression model restricted to active remitters.[9]

We first focused on the factors associated with the probability of being active remitters. We estimated models with all migrants and for men and women separately.

Three sets of factors were considered: migration-related data as well as individual, and household characteristics.

As was previously mentioned, studies conducted in other contexts indicate that, in the case of migrants who remit with altruistic motives, remittances are expected to decrease over time, due to a weakening of household ties. Our data do not support this expectation. The length of residence in Argentina does not significantly affect the probability of being an active remitter (Table 4). However, other indicators such as the intention to return to Paraguay as well as the number of trips back and forth to Argentina are positively associated with that probability. Both variables are clear indicators of the temporary nature of the move, even though the vast majority of migrants in our sample have spent many years in Argentina. In other words, they keep strong ties with Paraguay going back and forth, and many wish to return despite the fact that the date of this return is uncertain. These results suggest that altruistic motives may be present among active remitters although, due to the strong effect of return intentions, they also indicate that migrants remit for family insurance purposes (to help out their families).

The observed relationships between being an active remitter and the place of residence of family members continues to be strong after having checked all the other characteristics, and it is significant for female and male migrants. Those with children living in Paraguay are almost six times more likely to be active remitters than those who do not. Along the same line, those who have parents living in Paraguay are also significantly more likely to be active remitters. Their probability to send money home is almost four times greater that in the case of those migrants whose parents are not living in Paraguay.

Migrants' legal status does not appear to be a significant factor in explaining remittance behavior. In part, this result may be so because we are verifying other significant migratory factors, as those previously mentioned. However, it may also be the case that being an undocumented migrant has milder consequences in Argentina than in developed societies. Further research needs to be conducted in order to test to what extent differences in wages, migratory patterns and intentions to return among documented and undocumented migrants are different in developing and developed recipient countries. As was found by Amuedo-Dorantes and Pozo [2006] for Mexican migration to the United States, migrants are risk-adverse, (that is to say that, in the face of greater income risks, they will remit more. If migrants' risks associated with their undocumented status are lower in Argentina, they may feel less compelled to send money home.

Regarding the effect of sex and household-related characteristics, our results indicate that, after controlling the position in the household, women migrants have a similar probability of sending remittances than their male counterparts (Table 4).

Having a spouse residing in the same household in Argentina has a differential effect depending on each one's participation in the labor force. If the spouse does not have a job, the probability to be an active remitter is significantly lower than if she/he has a job or has no spouse in the household. This result indicates, on the one hand, that the household income may be higher in those households where the spouse has a job, increasing the probability of sending money home; on the other hand, it may be also indicative of migrants' motivation to stay in Argentina. It may well be the case that those migrants with a spouse who is not working are those with weaker ties with Paraguay and greater intentions to stay in Argentina.

Migrants' labor force participation and their position at work are also associated with their remitting behavior. Those who have a relatively stable source of income, that is, wage earners, are significantly more likely to be active remitters than those who are self-employed and those who are jobless or have unstable jobs. This may be attributed to both their higher income as well as to a more predictable source of income.

Finally, and again supporting the idea that those migrants who are economically better off are more likely to remit, we found that having properties both in Paraguay and Argentina increases the probability of being an active remitter. Migrants who have a better economic position, but also maintain ties with Paraguay are the ones more prone to remitting.

Factors associated with remitting behavior of men and women are very similar. The direction of the coefficients are the same although their levels and significance differ. As mentioned previously, being a head of household, intending to return, and being a circular migrant (evidenced in the number of trips to Argentina), having parents in Paraguay and having properties in Paraguay and Argentina, have stronger effects on women's probability to remit.

Turning the focus of the analysis to active remitters, we shall now examine factors associated with the amount usually sent to Paraguay. As mentioned above, unfortunately we do not have information on total household income that could be a strong predictor of the amount sent to Paraguay.

Table 5 shows the results of Ordinary Least Squares (OLS) regression models for active remitters and for men and women separately. As in other contexts, while the likelihood of remittances is very responsive to household and socio-demographic characteristics, the amount remitted is not (Massey and Parrado [1994] pp. 3-30). In our case, this is compounded by small sample sizes.

Interestingly enough, factors associated with the amount sent are different from those that predict the probability to remit, and differ for men and women. Women's age and years of schooling are positively associated with the amount sent. For men, however, human capital variables appear to be less important to predict the amount of remittances.

Although independent workers are less likely to remit, if they do so, the amount sent is higher than wage-earners. This characteristic seems to be relevant only for the case of women who are active remitters, and not among males.

Even though not exogenous to the remittance decision, migrants who plan to return to Paraguay send larger sums than those who do not plan to return. This is true for both men and women (although for men the coefficient is only marginally higher).

Transfer Methods

Historically Paraguayan migrants in Argentina have sent remittances using informal transfer methods, such as asking for help from relatives or friends. This behavior indicates that migrants trusted those intermediaries and were used to reciprocating these favors. However, this situation has changed over time with the proliferation of formal transfer alternatives. One interesting case is the role of bus companies. In the past, transferring money through bus companies was pretty common, although it was done in an informal manner, sometimes by requesting bus drivers to act as intermediaries. Currently, bus companies are offering a service similar to money transfer agencies. They charge a fee (usually between US$ 5 and US$ 7 per US$ 100 sent), and they also profit from differences in the exchange rate.[10]

Table 6 indicates this change, since among past remitters the preferred method was transferring money through relatives or friends (48.8%) whereas among active remitters, the most common methods used are bus companies and money transfer agencies. Only a small minority has sent money through banks (4.9% of past remitters).

Remittance Recipients

The main recipients of remittances in Paraguay are migrants' parents or siblings. Seven out of every ten migrants send or have sent remittances to them (69.6%), and two out of every ten to their spouses and children (19.9%) (Table 7). The same pattern is found for both active and past remitters, although there are interesting gender differences: men are more likely than women to send remittances to their wives and children (40% *vs.* 21.7%, respectively). This difference between men and women migrants may be attributed to the fact that married men are more likely to be circular migrants and to leave their family in Paraguay, whereas women are either more prone to leave their children with their parents or to establish their residence in Argentina.

Intended Use of Remittances in Paraguay

In our survey we also inquired about the intended use of remittances in Paraguay. We found that the vast majority of migrants (eight out of ten) remit with the sole purpose of covering household expenditures -food, clothing, etc.- (Table 8). Besides this use, 28.9% declared that they also send remittances to pay for health care and 15.7% to cover their children's educational expenses.

Only a small portion of migrants send money with the purpose of investing in productive activities. Among them, similar percentages responded that the money is (or was) used in agricultural activities (tools, animals, etc); or for building a home or purchasing a vehicle. It is important to mention that when other instances are considered, particularly savings in the case of returning migrants, transfers are mostly used for investment in land, construction or starting a business. Our data therefore support the idea that Paraguayan migrants remit both for altruistice purposes and to help out their families.

Properties and Remittances

Half of the Paraguayan migrants residing in Buenos Aires are homeowners in Argentina. It is not uncommon that migrants are (or were in the past) owners of other properties (28.4% of respondents). Generally, these properties are located in Paraguay, and half of them were bought using savings or remittances from Argentina. In other words, one out of ten surveyed migrants paid their properties in Paraguay using money earned in Argentina.

We also found that 12% of all surveyed migrants are owners of shops or small businesses. Interestingly enough the vast majority of these businesses are located in Argentina and not in Paraguay. Only eight percent of) respondents have their own businesses (small grocery shops or small textile or shoe factories) in Paraguay. This preference for locating businesses in Argentina instead of Paraguay is surely related to their decision to reside permanently there (in Argentina), however, it might be also indicative that business prospects in their communities of origin are not too good. Finally, 14% of migrants residing in Argentina are owners of a piece of land in Paraguay and in most cases (77%) it was bought with money generated in Argentina.

IV. Remittances in Paraguayan Communities

So far we have described remittance patterns and use of remittances based on data from Paraguayan migrants in Buenos Aires. In this section we will focus our attention on Paraguay. Based on household survey data collected in four Paraguayan districts (Carapeguá, San Roque González, Paraguarí and Piribebuy), firstly we present the relative numbers of households that declare to be receiving remittances from Argentina, the senders and how the money is used. Secondly, and focusing on those households in which their heads have migratory experience, we describe their remittance and savings patterns as well as the intended use of these transfers.

The percentage of households that were receiving remittances from Argentina in the four communities where we conducted our study is 11%. In accordance with the data collected in Buenos Aires that indicated that remittance recipients were mainly parents and siblings, the data collected in Paraguay show that 76% of households received remittances from their children and 14% from siblings (Table 9).

Regarding the use that receiving households made of remittances, our partial information (only for the districts of Piribebuy and Paraguarí) indicates that the vast majority uses these transfers for household maintenance. None declared that they used remittances in productive activities.

We also found that a large amount of heads of household are homeowners (89%) and, among them, about 10% used either migrants' remittances or savings to pay for these properties.

In these four districts, about three out of every ten households had at least one head -male or female-[11] with migratory experience to Argentina. Focusing now on these migrants' households, we found that four out of ten (either males or females) sent remittances home when they were residing in Argentina.[12] The main remittance recipients were parents (44%) and children (38%). The fact that a larger number of migrants -compared to those residing in Argentina- has indicated they sent remittances to their children, is related to their condition of heads of household.

Returning migrants, once more, declared that they sent remittances to pay for household maintenance (73%), and children's education (7.5%). Only 11% sent remittances to buy or fix property (7.5%), and buy land or start a business (3.8%).

One of the most interesting findings is that a significant number of migrants returned with savings. Two out of every three migrants went back to Paraguay with money made in Argentina. Paraguayan returning migrants use their savings differently from remittances. Even though a large percentage still utilizes savings to pay for household maintenance (40%), another considerable group uses them to buy or repair a house (36%). The fact that a large group of migrants use their savings in housing fits nicely with the finding that about 10% of households in the four communities were totally or partially paid for with funds generated in Argentina. We also found that 18% of returned migrants applied their savings to a business or to buy land.

V. Conclusion

This article focuses on remittance patterns, transfer methods and utilization of remittances for one of the most significant intra-Latin American migration flows: Paraguayan migration to Argentina. This migration stream started to gain importance around 1950 and

since then grew systematically. Today, the equivalent of about 6% of the total Paraguayan population resides in Argentina.

The importance of migrant remittances to the Paraguayan economy cannot be underestimated. However, and in contrast with the numerous studies about remittances in South-North migration flows, little is known on key aspects of migrants' remitting behaviors and the use of remittances. Based on primary data, this paper seeks to contribute not only to the knowledge of this particular flow but also to the discussion of the potential differences in remittance patterns in the case of South-South migration.

We found that among migrants residing in Buenos Aires, the percentage of active remitters is relatively low (about one third), although many of them have remitted in the past. Furthermore, among active remitters, it is more common for them to transfer sporadically rather than on a monthly basis.

Data from Paraguayan households show that it was very common for heads with migratory experience to return home with savings (six out of ten). This behavior implies an underestimation of total remittances when calculations are based only on migrants' money transfers to receiving areas.

The analysis of factors associated with the probability of being an active remitter indicates that in contrast with what has been observed in other contexts, migrants' length of residence in Argentina has no effect on migrants' remitting behavior. However, their intention to return and the number of trips to Argentina is positively associated with the probability to remit. As can be expected, having children or parents living in Paraguay -that is, having strong family ties with the community of origin- increases that probability as well.

Interestingly enough, undocumented migrants are just as likely to send remittances as documented migrants, suggesting that the risk associated to their legal status is lower in Argentina than in developed nations. Having a steady source of income is also a good predictor that a person will be an active remitter, as well as having a spouse who also has a job.

Remittance amounts are generally low, even for those who remit sporadically. As was found in other contexts, while the likelihood of being an active remitter is very responsive to household and socio-demographic characteristics, the amount remitted is not. Furthermore, in our case, this is compounded by small sample sizes. Women's characteristics are stronger for predicting remittance amounts than in the case of their male counterparts.

Regarding transfer methods, formal alternatives have increasingly become the preferred method to send money home. Whereas among past remitters it was more common to have friends or relatives take the money, today most migrants choose to use money transfer agencies as well as bus companies.

Parents and siblings and, to a lesser extent children and spouses, are the main remittance recipients. Information from migrants residing in Buenos Aires, as well as from returned migrants and households currently receiving remittances in Paraguay, clearly indicated that remittances are mainly used to cover household expenditures. Secondarily, they are used to cover health care and children's education. This finding is important since only a small portion of remittances is used for productive purposes. Furthermore, the few migrants who have invested in setting up a business have done so in Argentina and not in Paraguay. However, when focusing attention on the utilization of migrants' savings brought back to Paraguay, the picture is somehow different. Many migrants use these types of transfers to build or buy a house, and also to buy land or establish businesses.

Notes

[1] In a recent article on remittances between neighboring countries in Latin America, it is argued that these migratory systems differ from the South-North flows (mainly to the United States) particularly in the social origin of their migrants. Although these migrants are not from the poorest segments of their societies, they are poorer than those arriving in developed countries. They are more willing to work in the lower segments of the labor market, receiving meager salaries, under disadvantageous labor conditions and are poorly informed about financial transactions.

[2] Estimates from the Remittance Program, Latin America and Caribbean Center, International University of Florida, based on data from IDB and the Paraguayan Central Bank. Available at *http://programaderemesas.org/paises/sp/index_par_sp.html?l=sp&c=16*

[3] Another key factor promoting Paraguayan migration to Argentina is the role of social networks. As has been shown for Mexican migration to the United States, once the flow has been established and has gained density, social networks encourage further migration. Social networks significantly reduce the emotional and economic costs of migration by circulating information, making contacts, providing help, etc. (Massey *et al*. [1987]; Espinosa and Massey [1997] pp. 141-162).

[4] In 1991 a rigid scheme based on a "currency board" system was adopted in order to control inflation. Government was compelled by law to keep a pegged exchange rate (one Argentine *peso* equal to one US dollar) and to exchange dollars by *pesos* (and *vice-versa*) at any time and at the above rate. This exchange rate combined with a low -but still positive inflation rate- led to a significant overvaluation of the Argentine *peso*.

[5] In order to determine these areas we used data from the last Argentine National Population Census [2001] as well as from a Household Survey database collected by the Buenos Aires City Government (*Encuesta Anual de Hogares* [2002]). Within the selected areas, migrants were randomly chosen using a "snow ball" procedure. Even though we thought that many undocumented migrants would not accept to respond, the rejection rate was very low.

[6] This methodology was extensively applied to study Mexican migration to the US (Massey *et al*. [1987])

[7] This database includes information on heads of household and spouses' migratory, labor, and family history; the internal and international migratory experience of their children (including those who do not reside at home) and siblings.

[8] For the Bolivian case, see Dandler and Medeiros [1988]; for the Dominican Republic, see Ferrán and Pessar [1991].

[9] We tested for the effect of selection among remitters in biasing parameter estimates in the equation predicting the amount remitted using Heckman's two-stage procedure. Results show no significant selectivity effect and are available upon request.

[10] Recipients in Paraguay receive *Guaraníes* instead of dollars or *pesos* converted at a higher rate.

[11] Male and female heads of household were self-defined categories. In the case of families with both parents in the house, usually it was the male who defined himself as male head, and his spouse as female head.

[12] Some of them were residing in Argentina at the time of the survey.

Table 1

MIGRANTS SURVEYED IN BUENOS AIRES CLASSIFIED BY THEIR REMITTANCE BEHAVIOR AND SEX

Remittance Sending	Males	Females	Total
Never Sent Remittances	43.1	30.4	36.4
Not Currently, but have Sent in the Past	26.8	35.5	31.4
Sending at present	31.1	34.1	32.2
Total	*100.0*	*100.0*	*100.0*
	(123.0)	*(138.0)*	*(261.0)*

Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 2

MIGRANTS SURVEYED IN BUENOS AIRES CLASSIFIED BY THEIR REMITTANCE BEHAVIOR, FREQUENCY OF SENDING AND SEX

Sending Frequency	Males	Females	Total
Currently Sending			
Monthly	35.1	42.6	39.3
Sporadically	64.9	57.4	60.7
Total	*100.0*	*100.0*	*100.0*
Sent in the Past			
Monthly	24.2	34.7	30.5
Sporadically	75.8	65.3	69.5
Total	*100.0*	*100.0*	*100.0*

Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 3

MIGRANTS SURVEYED IN BUENOS AIRES WHO CURRENTLY SEND REMITTANCES
By amount sent monthly or sporadically

Remittances	Monthly		Sporadically	
Amounts (Argentine *pesos*)	% Distrib.	Cumulative	% Distrib.	Cumulative
Less than 100	12.5		18.0	
100	25.0	37.5	28.0	46.0
101 to 150	25.0	62.5	20.0	66.0
151 to 200	25.0	87.5	16.0	82.0
201 to 300	9.4	96.9	14.0	96.0
More than 300	3.1	100.0	4.0	100.0
Total	*100.0*		*100.0*	

Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 4

Estimates from Logistic Regression Models Predicting the Probability of Being an Active Remitter

	All Migrants			Female Migrants			Male Migrants		
	Beta	Std. Err.		Beta	Std. Err.		Beta	Std. Err.	
Constant	-5.5837	2.3878	**	-4.5195	3.5669		-7.3968	3.7992	***
Demographic Background									
Age	0.1796	0.1221		0.1127	0.1810		0.2596	0.1900	
Age Squared	-0.0023	0.0014		-0.0020	0.0022		-0.0028	0.0022	
Female	0.2339	0.3644							
Human Capital									
Years of Schooling	-0.1594	0.1584		-0.2903	0.2519		-0.0128	0.2375	
Labor Force Participation									
(Wage earner)									
Independent Worker/ Self-employed	-0.7210	0.4268	***	-1.4218	0.7148	**	-0.4113	0.6049	
Unemployed or Economically Inactive	-1.5943	0.4867	*	-2.2177	0.6562	*	-0.8412	0.9205	
Family Worker or Unstable Jobs	-2.0865	0.6832	*	-2.5683	1.2509	**	-1.8659	0.8898	**
Household Characteristics									
(Spouse in Argentina, employed)									
Spouse in Argentina, Jobless	-2.1062	0.8025	*	-1.7427	1.3214		-1.9172	1.0039	**
No spouse in Argentina	-0.2919	0.3965		-0.4479	0.5562		-0.0241	0.6460	
Children in Paraguay	1.9238	0.4551	*	2.1409	0.8101	*	2.0153	0.6245	*
Parents in Paraguay	1.5939	0.4753	*	2.4034	0.7689	*	1.0586	0.6699	
Migratory Characteristics									
Years of Residence in Argentina	0.0419	0.0762		0.0537	0.1245		0.0283	0.1083	
Years Squared	-0.0009	0.0017		-0.0005	0.0026		-0.0014	0.0025	
Intends to Return to Paraguay	0.5910	0.3551	***	0.8865	0.5445		0.4005	0.5330	
Documented	-0.2442	0.5202		-0.1761	0.8557		-0.1876	0.7211	
Number of Trips	0.5165	0.2875	***	0.9186	0.4495	**	0.3237	0.4405	
(No properties)									
Homeowner in Paraguay	-0.3077	0.6081		0.2587	0.8449		-1.3795	0.9990	
Homeowner in Argentina	0.3685	0.4471		0.4483	0.6623		0.3502	0.6709	
Homeowner in Both Countries	1.2595	0.5817	**	1.8490	0.8809	**	0.6338	0.9055	
Chi Square		96.56			63.35			41.88	
Degrees of Freedom		19.00			18.00			18.00	
N		261.00			138.00			123.00	

Notes: * p < 0.01; ** p< 0.05; *** p< 0.10
Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 5

Estimates from OLS Regression Models Predicting Remittance Amounts

	All Migrants			Female Migrants			Male Migrants	
	Beta	Std. Err.		Beta	Std. Err.		Beta	Std. Err.
Constant	3.2328	1.1599	*	5.5699	1.7351	*	0.9997	2.1895
Demographic Background								
Age	0.0394	0.0587		-0.1437	0.0882		0.1740	0.1080
Age Squared	-0.0004	0.0007		0.0019	0.0011	***	-0.0019	0.0013
Female	-0.1555	0.1450						
Human Capital								
Years of Schooling	0.1164	0.0735		0.2171	0.1192	***	0.0723	0.1261
Labor Force Participation								
(Wageworker)								
Independent Worker/ Self-employed	0.3382	0.1751	***	0.6133	0.2810	**	0.1756	0.3031
Unemployed or Economically Inactive	-0.0021	0.2360		0.3270	0.3497		-0.2862	0.6077
Family Worker or Unstable Jobs	-0.5361	0.3202	***	-0.0930	0.5212		-0.6397	0.5313
Household Characteristics								
(Spouse in Argentina, employed)								
Spouse in Argentina, Jobless	-0.3182	0.3800		0.3302	0.6985		-0.5987	0.4980
No spouse in Argentina	0.1161	0.1655		0.2590	0.2266		0.0990	0.3225
Children in Paraguay	0.0442	0.1786		0.3699	0.3257		-0.0268	0.2642
Parents in Paraguay	0.0380	0.2572		0.1959	0.4156		0.0671	0.3895
Migratory Characteristics								
Years of Residence in Argentina	-0.0164	0.0391		-0.0026	0.0662		-0.0261	0.0615
Years Squared	0.0001	0.0009		-0.0004	0.0014		0.0004	0.0015
Intends to Return to Paraguay	0.3527	0.1495	**	0.4083	0.2122	***	0.4220	0.3216
Documented	0.1673	0.2239		0.5803	0.3515		-02161	0.4734
Number of Trips	0.1562	0.1275		0.0357	0.1922		0.2248	0.2551
(No properties)								
Homeowner in Paraguay	0.0470	0.2569		-	0.3633		0.1088	0.5225
Homeowner in Argentina	0.2455	0.2087		0.5482	0.3848		0.2407	0.3329
Homeowner in Both Countries	-0.2078	0.2245		0.1202	0.3556		-0.4499	0.4321
Adjusted R Square		0.1307			0.0621			0.0031
N		85.0000			48.0000			37.0000

Note: * p < 0.01; ** p< 0.05; *** p< 0.10
Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 6

MIGRANTS SURVEYED IN BUENOS AIRES WHO SEND/SENT REMITTANCES BY TRANSFER METHOD

Sending Method	Sent in the Past	Currently Send	Total
Money Transfer agencies	11.0	28.6	19.9
Bus Companies	26.8	50.0	38.6
Banks	4.9	0.0	2.4
Relatives, friends, etc.	48.8	21.4	34.9
Others	8.5	0.0	4.2
Total	*100.0*	*100.0*	*100.0*

Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 7

MIGRANTS SURVEYED IN BUENOS AIRES CLASSIFIED BY THEIR REMITTANCE BEHAVIOR AND REMITTANCE RECIPIENTS

Remittance Recipients	Sent in the Past	Currently Send	Total
Spouse and/or Child	10.1	29.6	19.9
Parents and/or Silbings	75.9	64.2	69.6
To other Next-of-Kin	13.9	6.2	10.6
Total	*100.0*	*100.0*	*100.0*

Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 8

MIGRANTS SURVEYED IN BUENOS AIRES WHO SEND/SENT REMITTANCES, BY INTENDED USE

Intended use of Remittances	Yes	No	Total
Household Expenditures	77.8	22.2	100
Education	15.7	84.3	100
Health care	28.9	71.1	100
Home Construction	1.2	98.8	100
Productive Tools	1.2	98.8	100
Vehicles	1.2	98.8	100

Source: CENEP, Survey of Paraguayan Migrants in Buenos Aires [2004].

Table 9

SELECTED VARIABLES FROM A HOUSEHOLD SURVEY CONDUCTED IN CARAPEGUÁ, SAN ROQUE GONZÁLEZ, PIRIBEBUY AND PARAGUARÍ (PARAGUAY)

Paraguayan Surveys (four districts)	%
Households Receiving Remittances	11.0
Heads Who Are Homeowners	88.8
Who Paid House With Argentine Money	9.0
Households With Head or Spouse With Migratory Experience	27.7
Migrant Heads or Spouses Who Sent Remittances While in Argentina	38.3
Migrant Heads or Spouses Who Returned With Savings	63.6
Returned Migrants who used Savings for Housing	35.5
Returned Migrants who used Savings in Businesses or Land	17.7

Source: CENEP, Binational Survey of Paraguayan Migrations to Argentina.

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Remittances and Poverty in Mexico: A Propensity Score Matching Approach

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Summary

In this paper we investigate the effect of remittances on poverty conditions among Mexican households. We use three alternative (officially-defined) measures of poverty (food-based, capabilities-based and assets-based) in order to evaluate the impact of remittances on poverty in Mexico. We use a propensity score approach to match remittance-receiving households with households that have similar characteristics but that do not receive remittances. We find that receiving remittances reduces a household's probability of being in food-based and in capabilities-based poverty in 7.7 and 6.3 percentage points, respectively. These effects represent a reduction of around 36% and 23% in the corresponding poverty rates for a typical remittance-receiving household vis-à-vis a comparable non remittance-receiving household. In general, however, receiving remittances does not seem to affect the probability of being in assets-based poverty. In the case of rural households the effects of receiving remittances on poverty are similar (a reduction of 31% and 26%, respectively). The main difference, however, is that for rural households receiving remittances reduces the probability of being in assets-based poverty in 10 percentage points (that is, a reduction of about 15% in the corresponding poverty rate).

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I. Introduction

Remittances to developing countries have been growing at a relatively fast pace in recent years. Indeed, in many countries they are now the most important source of external

financing. Moreover, remittances from abroad seem to be more stable than other types of external inflows and they even seem to be countercyclical from a macroeconomic standpoint.[1]

Notwithstanding the growing importance of remittances for the developing world, their effects on the recipient economies are relatively unknown. Indeed, there are relatively few studies that investigate the effects of remittances on these economies.[2]

One of the areas that has received less attention in the research agenda is the relationship that may exist between remittances and poverty. Somehow it is unclear why this is so. It seems that this is partially the result of strong priors on this matter. For some authors, the existence of a negative relationship between these two variables is somehow obvious and may not deserve further discussion. For other authors, the relationship between remittances and poverty is affected by the characteristics of the migration process. That is, since there is plenty of evidence showing that migration is costly, migrants (and therefore potential senders of remittances) may not belong to the poorest people in the sending economies and, for that reason, remittances might not have an immediate and direct effect on poverty. This position is well represented by Kapur [2004]: "The fact that migrants are not drawn from the poorest households in their country of origin means that while remittances are poor-friendly, their direct effects on the poorest groups may be limited. Instead, the effects on structural poverty are likely to occur through substantial indirect effects...". Similarly, Adams and Page [2003] conclude that "because of the considerable travel costs associated with international migration, international migrants come from those income groups which are just above the poverty line in middle-income developing countries".[3] Other authors have also suggested that the poorest people may lack the appropriate skills to benefit from international migration, and therefore they tend to have lower emigration rates. This argument also implies that remittances may not have an important effect on poverty.

In the economic literature there are relatively few papers explicitly addressing the likely relationship between remittances and poverty. In the most extensive study on this topic, Adams and Page [2003] analyze the relationship between poverty and remittances in a sample of seventy-four developing countries. They find that international remittances have a strongly statistical negative impact on poverty. Specifically, they find that a 10% increase in the share of remittances in a country's Gross Domestic Product (GDP), leads to a reduction of 1.6% in the share of people living in poverty. On the other hand, Adams [1991], Adams [2004] and López Córdova [2006] analyze the relation between remittances and poverty indicators at a country level, in Egypt, Guatemala, and Mexico, respectively. Adams [1991] finds that in Egypt the number of rural households in poverty drops 9.8% when household's income includes international remittances. Adams [2004] finds that the squared poverty gap measure in Guatemala declines by 19.8% when international remittances are included as part of total household income. This occurs, according to the author, because the income status of households at the lowest decile changes dramatically when they receive remittances. López Córdova [2006], on the other hand, finds that remittances have a statistically and economically significant impact in reducing poverty in Mexico at the municipal level. He estimates that a one percentage point increase in the fraction of remittance-receiving households in a municipality significantly reduces the fraction of the population earning relatively low income.

In this paper we address, in a purely empirical manner, the issue of remittances and poverty for the Mexican case. We plan to do so by taking into account that current existing data do not allow us to follow a household in the periods before and after receiving

remittances. In that sense, we cannot use a standard methodology to identify the effect that migrating and sending remittances back home could have on the poverty status of the recipient household. We plan to get around this problem by using a *matching* approach. This means that we will match, using a propensity score approach, remittance-receiving households with otherwise similar households but that do not receive remittances. Once we have matched households in this manner, we will then be able to compute the effect of remittances on the probability of being in a situation of poverty. This effect takes the form of an "average treatment on the treated" effect, where the treatment is taken as whether a household receives remittances or not. For robustness purposes, we will use four alternative methods of estimation of the average treatment effect.

The Mexican case is particularly well suited to shed light on the discussion of whether remittances help the poorest people or not, since we have nationally representative microdata on total income, household characteristics, income from remittances, and household information on three officially-defined alternative measures of poverty: food-based poverty, capabilities-based poverty and assets-based poverty (which are equivalent to extreme poverty, poverty and moderate poverty). As a result, we will then be able to analyze whether remittances may help households to get out of each type of poverty.

From a purely local perspective, there are at least two other good reasons to undertake this study: (1) because remittances are becoming an extraordinarily important source of external resources for the Mexican economy. Moreover, the recent trend in remittances, as well as current migration patterns, suggest that they will continue to be important at least for several years ahead. Therefore, understanding the impact of remittances on different aspects of the Mexican economy is critical to foresee future trends on some of these aspects. (2) It is also interesting to pursue this question from a public policy perspective. This is particularly interesting since there is an ongoing debate in Mexico regarding the role of remittances in the fight against poverty. For example, in 2005 the Mexican government announced that a reduction in poverty levels had occurred between 2000 and 2004. This result came partially as a surprise because during those years the Mexican economy had grown at very low rates. Then, the source of the reduction in poverty was attributed by some to the increased volume of remittances, whereas the Mexican government claimed that this result was due to its successful social policy. In fact, the Mexican government downplayed the role of remittances on poverty by claiming that most migrants were not among the poorest people in Mexico. We expect that the results of our research may also help to shed light on this debate.

Finally, it is important to mention some differences of our approach with respect to those followed by previous studies. First, unlike Adams and Page [2003] and López Córdova [2006], who analyze the impact of remittances on poverty at an aggregate level, we focus on the role of remittances on poverty at a micro level. In that sense, Adams [2004] is the only other paper that we are aware of that also uses microdata to analyze the role of remittances on the poverty status of the receivers.[4] On the other hand, unlike Adams [2004], we do not estimate a counterfactual earnings function for the migrants. Although this would have been desirable, it cannot be done with the available data.

Besides this introduction, the rest of the paper is organized as follows: Section II describes the relevance of remittances in Mexico and presents a brief introduction and description of the data; Section III describes the methodology that we follow; Section IV presents the empirical results, and Section V concludes.

II. Remittances in Mexico

International remittances have traditionally been an important source of foreign exchange resources for the Mexican economy. In recent years, however, remittances have become a growing and extremely important source of external funds. The amount of remittances flowing into Mexico has increased monotonically since 1991 and they are now more than twice the inflows from tourism-related activities. Indeed, in recent years, remittances have even been as large as foreign direct investment inflows to Mexico (see Figure 1). In terms of the importance of remittances relative to the size of the economy, Figure 2 shows that remittances in Mexico are now close to 3% of GDP and that they have become particularly important since 2000. Moreover, Mexico is already the country that receives the second largest amount of remittances around the world (see Figure 3).

Remittances Data at the Household Level and Poverty Definitions

The data that we will use in this paper comes from the *Encuesta Nacional de Ingreso y Gasto de los Hogares* (Household's Income-Expenditure National Survey - *ENIGH*) conducted by the National Institute of Statistics Geography an Information of Mexico (*Instituto Nacional de Estadísticas e Informática de México* - INEGI) in 2002. This survey covers 17,167 households and 72,602 individuals. It contains information about the characteristics of households, individuals, income and expenses. With this information we compute the household's net *per capita* income in *pesos* of August 2002. This measure is constructed as the monthly average of the monetary and non-monetary income of all members of the household plus (minus) the monetary or in-species transferences received (made) by the household divided by the total number of household members. Remittances are measured as the monthly average income that is received by the household as transference from abroad.

A household is considered to be poor (according to the food-based poverty definition)[5] if the net *per capita* income of the household is less than or equal to US$ 672.25 of 2002 if it belongs to an urban zone and less than or equal to US$ 494.77 if it belongs to a rural zone. This amount of money is considered as the lowest income necessary to afford a minimum basket of food. In 2002, 15.8% of households and 20.3% of the population in Mexico were living in this type of poverty condition.

A household is considered to be in capabilities-based poverty if its members cannot afford to cover their basic expenses on food, health and education, according to an officially defined basket. This variable takes the value of 1 if the household's net *per capita* income is less than or equal to US$ 792.58 if it belongs to an urban zone and less than or equal to US$ 587.29 if it belongs to a rural zone. In 2002, 21.1% of households and 26.5% of the population in Mexico were under this condition.

Finally, a household is considered to be in assets-based poverty if its members cannot cover their expenses of food, health, education, dressing, home and public transportation. This variable takes the value of 1 if the household's net *per capita* income is less than or equal to US$ 1,367.35 if it belongs to an urban zone and less than or equal to US$ 946.49 if it belongs to a rural zone. In 2002, 44.1% of households and 51.7% of the population in Mexico were under this condition.

Who Receives Remittances in Mexico?

According to our data, 5.7% of total Mexican households received remittances in 2002. However, in this case there is a clear rural-urban divide: while only 3.1% of urban

households received remittances in 2002, more than 10% of rural households did. In fact, whereas almost two-thirds of total households are urban and one-third is rural, the distribution of households receiving remittances is exactly the opposite (see Table 1).

In terms of their regional distribution, remittances-receiving households in Mexico are not uniformly distributed across the country. Maps 1 and 2 show the regional distribution of remittance-receiving households in Mexico and the share of state households that receive remittances, respectively. These maps show that remittance-receiving households are concentrated in a few Mexican states and that they tend to be located in the center-north part of the country. Indeed, more than one third of all remittances-receiving households in Mexico are concentrated in only four states (Michoacan, Durango, Guanajuato y Zacatecas, see the Appendix for more detail on Mexican states). Similarly, in seven Mexican states 10% or more of their total households receive remittances from abroad (Michoacan, Durango, Guanajuato, Zacatecas, San Luis Potosí, Jalisco and Aguascalientes). It is interesting to note that the poorest Mexican states, such as Chiapas, Guerrero, Oaxaca, Puebla or Veracruz, do not belong to this list, although the recent pattern of migration may change this distribution in the future.

In order to verify the consistency of our state data on remittance-receiving households from the ENIGH 2002, we compared our remittances indicators at the state level with two related indicators that were derived by López Córdova [2006] using information from the 10% public sample of the 2000 Population and Housing Census. The result of this comparison is shown in Figure 4: although there are some differences, the 3 indicators are highly correlated, suggesting that our data are consistent with alternative sources of information.

Households Characteristics and Remittances

Table 2 shows a summary of household characteristics by remittance-receiving status. Although the figures are not always statistically different between types of households, it is interesting to note that remittance-receiving households tend to have less male members, have lower earnings (even after taking into account remittances), and tend to have lower levels of education. In terms of household income, household receiving remittances have an income which is only 66% (40%) that of a non-receiving remittances household when we include (exclude) remittances income.

Remittances and Poverty Condition

Table 3 shows the distribution of households by poverty condition and remittance- receiving status. This table shows that there is no clear pattern associating poverty condition and remittance-receiving status when we look at all households. In this case, both poor and non-poor households tend to have a similar fraction of remittance-receiving households (which ranges between 5.3 and 6.2% of each type of household), and this does not depend at all on the measure of poverty being used. A similar pattern emerges when we only look at urban households which, as mentioned above, tend to have a smaller fraction of remittance-receiving households. However, when we look at rural households, we do find a pattern. In this case it becomes clear that the share of non-poor households receiving remittances is larger than the share of poor remittance-receiving households. This is true regardless of which measure of poverty we use.

How should we interpret this pattern? The answer is not obvious. The real question is whether people from non-poor rural households have better access to the necessary financial resources to migrate and to send remittances back home, or whether

people who migrated were originally from poor households and then, due to their higher earnings abroad and to the remittances they send, their families have been able to escape out of poverty. This question takes us back to the fundamental question of who migrates, the poor or the non poor? While we are not attempting to answer this question, our analysis of remittances and household income may help to shed some light on this question.

Remittances and Household Income in Mexico

Figure 5 shows the distribution of Mexican remittance-receiving households according to the income deciles that are obtained using information of all Mexican households in 2002. We use two alternative income indicators for the remittance-receiving households: *per capita* total income (including remittances) and *per capita* income excluding remittances. This graph shows a remarkably different distribution depending on whether we include income proceeding from remittances or not. For example, if we exclude remittances from households' income, more than 45% of all remittance-receiving households would lie in the bottom decile of the income distribution. Once remittances are included, only 12% of these households still belong to the lowest decile. Indeed, the income distribution of remittance-receiving households after we include this source of income is relatively uniform, with a slight concentration on the bottom three deciles of the income distribution.

This result should not come as a surprise. Indeed, the income distribution of remittance-receiving households in Mexico is similar to those of other countries for which comparable information exists. For example, in the case of El Salvador, Cox-Edwards and Ureta [2003] have shown that around 30% of total remittance-receiving Salvadorean households would lie in the first decile of the local income distribution if we do not include income from remittances.

It is important to mention that some of the preconceptions (and misunderstandings) about the poverty-reducing effect of remittances depends precisely on an image similar to Figure 5. This figure seems to show, in an apparently unequivocal manner, that remittance-receiving households would be poor in the absence of the remittances. However, this graph should not be misinterpreted. It does not mean by itself that most remittance-receiving households would be poor had not been for the remittances. We should note that the income-generating capacity of this type of households is limited precisely because at least one of its economically active members is working abroad.

In this context, the relevant question then is, how would the income distribution of remittance-receiving households be if the contributing member of the households had not migrated? And the empirical problem is here precisely because we do not observe that situation. At a given point in time, we either observe a household without remittances or a household with remittances but without the local income that could have been generated by the sender. This problem requires constructing an appropriate counterfactual.[6] While we do not do that in this paper, we will be careful in making as appropriate comparisons as possible given the available information. Finally, an element that we would like to emphasize from Figure 5 is that, even after taking into account the amount of remittances, there is an important share of remittance-receiving households that belong to the first two deciles of the income distribution in Mexico. This means that there are migrants even among the poorest households in the country. Moreover, Figure 5 shows that the income distribution of remittance-receiving households after including remittances is still concentrated in the bottom deciles, thus showing that most of these households are poor despite of the remittances received.

III. Methodology

In this section we describe the methodology that we use in order to estimate the effect of remittances on poverty. The basic idea is to assume that receiving remittances is similar to a "treatment", so that we may estimate an average treatment effect on the probability of being in poverty. In this way, we want to compare the probability of being in poverty for remittance-receiving households versus that for not remittance-receiving households. The difference will then be attributed to the existence of remittances. The critical assumption that we are making in using this methodology is that the decision to be treated (that is, receiving remittances), although not random, ultimately depends upon observable variables. Notice that this assumption is less strict than assuming than migration depends on observables. While this may not be true, it could still be the case that receiving remittances depends on observables.

Estimation of Average Treatment Effects Based on the Propensity Score[7]

The estimation of an average treatment effect in observational studies can produce biased results when we use a non experimental estimator. The typical problem in this type of studies is that the assignment of subjects to the treatment and control groups is not random and therefore the estimation of the average treatment effect is usually biased as a result of the existence of confounding factors. For that reason, the matching between treated and control subjects becomes difficult when there is an *n*-dimensional vector of characteristics.

One way to address this problem is by using the propensity score matching method which summarizes the pre-treatment characteristics of each subject into a single index variable, the propensity score, which is then used to match similar individuals. The basic idea behind the propensity score is that we may reduce the bias if we compare outcomes of treated and control groups which are as similar as possible.

The propensity score is the probability of assignment to treatment conditional on pre-treatment variables:

$$p(X) = \Pr[D = 1 \mid X] = E[D \mid X]$$

where:

$$p(X) = F(h(X_i))$$

F(.) can be the normal or the logistic cumulative distribution.
D = 1 if the subject was treated and 0 otherwise.
X is a vector of pre-treatment characteristics.

Rosenbaum and Rubin [1983] established the following conditions in order to be able to estimate the Average Treatment on the Treated (ATT) effect based on the propensity score:

Condition 1: The Balancing Hypothesis

$$D \perp X \mid p(X)$$

This means that for observations with the same propensity score, the distribution of pre-treatment characteristics must be the same across control and treated groups.

That is, conditional on the propensity score, each individual has the same probability of assignment to treatment, as in a randomized experiment.

Condition 2: Unconfoundedness Given the Propensity Score

$$Y_1, Y_0 \perp D \mid X \Rightarrow Y_1, Y_0 \perp D \mid p(X)$$

If assignment to treatment is unconfounded conditional on the variables pre-treatment, then assignment to treatment is unconfounded given the propensity score.

Once the propensity score has been computed the ATT effect (τ) can be estimated as follows:

$$\tau = E\{Y_{1i} - Y_{0i} \mid D_i = 1\}$$

$$\tau = E\{E\{Y_{1i} - Y_{0i} \mid D_i = 1, p(X)\}\}$$

$$\tau = E\{E\{Y_{1i} \mid D_i = 1, p(X_i)\} - E\{Y_{0i} \mid D_i = 0, p(X_i)\} \mid D_i = 1\}$$

where:

Y_{1i} is the potential outcome if the individual is treated.

Y_{0i} is the potential outcome if the individual is not treated.

However, calculating this effect is not immediately obvious since the propensity score is a continuous variable. To overcome this problem four different matching methods have been proposed in the literature by Becker and Ichino ([2002] pp. 358-377).

Nearest Neighbor and Radius Matching

The first method consists of matching each treated individual with the control individual that has the closest propensity score. This method is usually applied with replacement in the control units. The second step is to compute the difference of each pair of matched units, and finally the ATT is obtained as the average of all these differences. It should be noticed that with this method each treated unit has a match, but this is not necessarily the best match since it only needs to be the closest to the treated.

A solution to this problem is to define a neighborhood within which a control unit can be considered a match; this method is called the *Radius Matching*. The election of the radius should be careful since a very small radius can discard treated observations, but the quality of the matches is better. The ATT effect in both the nearest neighbor and the radius matching methods is computed in the following way:

$$\tau^{NN,M} = \frac{1}{N^T} \sum_{i \in T} \left[Y_i^T - \sum_{j \in C(i)} w_{ij} Y_j^C \right]$$

$$= \frac{1}{N^T} \left[\sum_{i \in T} Y_i^T - \sum_{i \in T} \sum_{j \in C(i)} w_{ij} Y_j^C \right]$$

$$= \frac{1}{N^T} \sum_{i \in T} Y_i^T - \frac{1}{N^T} \sum_{j \in C} w_j Y_j^C$$

where:

$$w_{ij} = \frac{1}{N_i^C} \text{ if } j \in C(i) \text{ and } w_{ij} = 0 \text{ otherwise.}$$

$$w_j = \sum_i w_{ij}$$

and

$$C(i) = \min_j \left\| p_i - p_j \right\| \text{ for the nearest neighbor matching method.}$$

$$C(i) = \left\{ p_j \left\| \left\| p_i - p_j \right\| < r \right\} \right. \text{ for the radius matching method.}$$

N^C is the number of control observations, and

N^T is the number of treated observations.

Kernel Matching

In this method all treated subjects are matched with a weighted average of all controls using weights that are inversely proportional to the distance between the propensity scores of treated and controls. The ATT is computed as follows:

$$\tau^K = \frac{1}{N^T} \sum_{i \in T} \left\{ Y_i^T - \frac{\sum_{j \in C} Y_j^C G(\frac{p_j - p_i}{h_n})}{\sum_{k \in C} G(\frac{p_k - p_i}{h_n})} \right\}$$

where $G(.)$ is a Kernel function and h_n is a bandwith parameter.

Stratification Matching

This method consists of dividing the range of variation of the propensity score in intervals such that, within each interval, treated and control units have on average the same propensity score. It is recommended to use the same blocks within which the balancing property is tested. Within each interval the difference between the average outcomes of the treated and the control observations is computed as follows:

$$\tau_q^s = \frac{\sum_{i \in I(q)} Y_i^T}{N_q^T} - \frac{\sum_{j \in I(q)} Y_i^C}{N_q^C}$$

where:

$I(q)$ is the set of units in block q.

N_q^T, N_q^T are the numbers of treated an control units in block q. The total number of blocks is Q.

Finally, the ATT is obtained as an average of the ATT of each block with the weight of each block given by the corresponding fraction of treated units.

$$\tau^s = \sum_{q=1}^{Q} \tau_q^s \frac{\sum_{i \in I(q)} D_i}{\sum_{\forall i} D_i}$$

For the empirical implementation we use the Stata programs developed by Becker and Ichino [2002].

IV. Remittances and Poverty Levels in Mexico: Empirical Evidence

In this section we apply the methodology just described to identify the role of remittances on the probability of Mexican households of being in poverty situation in 2002. We apply the four estimators described in the previous section.

The first step in the empirical exercise is the estimation of the propensity score, that is, the estimation of the propensity to be treated, where the treatment is receiving remittances. Therefore, the dependent variable is 1 if the household receives international remittances and 0 otherwise. We proceed with four alternative specifications. The first specification uses as explanatory variables the following variables of the household head: age (linear and squared), gender (1 if female), marital status (1 if married), education level (linear and squared). It also includes as explanatory variables the following: a rural dummy, the household size, number of women in the household, number of rooms, a dummy for the presence of children in the house interacted with the marital status of the household head, a bathroom dummy and other interaction variables.[8]

The first column in Table 4 shows that all explanatory variables have statistically significant coefficients at the 5% level. Most variables have the expected signs: households that have a married female as a household head, that are located in rural zones, and where there are children, are more likely to receive remittances than other types of households.

With the results described in the first column in Table 5 we have computed the propensity score. As mentioned before, this represents the estimated propensity of a household to receive treatment (that is, to receive remittances from abroad). The next step is then to compute the ATT. In order to make the working sample even more comparable, we restrict ourselves to units with probabilities that lie within the region known as the *common support*, that is, the area where there are enough of both, control and treatment observations, to proceed with the comparisons.[9] This also means that we exclude treatment or control observations that do not have comparable values in the other group.

The first three columns in Table 5 show the results of the estimation of the ATT effect for the three different measures of poverty mentioned above and for the four alternative methodologies described in the previous section. Note that in some cases we have two types of standard errors: analytical and bootstrapped. Statistically significant coefficients are bolded.

Results in the first three columns of Table 5 show that the effect of remittances on poverty is always negative, although not always statistically significant. Moreover, the results in this table are, in qualitative terms, quite consistent across the alternatives methods of estimating the ATT effect. In particular, the ATT effect for both, the food-based and the capabilities-based poverty measures, are statistically significant under the four alternative estimation methodologies. In the first case, the effect ranges between 3.9 and 6.6 percentage points, whereas in the second case, it fluctuates between 3.1 and 5.8 percentage points. On the other hand, in the case of the assets-based poverty none of the estimates is statistically significant. Although these results are already quite strong and conclusive from a qualitative perspective, they still are relatively imprecise since the estimates fluctuate within an interval close to two percentage points.

In search of more precise estimates of the ATT effect, we estimated a second Propensity Score with an alternative specification. In this case, we attempt to account

for the fact that we know that there are states with relatively high migration rates. This information enters as a dummy variable taking the value of 1 for the 14 Mexican states where at least 6% of local households received remittances in 2002 (see Appendix for a list of these high-migration states), and 0 otherwise. These 14 states include 77% of all remittance-receiving households in Mexico in 2002 (see Appendix). The variable enters into the empirical analysis both alone and interacted with the rural dummy.

Results in column (2) of Table 4 show that the coefficients on the two added variables are highly significant. The marital status variables were non significant and they were then dropped out of the regression. All the remaining variables have coefficients that are statistically significant at the 5% level. Interestingly, the pseudo R-squared increased from 0.11 to 0.17 suggesting a better fit for this specification.

With the new propensity score, we proceeded to estimate a second set of ATT effects. These estimates are reported in Table 5 under the title "second specification". The new ATT effects are very similar to the first ones. As before, all of the coefficients associated to the food-based and the capabilities-based measures of poverty were negative and significant (with just one exception), and none of the coefficients associated to the assets-based measure of poverty were significant. This time however, the point estimates of the ATT effects were even less precise across methods (between 3.3 and 6.5 percentage points in one case and between 2.5 and 5.9 percentage points in the other). Despite that result, the fact that the high-migration states variables were quite significant in the estimation of the propensity score, led us to estimate yet another variant of this specification.

In order to improve the quality of our matches, we then estimated again the propensity score by focusing only on those households belonging to the 14 states with high-migration rates. This avoids the problem of comparing remittance-receiving households with relatively similar non-remittance receiving households but that are located in states where there is no tradition of migrating to the US. By restricting our sample in this way, we expect to compare more homogeneous households and therefore we expect to get better estimates of both the propensity score and the ATT effect.

Column (3) in Table 4 presents the results of our estimated propensity score when we restrict our data to the high-migration states. All coefficients are again statistically significant and many coefficients become larger such as those associated to the gender of the household head, the rural dummy, the marital status variable and the presence of children in the household.

With the new propensity score we estimated again the ATT effects associated to the last specification. The results that we obtained are displayed in the first columns of Table 6. Our estimates look remarkably stable across methodologies. In particular, the effect of remittances on the probability of being in food-based poverty ranges only between 7.4 and 8 percentage points, whereas the effect for the capabilities-based poverty fluctuates only between 5.5 and 7 percentage points. Moreover, for each methodology the point estimates for the effect of remittances on poverty show an interesting pattern: the estimated coefficients decline monotonically as we move from extreme poverty to moderate poverty. This result makes sense, since it seems more plausible that the extra income from international remittances helps people to get out of extreme poverty (although they may still be in moderate poverty), but it may not be enough as to help people to leave a moderate poverty condition.

The results obtained with this specification are more precise and robust and therefore they are among our preferred set of estimates. Taking simple averages

across different methodologies, we may conclude that the presence of remittances in a household reduce its probability of being in food-based and in capabilities-based poverty in 7.7 and 6.3 percentage points, respectively. Given the observed poverty rates within the households belonging to the common support area (21.1% and 27.1%, which are greater than the national poverty rates of 15.8% and 21.1%, respectively), the poverty-reducing effect of remittances is then equivalent to a reduction of around 36% and 23% in the corresponding poverty rates for remittance receiving households *vis a vis* non-remittance receiving households.

Finally, it is worth noting that receiving remittances does not seem to affect a household's probability of being in a situation of assets-based poverty. In that sense, we may conclude that remittances contribute to the reduction in the level and depth of poverty, but only up to a certain point.

We conclude our empirical analysis with a final exercise which focuses only on rural households. Column (4) on Table 4 shows the results of the estimated propensity score for such specification. Again, all variables are statistically significant and all the coefficients have the expected signs. As usual, the estimation satisfies the balancing condition. With these new estimates we computed again the ATT effect for the three poverty measures. These results are summarized on the second column in Table 6.

Unlike our previous results, now all the estimated effects are negative and statistically significant. Moreover, our new estimates are always higher than any other previous result suggesting that for rural households remittances play a more important and effective role as a mechanism to escape out of poverty than for urban households.

The estimated average effects of remittances on the rural household's poverty condition are 11.3, 11.5 and 9.7 percentage points for food-based, capabilities-based and assets-based poverty rates, respectively. Considering than poverty rates for rural households within the common support area are 36.6%, 44.4% and 65.4%, respectively, the estimated effects represent a reduction in the poverty rates of rural households of 31%, 26% and 15%, respectively, for a typical remittance-receiving rural household *vis-à-vis* a comparable non remittance-receiving rural household. Therefore, our results strongly suggest that receiving remittances is an important mechanism to help rural households to get out of poverty (either extreme or moderate), whereas for urban households remittances only seem to be effective to help them get out of extreme poverty.

V. Conclusion

In this paper we have analyzed the role of international remittances on poverty in Mexico. Since we cannot observe a Mexican household before and after receiving remittances, we are then unable to identify the effect of remittances on poverty using a standard methodology. We then follow a propensity score matching approach that allows us to compare remittance-receiving households with households that do not receive remittances but that have observable characteristics similar to those who do.

We then look at the effect of receiving remittances on the probability of being in a poverty situation using three alternative, officially-defined, measures of poverty (food-based, capabilities-based and assets-based). Our empirical results show that receiving remittances from abroad reduces the probability of being in food-based and capabilities-based poverty in 7.7 and 6.3 percentage points, respectively. Given the observed poverty

rates in our working sample (21.1% and 27.1%, respectively), these effects are equivalent to a reduction of around 36 and 23% in the corresponding poverty rates for remittance-receiving households *vis-à-vis* comparable non remittance-receiving households. However, receiving remittances does not seem to affect a household's probability of being in assets-based poverty. When we focus only on rural households, the effects of receiving remittances on poverty are similar to those reported before in the cases of the food-based and the capabilities-based poverty rates (a reduction of 31% and 26%, respectively). In this case, however, receiving remittances also reduces, in a statistically significant way, the probability of a rural household of being in assets-based poverty condition. The magnitude of the estimated effect (a reduction of 10 percentage points) implies a reduction of about 15% in the moderate poverty rate for rural households. In that sense, our results suggest that receiving remittances is an important mechanism to help rural households to get out of poverty (either extreme or moderate), whereas for urban households remittances only seem to be effective to help them get out of extreme poverty.

Notes

[1] See, among others, Ratha [2003] and Kapur [2004].

[2] Kapur [2004] and López Córdova [2006] review some of the existing literature. López Córdova and Olmedo [2006] present a survey of the literature on remittances and some development indicators.

[3] The two positions just described correspond to what Taylor, Mora and Adams [2005] refer as the "optimistic" and the "pessimistic" views, respectively.

[4] More recently, Taylor, Mora and Adams [2005] have also studied the role of remittances on poverty in rural Mexico using individual level data. They find that remittances reduce poverty in rural households. However, they obtain this result just adding remittances to local earnings which, almost by definition, reduces poverty.

[5] See *Secretaría de Desarrollo Social* (SEDESOL) [2003] for more details on the measurement of poverty in Mexico.

[6] Adams [2004], for example, estimates a *per capita* household income function to generate an appropriate counterfactual.

[7] For more details on the methodology see the papers by Dehejia and Wahba ([1999], [2002] pp. 1053-1062) and Rosenbaum and Rubin ([1983], [1985]).

[8] All the specifications reported satisfy the balancing condition described in the previous section.

[9] The importance of proceeding in this fashion has been recently emphasized by Dehejia [2005].

Table 1

Distribution of Households by Remittances Receiving Status

	All Households (%)	Urban HH (%)	Rural HH (%)
Do not Receive Remittances	94.3	96.9	89.9
Receive Remittances	5.7	3.1	10.2
Total	*100.0*	*100.0*	*100.0*

	All Households (%)	Urban HH (%)	Rural HH (%)
HH not Receive Remittances	100.0	65.0	35.0
HH Receive Remittances	100.0	35.0	65.0
All Households	100.0	64.0	36.0

Source: ENIGH [2002].

Table 2

Hosehold Characteristics by Remittances Receiving Status

	Type of Household	
Variable	Not Receiving Remittances	Receiving Remittances
Number of Members in the House	4.12 (1.99)	3.98 (2.16)
Number of Men	2.02 (1.27)	1.71 (1.33)
Number of Women	2.10 (1.25)	2.27 (1.43)
Monthly Net Income	7,998.68 (10,283.96)	5,149.69 (3,883.95)
Monthly Net Income Excluding Remittances	7,998.68 (10,283.96)	3,053.75 (3,344.89)
Members Younger than 5	0.39 (0.67)	0.40 (0.65)
Members Younger than 10	1.14 (1.22)	1.31 (1.25)
Members Older than 15	2.77 (1.32)	2.63 (1.22)
Members Older than 15 without Primary Education	0.74 (0.99)	1.04 (0.97)
Members Older than 15 with at Least Primary Education	1.97 (1.35)	1.29 (1.22)
Members Older than 15 with at Least Secondary Education	1.36 (1.29)	0.64 (0.93)
Members Older than 15 with at Least High School Education	0.59 (0.95)	0.17 (0.46)
Members Older than 15 with at Least Bachelor's Degree	0.17 (0.5)	0.03 (0.19)

Note: Standard errors in parentheses.
Source: ENIGH [2002].

Table 3

Household Distribution by Poverty Condition and Remittances Receiving Status

Poverty Measure: Food-Based						
	Total HH		Rural		Urban	
	Non poor	Poor	Non poor	Poor	Non poor	Poor
HH Not Receiving Remittances	94.3	94.6	88.5	93.2	96.9	97.1
HH Receiving Remittances	5.7	5.5	11.5	6.8	3.1	2.9
Poverty Measure: Capabilities-Based						
	Total HH		Rural		Urban	
	Non poor	Poor	Non poor	Poor	Non poor	Poor
HH Not Receiving Remittances	94.5	93.8	88.5	92.1	97.0	96.7
HH Receiving Remittances	5.5	6.2	11.5	7.9	3.1	3.3
Poverty Measure: Assets-Based						
	Total HH		Rural		Urban	
	Non poor	Poor	Non poor	Poor	Non poor	Poor
HH Not Receiving Remittances	94.7	93.9	87.8	91.2	97.2	96.4
HH Receiving Remittances	5.3	6.1	12.2	8.8	2.8	3.6

Source: ENIGH [2002].

Table 4

PROBIT ESTIMATES
Dependent Variable: Households Receiving Remittances Dummy

	Complete Sample				High-Migration States		Rural Households	
	(1)		(2)		(3)		(4)	
	dF/dx	Std. Err.	dF/dx	Std. Err.	dF/dx	Std. Err.	dF/dx	Std. Err.
Age	*0.008*	0.001	*0.006*	0.001	*0.016*	0.003	*0.017*	0.003
Age Squared	*0.000*	0.000	*0.000*	0.000	*0.000*	0.000	*0.000*	0.000
Gender	*0.082*	0.010	*0.063*	0.008	*0.160*	0.026	*0.148*	0.027
Marital Status	*0.016*	0.004			*0.030*	0.010	*0.030*	0.009
Rural	*0.047*	0.004	*0.025*	0.005	*0.089*	0.008		
Edu	*0.033*	0.007	*0.028*	0.006	*0.071*	0.015	*0.091*	0.019
Edu Squared	*-0.001*	0.000	*-0.001*	0.000	*-0.002*	0.001	*-0.003*	0.001
Household Size	*-0.006*	0.001	*-0.003*	0.001	*-0.010*	0.003	*-0.010*	0.003
Number of Women	*0.007*	0.002	*0.006*	0.001	*0.012*	0.004	*0.013*	0.004
Edu*age	*-0.001*	0.000	*-0.001*	0.000	*-0.002*	0.001	*-0.002*	0.001
Age*Gender	*-0.001*	0.000	*-0.001*	0.000	*-0.002*	0.000	*-0.002*	0.000
Edu*Age Squared	*8.020*	0.000	*6.180*	0.000	*0.000*	0.000	*0.000*	0.000
Marital*Children	*0.001*	0.000			*0.007*	0.003	*0.002*	0.001
Bath-Type	*0.012*	0.003	*0.011*	0.003	*0.033*	0.007	*0.031*	0.007
Rooms	*0.007*	0.001	*0.005*	0.001	*0.014*	0.002		
High-Migration States			*0.042*	0.004				
HighMmig States * Rural			*0.017*	0.007				
Pseudo R2	0.1122		0.1719		0.1206		0.0766	

Note: Coefficients in italics are statistically significant at the 5% level or less.
Source: Authors' calculations.

Table 5

AVERAGE TREATMENT EFFECT UNDER ALTERNATIVE SPECIFICATIONS AND MEASURES OF POVERTY

Method	Complete Sample. First Specification			Complete Sample. Second Specification		
	Measure of Poverty			Measure of Poverty		
	Food Based	Capabilities	Assets Based	Food Based	Capabilities	Assets Based
Nearest Neighbor	*-0.066*	*-0.057*	*-0.016*	*-0.050*	*-0.048*	*-0.020*
N. Treated	755	755	755	755	755	755
N. Control	746	746	746	717	717	717
Standard Error	0.020	0.020	0.027	0.020	0.020	0.027
t	-3.230	-2.490	-0.610	-2.490	-2.090	-0.750
St. Error. Bootstrap	0.020	0.030	0.029	0.020	0.020	0.030
t	-2.730	-2.080	-0.570	-2.220	-2.080	-0.710
Radius	*-0.039*	*-0.031*	*-0.008*	*-0.033*	*-0.025*	*-0.002*
N. Treated	753	753	7530	754	754	754
N. Control	15,033	15,033	15,033	14,565	14,565	14,565
Standard Error	0.010	0.020	0.019	0.010	0.020	0.019
t	-2.950	-2.050	-0.440	-2.500	-1.620	-0.100
St. Error. Bootstrap	0.010	0.020	0.017	0.010	0.020	0.020
t	-2.730	-1.860	-0.500	-2.830	-1.600	-0.100
Kernel	*-0.049*	*-0.042*	*-0.014*	*-0.053*	*-0.046*	*-0.016*
N. Treated	755	755	755	755	755	755
N. Control	15,040	15,040	15,040	14,565	14,565	14,565
St. Error. Bootstrap	0.010	0.020	0.020	0.010	0.010	0.020
t	-4.060	-2.640	-0.842	-3.800	-3.420	-1.030
Stratification	*-0.064*	*-0.058*	*-0.029*	*-0.065*	*-0.059*	*-0.031*
N. Treated	754	754	754	755	755	755
N. Control	51,041	51,041	51,041	14,565	14,565	14,565
Standard Error	0.010	0.020	0.019	0.010	0.020	0.017
t	-4.650	-3.680	-1.520	-5.430	-3.670	-1.890
St. Error. Bootstrap	0.015	0.020	0.020	---	---	---
t	-4.340	-3.500	-1.770	---	---	---

Note: Coefficients in italics are statistically significant at the 5% level.
Source: Authors' calculations.

Table 6

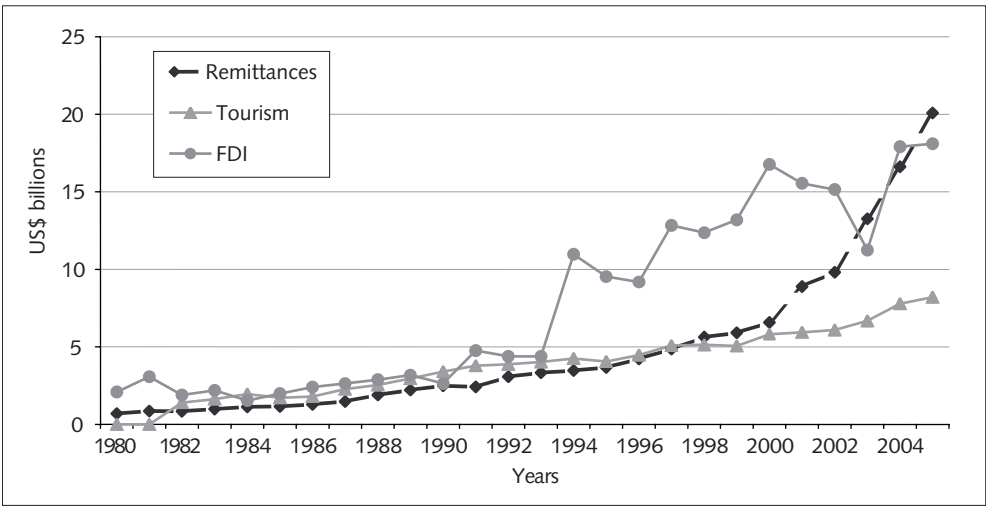
Average Treatment Effect under Alternative Specifications and Measures of Poverty

Method	Subsample: High Migration States			Subsample: Rural Households		
	Measure of Poverty			Measure of Poverty		
	Food Based	Capabilities	Assets Based	Food Based	Capabilities	Assets Based
Nearest Neighbor	*-0.080*	*-0.055*	0.000	*-0.108*	*-0.108*	*-0.077*
N. Treated	588	588	588	485	485.	485
N. Control	515	515	515	589	589	589
Standard Error	0.030	0.030	0.032	0.030	0.030	0.033
t	-3.210	-2.020	-0.009	-3.760	-3.490	-2.337
St. Error. Bootstrap	0.030	0.030	0.028	0.040	0.040	0.036
t	-2.820	-1.810	-0.010	-3.060	-3.100	-2.137
Radius	*-0.079*	*-0.070*	-0.041	*-0.129*	*-0.134*	*-0.118*
N. Treated	583	583	583	485	485	485
N. Control	5,692	5,692	5,692	5,537	5,537	5,5370
Standard Error	0.020	0.020	0.022	0.020	0.020	0.024
t	-5.020	-3.860	-1.859	-6.720	-6.320	-4.950
St. Error. Bootstrap	0.020	0.020	0.026	0.020	0.020	0.017
t	-5.190	-3.390	-1.540	-6.770	-6.620	-6.923
Kernel	*-0.074*	*-0.063*	-0.025	*-0.122*	*-0.126*	*-0.110*
N. Treated	588	588	588	485	485	485
N. Control	5,693	5,693	5,693	5,537	5,537	5,537
St. Error. Bootstrap	0.010	0.020	0.023	0.020	0.020	0.021
t	-5.340	-3.560	-1.065	-6.710	-7.070	-5.224
Stratification	*-0.077*	*-0.064*	-0.022	*-0.094*	*-0.092*	*-0.084*
N. Treated	588	588	588	485	485	485
N. Control	5,693	5,693	5,693	5,604	5,604	5,604
Standard Error	0.020	0.020	0.023	0.020	0.020	0.024
t	-4.600	-3.370	-0.979	-4.910	-4.330	-3.497
St. Error. Bootstrap	0.016	0.020	0.021	0.017	0.030	0.025
t	-4.708	-3.921	-1.043	-5.563	-3.760	-3.377

Note: Coefficients in italics are statistically significant at the 5% level.
Source: Authors' calculations.

Figure 1

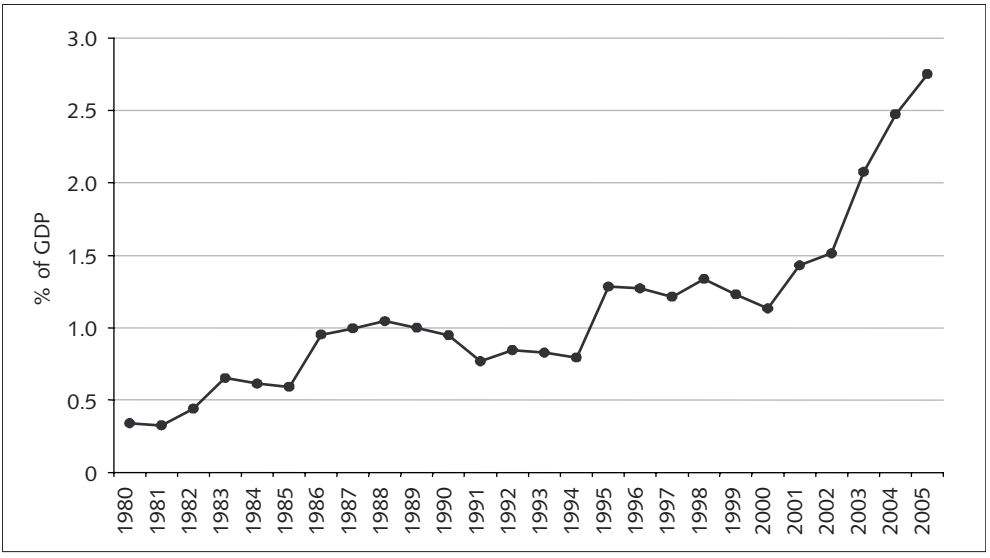
ANNUAL INFLOWS (1980-2005)
US$ Billions



Source: World Development Indicators (WDI), World Bank.

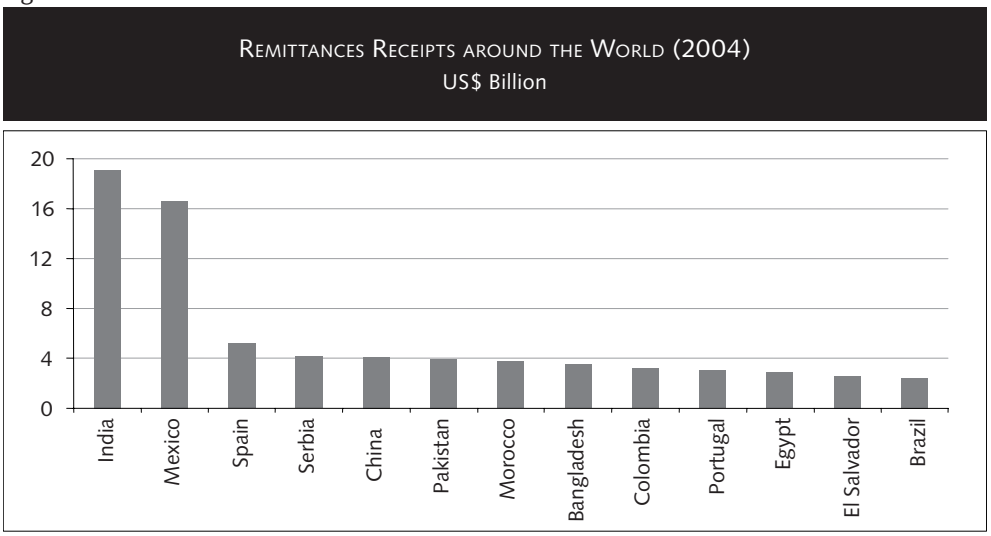
Figure 2

MEXICO: REMITTANCES (1980-2005)
As a % of GDP



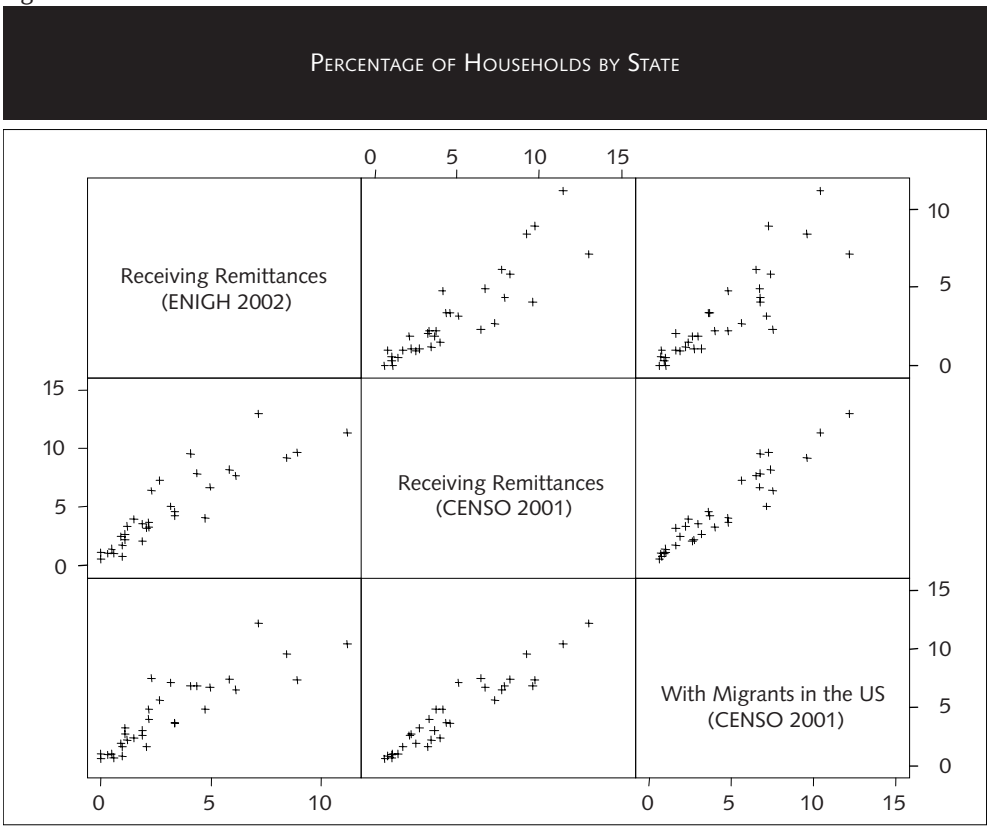
Source: WDI and *Instituto Nacional de Estadística e Informática de México* (INEGI).

Figure 3



Source: WDI World Bank.

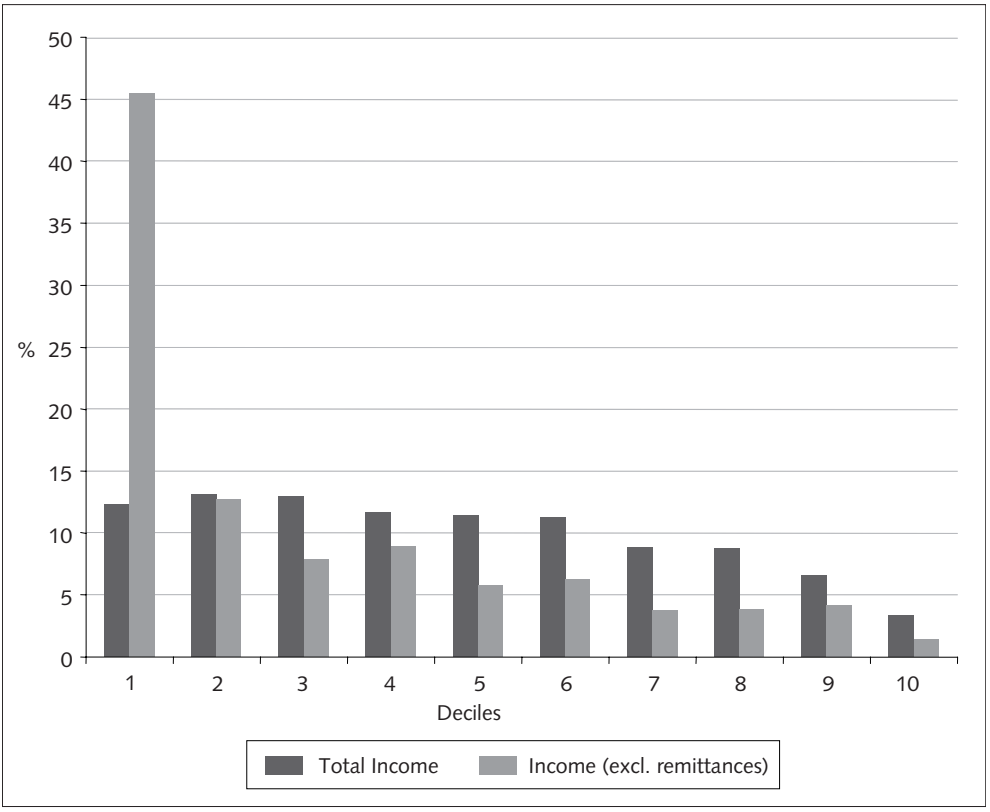
Figure 4



Source: ENIGH [2002] and Censo [2001].

Figure 5

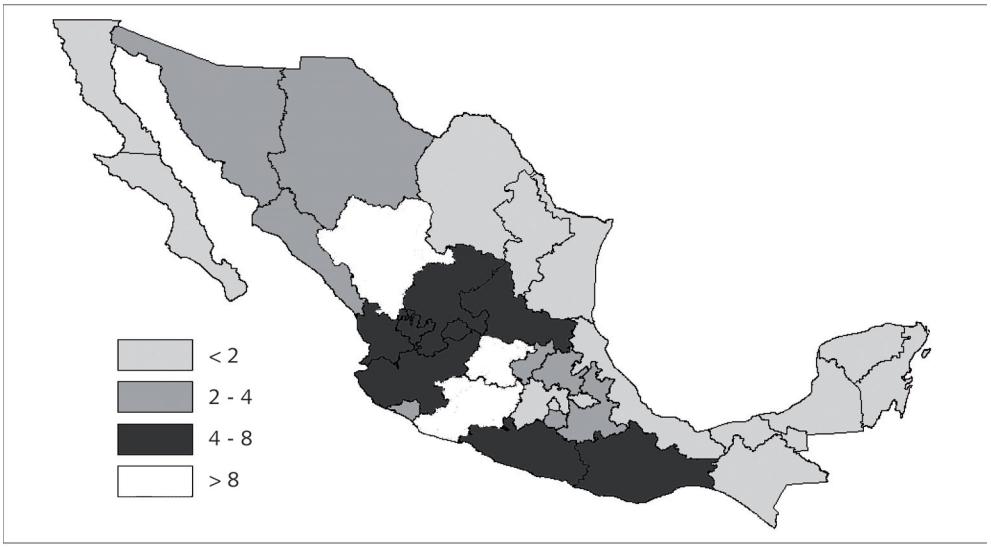
DISTRIBUTION OF REMITTANCE RECEIVING HOUSEHOLDS
By Income Deciles



Source: Elaborated with data from INEGI.

Map 1

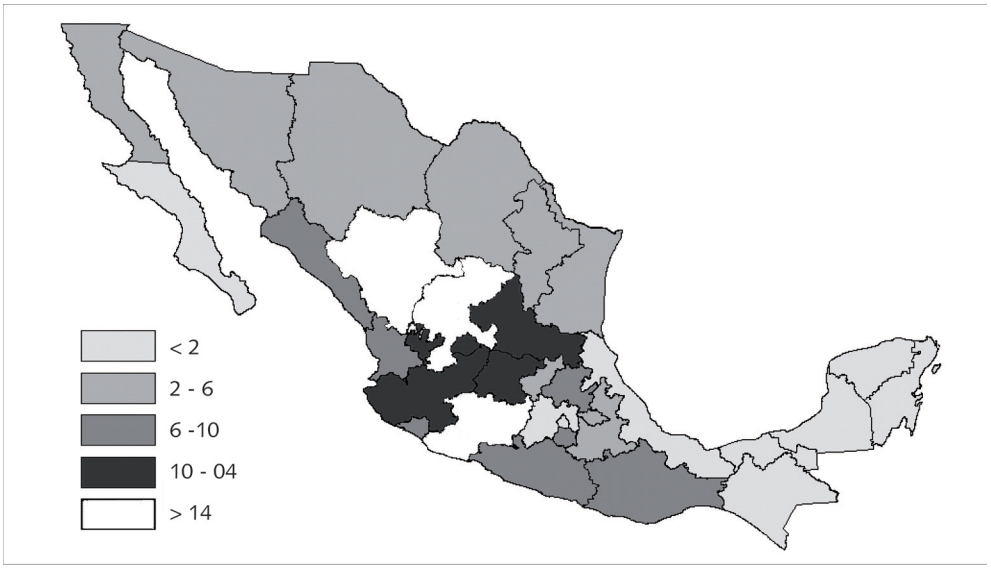
Distribution of Households Receiving Remittances by State
As a % of Total HRR



Source: ENIGH [2002].

Map 2

Households Receiving Remittances
As a % of Total Households in the State



Source: ENIGH [2002].

Appendix

Figure 1a

Mexican States

1	Aguas Calientes	17	Morelos
2	Baja California	18	Nayarit
3	Baja California Sur	19	Nuevo León
4	Campeche	20	Oaxaca
5	Chiapas	21	Puebla
6	Chihuahua	22	Querétaro
7	Coahuila de Zaragoza	23	Quintana Roo
8	Colima	24	San Luis Potosí
9	Distrito Federal	25	Sinaloa
10	Durango	26	Sonora
11	Guanajuato	27	Tabasco
12	Guerrero	28	Tamaulipas
13	Hidalgo	29	Tlaxcala
14	Jalisco	30	Veracruz
15	México	31	Yucatán
16	Michoacán	32	Zacatecas

Table 1a

High-migration States		
Subsample: States with a Relatively Large Fraction of Households Receiving Remittances		
	Percentage of Total Households in the State	Percentage of Total Households-Receiving Remittances
Michoacan	18.4	11.2
Zacatecas	16.8	7.1
Durango	15.7	8.9
Guanajuato	13.8	8.4
San Luis Potosí	11.7	5.8
Jalisco	11.5	6.1
Aguascalientes	11.1	5.0
Nayarit	8.5	4.1
Guerrero	8.2	4.4
Sinaloa	8.1	3.4
Colima	8.0	2.7
Morelos	7.9	2.3
Oaxaca	7.2	4.8
Hidalgo	6.1	3.2
Weighted Average	11.4	
Subtotal		*77.3*

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Emigration, Remittances and Labor Force Participation in Mexico

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Summary

In this paper, I examine emigration, remittances, and labor-force participation in Mexico during the 1990s. I use two samples of households for the analysis: (a) rural households in Mexico in 2000, which vary according to whether they have sent migrants to the United States (US) or received remittances from the US, and (b) individuals in Mexico in 1990 and 2000 born in states with either high-exposure or low-exposure to US emigration. In the first sample, controlling for observable characteristics, individuals are less likely to participate in the labor force if their household either has sent migrants abroad or received remittances from abroad. Surprisingly, this result holds for both women and men. These cross-sectional results are potentially contaminated by unobserved household characteristics that may be correlated with both household migration behavior and household labor supply. In the second sample, which is less subject to concerns about self-selection into migration, I find that over the 1990s women (but not men) from high-migration states become less likely to work outside the home (relative to women from low-migration states). These results are consistent with migration abroad, and the accompanying return flow of remittances, leading to greater intra-household specialization. Results for labor hours are similar.

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I. Introduction

Migration to the US is having dramatic consequences on the supply of labor in Mexico. In 2000, 10% of individuals born in Mexico resided in the US, up from 2% in 1970 (Figure 1).[1] As is the case in many countries, rates of emigration are highest for young adults. During the 1990s alone, 9% of Mexicans 16 to 25 years old (based on age in 1990) migrated to the US (Table 1).

Migrant outflows of this magnitude affect labor markets in myriad ways. A growing literature examines the impact of Mexico's outmigration on labor-market outcomes in the country.[2] Chief among the effects, emigration appears to have put upward pressure on wages in Mexico, particularly in regions that historically have sent large numbers of migrants to the US. Mishra [2004] estimates that over the period 1970-2000 emigration raised average wages in Mexico by 8%. Wage increases are even larger in Mexico's high-emigration states, which over the 1990s experienced 9% higher wage growth than low-emigration states (Hanson [2007]).

The outflow of labor from Mexico does more than raise incomes for migrants. Once in the US, migrants remit a portion of their income to family members who remain in Mexico. In 2003, remittances from Mexican migrants in the US equaled 2% of Mexico's GDP (IDB [2004]). These inflows appear to be considerably larger than the loss in Mexico's GDP due to emigration.[3] Remittances also appear to have encouraged capital accumulation in Mexico, contributing to higher investment in small businesses (Woodruff and Zenteno [2007]).

An unexplored issue is whether remittances condition how emigration affects labor-market outcomes. In the absence of remittances, emigration would be likely to increase labor-force participation among adults, due both to the upward pressure that labor outflows put on wages and to the need to replace income lost to the exodus of wage earners from households. With remittances, however, migrant families may feel less need to have non-migrating adults work outside the home. For women, in particular, remittances may decrease incentives to spend time in the labor force and increase incentives to invest in home production. Thus, emigration may increase intra-household specialization, with migrants, who are often fathers, devoting more time to working abroad, and non-migrants, who are often mothers, devoting time to working at home.[4]

In this paper, I examine the impact of emigration on labor-supply decisions in Mexico. I use data from the 1990 and 2000 Mexico Census of Population and Housing to examine differences in labor-force participation and labor hours worked across individuals according to their exposure to opportunities to emigrate.

Complicating the empirical analysis, migration is not a random event. Households choose to send migrants abroad based on the perceived gains from doing so. Most emigrants from Mexico appear to enter the US illegally. Illegal immigration is costly, given the need to hire the services of a smuggler to evade ever stricter enforcement of the US-Mexico border by US immigration authorities. In the presence of imperfect credit markets, migration costs may preclude the poorest households from sending migrants abroad. Individuals in richer households, in turn, may feel working legally in Mexico is preferable to working illegally in the US. Thus, household income, wealth, and willingness to tolerate the vagaries of illegal migration are all likely to influence the migration decision. Since these characteristics are measured imperfectly (or not at all), households are likely to self-select into sending migrants abroad based in part on their unobserved characteristics.

To gauge the consequences of self-selection into migration for the analysis, I report results using two samples of individuals. The first sample contains individuals living in rural areas

of Mexico in 2000. The 2000 Mexico Census reports whether households had sent a migrant to the US in the last five years or received remittances from migrants abroad in the last month. I see whether labor-supply decisions vary across individuals, according to the migration status of their household. I focus on rural households, since they appear to be the units most likely to send individual migrants abroad. Urban dwellers, if they migrate, may be likely to move the entire household (since the cost of maintaining a household in Mexico is higher in urban areas than in rural areas). Without a valid instrument for the household migration decision, the analysis using this first sample is subject to concerns about the correlation between household migration status and unobserved household characteristics.

The second sample I use includes individuals from high-migration states and low-migration states in Mexico. Due partly to historical accident, Central and Western Mexico have long had the country's highest labor flows abroad (Cardoso [1980]; Durand, Massey and Zenteno [2001]). In Figure 2, which shows the fraction of households that sent migrants to the US over 1995-2000 by Mexican state, emigration rates are relatively low in states along the US border, sharply higher in states 600-1,200 kilometers from the US, and lowest in distant southern states. Most states that have high current emigration rates also had relatively high emigration rates 50 or more years ago (Figure 3). I compare individual labor-supply decisions in 1990 and 2000 for two groups of states, those that had high emigration rates in the 1950s and those that had low emigration rates in the 1950s. In this approach, I use historical migration rates as a reduced-form determinant of current migration opportunities.[5] Since high emigration in the past could have altered regions in a manner that affects current labor-market conditions, a reduced-form approach is more appropriate than using past migration behavior as an instrument for current migration.[6] To control for internal migration, I use the 1950s emigration rate in an individual's *birth state*, rather than his or her current state of residence. Historical migration rates in an individual's birth state are thus meant to capture current opportunities to migrate abroad.

An additional challenge for the estimation is that there may be other, unobserved shocks that have affected high and low migration states differently. Candidate shocks include the North American Free Trade Agreement, the privatization and deregulation of industry, the reform of Mexico's land-tenure system, and the 1994-1995 *peso* crisis.[7] Obviously, the potential for these shocks to contaminate the analysis is an important concern, which I address in discussing interpretations of the results.

In the next section, I document how migration behavior varies across regions of Mexico and discuss criterion for selecting which Mexican households and states to include in my sample. In sections III and IV, I examine the impact of emigration on labor supply and labor-force participation in Mexico. In section IV, I discuss interpretations of the results and limitations of the estimation strategy.

II. Regional Patterns of Emigration in Mexico

Data Sources

Data for the analysis come from two sources. In 1990, I use the 1% microsample of the *XII Censo General de Poblacion y Vivienda, 1990,* and in 2000 I use a 10% random sample of the 10% microsample of the *XIII Censo General de Poblacion y Vivienda, 2000*. Unfortunately, the 1990 census contains no information about household emigration behavior. The 2000 census includes two questions about migration abroad: (i) whether in the last five years anyone from the household migrated to the US or another foreign country, and (ii)

whether in the previous month anyone in the household received remittances from migrants located abroad. These questions have obvious shortcomings. They provide no indication of migrant schooling, migration histories, annual remittances, or in-kind transfers from migrants. Still, the 2000 census is useful in that it is the only nationally representative sample available for Mexico that contains information about migration to the US.[8]

For data on historical migration patterns, I use estimates of state emigration rates from Woodruff and Zenteno [2007]. They calculate the fraction of each Mexican state's population that migrated to the US over 1955-1959 by combining data on Mexican state populations with data on annual US immigration of temporary legal workers from each Mexican state under the US Bracero Program. The Bracero Program, which lasted from 1942 to 1964, allowed US employers to import workers from Mexico (and the Caribbean) to fulfill short-term labor contracts (of less than a year). The vast majority of temporary migrants admitted under the program worked in agriculture (Calavita [1992]). Woodruff and Zenteno [2007] also provide data on state emigration rates in 1924, which I use in some exercises.

Regional Patterns in Mexican Migration to the US

Large scale migration from Mexico to the US began in the early 20th century. Railroad construction in the late 19th century linked interior Mexico to the US-Mexico border, giving US employers improved access to Mexico labor (Cardoso [1980]). Just after the turn of the last century, farmers in Texas began to recruit laborers in Mexico. To find workers, recruiters followed the main rail line to the relatively densely populated states in the central and western regions of the country. The early migrants from Mexico came primarily from nine states in this region (Durand, Massey and Zenteno [2001]).[9] Mexican migration to the US increased in the 1920s, after the US Congress lowered quotas on US legal immigration. Recruitment expanded again in the 1940s, after Congress enacted the Bracero Program (Calavita [1992]). From the 1920s to the 1960s, the nine west-central states accounted for 44% to 56% of Mexican migration to the US (but only 27% to 32% of Mexico's total population) (Durand, Massey and Zenteno [2001]).

After a stint working in the US, migrants often return to Mexico and help later generations go abroad. Migrants staying in the US have created home-town associations that assist other individuals from their home communities in Mexico (Cano [2004]). There are also many informal networks through which current migrants help prospective migrants settle in the US. These networks tend to be related to family or community of birth, giving them a strong regional component. They also appear to affect migrant outcomes. Munshi [2003] finds that Mexican migrants in the US are more likely to be employed the larger is the US population of residents from their home towns in Mexico.

Figure 3 gives evidence of strong persistence in regional migration behavior. The states that had high migration rates in the 1950s, during the height of the Bracero Program, continue to be high migration states today. The correlation between state emigration rates in the 1995-2000 and the 1955-1959 is 0.73. The correlation between state migration rates in the 1995-2000 and 1924 is 0.48 (Woodruff and Zenteno [2007]). Figure 4 shows a similar strong positive correlation between the share of remittances in state GDP in 1995 and the 1955-1959 state emigration rate.

Table 2 reports regressions using as a dependent variable either the fraction of households sending migrants abroad or of the fraction of households receiving remittances from abroad over the 1995-2000 period. High migration states are not simply the poorest states or those closest to the US. In columns 1 and 5, there is a negative correlation between

emigration rates or remittances and state *per capita* income, but the explanatory power of income is not very strong. Adding distance to the US, in columns 2 and 6, doubles the R^2 of the regressions. Adding the state emigration rate in 1924, in columns 3 and 7, also raises the R-squared substantially. There appears, however, to be little covariation between 1995-2000 and 1924 state emigration rates that is independent of the 1950s state emigration rate. In columns 4 and 8, once the 1955-1959 emigration rate is added as a regressor the R^2 rises further and the 1924 migration rate becomes statistically insignificant.

If states with relatively high emigration rates are also more exposed to other aspects of globalization, the empirical analysis might confound the effects of migration with the effects of trade or capital flows. During the 1980s and 1990s, Mexico lowered its barriers to foreign trade and investment. See Chiquiar [2005] and Hanson [2004], [2007] for evidence that high-emigration states are not those that have benefited disproportionately from investment and trade reform (not surprisingly, the states that have benefited disproportionately are those close to the US-Mexico border).

Sample Design

The goal of this paper is to examine the consequences of emigration on labor supply in Mexico. The first approach I take is to utilize data on migration to the US in Mexico's 2000 population census and to compare labor-market outcomes in households with emigrants to outcomes in households without emigrants. One concern with this approach is that household migration behavior is endogenous. The unobserved characteristics of households that affect labor supply are also likely to affect whether households choose to send migrants abroad.

One might consider historical state emigration rates as potential instruments for current migration opportunities. Based on data from the 2000 census, the likelihood a household either has sent a migrant to the US in the last five years or has received remittances from abroad in the last month is strongly positively correlated with the 1955-59 emigration rate in the household head's birth state (Hanson [2007]). However, historical state emigration rates are unlikely to be a valid instrument for current migration rates. Emigration opportunities in an individual's birth state may have affected an individual's labor market experience or the quality of education the individual obtained. Thus, past emigration opportunities are likely to affect current labor-market outcomes both directly, through their impact on current emigration, and indirectly, through their impact on an individual's human capital.

Given these concerns, I also employ a second approach in which I compare changes in cross-section labor-market outcomes, where I categorize individuals according to the emigration rate in their birth state. In so doing, I capture both the direct and indirect effects of historical emigration opportunities on current labor-market outcomes. This strategy is thus to compare labor-market outcomes in regions that have been more or less exposed to opportunities to migrate to the US.

Table 3 describes the sample of states. I drop the six border states from the sample, since these states appear to have benefited disproportionately from trade and investment liberalization. Most border states had above average emigration rates in the 1950s and including them in the sample would potentially confound the effects of emigration with those of other aspects of globalization. To help isolate the effects of emigration, I limit high-migration states to those with emigration rates in the top three deciles of non-border states and low-migration states to those with emigration rates in the bottom three deciles of non-border states.[10] In 2000, 11% of households in the six high-migration states had sent a migrant to the US in the previous five years, compared with only 2% of households in the six low-migration states.

III. Summary Statistics on Wages and Labor-Force Participation

The most direct effect of foreign labor outflows has been to reduce the population of young adults born in high-migration states. Figures 5 and 6 show cohort sizes based on age in 2000 for males and females born in high-migration or low-migration states. In the absence of measurement error, changes in population size are due to either net migration abroad or to death. Cohort sizes decline for all age-sex groups, except 10-19 year olds. Population declines are largest for 20-29 year-old men (men born between 1971 and 1980) in high-migration states, whose number declines by a whopping 37 log points. For those born in low-migration states, the number of 20-29 year-old men drops by the smaller-yet-still-impressive value of 14 log points, such that the relative decline of the 20-29 year-old male population in high-migration states over 1990-2000 is 23 log points. Overall, the population of 20-59 year-old men declines by 9 log points for high-migration relative to low-migration birth states.

Absolute and relative changes for female cohorts are smaller. The cohort of 20-29 year-old women declines by 18 log points in high-migration states and 5 log points in low-migration states. Overall, the population of 20-59 year-old women declines by 7 log points in high-migration relative to log-migration states. Larger declines in the male population are consistent with the relatively high emigration rates for men in Table 1. Since we lack data on households with migrants abroad in 1990, we cannot perform the same analysis, comparing 1990 and 2000, at the household level.

One might expect the educational profile of individuals to differ according to the migration status of their households. Chiquiar and Hanson [2005] show that in Mexico individuals with moderately high education levels are those most likely to migrate to the US. If schooling is correlated across individuals within households, then individuals living in migrant households may tend to have relatively high education levels. On the other hand, if households tend to send their more-educated members abroad, those remaining in migrant households may tend to have lower education levels than individuals in households without foreign migrants.

Table 4 shows the distribution of schooling by age cohort in 2000 for individuals in rural areas, who live in households either with or without migrants in the US. Individuals who live in households that receive remittances from abroad are moderately over-represented in the 1-to-5-year-of-schooling group and under-represented in higher-schooling other groups. Among 30-39 year-old men in 2000, 34% had completed nine or more years of schooling in households without migrants abroad, *versus* 31% in households with migrants abroad. For women, these figures are 26% and 23%, respectively. A similar pattern is revealed when separating households by whether they have sent a migrant to the US in the last five years.

Repeating the analysis for high-migration and low-migration states, Table 5 shows the distribution of schooling by age cohort in 2000 for individuals born in these two groups of Mexican states. For men, average schooling is similar in low-migration and high-migration states. Among 30-39 year-old men in 2000, 47% had completed nine or more years of schooling in low-migration states, *versus* 46% in high-migration states. For women, these figures are 40% and 41%, respectively.

Despite comparable education levels in high and low-migration states, wages appear to be higher in high-migration states.[11] Figure 7 shows kernel densities for log average hourly wages. In 1990, wages have lower dispersion and a higher mean in high-migration states when compared to low-migration states. In 2000, these features are more pronounced. Relative to low-migration states, the wage density in high-migration states shows a distinct rightward shift, indicating positive relative wage growth.

The reported wage densities do not control for differences in the distribution of characteristics across regions. Hanson [2007] finds that after controlling for differences in age, education, and other observable characteristics, wages are higher in high-migration states and over the 1990s increase in high-migration states relative to low-migration states. Between 1990 and 2000, wages grow by 9% more on average for men in high-migration states, relative to low-migration states. Relative wage gains are even larger among male workers with higher education levels (9 to 15 years of schooling). The increase in relative wages in high-migration states is consistent with the decrease in the supply of labor in high-migration states relative to low-migration states, which is evident in Figures 5 and 6.

Table 6 shows the fraction of 30-49 year old men and women with positive labor earnings by schooling group in rural households with and without migrants in the US. Individuals have uniformly lower labor-force participation rates in households that either receive remittances (relative to households that don't) or that have sent migrants to the US (relative to households that haven't). This is suggestive evidence that incentives to participate in the labor force are lower in households that have sent migrants to the US, which would be consistent with greater intra-household specialization in migrant-sending households. However, this interpretation is subject to the caveat that differences in unobserved characteristics between households with and without migrants may contribute to differences in their labor-supply behavior.

Table 7 shows the fraction of 30-49 year old men and women with positive labor earnings by schooling group in high-migration and low-migration states. Among individuals with low schooling levels, men tend to have slightly lower labor-force participation in high-migration states. This pattern is evident in both 1990 and 2000. Among individuals with high schooling levels, labor-force participation is very similar in the two groups of states. For women, labor-force participation is much lower overall. Labor-force participation appears to be modestly lower in high-migration states in 2000, but not in 1990. Given sharply higher wages in high-migration states, similar labor-force participation rates in high-migration and low-migration states are perhaps surprising. This is additional suggestive evidence that households in migrant-sending regions may tend to be more specialized in home production than households in other regions. In the next section, we examine differences in labor-force participation across households and between regions in more detail.

IV. Emigration and Labor-Force Participation

Rural Households in 2000

Emigration may affect the labor-supply decision through several channels. For men and women, higher emigration may put upward pressure on wages, making it more likely that they supply labor outside the home. Within the household, sending migrants abroad may increase remittances to the household, raising incomes among family members in Mexico. Previous research has shown that higher household income is often associated with lower female labor supply (Altonji and Blank [1999]). For women, then, the impact of emigration on the labor-supply decision is ambiguous, depending in part on whether they substitute for emigrant labor in the Mexican labor market and on whether emigration increases household income through remittances.

To examine these channels, I estimate the labor-force participation and the labor-hours decisions as functions of individual characteristics, household characteristics, and regional characteristics. Following a large academic literature, I model the labor-supply

decision in reduced-form. Coefficients indicate which types of individual, household, or regional characteristics tend to be associated with higher returns in the labor-market (which would tend to increase labor supply, as long as substitution effects dominate income effects in the labor-leisure choice) or higher family income (which would tend to decrease labor supply, particularly for women).

In one exercise, I use cross-section data on household migration behavior from the 2000 population census to estimate the following regression for labor hours,

$$y_{hs} = \alpha_s + X_{hs}\beta_1 + \beta_2 \, \text{Remitt}_{hs} + \varepsilon_{hst} \quad (1)$$

where y is labor hours worked last week, X is a vector of observed characteristics, and *Remitt* is a dummy variable indicating whether or not the household receives remittances from migrants in the US (which is replaced in some regressions with the variable *Has Migrant in US*, to indicate whether a household has sent a migrant abroad in the last five years). The regression includes controls for state-of-birth fixed effects and adjusts standard errors for correlation across observations associated with the same birth state. I estimate equation (1) as a tobit, given that hours worked are zero for many individuals. In a second exercise, I estimate an analogous probit regression in which the dependent variable is a dichotomous outcome on whether or not an individual participates in the labor force. The sample is individuals living in rural households in 2000.

Table 8 shows regressions for whether an individual supplies labor outside the home. Labor-force participation is measured by whether the individual earns positive labor income; labor hours are measured by the reported number of hours an individual supplied for remunerated work in the previous week. The regressors are a quartic in age, dummy variables for schooling, dummy variables for the number of children in the household, dummy variables for state of birth, and an indicator of whether the household has sent a migrant to the US in the last five years or whether the household has received remittances from migrants abroad in the last month.

In households that have sent migrants to the US, the coefficient estimates indicate that men are 11% less likely and women are 2.5% less likely to supply labor outside the home, with both effects precisely estimated.[12] It is surprising that the estimated effects are so much larger for men than for women. For women, the results are consistent with sending migrants abroad leading to higher family income and lower female labor supply. Since a relatively large fraction of the migrants households send abroad are men, the results for them are harder to interpret. It could be that higher household income associated with remittances lowers male labor supply. It could also be that the members households choose to finance to go abroad or those most likely to work outside the home. The men remaining in Mexico could be individuals whose unobserved characteristics make them less likely to work for a wage (where this effect may operate for women, as well). Given these concerns, one may suspect the results are telling us more about the correlation between unobservables and labor supply than about the impact of migration behavior on labor supply.

The results for remittances are quite similar, indicating that in households that receive remittances from abroad men are 11% less likely to work outside the home and women are 2.2% less likely to work outside the home, with both effects precisely estimated. Again, it is surprising that the effects are so much larger for men.

Turning to labor hours, the second panel of Table 8 shows tobit regression results for hours worked in the previous week. Individuals in households that either have sent migrants abroad or received remittances from migrants abroad tend to supply fewer labor

hours than individuals in non-migrant households. These effects are precisely estimated both for the *Has Migrant in US* variable and for the Received Remittances variable. The coefficient magnitudes are larger for women, consistent with previous literature.

One might be concerned that the results are driven by unobserved differences in household wealth. In rural households, wealth is likely to be correlated with the education of household members. To continue beyond primary school (six years of education), individuals in many rural areas may have to relocate to a small or medium size town in order to gain access to a secondary school. In the second four columns of Table 8, I restrict the sample to individuals with 6 or fewer years of education. For both labor-force participation and labor hours, these results are very similar to those in the first four columns. One might also be concerned that the migration variables are picking up unobserved differences in household access to migration networks, rather than with the impact of migration itself. In the third four columns of Table 8, I restrict the sample to rural households in high-migration states. Presumably, there is less variation across households in access to migration networks in this sample. Again, the results are very similar to those in the first four columns of Table 8.

To return to the earlier discussion, the cross-section results in Table 8 are subject to concerns about the unobserved determinants of household migration behavior. The problem is that the unobserved characteristics of households that are correlated with labor supply may also be correlated with the household decision to send migrants abroad. For instance, households with higher unobserved sources of income may be more likely to have sent migrants to the US (since higher income makes it easier to finance migration costs) and less likely to have mothers in the household work outside the home (since higher income may lower the shadow value of female earnings for the household). As an attempt to deal with selection into migration by households, I redo the analysis for individuals from high-migration or low-migration birth states, where birth state serves as a reduced-form determinant of access to migration networks.

High-Migration and Low-Migration States in 1990 and 2000

In my alternative estimation strategy, I pool data across households in 1990 and 2000 and limit the sample to individuals living in rural areas who were born in either a high-migration state or a low-migration state. I then see whether labor-supply behavior changes differentially between high-migration and low-migration states over the 1990s. For hours worked, I estimate the following regression,

$$y_{hst} = \alpha_s + X_{hst}(\beta_1 + \beta_2 Y2000_{ht} + \beta_3 High_{hs}) + \phi * Y2000_{ht} * High_{hs} + \varepsilon_{hst}$$

where y is hours worked last week, X is a vector of observed characteristics, *Y2000* is a dummy variable for the year 2000, and *High* is a dummy variable for whether an individual was born in a high-migration state. The regression includes controls for state-of-birth fixed effects and allows returns to observable characteristics to vary across regions and time. The coefficient, φ, captures the mean differential 1990-to-2000 change in earnings between high and low-migration states. I also estimate an analogous probit regression in which the dependent variable is a dichotomous outcome on whether or not an individual participates in the labor force. Standard errors are adjusted for correlation across observations associated with the same birth state.

One important estimation issue is that shocks other than emigration may have had differential impacts on high and low-migration states. I've already discussed the shock associated with North American Free Trade Agreement (NAFTA) and trade reform more

generally. Other shocks in the 1990's include a currency crisis in 1995, a reform of the land-tenure system, privatization of state-owned enterprises, and industry deregulation. The existence of these shocks leaves the results subject to the caveat that factors other than emigration may have contributed to differential regional changes in earnings.

Table 9 reports the results. The results for women are quite similar to those in Table 8 but the results for men differ sharply. For women, there is an increase in the differential between high-migration and low-migration states in labor-force participation over the 1990-2000 period. The coefficient estimates indicate (based on mean values for the other regressors) that over the 1990s women in high-migration states become 2.2% less likely to work outside the home, where this change is precisely estimated. For men, there is no statistically significant change in their labor-force participation behavior between 1990 and 2000 in high-migration *versus* low-migration states. Limiting the sample to individuals with six or fewer years of education, the results are unchanged. This is additional evidence that, despite wage increases in high-migration states, women in these states became less likely to work outside the home. Consistent with the cross-sectional results for 2000, it appears migration abroad contributes to greater within-household specialization, with women devoting less time to work outside the home.

For labor hours, the results for women in Table 9 are also consistent with those in Table 8. Over the 1990s, women born in high-migration states reduce labor hours relative to women born in low-migration states, with this effect precisely estimated both in the full sample and in the sample of individuals with a primary education or less. For men, there is also a reduction in labor supply in high-migration states relative to low-migration states, but the effect is much smaller than that for women. As with the 2000 cross-section results, this finding is surprising. Relative to low-migration states, we would expect to see male relative labor supply increase in high-migration states in response to the observed increase in high-migration state relative wages.

Overall, there is some evidence that emigration is associated with lower household labor supply. Women are less likely to work outside the home in households with migrants abroad and show a decrease in the likelihood of working outside the home in high-migration states relative to low-migration states. If remittances raise household income, then these results are to be expected. In effect, households may be using their extra income to buy back labor time of women remaining in Mexico. However, we also see indication that emigration is associated with lower male labor supply. This is surprising and counterintuitive. Since male wages are rising in relative terms in high-migration states, we would expect to see increases rather than decreases in relative male labor supply. The results for men may indicate that neither regression approach I employ sufficiently accounts for correlation between unobservables and migration behavior.

V. Discussion

In this paper, I examine how emigration may have affected adult labor force participation in Mexico. To investigate the issue, I employ two estimation strategies, one of which exploits data on household migration behavior in Mexico's 2000 population census and the other of which exploits strong persistence of regional differences within Mexico in the likelihood of emigrating to the US. A key concern in the empirical analysis

is how to account for unobserved characteristics of households that may influence both labor-supply and migration behavior.

As in earlier decades, during the 1990s individuals born in Mexico's high-migration states appear to have a high propensity to migrate abroad. Between 1990 and 2000, the population of 20-59 year-old men born in high-migration states declined by 9 log points relative to similarly aged men born in low-migration states. For women, the corresponding relative regional change in population was 7 log points. Most of these population changes appear due to emigration. Mishra [2004] and Hanson [2007] find that emigration-induced reductions in labor supply have raised wages in Mexico.

In cross-section results for 2000, women in households either with migrants abroad or receiving remittances from abroad are less likely to work outside the home and supply fewer labor hours overall. Comparing 1990 and 2000, women from high-migration states in Mexico become less likely to work outside the home and reduce their total labor hours (relative to women from low-migration states). This pattern of behavior is consistent with households choosing to reduce female labor supply in response to emigration-induced increases in family income or regional income. That is, emigration appears to be associated with greater intra-household specialization.

What casts some doubt on this interpretation is that, at least in the cross-section regressions for 2000, the results for men and women are similar. This is surprising since previous literature would suggest that higher wages associated with emigration would increase male labor supply. One interpretation of the results for men (and possibly for women) is that they reveal information about self-selection into migration. In households that send migrants abroad, the men that remain in Mexico may be individuals whose unobserved characteristics make them less able or less willing to work outside the home. Similarly, in states that send large numbers of migrants to the US, the men that choose not to migrate abroad may be those whose labor-market opportunities, either in Mexico or the US, are relatively unattractive.

Concerns about self-selection into migration make it necessary to qualify the empirical results in this paper. We can say that I find suggestive evidence of a relationship between emigration and within-household specialization. To remove the qualification, we would need longitudinal data on households that would allow us to examine changes in within-household migration behavior over time.

Notes

[1] I take the total population of Mexicans to be the sum of individuals born in Mexico who reside in either Mexico or the United States (thus ignoring the small number of Mexicans residing in third countries).

[2] Comparatively, the literature on the consequences of immigration in the US is much larger. See Borjas [2007] for a collection of recent work on the Mexican immigration and the US economy.

[3] Based on Mishra's [2004] estimates, the emigration loss in Mexico for 2000 would be 0.5% of GDP (0.5 times the change in wages due to emigration of 8% times the loss in labor supply due to emigration of 16% times a labor share of income of 0.7). In that year, remittances were 1% of Mexican GDP.

[4] Of course, this outcome depends on households sending some but not all members abroad. If the entire household migrates, then migration might reduce intra-household specialization (as would be the case if all members of the household end up working outside the home).

[5] This approach depends on the assumptions that (a) labor is sufficiently immobile across Mexican regions for region-specific labor-supply shocks to affect regional earnings differentials (Robertson [2000], Chiquiar [2005] and Hanson [2004] for evidence consistent with this assumption), and (b) current opportunities to migrate to the US depend on regional historical migration patterns (Munshi [2003] and Orrenius and Zavodny [2005] for recent work on migration networks).

[6] For instance, states with higher emigration rates in the past could have attracted less investment over time, affecting the demand for labor in these states today.

[7] See Chiquiar [2003] on recent policy changes in Mexico. For work on the labor-market implications of globalization in Mexico, see Cragg and Epelbaum [1996]; Feenstra and Hanson [1997]; Revenga [1997]; Hanson and Harrison [1999]; Robertson [2000], [2004]; Feliciano [2001]; Farris [2003]; Ariola and Juhn [2003]; Chiquiar [2005] and Hanson [2004].

[8] Many studies on Mexican migration to the US use data from the Mexican Migration Project (MMP),a household survey in several dozen rural Mexican communities over the period 1987-1997 where emigration tends to be high (Durand *et al.* [1996]; Massey *et al.* [1994]). The MMP is not suitable for my purposes. The MMP sample of migrants is selected both in terms of the communities included, which are poor, rural, and in high-migration states (and so very far from being nationally representative), and in terms of its focus on return migrants (rather than on migrants currently residing in the US).

[9] These nine states are Aguascalientes, Colima, Durango, Guanajuato, Jalisco, Michoacán, Nayarit, San Luis Potosí, and Zacatecas.

[10] From this group, I drop the Federal District (Mexico City) from low-migration states (since this state has the highest *per capita* income in Mexico and is highly exposed to globalization; other low-migration states are poor, located in southern Mexico, and little exposed to globalization); and I drop Jalisco from high-migration states (since this state has Mexico's second largest city, which has also been highly exposed to globalization). The results are unchanged when these two states are added to the sample.

[11] Average hourly wages are calculated as monthly labor income (4.5*hours worked last week). I need to assume individuals work all weeks of a month, which could bias wage estimates downwards. To avoid measurement error associated with implausibly low wage values or with top coding of earnings, I restrict the sample to be individuals with hourly wages between $0.05 and $20 in Mexico (in 2000 US$). This restriction is nearly identical to dropping the largest and smallest 0.5% of wage values.

[12] These probabilities are based on mean values for the other regressors.

Table 1

SHARE OF US IMMIGRANTS FROM MEXICO IN THE POPULATION OF MEXICO
Percentage

Age Cohort		Males			Females		
		% Residing in US			% Residing in US		
Age in 1990	Age in 2000	1990	2000	Change	1990	2000	Change
--	16 to 25	--	11.99	--	--	7.68	--
16 to 25	26 to 35	7.57	17.53	9.96	4.89	12.62	7.73
26 to 35	36 to 45	10.87	15.49	4.62	7.69	11.90	4.21
36 to 45	46 to 55	9.18	12.21	3.03	7.47	10.44	2.97
46 to 55	56 to 65	7.00	8.64	1.64	6.44	8.36	1.92
56 to 65	--	5.70	--	--	5.84	--	--

Notes: This table shows Mexican immigrants in the US as a percentage of the population of individuals born in Mexico (equal to the sum of the Mexico-born population residing in Mexico and the Mexico-born population residing in the US) by age and sex categories. The sample is individuals 16-65 years old (in the US, excluding those in group quarters; in Mexico, excluding those not born in the country). Residents of Mexico in 1990 are the 1% microsample of the *XII Censo General de Poblacion y Vivienda* [1990], and in 2000 are a 10% random sample of the 10% microsample of the *XIII Censo General de Poblacion y Vivienda* [2000]. Mexican immigrants are from the 1990 and 2000 5% US Public Use Microsample.
Source: Chiquiar and Hanson [2005].

Table 2

Emigration and Characteristics of Mexican States

	Migration to US 1995-2000				Households Receiving Remittances 2000			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Constant	0.231	0.169	0.211	0.175	0.069	0.064	0.082	0.071
	(0.085)	(0.085)	(0.098)	(0.077)	(0.032)	(0.031)	(0.035)	(0.028)
Log *Per Capita*	-0.025	-0.036	-0.03	-0.017	-0.007	-0.012	-0.010	-0.006
GDP in 1995	(0.011)	(0.011)	(0.011)	(0.009)	(0.004)	(0.004)	(0.004)	(0.003)
Log Distance		0.070	0.006	-0.025		0.024	-0.003	-0.013
to US		(0.027)	(0.029)	(0.026)		(0.009)	(0.010)	(0.009)
Log Distance		-0.007	0.000	0.003		-0.003	0.000	0.001
to US Squared		(0.003)	(0.003)	(0.003)		(0.001)	(0.001)	(0.001)
Migration Rate			32.813	4.295			13.835	4.653
1924			(10.210)	(10.210)			(3.435)	(4.116)
Migration Rate				1.919				0.618
1955-59				(0.386)				(0.128)
Adjusted R^2	0.116	0.252	0.456	0.667	0.072	0.228	0.504	0.670
N	32	32	32	32	32	32	32	32

Notes: The sample is the 31 states of Mexico plus the Federal District. In columns 1-4, the dependent variable is the average share of households in a state that had sent a migrant to the US in the 1995-2000 period; in columns 5-8, the dependent variable is the share households in a state in 2000 that had reported receiving remittances from migrants located abroad in the previous month. Standard errors are in parentheses.
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 2000.

Table 3

RANKING MEXICAN STATES BY HISTORICAL EMIGRATION RATES

		Migration Rate		*Per Capita*	Pop. 2000
State		1995-2000	1955-1959	GDP 1995	('000s)
High	Aguascalientes	0.090	0.032	1,728	952
Migration	Durango	0.093	0.055	1,329	1,440
	Guanajuato	0.114	0.041	1,062	4,604
	Michoacán	0.130	0.031	901	3,921
	San Luis Potosí	0.087	0.025	1,094	2,362
	Zacatecas	0.151	0.059	878	1,348
	Mean	0.114	0.038	1,077	2,438
Low	Campeche	0.011	0.000	2,341	680
Migration	Chiapas	0.009	0.000	678	3,877
	Quintana Roo	0.009	0.000	2,437	876
	Tabasco	0.007	0.002	951	1,911
	Veracruz	0.037	0.000	912	6,923
	Yucatan	0.013	0.002	1,159	1,646
	Mean	0.021	0.001	1,030	2,652
Other Non-Border States		0.049	0.007	1,096	2,925
Border States		0.032	0.020	2,054	2,759

Note: This table shows rates of migration to the US, *per capita* GDP, and population for Mexican states. Means are weighted by the 2000 population of the subgroup.
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 2000.

Table 4

Schooling by Age, Gender, and Household Migration Status, 2000

		Receives	Years of Schooling					
Sex	Age	Remittances	0	1-5	6-8	9-11	12-15	16+
Men	30-39	No	0.082	0.284	0.294	0.207	0.087	0.047
	40-49	No	0.145	0.411	0.267	0.091	0.047	0.039
	50-59	No	0.254	0.488	0.174	0.048	0.019	0.018
	30-39	Yes	0.106	0.322	0.263	0.220	0.062	0.026
	40-49	Yes	0.138	0.534	0.209	0.075	0.032	0.012
	50-59	Yes	0.254	0.558	0.141	0.033	0.011	0.004
Women	30-39	No	0.119	0.320	0.298	0.156	0.074	0.034
	40-49	No	0.220	0.442	0.225	0.067	0.032	0.015
	50-59	No	0.356	0.461	0.130	0.033	0.013	0.006
	30-39	Yes	0.065	0.380	0.326	0.165	0.052	0.012
	40-49	Yes	0.140	0.554	0.250	0.035	0.016	0.005
	50-59	Yes	0.243	0.571	0.154	0.017	0.005	0.010

		Has US	Years of Schooling					
Sex	Age	Migrant	0	1-5	6-8	9-11	12-15	16+
Men	30-39	No	0.083	0.283	0.293	0.206	0.086	0.048
	40-49	No	0.145	0.406	0.267	0.094	0.049	0.041
	50-59	No	0.256	0.486	0.173	0.048	0.018	0.019
	30-39	Yes	0.069	0.306	0.300	0.212	0.091	0.022
	40-49	Yes	0.139	0.514	0.256	0.053	0.024	0.014
	50-59	Yes	0.235	0.534	0.159	0.041	0.024	0.007
Women	30-39	No	0.120	0.318	0.297	0.158	0.075	0.033
	40-49	No	0.222	0.435	0.225	0.068	0.033	0.016
	50-59	No	0.362	0.455	0.129	0.033	0.014	0.006
	30-39	Yes	0.074	0.385	0.322	0.137	0.056	0.026
	40-49	Yes	0.173	0.534	0.230	0.047	0.011	0.006
	50-59	Yes	0.265	0.552	0.148	0.025	0.005	0.005

Notes: This table shows the distribution of educational attainment for individuals in rural Mexico in 2000 by age and by whether an individual's household received remittances from the US in the last month or sent a migrant to the US in the last five years.
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 2000.

Table 5

SCHOOLING BY AGE COHORT IN HIGH-MIGRATION AND LOW-MIGRATION STATES, 2000

Sex	State Migration Rate	2000 Age Cohort	Years of Schooling					
			0	1-5	6-8	9-11	12-15	16+
Men	Low	30-39	0.072	0.220	0.238	0.218	0.147	0.104
	Low	40-49	0.108	0.307	0.253	0.127	0.089	0.116
	Low	50-59	0.182	0.404	0.213	0.075	0.056	0.070
	High	30-39	0.052	0.215	0.274	0.233	0.129	0.097
	High	40-49	0.090	0.292	0.288	0.142	0.082	0.106
	High	50-59	0.174	0.386	0.235	0.089	0.050	0.065
Women	Low	30-39	0.113	0.261	0.225	0.186	0.131	0.084
	Low	40-49	0.177	0.353	0.231	0.105	0.076	0.057
	Low	50-59	0.301	0.367	0.195	0.067	0.048	0.022
	High	30-39	0.060	0.236	0.298	0.205	0.135	0.066
	High	40-49	0.113	0.364	0.283	0.116	0.079	0.044
	High	50-59	0.218	0.414	0.216	0.083	0.052	0.017

Note: This table shows the distribution of educational attainment by age cohort for individuals 30-59 years old in 2000 born in high-migration or low-migration Mexican states (based on 1955-1959 emigration rates).
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 2000.

Table 6

Labor Force Participation by Household Migration Status

Years of Schooling	Men					
	Remittances			Has Migrant in US		
	No	Yes	**Diff.**	No	Yes	**Diff.**
0	0.558	0.558	**0.000**	0.561	0.508	**-0.053**
1-5	0.615	0.519	**-0.096**	0.620	0.522	**-0.098**
6-8	0.676	0.414	**-0.262**	0.679	0.553	**-0.126**
9-11	0.752	0.698	**-0.054**	0.757	0.635	**-0.122**
12-15	0.817	0.714	**-0.103**	0.827	0.594	**-0.233**
16+	0.880	0.901	**0.021**	0.882	0.810	**-0.072**
Total	*0.674*	*0.537*	***-0.137***	*0.679*	*0.552*	***-0.127***
Years of Schooling	Women					
	Remittances			Has Migrant in US		
	Noa	Yes	**Diff.**	No	Yes	**Diff.**
0	0.127	0.091	**-0.036**	0.130	0.082	**-0.048**
1-5	0.144	0.118	**-0.026**	0.146	0.119	**-0.027**
6-8	0.184	0.172	**-0.012**	0.186	0.164	**-0.022**
9-11	0.278	0.235	**-0.043**	0.277	0.273	**-0.004**
12-15	0.501	0.359	**-0.142**	0.503	0.418	**-0.085**
16+	0.762	0.743	**-0.019**	0.765	0.715	**-0.050**
Total	*0.205*	*0.157*	***-0.048***	*0.207*	*0.160*	***-0.047***

Note: This table shows the fraction of 30-49 year olds with positive labor earnings by sex, years of schooling, and whether an individual's household received remittances from the US in the last month or sent a migrant to the US in the last five years.
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 2000.

Table 7

Labor Force Participation in High-Migration and Low-Migration States

Men Years of Schooling	1990			2000		
	Migration State			Migration State		
	Low	High	**Diff.**	Low	High	**Diff.**
0	0.663	0.612	**-0.052**	0.625	0.596	**-0.029**
1-5	0.713	0.677	**-0.036**	0.684	0.668	**-0.016**
6-8	0.748	0.741	**-0.007**	0.777	0.775	**-0.002**
9-11	0.757	0.761	**0.004**	0.837	0.831	**-0.006**
12-15	0.666	0.686	**0.020**	0.862	0.859	**-0.003**
16+	0.784	0.823	**0.039**	0.892	0.886	**-0.005**
Total	*0.722*	*0.714*	***-0.008***	*0.774*	*0.767*	***-0.007***

Women Years of Schooling	1990			2000		
	Migration State			Migration State		
	Low	High	**Diff.**	Low	High	**Diff.**
0	0.058	0.092	**0.033**	0.167	0.172	**0.004**
1-5	0.079	0.095	**0.016**	0.214	0.171	**-0.044**
6-8	0.156	0.150	**-0.006**	0.268	0.254	**-0.015**
9-11	0.289	0.284	**-0.005**	0.357	0.358	**0.001**
12-15	0.427	0.450	**0.022**	0.538	0.522	**-0.015**
16+	0.589	0.594	**0.005**	0.733	0.720	**-0.013**
Total	*0.183*	*0.199*	***0.016***	*0.315*	*0.297*	***-0.018***

Note: This table shows the fraction of 30-49 year olds (based on age in 2000) that have positive labor earnings by year, sex, years of schooling completed, and whether an individual's birth state is high-migration or a low-migration.
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 1990 and 2000.

Table 8

Labor Supply and Household Migration Behavior

	Labor Force Participation											
	Full Rural Sample				Primary Education or Less				High-Migration States			
	Men		Women		Men		Women		Men		Women	
Sent Migrant to US	**-0.292**		**-0.103**		**-0.271**		**-0.091**		**-0.344**		**-0.108**	
in Last 5 Years	(0.020)		(0.019)		(0.019)		(0.031)		(0.027)		(0.030)	
Received Remittances		**-0.281**		**-0.092**		**-0.266**		-0.076		**-0.223**		-0.065
from US in Last Month		(0.038)		(0.040)		(0.043)		(0.041)		(0.053)		(0.049)
R	0.064	0.062	0.103	0.103	0.051	0.050	0.042	0.042	0.066	0.061	0.119	0.118
N	117,585	117,585	126,017	126,017	82,773	82,773	94,540	94,540	25,986	25,986	30,268	30,268

	Hours Worked											
	Full Rural Sample				Primary Education or Less				High-Migration States			
	Men		Women		Men		Women		Men		Women	
Sent Migrant to US	**-4.999**		**-5.827**		**-4.171**		**-6.709**		**-6.943**		**-6.480**	
in Last 5 Years	(0.336)		(0.762)		(0.392)		(1.024)		(0.570)		(1.262)	
Received Remittances		**-6.633**		**-8.008**		**-6.025**		**-8.154**		**-7.700**		**-9.278**
from US in Last Month		(0.598)		(1.236)		(0.652)		(1.606)		(0.927)		(1.968)
R	0.006	0.006	0.024	0.024	0.006	0.006	0.013	0.013	0.007	0.006	0.032	0.032
N	117,585	117,585	126,017	126,017	82,773	82,773	94,540	94,540	25,986	25,986	30,268	30,268

Notes: The sample is individuals living in rural areas of Mexico aged 20-59 in 2000. The first table shows a probit on whether an individual has positive labor earnings. The second table shows a tobit on hours worked. "Sent Migrant to US" indicates whether the individual's household sent a migrant to the US in the last five years. "Receives Remittances" indicates whether the individual's household received remittances from migrants living abroad in the last month. Other regressors are a quartic in age, dummy variables for schooling, dummy variables for the number of children in the household, and dummy variables for state of birth. Standard errors (in parentheses) are adjusted for correlation in the errors within birth states.

Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 1990 and 2000.

Table 9

Labor Supply in High-Migration and Low-Migration States, 1990-2000

	Labor-Force Participation				Hours Worked			
	Full Rural Sample		Primary Education or Less		Full Rural Sample		Primary Education or Less	
	Men	Women	Men	Women	Men	Women	Men	Women
Year 2000*	0.062	**-0.145**	0.065	**-0.172**	**-2.400**	**-8.484**	**-2.729**	**-11.546**
High Migration	(0.091)	(0.065)	(0.106)	(0.069)	(0.488)	(1.787)	(0.536)	(2.304)
R	0.049	0.139	0.039	0.067	0.006	0.049	0.006	0.034
N	59,201	62,271	48,469	54,163	59,201	62,271	48,469	54,163

Notes: This table reports results for probit (tobit) regressions in which the dependent variable equals one if an individual has positive labor earnings (hours worked). The sample is men and women living in rural communities in Mexico aged 20-49 in 1990 or 30-59 in 2000 born in a high-migration or a low-migration Mexican state. The other regressors are: (a) a quartic in age, dummy variables for five categories of educational attainment (1-5 years, 6-8 years, 9-11 years, 12-15 years, or 16+ years), a dummy variable for marital status, dummy variables for presence of children in the household (ages 0-5, 6-12, or 13-18 years), dummy variables for the state of birth, and a dummy variable for the year 2000; (b) interactions between the age, education, marital status, and children variables and the year 2000 dummy; and (c) interactions between the age, education, marital status, and children variables and a dummy variable for whether the individual was born in a high-migration state. Coefficients show the change in the probability of labor-force participation (change in hours worked) associated with an individual being from a high-migration state in 2000 *versus* that in 1990 (evaluated at means for other regressors in probit regressions). Standard errors (corrected for correlation in the errors within birth states) are in parentheses.
Source: Author's calculations based on data from the *Censo de Población y Vivienda, México* 1990 and 2000.

Figure 1

Share of Population Born in Mexico Residing in the US

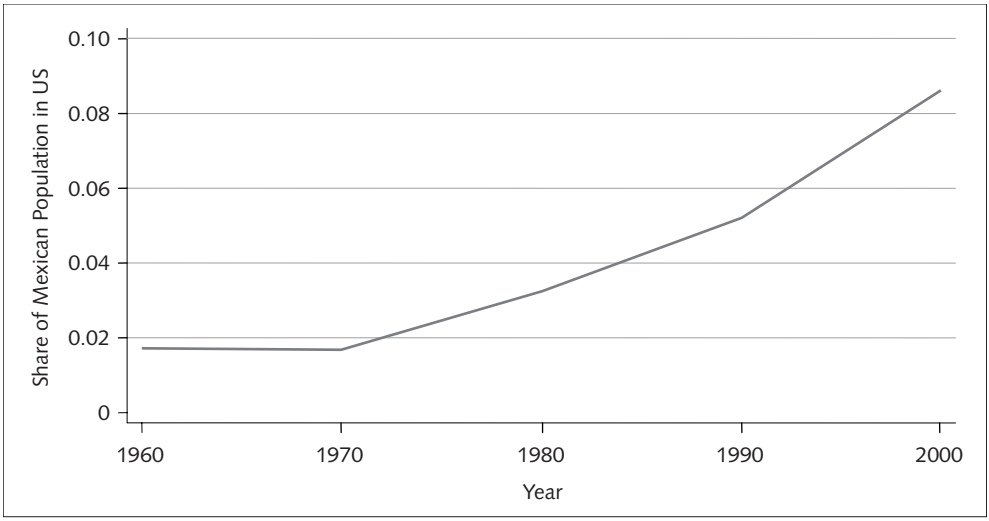


Figure 2

Rate of Migration to the US 1995-2000 by Mexican State

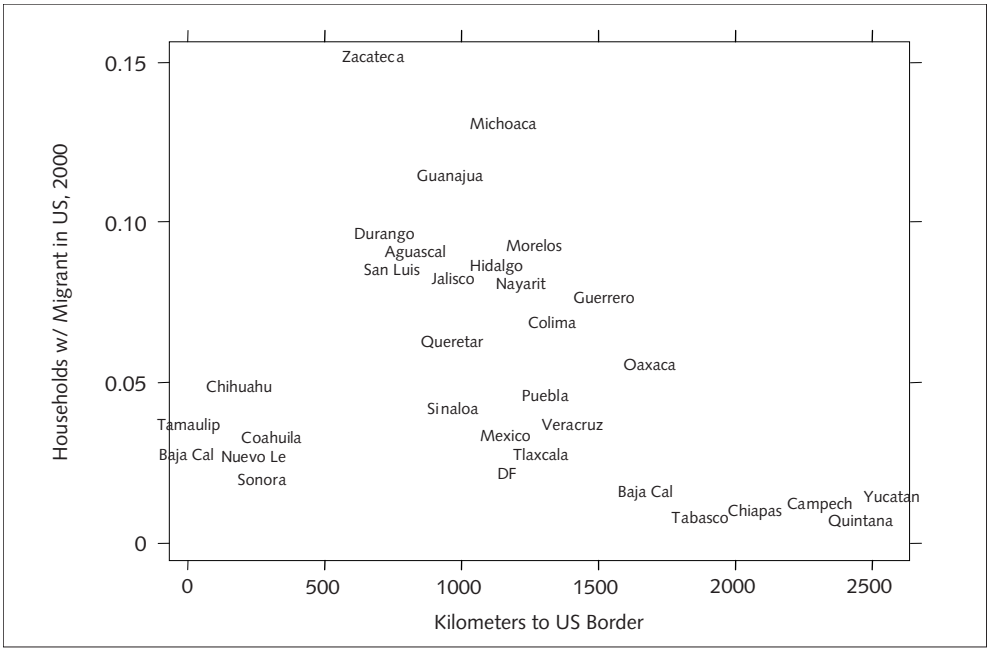


Figure 3

STATE RATES OF MIGRATION TO THE US IN 1990S VERSUS 1950S

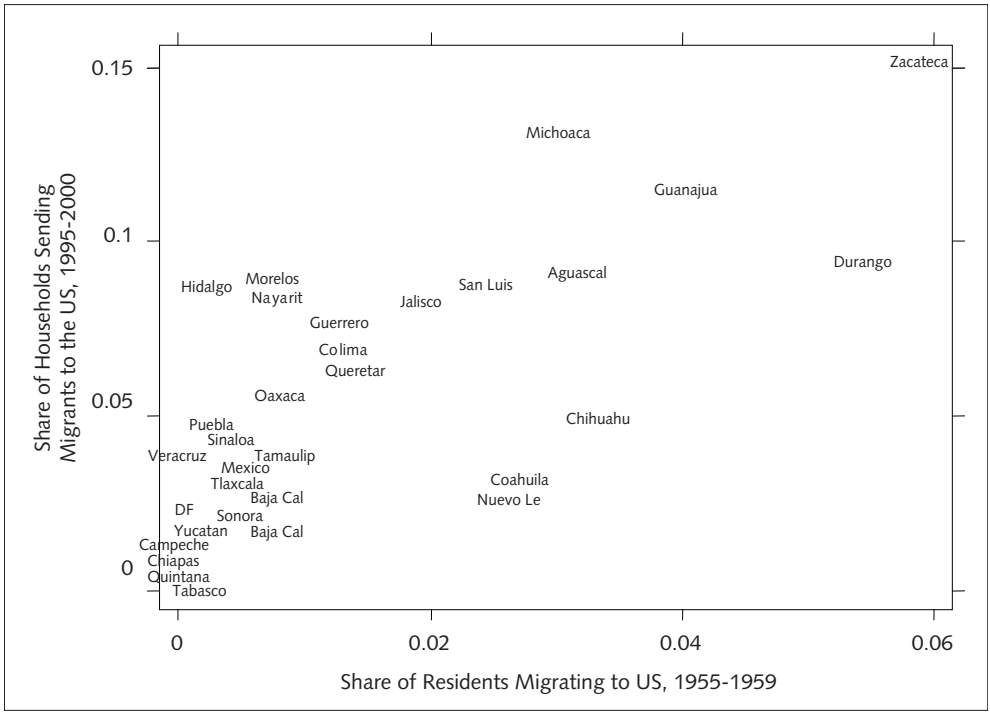


Figure 4

REMITTANCES AND HISTORICAL MIGRATION RATES TO THE US

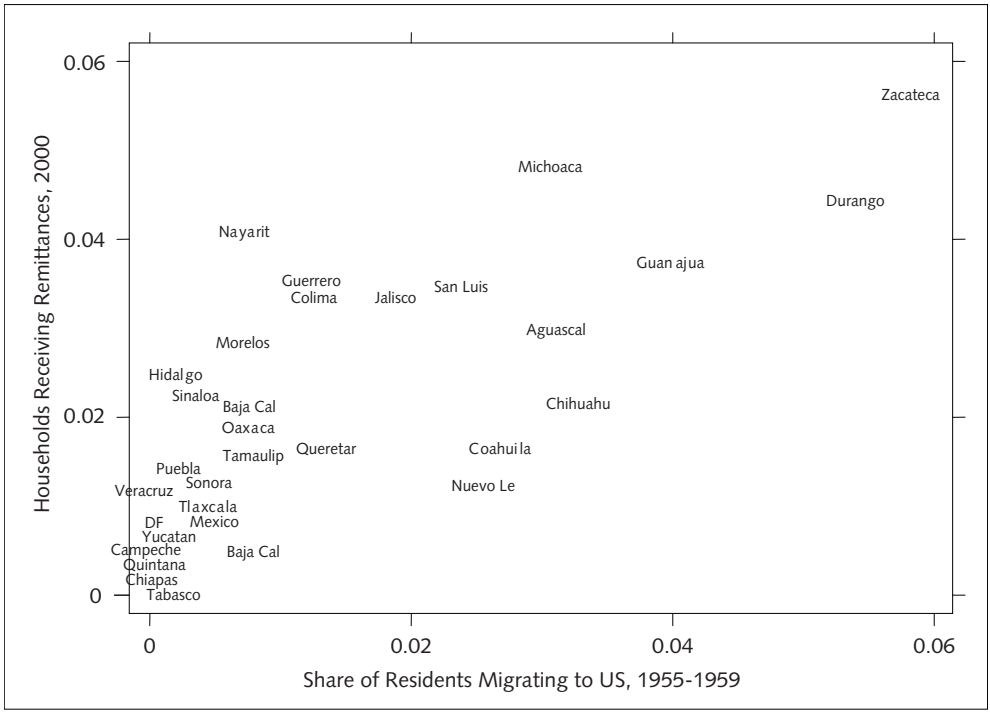


Figure 5

COHORT SIZES FOR MEN BORN IN HIGH AND LOW-MIGRATION STATES
Based on Age in 2000

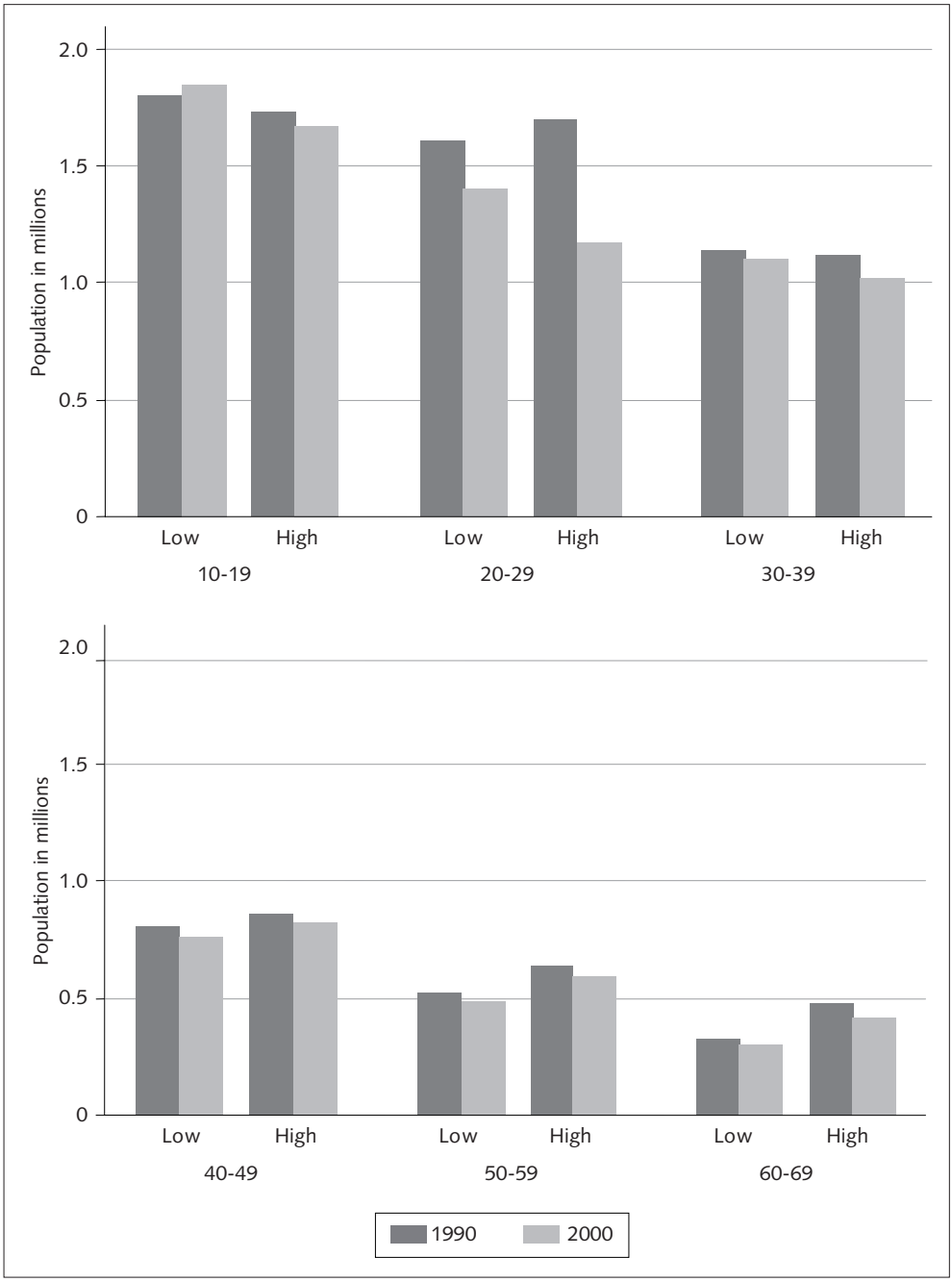


Figure 6

COHORT SIZES FOR WOMEN BORN IN HIGH AND LOW-MIGRATION STATUS
Based on Age in 2000

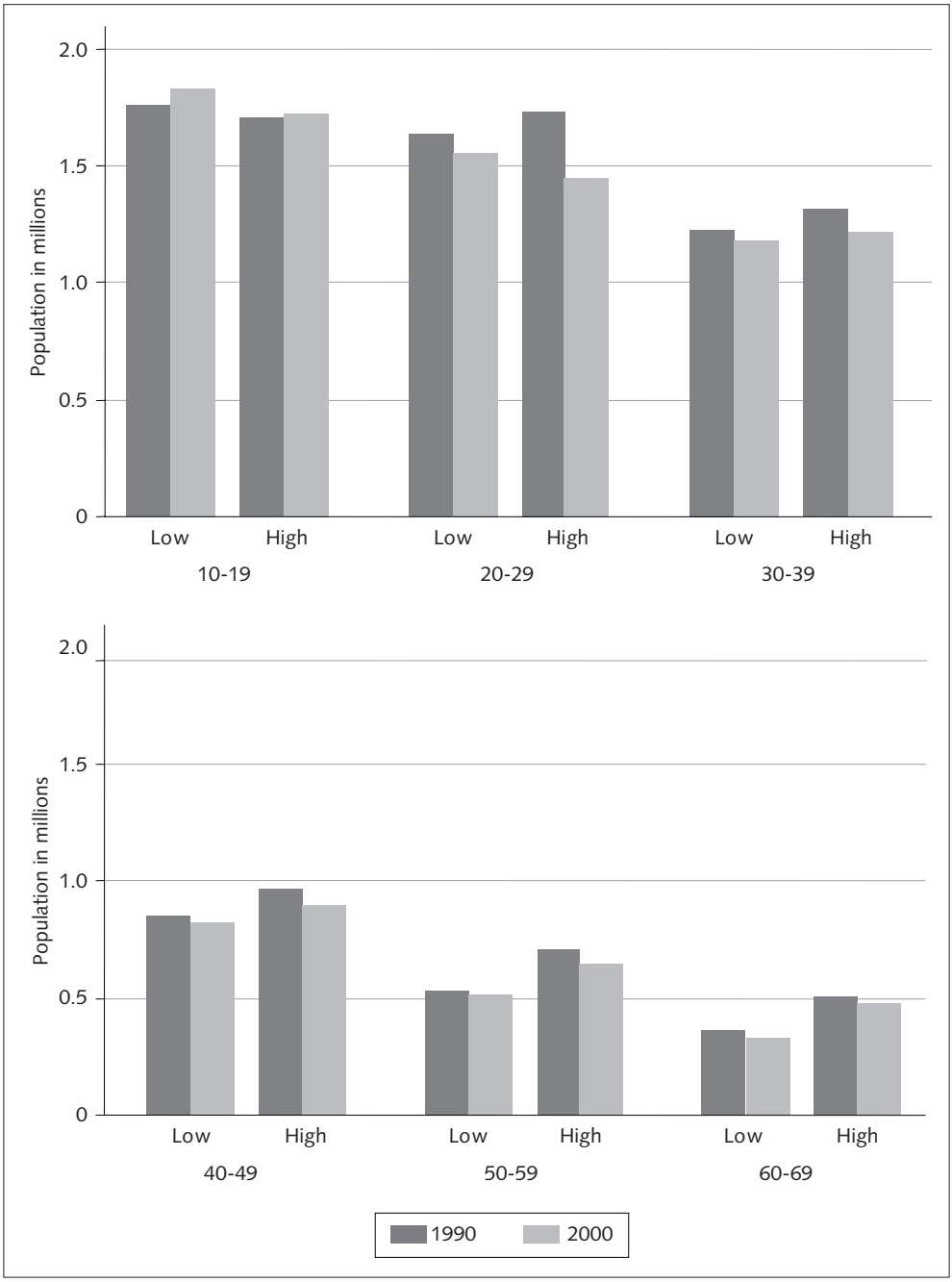
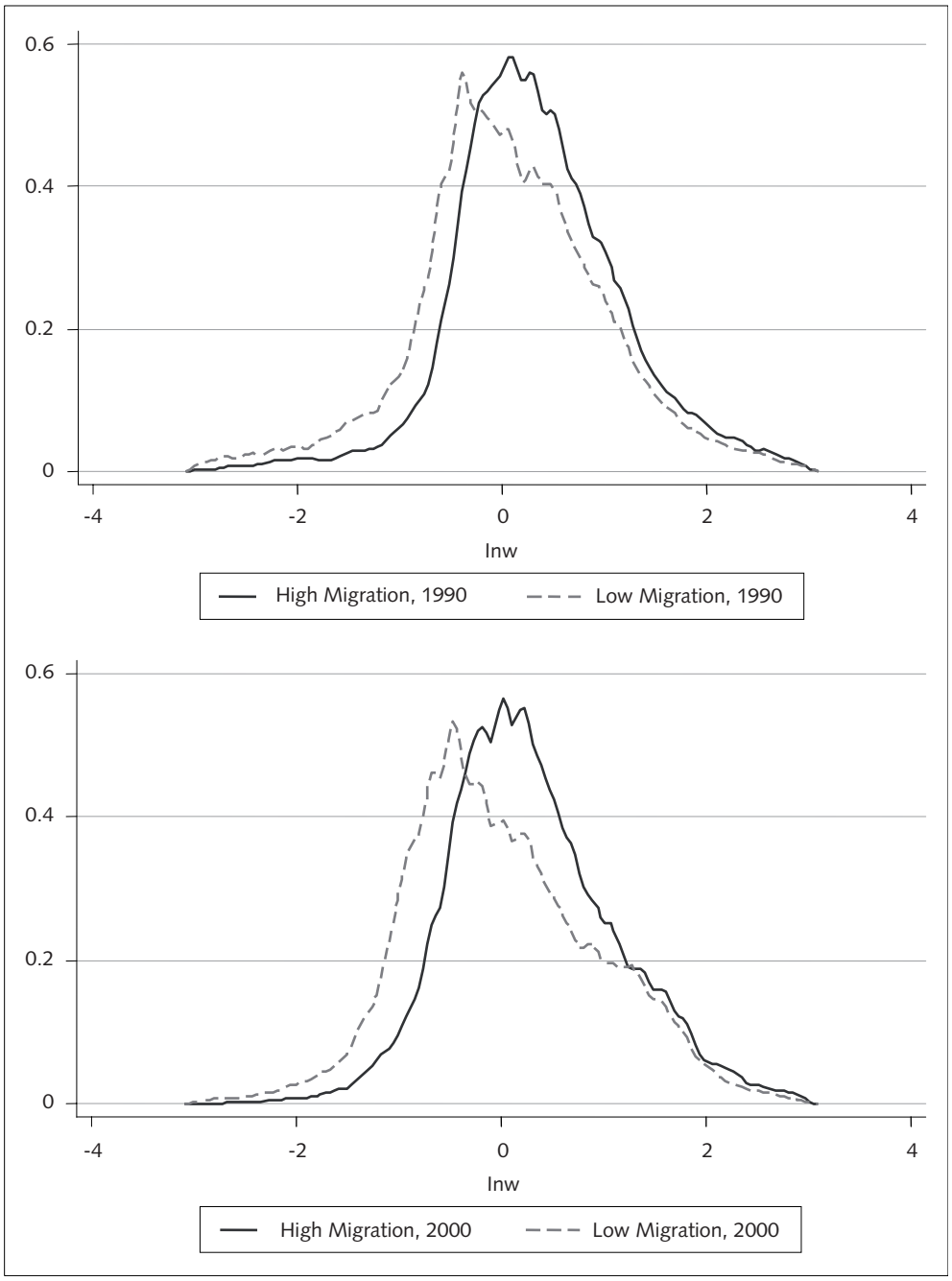


Figure 7

KERNEL DENSITIES FOR LOG WAGES IN HIGH-MIGRATION AND LOW-MIGRATION STATES



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Migrant Remittances, Human Capital Formation and Job Creation Externalities in Central America

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Summary

In this paper we model the effect of migrant remittances on job creation and human capital formation, given migration prospects. Model calibration of deep parameters was performed with data from El Salvador and Honduras. The simulations based on the model show that remittances can have offsetting effects on the equilibrium between human capital and labor market outcomes in the country of origin of migrants. First, remittances enhance schooling opportunities for recipient households, and human capital formation can be augmented. Second, an increase in human capital supply by recipient households induces job creation as labor demand increases in the origin country. If a sufficiently large share of remittance recipients do not migrate, then the net effect is brain gain rather than brain drain ensuing remittances. The job creation spillover in local labor markets increases the rate of return to schooling for non recipient households, whose members are less likely to migrate. As a result, there are more incentives to substitute consumption for human capital investment. At the same time, the rise in expected income due to the spillover induces higher desired consumption. If the "substitution effect" outweighs the "income effect", then remittances will increase overall human capital and reduce the unemployment rate. The calibration and simulation analysis for El Salvador and Honduras suggests that the net effect of remittances depends upon the accessibility of education and the degree and labor market frictions in the origin country as well as the immigration policy in the destination country of migrants.

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I. Introduction

The impact of migration on both sending and receiving countries has long been researched. The purpose of this paper is to shed light on the relationship between migrant remittances and human capital formation under imperfections in the job matching process. Thus we will analyze the impact of migration on the labor markets of the sending countries. Different forces can affect the way labor markets perform, especially when migration occurs between countries at different stages of development. On the one hand, migration from a less to a more developed country affects natives in the destination country by introducing more competition in the labor market and by influencing the decision of entrepreneurs to offer new job opportunities. On the other hand, migration can also affect the labor market in the origin country. First, migration prospects can influence the education decision of both migrants and stayers (Stark *et al*. [1998] pp. 363-367). Second, when migrants remit part of their earnings back to their households, they can affect the consumption, investment and employment decisions of the recipients. Also, the decision to increase human capital investments by recipient households generates a job creation externality on non recipient households. As aggregate employment prospects improve in the country of origin of the migrant, the rise in expected income increases returns to human capital investments generally. Hence, both aggregate employment and human capital can rise ensuing migration. However, there can be two mitigating effects. One due to the brain drain cause. The other is the wealth effect associated with remittances, which, other things equal, makes consumption and leisure more desirable.

Economic analysis of the effects of remittances has become an important issue recently because of the rapid growth of this form of financial flows. Official estimates by the Inter-American Development Bank (IDB) put remittances to Latin America and the Caribbean at around US$ 45.8 billion in 2004 but the total amount, which includes flows through unofficial channels, is thought to be greater than this. Even the official level of remittances exceeds the amount received in overseas aid for many countries in the region. Remittances are particularly important in El Salvador and Honduras. For example, in El Salvador remittances flows amounted to 17% of GDP in 2004, and in Honduras to 11%. In the Central American context, remittances have risen dramatically during this decade. In El Salvador, remittances have grown by 33% since 2000. In Honduras, remittances have grown by 147%.

Given the salient and growing macroeconomic influence of remittances as part of international capital flows in Latin America, it is of fundamental importance to assess the general equilibrium effects of migrant remittances. In this paper, we analyze the impact of remittances on human capital in a general equilibrium framework. The basic idea of the model is that migrant remittances can have two opposing effects on human capital and employment for both recipient and non recipient households. (1) For recipient households, remittances from migrants generate funds that enhance schooling opportunities and potentially generate a brain gain. But, educated remittance recipients could eventually migrate and cause a brain drain. (2) For non recipient households, the job creation spillover from higher human capital, when there is net brain gain among recipient households, increases the rate of return to schooling. But, the income effect of remittances could increase desired consumption and leisure, thereby reducing human capital investment. Therefore, the net effect of remittances on human capital is far from obvious. In particular, we show that when households are financially constrained, under certain conditions remittances can increase the human capital supply, and thereby reduce the unemployment rate in the home labor market.

We develop a matching model with frictions in the labor, giving rise to search, and with capital market imperfections, giving rise to credit constraints. This gives us a useful theoretical framework to discriminate between the "productive" and "unproductive" uses of remittances. As with any source of wealth, the allocation of remittances depends on incentives. When education costs are relatively low and schooling enhances labor market prospects, at home or abroad, the net rate of return to human capital formation is high. If the net rate of return to human capital formation is high (low), additional remittances are likely to be allocated on the margin to schooling investments (consumption).

We also consider the effect of remittances on the unemployment rate of the labor exporting country. Remittances have two opposing effects on the labour market. First they augment the pool of funds for recipient households back home. This causes schooling to rise. Since it is likely that many households in labor exporting countries are credit constrained, remittances available for schooling investment will then relax these constraints and increase the level of the human capital stock. The second effect is on the return to human capital investment in the country receiving remittances. The effect of the rise in the human capital supply of households receiving remittances is to induce job creation, and to reduce the unemployment rate as non recipient households also increase schooling. As a result of the higher relative return to education, one effect is the substitution away from consumption and leisure towards human capital investment. At the same time, higher expected income has an opposite effect increasing the desirability of consumption and leisure, as they are normal goods. If the "substitution effect" outweighs the "income" effect arising from better opportunities, then remittances will increase human capital supply and reduce the unemployment rate.

The paper is organized in the following way. Section II provides an overview of the existing theoretical and empirical literature on the effects of migration on the welfare of stayers. Section III introduces the basic model in which we explore the effect of remittances on human capital and labor market outcomes. Section IV contains simulation and calibration analyses on the impact of remittances on human capital and unemployment in Central America. Finally, in Section V we conclude.

II. Related Literature

A fruitful way to assess the economic role of remittances is to rely on household surveys and estimate the proportion of households for which remittances are an important source of income. Such surveys tend to show that remittances are often a crucial element of survival and livelihood strategies for many (typically rural) poor households. For example, Rodríguez [1996] reports that 17% of Philippines households receive income transfers from abroad, representing 8% of national income. Similarly, Cox, Eser and Jiménez [1998] found that 25% of Peruvian households receive private transfers (mainly remittances), representing 22% of their incomes. On a more reduced scale, de la Brière *et al*. [2002] show that approximately 40% of the households in the Dominican Sierra, a poor rural region of the Dominican Republic, have migrant members, 52% of whom are sending remittances.

In the context of Central America, Cox and Ureta ([2003] pp. 429-461) find for El Salvador that 14% of rural and 15% of urban households received remittances from friends and relatives abroad in 1997. These studies, as well as many others detailed below, show that remittances are instrumental to achieving mutual insurance, consumption smoothing, and alleviation of liquidity constraints. In another study, Funkhouser ([1995] pp. 137-146) study compares remittances to the capital cities of El Salvador and Nicaragua. In this study,

Funkhouser noted that while the number of migrants and the general economic conditions prevailing in the two countries during the 1980s were quite similar, twice as many households received remittances from relatives abroad in San Salvador than in Managua; moreover, for those who received remittances, the average transfer received in San Salvador was twice as high as that in Managua. Using micro data on both migrants and receiving households, Funkhouser [1995] found many similarities between the two pools of migrants with respect to age, education, gender, and, to a lesser extent, number of years since emigration. In other words, differences in remitting behavior could not be accounted for by differences in households or migrants observed characteristics, including the timing of migration. By contrast, the estimation of remittance functions revealed substantial differences in remitting behavior between the two samples, allowing to conclude that differences in unobserved characteristics (that is, how remitters self-select with the pool of migrants) are central to explaining inter-country differences in remittance behavior. Remitters were negatively selected out of the pool of emigrants, but in a more pronounced way for Nicaragua, meaning that the more educated Salvadorans tend to have stronger motives and/or opportunities to remit. Remittances were negatively correlated to years since emigration for both immediate family members and other relative emigrants in Nicaragua but not for Salvadorans, suggesting higher propensities to return among the latter.

The relationship between remittances and education has been explored in the literature, with particular attention to the effect on the decisions of members of recipient households. The first possible link between remittances and education is through the repayment of informal loans.[1] A natural interpretation is that the prospect of migration makes education a profitable investment for the family. Hence, migration fosters human capital formation provided that not too many educated individuals emigrate out of the country. In this case, remittances are a financial arrangement to make possible the materialization of the brain gain brought about by migration prospects.

An alternative is that the migrant rather than being the borrower as above is, in some sense, the lender. Along the lines suggested in the theoretical model of remittances and liquidity constraints in this paper, a second possible link between remittances and education must be considered as remittances also finance education for the migrants' household members who stayed back home. Given the relatively high income elasticity of education, one would expect remittances to have significant positive effects on the educational attainments of members from households with migrant members. Notwithstanding, as Hanson and Woodruff [2003] point out, such households are also often characterized by the absence of one parent. Since recent research on education indicates that this could be detrimental to the children's schooling achievements, the overall effect on educational attainments is a priori unclear.

Few studies have looked for evidence on this potential forward linkage between remittances and education. In fact, the only works on remittances and investments in human capital we are aware of are two recent studies on Mexico by López Córdova [2004] and Hanson and Woodruff [2003], and one by Cox and Ureta [2003] on El Salvador, which contribute towards documenting the potential growth effects of remittances through human capital formation. First, López Córdova [2004] establishes using municipal data that a higher incidence of remittances is associated with improvements in various indicators of welfare. A one standard deviation increase in the fraction of households receiving remittances within a municipality is associated with a decrease of 5% in child mortality, a rise in school attendance of 4% and a remarkable fall in illiteracy of 40%. This study is of particular interest because it considers the impact of remittances not only on recipient households but also on non recipient

household within the same municipality. Hanson and Woodruff [2003] used the 2000 Mexican Census to evaluate the effect of remittances on accumulated schooling (number of school grades completed, and not only number of years) by 10-15 year olds, a critical age group. Their preliminary results show that children in households with a migrant member complete significantly more years of schooling, with an estimated increase that ranges from 0.7 to 1.6 years of schooling; interestingly, the gain is the highest for the categories of children traditionally at risk of being dropped from school, that is, girls and older children (13 to 15 year olds). These results are robust with respect to the identification procedure (that is, when migration is treated as endogenous) and the introduction of dummy variables for Mexican States. Cox and Ureta [2003] estimate survival functions and show that remittances significantly contribute to lower the hazard of leaving school. This effect would seem to be greater in urban areas, but the mere fact of receiving remittances (irrespective of amounts) is shown to have a very strong effect in the rural areas as well.

The literature has also explored potential effects of remittances on labor market outcomes in the country of origin of migrants. The most obvious effect that migration from developing countries should have on the labor market in the home economy is that, in itself, migration should lower the unemployment rate by reducing the supply of labor. However, the relationship between migration and the labor market in the labor exporting country is far more complex than this. In particular, given that it is often the most skilled individuals who migrate, a brain drain could negatively affect the labor market of the labor exporting country, although more recent studies argue that the brain drain need not harm less development countries (LDCs) as the net effect of skilled migration could be brain drain (Stark *et al*. [1997] pp. 227-234 and 1998; Beine *et al*. [2001]).

The empirical literature has explored how labor market participation among recipient households is related to remittances. Funkhauser [1992] notes that migration and remittances can have two effects on participation decisions on the home country's labor market. The loss of the migrant worker may mean that other household members, in particular females, enter the labor market. However, the receipt of remittances could reduce participation rates because of the income effect. He further suggests that high levels of remittance flows into local labor markets may increase aggregate demand and hence the demand for labor. Using data from El Salvador, he finds that remittances have a negative and significant influence on the labor force participation of both males and females. However, he finds that migrants do not have a significant effect on local labor markets. For females the positive but small effect of the local labor market is enough to outweigh the negative remittance effect, but for males, the negative income effect from remittances dominates all other effects.

Further evidence that remittances act in a similar way to welfare payments is provided by Zachariah *et al*. ([2001] pp. 43-68). They report that the worker-population ratio was 55% amongst non-migrant households in Kerala but only 31.6% in households with an emigrant. They suggest that this finding may be caused by employment seekers from emigrant households being more selective with regards to their job match. Furthermore, they report unemployment rates of 20.8% and 8.1% for emigrant and non-emigrant households respectively. They conclude their section on the effect of migration on employment and unemployment with the comment "because unemployed persons belonging to emigrant households enjoy the financial support of the emigrant members, they are not in any hurry to get employed" (p. 55).

The idea that unemployment insurance can improve productivity is theoretically explained in Marimon and Zilibotti [1997]. They develop an equilibrium search matching model

with two-sided and ex-ante heterogeneity to obtain a distribution of match productivity. An increase in unemployment benefits acts as a safety net and the unemployed wait longer for better matches. They find that in an economy with higher unemployment benefits there will be a higher unemployment rate but also a better allocation of skills to jobs. In our context, workers may not only devote more time to employment search, as result of receiving remittances, but also may invest in skill upgrading to enhance job market prospects. Productivity may increase due to both better skill matching and higher average human capital.

It is also important to explore exactly how remittances are used in the home country. The central issue here is whether there is a dual use of such resource transfers. On the one hand, studies have suggested that migration, through remittances, have a positive impact on consumption in the source country. Furthermore, if the majority of the money that is sent back is spent on goods and services, then remittances could cause inflation which could lead to excessive wage claims. On the other hand, remittances can be equality enhancing and have a positive impact on the development of poor areas, especially if they are invested in productive activities.

Several papers characterize the composition of spending of household receiving remittances. Most studies have found that remittances are generally spent on consumer goods such as food and clothes as well as housing, although there is a debate over the extent to which they are used for productive purposes. Durand *et al*. ([1996] pp. 249-264) report that 10% of their sample of Mexican migrants to the US who reported that they sent remittances or brought savings back with them spent at least some of the saved/remitted money (that is, migradollars) productively, 14% reported that they spent some of their migradollars on housing and the remaining 76% reported that they spent the migradollars only on consumption.

Glytsos ([1993] pp. 131-168) estimates that only 4% of the estimated 14 billion drachmas sent migrant remittances to Greece in 1971 was invested in machinery and another 4% was invested in small shops, compared with 63% on consumption, 22% on housing and 7% on land. Using input-output analysis, he estimates that the multiplier effect associated with migrant remittances is 1.7 and this is found to vary between industries. Multiplier effects are estimated to be highest in the apparel and footwear, leather and electrical machinery industries and lowest in services. The author also estimates the potential employment and capital effects of remittances amounted to around 74,000 new non-agricultural and non-public sector jobs and 8% of installed manufacturing capacity.

Adams ([1998] pp. 155-173) also finds that external remittances have an important impact on the accumulation of rural assets using Pakistani data and argues that the marginal propensity to invest transitory income is higher than it is for labor income. Rozelle *et al*. [1999] find that remittances help to loosen the constraints on crop production in rural China and also stimulate productivity. Furthermore, given that many LDCs are likely to face capital and liquidity constraints, these constraints can be eased as a result of the savings that are deposited by migrants or their families. Therefore despite the fact that only a small proportion of remittances may be invested directly by migrants or their families, remittances can be channeled into productive uses by the banking system.

Kule *et al*. ([2002] pp. 229-239), summarize the results of two surveys carried out in Albania in 1998. The first of these was completed by around 1500 individuals about their migration experience (of whom just under a half had migrated), whilst the second contained questions which were directed towards firms. Both of these surveys contained information on remittances. The information provided in the first of the surveys suggested that over 50% of the remittance sent to Albania were used for consumption,

16% were saved in a bank, 7% were invested both in financial institutions and in property, and over 7% invested in business. The survey of firms indicates that around 17% of the capital required to establish a business came from remittances. This evidence suggests that remittances can be seen as a way to overcome credit-constraints in the source economy.

Finally, Leon-Ledesma and Piracha [2001] also adopt a positive view of the relationship between migration and development by modelling the effects of short term migration on labor productivity. Remittances can be channeled into investments and increase productivity in the home economy. The authors study the impact of migration and remittances on the employment performance of Central and Eastern European Countries and claim that the main sources of the migrants' savings from overseas are used productively in the home country.

To the best of our knowledge, the literature on matching theory has been silent until now on the role of migration opportunities on the labor market performance of the home country. In the absence of credit market imperfections, producers choose the optimal level of investment and the introduction of new savings in the economy does not have any effect on the output produced by each firm. The introduction of credit constraints generates new effects and creates a link between the literature on matching theory and the one that investigates the effects of remittances on labor exporting countries.

We provide a framework to explore how international remittances impinge on human capital formation and the labor market. The presumption is that human capital is the engine of growth, and that liquidity constraints affect on human capital formation. The most commonly cited motivation to remit is simply that migrants care of those left behind: spouses, children, parents, and members of larger kinship and social circles. Alongside altruism, and notwithstanding self-rewarding emotions associated with remitting behavior, the very fact that donors and beneficiaries of remittances are spatially differentiated creates room for additional motives. First of all, remittances may just buy a wide range of services such as taking care of the migrants' assets, with the likelihood and size of remittances depending on whether and when the migrant intends to return. Secondly, it is clear that migration is primarily (but not only) driven by wage differentials, implying that people are ready to incur substantial moving costs in order to access to international migration. Such migration costs, however, are beyond the possibilities of many prospective migrants and, given capital markets imperfections, must be financed through informal family loans repaid later (with interest) in the form of remittances. Even when wage differentials are not significant enough to compensate for migration costs, it may still be optimal for some families to have migrant members. This is the case, in particular, for rural households whose agricultural income is highly volatile due to changing climatic conditions and other idiosyncratic risks. When the market does not allow for a trade-off between a lower mean and a reduced variance, migration by some members may become a straightforward way to achieve mutual insurance; for this to occur, wages at destination need not be higher providing that incomes at home and destination are not positively correlated.

In the model, we assume that the driving motivation for remittances is altruism. We focus on the macroeconomic effects of remittances as they impinge on households decisions in terms of labour supply, investment, education, and migration with potentially important aggregate effects. Our model considers the effects of remittances on both labor market prospects and human capital formation for all households, including those which do not receive remittances. The series of works highlighted above focused on the impact of remittances, but they mainly emphasize a particular aspect of the international transfers

and are mostly confined to effects on recipient households. The exceptions are two studies with Mexican data which assess the impact of remittances an emigration within the whole municipality where the recipient households are located. These are important contributions because, as indicated above, we believe that there are potential aggregate effects on the labor market and human capital formation. López Córdova [2004] finds marked improvements in schooling in municipalities with higher remittance propensity. Hanson [2007a] shows that the distribution of earnings shifted and has a higher mean in high migration states providing evidence of important differences in local labor markets.

III. Model

We model migration as a family choice and we show that repatriated savings have an important role in the development process of the labor exporting country. Migration decision is taken for the interest of the family. We assume positive selection in that relatively more skilled workers have a higher propensity to migrate. This assumption is coherent with the empirical evidence on migration and human capital which shows that individuals with a higher educational level are more likely to migrate (for example, Chiquiar and Hanson [2005] pp. 239-281).[2]

There is an ongoing debate on the impact of remittances on economic performance. We look at the impact of intra-household transfers from migrants to stayers on the decision making of stayers. In particular, we model the macroeconomic impact in which schooling and labor supply prospects change in the presence of remittances.

Building Blocks

The theoretical framework is related to Drinkwater *et al*. [2003], but we allow for human capital formation. The possibility of emigration in the short-run contracts the supply of human capital as there is brain drain. However in the long-run there can be three sources of brain gain. (1) Migration opportunities raise the rate of return to human capital investments by stayers. (2) Remittances relax liquidity constraints for recipients and reduce the costs of schooling. (3) Higher human capital supply by recipient households generates a job creation externality that may increase the returns to schooling for non recipient households as well.

Preferences

We propose a search model in which remittances affect the human capital and labor supply in the source economy. We assume that the relatively skilled members of the family can be the potential migrants while the others members faces frictions in the home labor market. Each household has an utility function for the family of the form:

$$U(y,x;e) = ey + (1-e)x \tag{1}$$

where e is the fraction of household members who are migrants, y is their disposable income after transfers (including remittances), and x is the income for the stayers. In the baseline model, we assume risk neutrality but later on examine how to relax this assumption. Households compare the utility of the family with or without migration. We then consider a matching model to describe the frictions in the labor market of the source economy.

Technology

Let us assume a Cobb-Douglas production function of the form:

$$y_c = A_c h_c^{\alpha} \tag{2}$$

where the subscripts refer to the country where production takes place. We assume that the only factor of production is human capital and that production is subject to diminishing returns, with $0<\alpha<1$. Furthermore we assume that for any level of aggregate human capital the productivity parameter is larger in the destination country is higher, with $A_d > A_o$. This provides the rationale for migration as migrants enjoy a wage premium which covers the costs of migration. Additionally, the relative abundance of human capital in the destination country is assumed to have a sufficiently low upper bound. In particular, we need $\frac{h_d}{h_o} < \left(\frac{A_d}{A_o+\zeta}\right)^{\frac{1}{1-\alpha}}$, where ζ is the cost of migrating.

Migration

The investment decision in human capital can be positively affected by migration and remittances. The literature which stresses the possibility of a brain gain from migration, shows that a positive, but sufficiently small, probability of migration to a richer country raises the level of human capital investment in the source country (for example, Stark and Wang [2001]). We look at the impact of migration and remittances in a framework where households can have individuals with low moving costs (potential migrants) while the other members are characterized by high moving costs. We can assume that migration of the first group of agents is freely determined by market conditions while migration of the second group is regulated by the Government in the destination country. The fraction of households with migrants is m.

The probability of migration for individuals with high moving costs (that is, stayers) depends on whether there is a migrant in the household. We assume that the fraction of $1-m$ households with no first wave migrants have very high migration costs such that their probability to migrate is equal to p_{nm} while for households that receive remittances this probability is equal to p_m where $p_m \geq p_{nm}$. For simplicity, let us normalize $p_{nm} = 0$ and $p_m = p$. Our results do not require this dichotomy but rather rely simply on the observation that households with migrants in the destination country enjoy from network effects which facilitate further migration. Households without migrants generally face higher moving costs.[3]

Education

The timing of the economy is the following. The agents with low moving costs migrate or stay. In case of migration they remit a given amount τ. The migration decision of the skilled and the probability p of migration of stayers affect the human capital accumulation of the stayers and the labor market equilibrium in the source economy. Now, we concentrate on the human capital investment of high mobility cost individuals. Contrary to their partners, they face frictions in the labor market. They meet a firm with probability q, which is endogenous and described in greater detail below. Their education choice is affected by domestic labor market conditions, the probability to migrate and the labor market conditions in the destination country.

Stayers take migrant income and remittances as given and allocate resources to schooling. Once abroad migrants remit an amount τ. For simplicity, we assume that they have the same ability to learn γ and that, if the partner migrates, they invest in education a fraction of remittances equal to s. Since we assume risk neutrality and the utility function is linear, the education decision is taken to maximize consumption income net of schooling investments:

$$\max_{h_i} \left\{ c - \frac{h_i^{\Psi}}{\Psi(\gamma + s\tau_i)} \right\} \tag{3}$$

$$\text{s.t. } c = p_i \left\{ A_d h_d^{\alpha} + (1-s)\tau_i \right\} + (1-p_i) \left\{ q \left[A_o \beta h_o^{\alpha} + (1-s_i)\tau_i \right] + \left(1-q \right) \tau_i (1-s) \right\} \tag{4}$$

where β is the labor share in the country of origin we assume that $\tau_m \geq 0$, $\tau_{nm} = 0$, $p_{nm} = 0$ and $p_m = p$.

By solving the maximization problem we obtain:

$$h_m = \left\{ \left| \alpha p_i \left(A_d - \bar{q} A_o \beta \right) + \bar{q} \alpha A_o \beta \right| (\gamma + \tau s) \right\}^{\frac{1}{\Psi - \alpha}} \tag{5}$$

$$h_{nm} = \left\{ \bar{q} \alpha A_o \beta \gamma \right\}^{\frac{1}{\Psi - \alpha}} \tag{6}$$

Human capital accumulation is a positive function of the probability to migrate p and of remittances. If we assume that part of the remittances are invested, then households with a migrant member invest more in education compared to a non-migrant household. Human capital accumulation is also a positive function of the probability to find a job in the domestic labor market and of the workers' bargaining power. We can easily verify that if $p = 1$ recipient households invest for the foreign market, while for $p = 0$ they invest in human capital for the domestic market.

We can then determine the average level of education in the source economy after first wave migration and remittances:

$$E(h) = (1-p)\, m\, h_m + (1-m)\, h_{nm} \tag{7}$$

Clearly, the effect of migration and remittances on the average level of human capital of the labor exporting country is ambiguous.

Labor Market

We assume there are frictions in the process of finding a job. The matching technology is given by,

$$j = v^{\phi} L^{1-\phi}$$

where v is the number of vacancies and L is the labor force in the origin country.

Upon finding a job, workers receive a fraction β of the revenue they generate,

$$w_i = \beta\ (A_o\ h_i^{\alpha})\ \ with\ \ i = nm, m \tag{8}$$

We assume that the firm does not know which type of worker will be matched to a vacancy. When a vacancy is created, the decision is taken with respect to the expected average level of education. Firms create vacancies up to the point where the expected revenue generated by new workers is equal to the cost of hiring them,

$$(1-\beta)\, A_o E(h^{\alpha}) = \frac{\Lambda}{q(\theta)} \tag{9}$$

where Λ is the cost of creating a vacancy and q is the probability that it will generate a match.

The average level of education in the economy will depend on the human capital education decision of the stayers and on the effect of this education choice on future brain drain. Given this assumptions, the expected level of human capital in the small developing country will be equal to:

$$E(h) = (1-p)\, m\, h_m + (1-m)\, h_{nm} \tag{10}$$

The definition $\theta = \frac{v}{u}$ (the "labour market tightness" parameter) gives the vacancy rate and completes the description of the matching process. In equilibrium,

$$\theta = \left[(1-\beta)\, \frac{A_o E(h^{\alpha})}{\Lambda} \right]^{-\frac{1}{1-\phi}} \tag{11}$$

The average level of investment in human capital depends on the proportion of households with migrants m, the amount of remittances invested in education per recipient $s\tau$, the probability of migration p, and the probability of finding a job q, given by:

$$q(\theta) = \theta^{\phi - 1} = (1-\beta) \frac{A_o E(h^{\alpha})}{\Lambda} \tag{12}$$

Similarly, we obtain the probability of a vacancy to meet a worker is the product of the vacancies per job searcher times the matches per vacancy:

$$\theta q(\theta) = \theta^{\phi} = \left| (1-\beta)\, \frac{A_o E(h^{\alpha})}{\Lambda} \right|^{-\frac{\phi}{1-\phi}} \tag{13}$$

Analytical Solution: The Case without Brain Drain

Let us assume a simplified version of the model and look at the limit case of $p = 0$. In this case, workers invest in human capital only for the domestic labor market. The maximization process simplifies in the following way:

$$\max_{h_i}\left\{c-\frac{h^{\Psi}}{\Psi\left(\gamma+s\tau_i\right)}\right\}$$
$$\text{s.t. } c=\left\{q\left[A_o\beta h_i^{\alpha}+\left(1-s_i\right)\tau_i\right]+\left(1-q\right)\tau_i\left(1-s\right)\right\} \tag{14}$$

Optimal human capital investment is,

$$h_i=\left[\alpha\, q\, A_o\beta(\gamma+s\tau_i)\right]^{\frac{1}{\Psi-\alpha}} \tag{15}$$

and given this, labor matching yields,

$$q^{1-\alpha}=\left(1-\beta\right)\alpha^{\alpha}\beta^{\alpha}\frac{A_o^{1+\alpha}}{\Lambda}\left(m\left[(\gamma+s\tau)\right]^{\frac{1}{\Psi-\alpha}}+(1-m)\gamma^{\frac{1}{\Psi-\alpha}}\right)^{\alpha} \tag{16}$$

Thus we have two equations and two unknowns. First, the expected level of human capital in the small developing country will be equal to:

$$E\left(h\right)=m\left[\Gamma\alpha A_o\beta\left(\gamma+s\tau\right)\right]^{\frac{\alpha}{\Psi-2\alpha}}+\left(1-m\right)\left[\Gamma\alpha A_o\beta\gamma\right]^{\frac{\alpha}{\Psi-2\alpha}} \tag{17}$$

Then, we obtain:

$$h_i=\left[\Gamma\alpha A_o\beta\left(\gamma+s\tau_i\right)\right]^{\frac{\alpha}{\Psi-2\alpha}} \tag{18}$$

with $\Gamma=\frac{(1-\beta)A_o}{\Lambda}$, and,

$$q=\left[\frac{\left(1-\beta\right)A_o}{\Lambda}\right]^{\frac{\Psi-\alpha}{\Psi-2\alpha}}\left[\alpha A_o\beta\left(\gamma+s\tau\right)\right]^{\frac{\alpha}{\Psi-2\alpha}}$$

These equations show that by inducing job creation, remittances enhance matching prospects. The main conclusion of this exercise is to show that, even if we are assuming away the possibility of brain gain through the migration prospects of recipient households, remittances have a potentially positive impact also on the human capital formation of the non recipient households.

This is due to an externality in the labor market. Remittances have a direct positive impact on the human capital investment of recipient households and through this channel increase the average level of human capital in the economy. Since firms open their vacancies as a function of the average expected profits, the rise in average human capital induces job creation. In this way, remittances increase the probability of employment of non recipient workers. The increase in labor demand in the source economy will then influence the human capital investment decision of all workers. In particular, the expected return to

schooling is higher to the extent that remittances enhance employment opportunities in the country of origin of migrants.

Extensions: Risk Aversion and Borrowing Constraints

We now turn to two extensions of the baseline model. The first is to relax the assumption of risk neutrality. Second, we introduce the possibility of imperfect capital markets.

The Model with Risk-Averse Workers

Risk-averse workers value remittances more if unemployed and the introduction of these transfers modifies their outside option. Let $\overline{z}$ denote the domestic support for the unemployed and $\tilde{z}$ denote income from remittances. Then $z^m = \left(\overline{z} + \tilde{z}\right)$ and $z^{nm} = \overline{z}$ are the unemployment incomes for the worker in a migrant and non-migrant family respectively. Similarly, for the employed incomes are $y^m = \left(w^m + \tilde{z}\right)$ and $y^{nm} = w^{nm}$. The remaining value functions which summarize unemployed and employed workers' asset values are then respectively:

$$rU^i = \ln(z^i) + \theta q(\theta)[E^i - U^i] \tag{19}$$

$$rE^i = \ln(y^i) + \lambda[U^i - E^i] \tag{20}$$

for a worker in a family of type $i = m, nm$ says that the asset value of unemployed worker of type i depends on the unemployment income and the probability of finding a job, $\theta q(\theta)$ says that the asset value of employed worker of type i depends on the employment income and the exogenous probability of losing a job, λ.

We assume that firms are not able to discriminate *ex ante* between an unemployed migrant and non-migrant since only information concerning the average characteristics of workers is available when the vacancy is opened. This implies that firms will open the same vacancy for the non-recipient and recipient unemployed. In the home economy, households will bargain over two different wages and the wage for workers with migrants in the family will be higher than that of workers in non-migrant families since they have a higher "threat point".

In equilibrium all firms enter the market until the asset value from a vacant job, V, is zero. By manipulating the two Bellman equations for the firms and the zero profit assumptions, we can determine the *job creation curve* JC:

$$A_o[f(h_i) - (r+\delta)h_i] - w_i - \frac{(\lambda + r)p\Lambda}{q(\theta)} = 0;\ i = nm, m \tag{21}$$

Aggregating over $i = nm, m$, applies to the average wage $w = mw^m + (1-m)w^{nm}$ as well. During the bargaining stage, the partners agree on a way to share the rents. Wages are determined as the solution to a Nash bargaining problem. We now concentrate on the expected values. Given that the firm surplus is equal to $F^e - V$ and the worker surplus is $E^e - U^e$, the wage is contracted by following the maximization problem:

$$w = \arg\max \left[E_i^e - U_i^e\right]^{\beta} \left[F^e - V\right]^{1-\beta};\ i = nm, m \tag{22}$$

where $0 \leq \beta \geq 1$ is the bargaining power of workers. By solving the maximization problem, we obtain:

$$\ln\left(\frac{w+\tilde{z}}{\overline{z}+\tilde{z}}\right)(1-\beta)(y-w)=\frac{\beta}{w+\tilde{z}} \tag{23}$$

If we rearrange the free-entry condition

$$w=\frac{pyq(\theta)-(r+\lambda)\Lambda}{q(\theta)} \tag{24}$$

we can then write the following equation in function of :

$$\ln\left(\frac{\frac{pyq(\theta)-(r+\lambda)\Lambda}{q(\theta)}+\tilde{z}}{\overline{z}+\tilde{z}}\right)(1-\beta)\frac{q(\theta)}{\Lambda(r+\lambda)}=\frac{\beta}{\frac{pyq(\theta)-(r+\lambda)\Lambda}{q(\theta)}+\tilde{z}} \tag{25}$$

To complete the matching model with capital, the evolution of unemloyment is given by

$$\dot{u}=\lambda(1-u)-\theta q(\theta)u \tag{26}$$

In the steady state $\dot{u}=0$ and we arrive at the *Beveridge Curve* (BC):

$$u=\frac{\lambda}{\lambda+\theta q(\theta)} \tag{27}$$

We obtain steady-state values for θ, w and u, where w is the average wage in the economy and $\theta=\frac{v}{u}$ (the "labour market tightness" parameter) gives the vacancy rate.

Credit Market Imperfections

Without some constraint on the ability to raise finance for investment, remittances can affect the unemployment income, but they would have no effect on human capital. Firms would choose the optimal level of human capital at $h = h^*$. However, as discussed in the introduction, the lack of formal channels to obtain credit that characterizes many developing and transitional countries can generate financial constraints for firms. We therefore assume that households face liquidity constraints to finance human capital. With credit constraints $h < h^*$, remittances play a dual role. First, they relax the constraints and enhance human capital accumulation opportunities. To see this "investment effect" algebraically, we differentiate the equilibrium condition with respect to h to obtain:

$$\frac{d\theta}{dh}=-\frac{\left\{\left[\frac{\bar{z}+\tilde{z}}{A+\tilde{z}}\right]\left[\frac{1}{\bar{z}+\tilde{z}}\Lambda py'(h)\right]-\left(-\frac{\beta py'(h)}{(A+\tilde{z})^2}\right)\right\}}{\left\{\frac{\bar{z}+\tilde{z}}{A+\tilde{z}}\left[\frac{1}{\bar{z}+\tilde{z}}B\right]\Lambda+\ln\left[\frac{A+\tilde{z}}{\bar{z}+\tilde{z}}\right]\Lambda q'(\theta)-\left(-\frac{\beta}{(A+\tilde{z})^2}\right)B\right\}}>0$$

by noting that the denominator is always negative and the numerator is positive in presence of credit constraints.

The second effect of remittances is to increase the search. The "search effect" can move in both directions since:

$$\frac{d\theta}{d\tilde{z}} = -\frac{\frac{\bar{z}-A}{(A+\tilde{z})\left(\tilde{z}+\bar{z}\right)}\Lambda q\left(\theta\right)+\frac{\beta}{(A+\tilde{z})^2}}{\frac{B}{(A+\tilde{z})}\Lambda q\left(\theta\right)+\ln\left[\frac{A+\tilde{z}}{\bar{z}+\tilde{z}}\right]\Lambda q'\left(\theta\right)+\frac{\beta}{(A+\tilde{z})^2}B}$$

and the numerator can be both positive and negative. In particular, if β is small enough then the search effect is negative with $\frac{d\theta}{d\tilde{z}}<0$ and $\frac{d\theta}{dh}\geq 0$. We totally differentiate equation to see these two effects analytically. We first concentrate on the search effect and a similar analysis applies to the investment effect:

$$\frac{\partial F}{\partial \theta}\frac{d\theta}{d\tilde{\tilde{z}}}+\frac{\partial F}{\partial \tilde{\tilde{z}}}=0$$

Let us $$\frac{pyq\left(\theta\right)-\left(r+\lambda\right)\Lambda}{q\left(\theta\right)}=A>0$$

and $$\frac{q'\left(\theta\right)pyq\left(\theta\right)-q'\left(\theta\right)\left[q\left(\theta\right)py-p\Lambda\left(\lambda+r\right)\right]}{\left(q\left(\theta\right)\right)^2}=B<0$$

$$\left(1-\beta\right)\frac{1}{\Lambda\left(r+\lambda\right)}=\Lambda>0$$

with $q'\left(\theta\right)<0$

Then: $$\frac{d\theta}{dz}\left(\frac{\bar{z}+\tilde{z}}{A+\tilde{z}}\left[\frac{1}{\bar{z}+\tilde{z}}B\right]\Lambda q\left(\theta\right)+\ln\left[\frac{A+\tilde{z}}{\bar{z}+\tilde{z}}\right]\Lambda q'\left(\theta\right)-\left(-\frac{\beta}{\left(A+\tilde{z}\right)^2}\right)B\right)$$

$$+\left\{\left[\frac{\bar{z}+\tilde{z}}{A}\right]\left[\frac{\bar{z}-A}{\left(\bar{z}+\tilde{z}\right)^2}\right]\Lambda q\left(\theta\right)+\frac{\beta}{\left(A+\tilde{z}\right)^2}\right\}=0$$

That is: $$\frac{d\theta}{d\tilde{z}}=-\frac{\frac{\bar{z}-A}{(A+\tilde{z})\left(\tilde{z}+\bar{z}\right)}\Lambda q\left(\theta\right)+\frac{\beta}{(A+\tilde{z})^2}}{\frac{B}{(A+\tilde{z})}\Lambda q\left(\theta\right)+\ln\left[\frac{A+\tilde{z}}{\bar{z}+\tilde{z}}\right]\Lambda q'\left(\theta\right)+\frac{\beta}{(A+\tilde{z})^2}B}$$

Suppose those variables θ, h and z refer to a post-migration state with remittances and in the pre-migration state without remittances they take values $\bar{\theta}$, $\bar{h}$ and $\bar{z}$. Recipient households use remittances to overcome credit constraints.

IV. Parameterization, Calibration and Simulations

In this section we parameterize the three groups of parameters in the model and calibrate for El Salvador and Honduras.

Numerical Solution

The baseline model of the source economy is summarized as:

$$q(\theta) = \theta^{1-\phi} = \left[(1-\beta) \frac{A_o E(h^{\alpha})}{\Lambda} \right]^{\frac{1-\phi}{\phi}} \tag{28}$$

$$\theta q(\theta) = \theta^{\phi} = \left[(1-\beta) \frac{A_o E(h^{\alpha})}{\Lambda} \right] \tag{29}$$

$$E(h) = (1-p)\, m h_m + (1-m) h_{nm} \tag{30}$$

$$h_m = \left\{ \left[\alpha p \left(A_d - \bar{q}\, A_o \beta \right) + \bar{q} \alpha A_o \beta \right] (\gamma + \tau s) \right\}^{\frac{1}{\Psi - \alpha}} \tag{31}$$

$$h_{nm} = \left\{ \bar{q} \alpha A_o \beta \gamma \right\}^{\frac{1}{\Psi - \alpha}} \tag{32}$$

where $\bar{q}$ is the probability of employment in the source economy. Note that remittance recipients always accumulate more human capital unless $p = 0$, as by assumption $A_d > A_o$, $\beta < 1$ and $\bar{q} < 1$. Hence, in a sense, brain drain facilitates a potential net brain gain from remittances.

Parameterizing the Baseline Model

The spirit of the analysis in this section is to value the quantitative impact of migration policies and remittances on the labor market of the labor exporting country. As a first step towards an empirical analysis of our model, we require functional forms for the matching and the production functions. In common with most authors we specify a Cobb-Douglas matching function. So we can write $j = L^{1-\phi} v^{\phi}$ and hence $q(\theta) = \theta^{\phi - 1}$, $\theta q(\theta) = \theta^{\phi}$.

Counting up across the model's equations and the functional forms for the matching and production functions we need to find values for a series of exogenous parameters. As a reference value we choose $\theta = 1$. This leaves us with the following

aggregate parameters: β (it is usually assumed equal to 0.5 in the matching literature) ϕ, A_o, A_d, α, Ψ and γ. We use need data for $y^e = A_o E(h^\alpha)$, $w^e = A_o \beta E(h^\alpha)$, m, p and τ. The cost of opening a vacancy Λ can be obtained from:

$$\Lambda = \theta^{-\phi}\left(1-\beta\right) A_o\, E(h^\alpha)$$

We can then estimate α from:

$$w_i = \beta A_o h_i^\alpha$$

$$w = \arg\max \left[E-U\right]^\beta \left[F-V\right]^{1-\beta}$$

$$\beta \ln\left(E-U\right) + \left(1-\beta\right)\ln F$$

First order condition:

$$\frac{\beta}{E-U}\left(\frac{1}{w+z}\right)\frac{1}{r+\lambda+\theta q\left(\theta\right)} + \frac{1-\beta}{F}\left(-\frac{1}{r+\lambda}\right) = 0$$

By noting that $F = \dfrac{y-w}{r+\lambda}$

and $E-U = \dfrac{\ln\left(w+\tilde{z}\right) - \ln\left(\bar{z}+\tilde{z}\right)}{r+\lambda+\theta q\left(\theta\right)}$

we obtain: $\ln\left[\dfrac{w+\tilde{z}}{\bar{z}+\tilde{z}}\right]\left(1-\beta\right)\left(y-w\right) = \dfrac{\beta}{w+\tilde{z}}$

and since $y-w = \dfrac{\Lambda}{q\left(\theta\right)\left(r+\lambda\right)}$

we can write: $\ln\left[\dfrac{w+\tilde{z}}{\bar{z}+\tilde{z}}\right]\left(1-\beta\right)\dfrac{\Lambda}{q\left(\theta\right)\left(r+\lambda\right)} = \dfrac{\beta}{w+\tilde{z}}$

The next step requires a substitution of the wage derived from the free entry condition:

$$w = \frac{A_o y q\left(\theta\right) - \left(r+\lambda\right)\Lambda}{q\left(\theta\right)}$$

We now have a relation which depends only on θ

$$\ln\left(\frac{\frac{A_o y q(\theta)-(r+\lambda)\Lambda}{q(\theta)}+\tilde{z}}{\overline{z}+\tilde{z}}\right)(1-\beta)\frac{q(\theta)}{\Lambda(r+\lambda)}=\frac{\beta}{\frac{A_o y q(\theta)-(r+\lambda)\Lambda}{q(\theta)}+\tilde{z}}$$

Our model is given by the following relations in the unknowns θ, u and h:

$$\ln\left(\frac{\frac{A_o y q(\theta)-(r+\lambda)\Lambda}{q(\theta)}+\tilde{z}}{\overline{z}+\tilde{z}}\right)(1-\beta)\frac{q(\theta)}{\Lambda(r+\lambda)}=\frac{\beta}{\frac{A_o y q(\theta)-(r+\lambda)\Lambda}{q(\theta)}+\tilde{z}} \tag{33}$$

$$u=\frac{\lambda}{\lambda+\theta q(\theta)} \tag{34}$$

$$f'(h)=r+\delta \tag{35}$$

Calibration Framework

The complete model, with remittances is summarized as:

$$BC: u=\frac{\lambda}{\lambda+\theta q(\theta)} \tag{36}$$

$$WC: w=(1-\beta)z+\beta A_o+\Lambda\theta \text{ where} \tag{37}$$

$$z=\rho w+\tilde{z} \tag{38}$$

$$JC: A_o[f(h)-(r+\delta)h]-w-\frac{(r+\lambda)p\Lambda}{q(\theta)}=0 \tag{39}$$

$$h^*: f'(h)=r+\delta \tag{40}$$

Thus require functional forms and possibly some parameter values for $q(\theta)$ (from $m(u, v)$) and $f(h)$, and values for the following parameters in the model: p, δ, λ, Λ, β, ρ, ξ and η. The functional form for the matching function, $m(u, v)$ is:

$$m(u,v)=v\left[1-\exp\left(-\frac{v}{u}\right)\right] \tag{41}$$

and hence $$q(\theta)\equiv\frac{m(u,v)}{v}=\left[1-\exp(-\theta)\right] \tag{42}$$

and for $f(h)$ we choose:

$$f(h) = A_o h^{\alpha} \tag{43}$$

The Calibration of Aggregate Parameters

We calibrate λ to data observations of u, v (and hence $\theta = \frac{v}{u}$), denoted by $\hat{u}$, $\hat{v}$ and $\hat{\theta}$) respectively. Then we have at the calibrated value:

$$\lambda = \frac{\hat{u}\,\hat{\theta}\,q(\hat{\theta})}{1-\hat{u}} \tag{44}$$

To calibrate β and Λ, we use data for the distribution of output between wages and the firm's economic rent. First write,

$$f(h) = w + (r+\lambda)\frac{A_o \Lambda}{q(\theta)} \tag{45}$$

which decomposes output into the wage plus the firm's rent, this last term being $(r+\lambda)J$, where J is the value of an occupied job. Suppose we have data on these components of output as shares of output; i.e., data on $\frac{(r+\lambda)J}{A_o f(h)} = \hat{R}$ and $\frac{w}{A_o f(h)} = \hat{W}$.

Next consider the calibration of Λ. We calibrate the model assuming no credit constraints so that $h = h^*$. From our definition of $\hat{R}$,

$$\Lambda = \frac{q(\hat{\theta})\,\hat{R} f(h^*)}{(\hat{r}+\lambda)} \tag{46}$$

Since everything on the right-hand-side is calculated or observed at this point, we therefore have a calibrated value of Λ.

Finally we calibrate β. Put $z = \rho w$ in the pre-migration state and assume we have data $\hat{\rho}$ for ρ. Let $y_n(h) = A_o(f(h) - (r+\delta)h)$. Then from the definition of $\hat{W}$, we obtain the calibrated value of β as:

$$\beta = \frac{(1-\hat{\rho})\hat{W} A_o f(h^*)}{\left[y(h^*) + A_o \Lambda \hat{\theta} - \hat{\rho}\hat{W} A_o f(h^*)\right]} \tag{47}$$

Note that we can choose our units such that in this baseline calibration the productivity parameter $A_o = 1$.

For the calibration of the human capital formation parameters γ and Ψ, we note that

$$E(h) = (1-p)m\left\{\left[\alpha p\left(A_d - \bar{q}\,A_o\beta\right) + \bar{q}\,\alpha A_o \beta\right](\gamma + \tau s)\right\}^{\frac{1}{\Psi-\alpha}} + (1-m)\left\{\bar{q}\,\alpha A_o \beta\gamma\right\}^{\frac{1}{\Psi-\alpha}}$$

and for a given value of the left hand side we find the values of γ and Ψ that satisfy the equation given that all other variables are fixed and the parameters are calibrated. We have that γ is a shift parameter that indicates for the education cost function while Ψ indicates how fast marginal education costs rise with schooling attainment.

Policy Simulations

The household parameters for each country were derived from data for El Salvador and Honduras. For the parameter m we used for each country the share of households which receive remittances. For the parameter s, we used for each country the average reported share of remittances spent on education. For the parameter e, we used for each country the average fraction of household members who migrate within households receiving remittances. For the amount of remittances τ, we used the average monthly amount received.[4] In Honduras about 40% send less than US$ 150 while in El Salvador most send over US$ 200. As of 2003, about one third of remittance senders in Guatemala and Honduras had been sending money to their household for more than five years while in El Salvador this proportion is more than half. Not surprisingly, 96% of remittance senders to Central America are migrants in the US. Also, 54% of remittance recipients are women. In El Salvador and Honduras about a third of remittances go to siblings, about a quarter to the migrant's children, about one tenth to the spouse and about a fifth to parents.

In Table 1, household parameters are summarized.

For the purposes of the policy simulation exercise the model was solved calibrating the aggregate parameters as described above. The policy parameters are set on the basis of subsidiary evidence. The main policy parameters are related to labor market and education policies in the origin country of migrants and immigration policy in the destination country. For the domestic policy parameters, we note from the study by Lora [2001] that the labor markets in the three countries under consideration are relatively rigid in the Latin American context. And, from Barro and Lee ([1996] pp. 218-223) and Duryea and Pages [2003] we note that education access and provision is severely limited even compared to other countries in Latin America, which as a whole is a lagging region in the provision of education. For the migration propensity parameter p, we note that the US border crossing is not the binding constraint. Both Hanson *et al.* [2002] and Orrenius [1999] show that migrant networks are more likely to influence this probability, via migration costs, than border patrol policies.[5]

Remittance Effects and Education Policy

First, we compare the impact of remittances under varying degrees of education access. The values in the column "Current" were generated by noting that in the year 2000, according to Duryea and Pages [2003], in El Salvador the average years of completed schooling were 4.5 and in Honduras they were 4.08. The fraction of individuals with secondary schooling was 14.3% in El Salvador and 12.5% in Honduras. In this case, γ and Ψ were calibrated to fit country specific parameters using the last equation in the previous section. The values in the column "LA Average" were generated calibrating the parameters γ and Ψ using the Latin American averages for years of schooling attained, which was 5.92 in 2000, and for the percentage with secondary education, which was 21.77.

Table 2 shows the impact of remittances on human capital and employment under different levels of access to education. Given the current level of remittances in Honduras, to the extent that there are job creation spillovers leading to improvements in schooling for non recipient households, such effect would be more pronounced if education were more

accessible. If Honduras were able to achieve the average Latin American levels of enrollment and schooling, there would be a proportionally more substantial increase in schooling among non recipient households. This is because households that receive remittances are partially able to overcome education costs. In the meantime, households that do not receive remittances by and large may find schooling investment prohibitive unless education policy is targeted to enhance accessibility. Even if the rise in the supply of human capital by remittance recipients increases the rate of return to education, the high cost of schooling can preclude any investment by non recipient households. Without more widespread to education the potential impact of remittances on aggregate human capital may not materialize. Table 2 also shows what would happen if average monthly remittances doubled to reach a level similar to that observed in El Salvador. Under the current level of accessibility to education, average human capital would increase about 20% after the rise in remittances. By contrast, if the rise in remittances were accompanied by an increase in accessibility to education to the Latin American average, aggregate human capital would rise by more than 70%, with a particularly pronounced improvement among non recipient households. Hence, to the extent that schooling is affordable, job creation spillovers materialize.

Given the high level that monthly remittances have already attained in El Salvador, we assess how a doubling in the share of remittances devoted to education would impact on human capital and employment. We find that in El Salvador where remittances are higher the pattern of results is somewhat similar to was found for Honduras. However, the aggregate impact of a rise in the share of remittances spent in education under current levels of education costs for households would be even more limited than in Honduras with an improvement on aggregate human of about 10%. This compares to a rise of about 50% in aggregate human capital if the rise in remittances invested in schooling were accompanied by an improvement in access to education towards the Latin American average.

Remittance Effects and US Immigration Policy

To set the migration probability above, we used the evidence provided by Orrenius [1999] who shows that, on a first trip, access to an additional family member network (a family member who has prior migration experience) increases the annual probability of migrating from 1.9 to 4.8%. For the baseline calibration we set the probability of migration for households with first wave migrants to $p = 0.05$. Now we turn to simulating would be effect of two polar cases. (1) We consider tightening up border control so that it is not porous at all. In this case of a sealed border, all migrants are legal. Orrenious documents that among Mexican migrants in the US, 60% have legal status. Hence, $p_{sealed} = 0.03$. (2) We consider the impact of moving towards an open borders policy which largely reduces migration costs and consider a doubling in the probability of successful second wave migration relative to that estimated by Orrenius, with $p_{porous} = 0.1$.

Table 4 shows how the impact of remittances in Honduras may be affected by US immigration policy. While it is widely documented that border control *per se* has a marginal effect on migration, relative to say family and village network effects, the polar cases of eradicating all undocumented migration and making all migration legal would plausibly affect flows. Compared to the benchmark in Table 2, with $p = 0.05$ and current education policy, limits on emigration appear to enhance the impact of remittances on human capital and employment. The reason is that, with costly education and labor market rigidity, remittances are used to enhance migration prospects given limited opportunities at home. The selection

process associated with migration would make remittance recipients more likely to leave and under these conditions opening of the border makes net brain drain more likely.

Brain drain dominates when education access is limited because the effect of remittances on job creation in the local labor market is negligible. This is because while recipient households accumulate more human capital, they do so in a very small scale due to the inaccessibility of education. The impact on non recipient households is very limited because job creation externalities are negligible on top of the high costs of education. Given this, to the extent that there is more human capital formation by recipient households it is with the purpose to migrate. The net effect is brain drain.

Table 5 presents the analogous results for El Salvador. There is also evidence that, under the present levels of education and job creation costs, a rise in migration prospects tends to lessen the positive impact of remittances on human capital and employment. In fact when the border is porous there are limited gains from remittances. However, as Stark *et al.* [1997], [1998] and Beine *et al*. [2001] have pointed out, better emigration prospects can raise the average level of human capital and the growth rate even if some leave the country, as the rate of return to human capital is higher.

Brain gain would be more important when education access is more widespread and the labor market more flexible because the effect of remittances on job creation in the local labor market then is important. This is because when recipient households accumulate significantly more human capital, non recipient households engage in schooling investments due to enhanced job creation. Increased human capital formation by recipient households would be larger and not solely to migrate. The net effect can then be brain gain.

The simulation exercises illustrate the positive role of remittances on education and employment for recipient households as well as others. While remittances appear to have a potentially beneficial macroeconomic effect in both El Salvador and Honduras, the gains from these substantial capital inflows would be much larger if progress could be made in lowering the costs of education for households and the costs of job creation for businesses.

V. Conclusion

Given the salient and growing macroeconomic influence of remittances as part of international capital flows in Latin America, it is of fundamental importance to assess the general equilibrium effects of migrant remittances. Official estimates by the IDB put remittances to Latin America and the Caribbean at around US$ 45.8 billion in 2004. Remittances are particularly important in El Salvador and Honduras. For example, in El Salvador remittances flows amounted to 17% of GDP in 2004, and in Honduras to 11%. In the Central American context, remittances have risen dramatically during this decade. In El Salvador, remittances have grown by 33% since 2000. In Honduras, remittances have grown by 147%.

In this paper, we assess the impact of remittances in El Salvador and Honduras on human capital and employment by calibration and simulation of a matching model. The basic idea of the model is that migrant remittances can have two opposing effects on human capital and employment for both recipient and non recipient households. (1) For recipient households, remittances from migrants generate funds that enhance schooling opportunities and potentially generate a brain gain. But, educated remittance recipients could eventually migrate and cause a brain drain. (2) For non recipient households, the job creation spillover from higher human capital, when there is net brain gain among recipient households, increases the rate of return to schooling. But, the income effect of remittances

could increase desired consumption and leisure, thereby reducing human capital investment. Therefore, the net effect of remittances on human capital and employment is ambiguous.

Our contribution is to consider the effects of remittances not only on recipient households but also the rest of the economy using a macroeconomic model which we calibrate to data from El Salvador and Honduras to conduct policy simulations. We identify potential gains from remittances on education and employment but find that they could be much larger with more access to schooling and less distortions in the labor market.

The calibration exercises indicate that higher remittances are associated with a macroeconomic equilibrium where human capital formation by recipient households increases. This observation is consistent with the evidence presented by Hanson and Woodruff [2003] who find evidence for Mexican households that emigration and remittances help relax household credit constraints on the financing of education. The schooling investments financed with remittances not only enhance the earning prospects of recipients at home and abroad but can generate job creation spillovers as businesses post vacancies in reaction to the rise in the supply of human capital. This indirect effect of remittances can potentially increase both human capital and employment across all households as the labor market becomes thicker. In equilibrium, because job creation increases with expected human capital, schooling by recipient and non recipient households are strategic complements provided that brain drain and education costs are both sufficiently low.

There are two empirical studies which consider the impact of remittances in Mexico beyond recipients. López Córdova [2004] examines the impact on education attainment and establishes using Mexican municipal data that a higher incidence of remittances is associated with improvements in human capital formation with a rise in school attendance of 4% and a remarkable fall in illiteracy of 40%. This study is of particular interest because it considers the impact of remittances not only on recipient households but also on non recipient household within the same municipality. The result is consistent with the prediction of the model that remittances enhance incentives for human capital formation across all households.

The impact of migration on origin labor markets is analyzed by Hanson [2007a] who studies changes in labor supply and earnings across regions of Mexico during the 1990s. The evidence is consistent with the model's characterization of positive selection of emigrants in terms of skills as emigration rates are highest among individuals with earnings in the top half of the wage distribution. Also, the evidence that the distribution of male earnings in high-migration states shifted to the right relative to low-migration states accords with the notion that labor market equilibrium changes possibly in part due to an increase in labor demand. While this evidence could reflect simply a contraction in labor supply, it is also consistent with remittances inducing skill formation and job creation. In fact, average hourly earnings in high-migration states rose relative to low-migration states by over 5%.

The simulation exercises illustrate the positive role of remittances on aggregate education and employment as a result of the decisions by recipient households. The macroeconomic benefits of remittances in both El Salvador and Honduras would be much larger if progress could be made in lowering the costs of education for households and the costs of job creation for businesses. As with other capital inflows, the extent to which remittances are invested productively, and are catalysts to other investments, depends on the viability for workers to upgrade skills and the flexibility for businesses to adjust scale of operation. When frictions impede matching in the market, the potential gains from remittances are less likely to be realized.

Notes

[1] A number of empirical case studies confirm that, in many instances, remittances may be seen as repayment of loans used to finance educational investments.

[2] For example in El Salvador and Honduras the majority of remittance recipients do not have schooling beyond primary education. This is consistent with the presumption that migrants have at least as much schooling as stayers.

[3] This characterization is consistent with the findings of Hanson, Robertson and Spilimbergo [2002]. Their evidence is consistent with border enforcement having a minimal impact on illegal immigration, and illegal immigration from Mexico having a minimal impact on wages in US border areas. Hence, for a given human capital investment, the main determinant of the propensity to migrate after the first wave is the cost of migration.

[4] The average frequency of remittances in the 2 countries is about 8 times per year.

[5] Furthermore, as noted by Hanson and Spilimbergo [2001], "whether by accident or design, US borders are porous. One common explanation for why the US Immigration and Naturalization Service (INS), which oversees the Border Patrol, fails to prevent illegal entry is that it operates under conflicting mandates: while groups opposed to immigration demand strict enforcement, industries intensive in manual labor demand that enforcement not undermine their economic viability".

Table 1

Household Parameters

	El Salvador	Honduras
m	0.28	0.16
s	0.14	0.19
e	0.17	0.09
τ	US$ 215	US$ 120

Table 2

Effects of Remittances in Honduras under Different Domestic Education Policies

	Current	LA Average
Current (τ = 120)	h_m = 13.2461	h_m = 14.0843
	h_{nm} = 2.5218	h_{nm} = 3.9631
	h^e = 4.0763	h^e = 5.9451
	θ = 0.6225	θ = 0.73431
Double (τ = 240)	h_m = 14.1503	h_m = 15.9574
	h_{nm} = 3.0309	h_{nm} = 4.7895
	h^e = 4.8903	h^e = 7.4634
	θ = 0.6446	θ = 0.9580

Table 3

Effects of Remittance Funds for Schooling in El Salvador under Different Domestic Education Policies

	Current	LA Average
Current (s = 0.14)	h_m = 12.9621	h_m = 13.9574
	h_{nm} = 3.1308	h_{nm} = 3.6852
	h^e = 4.6037	h^e = 5.5691
	θ = 0.5372	θ = 0.6147
Double (s = 0.28)	h_m = 14.1503	h_m = 17.0843
	h_{nm} = 4.0309	h_{nm} = 4.9825
	h^e = 5.1903	h^e = 6.9634
	θ = 0.5925	θ = 0.8271

Table 4

Effects of Remittances in Honduras under Different US Immigration Policies

	Sealed Border	Porous Border
Current ($\tau = 120$)	$h_m = 14.5114$	$h_m = 12.1479$
	$h_{nm} = 3.2832$	$h_{nm} = 2.9309$
	$h^e = 4.8109$	$h^e = 4.4451$
	$\theta = 0.6446$	$\theta = 0.6331$
Double ($\tau = 240$)	$h_m = 16.7257$	$h_m = 15.4005$
	$h_{nm} = 4.1120$	$h_{nm} = 3.3062$
	$h^e = 5.5563$	$h^e = 4.8792$
	$\theta = 0.8446$	$\theta = 0.7331$

Table 5

Effects of Remittance Funds for Schooling in El Salvador under Different US Immigration Policies

	Sealed Border	Porous Border
Current ($s = 0.14$)	$h_m = 13.1283$	$h_m = 12.7936$
	$h_{nm} = 4.2081$	$h_{nm} = 3.9291$
	$h^e = 4.7162$	$h^e = 4.5263$
	$\theta = 0.6592$	$\theta = 0.5213$
Double ($s = 0.28$)	$h_m = 15.3745$	$h_m = 13.9405$
	$h_{nm} = 4.6272$	$h_{nm} = 4.4132$
	$h^e = 5.0533$	$h^e = 4.8625$
	$\theta = 0.7843$	$\theta = 0.6931$

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Migration and Education Inequality in Rural Mexico

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Summary

This paper examines the impact of migration on education inequality in rural Mexico. Using data from the 1997 National Survey of Demographic Dynamics (ENADID), we first examine the impact of migration on educational attainment for males and females aged 12-15 and 16-18. We then build on the results on attainments to compute education inequality indicators for a large sample of communities throughout Mexico. After instrumenting, we find no significant impact of migration on educational attainment of 12 to 15 year olds. In contrast we find evidence of a strong disincentive effect of migration on schooling levels of 16 to 18 year olds, resulting in less education. This effect is strongest for males and for children of highly educated mothers. As a result of this, migration tends to lower educational inequality, in particular for females, but changes in inequality are driven mainly by reductions in schooling at the top of the education distribution rather than by increases in schooling from relaxing liquidity constraints at the bottom.

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I. Introduction

Economic inequality in Latin America is among the highest in the world,[1] for reasons that are in part deeply rooted in the region's history and partly due to the fact that until recently and with few exceptions, inequality reduction has hardly been a policy

priority for Latin American governments. Among the many facets of inequality (in assets, in incomes), education inequality is of particular interest and importance as it is at the center of the debate on equality of opportunities. Indeed, education is both the main productive asset for most people and, therefore, a key determinant of their incomes, and it is also a determinant of people's ability to make informed choices and derive utility from public goods such as political freedom and democracy. In addition, as is well known, the social return to education is higher than its private return, meaning that if higher inequality prevents people from engaging in profitable education investments, the welfare loss to society is greater than the private value of the missed opportunities.

In Mexico, education inequality is large even by Latin American standards: the average person in the poorest fifth of the population has 3.5 years of schooling, compared with 11.6 years for the average person in the richest fifth (this is notwithstanding differences in the quality of education received). The gap between the top quintile and the bottom quintile is around the regional average for primary education but is among the highest for lower- and upper-secondary education. For example, Mexico is second only to Ecuador in education inequality rankings for 13 to 17 year-olds (de Ferranti *et al.* [2004]).

There is a growing understanding that efforts to reduce inequality should focus on equality of opportunities instead of outcomes. In the case of education, this means that emphasis should be put on improving access to education (and the quality of schools) rather than, say, on making school attendance mandatory below a certain age. If we push the rationale a little bit further, this also means for example that if children drop out of schools earlier, and disproportionately so for children from poor families, we should perhaps care less if this is by choice, because of their having better opportunities outside of schools, instead of by (liquidity) constraint.

This debate is anything but speculative. In fact, the other "opportunity" we have in mind in the case of Mexican teenagers is migration to the US. Indeed, this option is attracting an increasingly large fraction of the Mexican youth, possibly causing a substantial increase in the proportion of high-school dropouts. At the same time, thanks to remittance income, migration alleviates credit constraints that impede investment in human capital for households at the lower end of the income distribution. Therefore, for a given community, the exact impact of migration on the amount and distribution of education is a priori unclear and depends on how education and migration incentives balance out. Moreover, such a balance is likely to evolve over time as households and communities accumulate migration experience that reduces the costs and risks of migration to future migrants (Massey, Goldring and Durand [1994]).

Previous research on the impact of migration on education in developing countries has emphasized the potential for remittance income to improve access to education for the poor and to consequently lower education inequality.[2] For example, Hanson and Woodruff [2003] used the 2000 Mexican Census to evaluate the effect of migration on "accumulated schooling" (number of school grades completed) by 10-15 year-olds and found that children in households with a migrant member complete significantly more years of schooling, with an estimated increase that ranges from 0.7 to 1.6 years of schooling, depending on age and gender. Interestingly, the gain is the highest for the categories of children traditionally at risk of being dropped from school (*i.e.*, girls and 13 to 15-year olds). Cox Edwards and Ureta ([2003] pp. 429-461) reached similar conclusions for El Salvador. Their estimates of survival functions show that remittances significantly contribute to lower the hazard of leaving school. This effect would seem greater

in the urban areas, but the mere fact of receiving remittances (irrespective of amounts) is shown to have a very strong effect in the rural areas. Two very recent papers would seem to further confirm these positive effects of remittances on education attainments: López Córdova [2004] uses the 2000 Mexican census to examine relationships at the municipality level and finds that remittances improve literacy levels and school attendance among 6 to 14 year olds; and Yang [2004] finds greater child schooling in families whose migrants receive larger positive exchange rate shocks in the Philippines.

While the above cited studies focus on the effect of past migration on current schooling, a new "brain drain" literature has emphasized a possible link between expectations of future migration and current schooling decisions. The underlying assumption in much of this literature is that education is needed to migrate, and since incomes abroad are much larger than at home, this raises the potential returns to schooling and can therefore increase human capital investment (Docquier and Rapoport [2004]). However, in the case of Mexican migration to the US, most first-time migration is illegal and involves no formal education requirement. As inequality is much greater in Mexico than in the US, one would expect higher returns to schooling in Mexico. Chiquiar and Hanson ([2005] pp. 239-281) provide evidence that returns to education are indeed higher in Mexico than for Mexicans in the US As a result, in the context we study the possibility of migration may actually lower the anticipated returns to education and negatively affect education investment.

How migration is going to affect education outcomes and education inequality in a given community is therefore theoretically uncertain. In this paper, we first examine the impact of migration on educational attainment, and then use this to compute inequality measures for a large sample of communities in rural Mexico. The rest of this paper is organized as follows. Section II presents the dataset used for the empirical analysis, namely, the National Survey of Demographic Dynamics (*ENADID - Encuesta Nacional de Indicadores Demográficos*), and contrasts it to the 2000 Mexican Census which has been the dataset predominantly used by previous studies on migration and educational attainments in Mexico. Section III discusses the identification strategy and the results are presented in Section IV for education levels and Section V for education inequality. Section VI concludes.

II. Data

This paper uses data from the 1997 National Survey of Demographic Dynamics (ENADID - *Encuesta Nacional de la Dinámica Demográfica*) conducted by Mexico's national statistical agency (INEGI - *Instituto Nacional de Estadística, Geografía e Informática*) in the last quarter of 1997.[3] The ENADID is a large nationally representative demographic survey, with approximately 2000 households surveyed in each state, resulting in a total sample of 73,412 households. We restrict our analysis to rural communities, defined broadly here to be municipalities which are outside of cities of population 100,000 or more, with at least 50 households surveyed in each municipality. This gives a sample of 214 rural municipalities across all Mexican states. Within these communities we have a sample of 26,197 households, of which 9,758 households contain at least one child aged 12 to 18 years.

The ENADID asks whether household members have "ever" been to the US in search of work. This question is asked of all household members who normally live in the household, even if they are temporarily studying or working elsewhere. Additional questions ask whether any household members have gone to live in another country in the past five years, capturing migration for study or other non-work purposes in addition

to work related migration. We define a household as having a migrant if they have a member aged 19 and over who has ever been to the US to work, or who has moved to the US in the last five years for any other reason.

Table 1 provides summary statistics for the key variables used in this study. Almost one quarter of all households in our sample with a child aged 12 to 18 have a migrant member.[4] Households with secondary school-aged children are more likely to have a migrant member than the general population: the migration rate is 16% in households without a child aged 12 to 18. The ENADID questions on migration within the last five years are identically worded to those used in the 2000 Mexican Census, which does not capture migration by household members outside of a five-year window. Table 1 shows that relying on the Census questions to define migrant status understates the proportion of households with migrant experience by almost fifty percent. Conversely, one in eight households classified by the Census definition as not having a migrant have a member who has ever been to the US to work. Since education is a cumulative process and migration may affect households' resources and choices years after the migration episode occurred, we believe our use of a broader definition of migrant status is appropriate for analyzing the effect of migration on education.

The ENADID asks migrants who have ever been to the US for work a set of additional questions about their migrant experience, including the number of trips they have ever made, and whether they had legal documentation to work. Approximately 50% of all migrants have made more than one trip, with a mean of 2.8 trips per migrant. The vast majority of migrants in our sample had no legal documentation to work, especially on their first trip. Over 91% of first-time migrants who went to work in the US had no legal documentation to do so.

One downside of the ENADID is that the information it collects on remittances is not as comprehensive as that collected in some other sources of Mexican migration information, such as the Mexican Census. In addition to separate questions on labor income, the ENADID asks each individual whether they have received income in the past year from pensions, transfers from relatives within the country, transfers from relatives outside the country (remittances), rent, interest, scholarships, the *Procampo* program, and other sources. The interviewer reads this list of eight categories, and records up to two sources per individual. Therefore remittance income may or may not be collected for any individual receiving income from at least two other categories from this list, leading to an underrecording of remittance income. While it is difficult to gauge the exact extent or biases introduced by this underreporting, comparisons with the Mexican Census numbers reported by Hanson and Woodruff [2003] suggests an undercount of approximately 15 to 20% in the proportion of migrant households receiving remittances.[5] For this reason and for more substantial ones explained further in section III on identification, this paper will focus on the impact of migration, rather than of remittances *per se*.

Our main measure of education is based on years of schooling attained. Elementary education (grades 1 to 6) is compulsory in Mexico and is normally provided to children aged 6 to 14. Lower secondary education (grades 7 to 9) became compulsory in 1993 and is generally given to children aged 12 to 16 who have completed elementary education. This is followed by three years of upper secondary schooling (grades 10 to 12) and higher studies. Despite education being compulsory, there is still far from complete compliance and a lack of infrastructure in some of the more rural areas (*Secretaría de Educación Pública* - SEP [1999]). Approximately half of all 15 year olds with less than 9 years of attained schooling

were not attending school in 1997. We focus our study on children aged 12 to 18, the ages at which children will be receiving the majority of their post-primary education, and the age range at which children start leaving school. 89% of 12 year olds in our sample were attending school in 1997, compared to 57% of 15 years old and 26% of 18 years old.

Table 2 provides a first exploration of the association between child schooling attainment and migration. We first test for a difference in mean years of schooling attained by age for males and females. There is no significant difference in mean years of schooling between boys aged 10 to 14 in migrant and non-migrant households, while boys aged 15, 17 and 18 have significantly lower mean schooling levels. The ENADID asks about all household members who usually live with the household, even if they are absent due to study or work, so these differences are not due to more educated boys in migrant households being absent from the household. On average, 16 to 18 years old boys in migrant households have accumulated one-third of a year less schooling than boys in non-migrant households. The only significant difference, at the 10% level, between migrant and non-migrant household in girls schooling occurs for girls aged 12 and 13, who receive 0.15 to 0.20 years more schooling in migrant households.

Hanson and Woodruff [2003] find that the effects of migration on schooling of 10 to 15 years old in the Mexican Census vary according to the level of maternal schooling. In our sample we do not have data on mother's education for 11.5% of children aged 12 to 18 in migrant households,[6] compared to 13.1% of children aged 12 to 18 in non-migrant households. In the bottom half of Table 2 we test for differences in mean years of schooling for those children for whom maternal education is available. We present results by three groups of maternal education: 0 to 2 years (34% of mothers), 3 to 5 years (26% of mothers), and 6 or more years of education (40% of mothers). There is no significant difference between migrant and non-migrant households in mean years of schooling for boys with low-educated mothers, whereas girls in migrant households with mothers with 0 to 2 years of schooling have 0.38 to 0.47 more years of schooling than girls in non-migrant households with low-educated mothers. In contrast, we find migration to be associated with significantly lower levels of schooling of (1) 0.42 to 0.55 years for boys aged 16 to 18 whose mothers have 3 or more years of education; (2) 0.43 years for boys aged 12 to 15 whose mothers have 6 or more years of education; and (3) 0.55 years for girls aged 12 to 15 whose mothers have 6 or more years of education.

III. Identification Strategy

As explained, migration affects education outcomes in a number of ways, of which current remittances received is only one part. It is difficult to think of variables which are not correlated with education decisions that allow one to identify why one migrant household will receive remittances and another will not, or why one migrant sending remittances sends more remittances than another migrant also sending remittances (McKenzie [2005]). For this reason this paper will look at the impact of migration (that is, of being raised in a "migrant household" according to the broader definition exposed above) on children education outcomes rather than on the impact of receiving remittances. In addition, it is well known that unobserved characteristics or shocks which influence households' decisions to migrate may also play a role in their schooling decisions.

We therefore follow Woodruff and Zenteno [2001] and a number of subsequent studies[7] in using historic state-level migration rates as an instrument for current migration

stocks. In particular, we use the US migration rate from 1924 for the state in which the household is located, taken from Foerster [1925].[8] These historic rates can be argued to be the result of the pattern of arrival of the railroad system in Mexico coupled with changes in US demand conditions for agricultural labor. As migration networks lower the cost of migration for future migrants, they become self-perpetuating. Hildebrandt and McKenzie [2005] show that the historic migration rate is a strong predictor of current migration rates, with a first-stage F-statistic of over 30.

Our identifying assumption is then that historic state migration rates do not affect education outcomes over 70 years later, apart from their influence through current migration. Instrumental variables estimation relies on this exogeneity assumption, and so it is important to consider and counteract potential threats to its validity.

One potential threat is that historic levels of inequality and historic schooling levels helped determine migration rates in response to the railroad expansion, and also influence current levels of schooling due to intergenerational transmission of schooling. To allow for this possibility we control for a number of historic variables at around the same time period as our historic migration measure. The controls are the proportion of rural households owning land by state in 1910 taken from McBride [1923],[9] and the number of schools per 1000 population by state in 1930, and male and female school attendance for 6 to 10 year olds by state for 1930, both taken from *Dirección General de Estadísticas* - DGE [1941].

A second possible threat to validity is that the development of the railroads in certain states and communities ushered in the subsequent development of other infrastructure, such as school facilities, and led to changes in the income distribution which themselves influenced the incentives and ability to invest in schooling. We include the following state-level controls for this possibility, all calculated from the public use sample of the 1960 Mexican Census: the Gini of household income, the Gini of years of schooling accumulated for males and females aged 15-20, and the average levels of years of schooling accumulated for males and females aged 15-20. Spearman rank-order correlation tests do indeed indicate some significant correlations between the 1924 migration rates and some of these controls: states with higher historic migration rates had higher average rates of schooling and lower inequality in schooling in 1960. This might represent the influence of migration over the 1924-1960 period, or the effects of concomitant trends, and so we prefer to include these 1960 education inequality and levels as controls. Even after controlling for these variables, historic migration rates remain a powerful predictor of current community migration prevalence, with a first-stage F-statistic of 28.[10]

IV. The effect of migration on educational attainments

At a theoretical level, one can think of the following main channels through which migration directly impacts on education decisions: the effect of remittances on the feasible amount of education investment (which is likely to be positive where liquidity constraints are bidding); the effect of having parents absent from the household as a result of migration (which may translate into less parental inputs into education acquisition and maybe into more house and farm work by remaining household members, including children); and the effect of migration prospects on the desirable amount of education (which depends on how education incentives are affected by the prospect of migration).

The theoretical impact of migration on education is therefore unclear and is likely to depend on household resources. However, the ENADID only contains measures

of current household assets, which are themselves affected by the household's migration decision. We therefore instead examine how the impact of migration varies according to maternal education. There is a large literature which finds that higher maternal education is associated with more education of future generations. Moreover, as discussed above, many of the interactions between household wealth and migration status in determining the impact of migration on schooling are likely to apply for maternal education as well, be it through constraints or through incentives. Furthermore, maternal education and household wealth are strongly correlated in our sample. Mother's years of schooling has a 0.46 correlation with an asset index formed as the first principal component of a number of asset indicators.

We estimate the following equation for $S_{i,c}$, the years of schooling completed by child i in community c:

$$S_{i,c} = \lambda_0 + \lambda_1 Mig_{i,c} + \lambda_2 Mig_{i,c} \times MidEduc_{i,c} + \lambda_3 Mig_{i,c} \times HighEduc_{i,c} + \alpha_1 MidEduc_{i,c} + \alpha_2 HighEduc_{i,c} + \phi' X_{i,c} + \gamma' Z_c + \varepsilon_{i,c} \quad (1)$$

where $Mig_{i,c}$ is a dummy variable taking the value one if child i lives in a household with a migrant member, $MidEduc$ and $HighEduc$ are dummy variables for child i having a mother with 3-5 years of schooling and 6 or more years of education respectively, $X_{i,c}$ are a number of child controls, such as age and age squared, and Z_c are the set of state-level controls.

Equation (1) is estimated separately for four groups: males 12 to 15, males 16 to 18, females 12 to 15, and females 16 to 18. For each group we estimate equation (1) with and without the controls for maternal education. Ordinary Least Squares (OLS) results are compared with two-stage least squares results in which the 1924 state-level migration rate and its interactions with maternal education are used as instruments for whether a household has a migrant, and the interaction of migrant status with maternal education. Since this instrument only varies at the state level, we cluster our standard errors at the state level to allow for arbitrary correlation in the error structure of individuals within a state.[11] This approach follows closely the work of Hanson and Woodruff [2003]. The two main differences are that we use the ENADID rather than the Mexican census, allowing us to classify households according to whether they have ever had a migrant, rather than on whether they have had a migrant in the last five years; and that we also consider 16 to 18 year olds. It is this latter group for whom we think the negative effects of migration on schooling will potentially be the strongest.

Table 3 presents the results of this estimation for males. Looking first at 12 to 15 years old, we see in columns 1 and 3 that the overall impact of migration is small and insignificantly different from zero. Columns 2 and 4 find a relatively large increase in years of schooling associated with maternal education: boys in a non-migrant household with a mother with 3 to 5 years of schooling have 0.54 to 0.66 years more schooling than boys in non-migrant households with a mother with 2 or fewer years of schooling, while boys with mothers with 6 or more years of schooling have 1.54 to 1.59 more years of schooling accumulated. This is a sizeable increase on the 5.4 mean years of schooling for boys whose mothers have two or fewer years of education. The interactions between mother's education and being in a migrant household are negative and, when coupled with the negative coefficient on migration status, seem to suggest that migration strongly reduces education for boys with more highly educated mothers. However, after instrumenting for migration status, these effects become insignificant.

The results for 16 to 18 years old males in Table 3 show a stronger impact of migration. Pooling across levels of maternal education results in an overall negative impact of migration, which becomes stronger after instrumenting. Being in a migrant household lowers average years of schooling by 1.4 years. Again we find higher levels of education for boys with more educated mothers, with the effects being larger than for 12 to 15 years old. After instrumentation we find that the interaction effects between education and migration status are negatives, and significant for boys with more highly educated mothers. The coefficient on being in a migrant household is also negative and significant, so migration lowers education for boys whose mothers have less education, and lowers it by even more for boys with more educated mothers. In terms of the coefficients in equation (1), the overall impact of migration is λ_1 for children whose mothers have 0 to 2 years of education, $\lambda_1 + \lambda_2$ for children with maternal education of 3 to 5 years, and $\lambda_1 + \lambda_3$ for children with maternal education of 6 or more years. The foot of Table 3 reports p-values for Wald tests of significance of these effects.

Migration lowers schooling by more both in absolute and in relative terms for boys with higher maternal education. Migration lowers schooling by 3.05 years for boys with maternal education of 6 or more years. This represents a 33% drop compared to the 9.14 mean years of education for boys in non-migrant households with highly educated mothers, and completely erases the 2.8 years of educational gain associated with having a highly educated mother. In contrast, the 0.94 fall in years of schooling for boys with low-educated mothers, and 2.02 fall in schooling years for boys with mid-educated mothers represent falls of 14% and 26% compared to the mean schooling levels for boys in non-migrant households with these education levels.

Table 4 presents the estimates of equation (1) for females. The overall impact of migration is found to be insignificant when we pool girls with different levels of maternal schooling. This is the case for both 12 to 15 year olds and 16 to 18 years old. The OLS results which allow for interactions with maternal education (columns 2 and 5) show that migration is associated with higher levels of education for girls whose mothers have 0-2 years of education, and has no effect on education for girls whose mothers have more years of education. However, these results change after we instrument for migration status. There is no significant impact of migration on education for girls 12 to 15, regardless of maternal education level. Migration is found to significantly lower education for girls aged 16 to 18, even in households with low maternal education. As with 16 to 18 years old boys, migration lowers education more for 16 to 18 years old girls with more highly educated mothers. The increases in years of schooling associated with higher maternal education in non-migrant households are similar in magnitude to those found for boys.

Hanson and Woodruff [2003] find a significant positive effect of migration on education of 13 to 15 years old whose mothers have two or fewer years of education, and no effect for girls of this age whose mothers have higher education, or for males aged 13 to 15. Our results for 12 to 15 years old broadly match their findings: we find no significant impact of migration on the schooling of boys aged 12 to 15, a positive impact on girls with low maternal education which is significant in our OLS estimation but insignificant after instrumenting, and insignificant effects on other 12 to 15 years old girls. Stronger results are found for the older 16 to 18 years old age group not considered by Hanson and Woodruff [2003], and it is for this group that migration appears to reduce child schooling.

V. The effect of migration on education inequality

The results of the previous section suggest that we should see little impact of migration on inequality in the education of 12 to 15 years old, with greater potential impact for 16 to 18 years old. Migration lowers the education attained by 16 to 18 years old with high levels of maternal education by more than it does for those with lower levels of maternal education. As a result, we expect migration to lower educational inequality; however, this effect will depend on the degree to which mother and child's education are correlated, and on how education determines who migrates.

A descriptive look at the potential effect of migration on inequality comes from plotting Lorenz curves. Figure 1 plots Lorenz curves of years of schooling achieved for males and females aged 12 to 15 and 16 to 18 by household migration status. The Lorenz curves for males cross multiple times and almost lie exactly on top of each other. As a result, there appears to be visually no impact of migration on inequality in male education. In contrast, the Lorenz curves for females aged 12 to 15 and 16 to 18 in migrant households lie entirely above the curves for non-migrant households, suggesting that migration is indeed lowering inequality. The curve shifts more for the older group of females, suggesting a stronger inequality-reducing effect for this group. Of course these visual comparisons do not control for other characteristics which may influence both migration and inequality in education, and do not tell us whether any differences observed are statistically significant.

We therefore turn to regression-based analysis of the impact of migration on inequality. This requires us to construct an index of inequality in years of education for each community. Many of the municipalities in our sample have fewer than 30 children of a given gender and age group in our sample. We therefore measure inequality at the state level, allowing us to maximize the number of observations used. Thomas, Wang and Fan [2002] discuss several measures of education inequality. They note several of the standard measures of inequality, which involve taking logarithms, are not defined when the basic variable takes the value of zero. This is not a large problem in our data, since only 2.3% of 12 to 18 years old in our sample have zero years of education. Nevertheless, in order to include these observations, we use three measures of inequality which allow for zero values.

Our main measure is the Gini of attained years of schooling. For robustness we supplement this with the coefficient of variation and with the generalized entropy (0.5) measure. Then for each state *s* we construct an inequality measure I_s for years of schooling attained by a particular age group and carry out the following state-level regression:

$$I_s = \beta_0 + \beta_1 network_s + \phi' Z_s + \nu_s \quad (2)$$

where $network_s$ is the state migration prevalence and Z_c are a set of state-level controls. Again we can instrument the current state migration network using the 1924 state migration rates. We can also allow for a quadratic term in the migration network, although this never turns out to be significant, so is not reported here.

However, Thomas *et al*. [2002] note that as years of schooling is bounded from below (zero years with no schooling) and from above (20 years, consisting of four years or more of graduate education), there is a strong mechanical negative correlation between education inequality and the average level of schooling. If migration affects the average level of schooling in a community, this will therefore in itself result in an effect on measured

inequality. To neutralize this mechanical effect, we therefore add the average level of education in a state as an additional control to equation (2).

Table 5 presents the instrumental variable results using Gini of years of schooling to measure inequality. Columns 1 to 4 report the results for each of the four gender-age groups when the mean level of years of schooling is not included as a control, and Columns 5 through 8 report results controlling for the level of years of schooling. As expected, the coefficient on mean years of schooling is negative and strongly significant, so it is important to control for this mechanical effect of levels on inequality. After controlling for levels we find negative coefficients on migration prevalence for all four groups, but this effect is only significant (at the 10% level) for females aged 16 to 18. A one standard deviation increase in migration prevalence is estimated to lower the Gini of education for females aged 16 to 18 by 0.17 standard deviations, which is in line with the 0.2 standard deviation reduction in consumption inequality that McKenzie and Rapoport [2004] report to be the impact of increasing migration prevalence in the ENADID sample.

Table 6 examines the robustness of these results to different specifications. It reports just the coefficient on migration prevalence for regressions analogous to Columns 5-8 in Table 5, where we control for average levels of education. The first row reports the OLS estimates for the Gini of education, the second row repeats the IV estimates from Table 5, and the third row reports the IV estimates when the only state-level control is the average level of education. As estimation is only at the state level for the 29 states with sufficient observations,[12] it is possible that the sample size is not large enough to justify the inclusion of these additional controls. Indeed, migration prevalence is significant at the 1% level when these additional controls are not added. However, migration prevalence is still found to have an insignificant negative effect on education inequality for males of both age groups, and for females aged 12 to 15.

The remaining rows of Table 6 present the coefficient on migration prevalence when the coefficient of variation and GE(0.5) measures of education inequality are used. The negative effect of migration on education inequality of females aged 16 to 18 is robust to the use of the coefficient of variation, with an estimated effect of 0.14 (with controls) to 0.24 (without controls) standard deviations reduction in inequality from a one standard deviation increase in migration prevalence. The coefficients for 16 to 18 years old females are also negative, but are statistically insignificant, for the GE(0.5) measure of inequality, with a point estimate of a 0.07-0.13 standard deviation reduction in inequality from a one standard increase in inequality. Using these other measures of inequality still yields insignificant effects of migration on education inequality for males, and for females aged 12 to 15.

VI. Conclusion

Using historical migration rates by state to instrument for current migration, this paper examined the overall impact of migration on educational attainments and inequality in rural Mexico. Focusing first on education levels, we found evidence of a significant negative (or disincentive) effect of migration on schooling levels of 16 to 18 years old, which is greater for males and for children with highly educated mothers; this is consistent with migration prospects translating into lower expected returns to schooling, which are likely to impact mainly on prospective migrants whose education decisions are unconstrained (that is, males with relatively educated mothers). We also found evidence of

a significant negative effect for female children of the same age group; since females are far less likely to migrate than males, we interpret this finding as pointing to a substitution effect between housework and schooling. In addition, migration was also found to significantly increase schooling attainments for girls from households with uneducated mothers, which is consistent with remittances alleviating credit constraints that impede education investments of poor households; this effect, however is no longer significant after instrumenting.

Building on these educational attainments results, we then computed state-level measures of inequality in education in rural communities. Our results point to a tendency for migration to lower inequality in education, but this inequality-reducing effect of migration is significant after instrumenting only for girls aged 16 to 18. Moreover, the changes in inequality that migration brings about seem to be driven mainly by reductions in schooling at the top of the education distribution, rather than by increases in schooling from relaxing liquidity constraints at the bottom.

As a final word we would like to mention a number of concerns that should be addressed in further analysis before policy implications may be derived. A first concern is the possibility that some children in rural areas may begin to leave home after age 15, either to work or to continue schooling. As mentioned previously, the ENADID asks about all household members who usually live with the household even if they are absent due to study or work. Therefore, we do not believe that the differences found in education attainments between 15-18 years old in migrant and non-migrant households are due to more educated children in migrant households being absent from the household. In future work we will apply bounds analysis to examine further the sensitivity of our results to this possibility.

A second concern is that there are certain natural stopping points (for example, primary school, junior secondary school, end of high school), and so moving from say 7 to 8 years of education is not the same as from 8 to 9. A related issue is that we observe children at a given point in time without knowing how far they will go in terms of educational attainment (censored observations). Ideally, these censoring and nonlinearities issues must be dealt with using econometric techniques allowing for discrete choices in education and for the fact that some children are still in school. Nevertheless, our findings do show that there are differences in educational attainment among school-age children, while in future work we will apply econometric methods which can enable us to estimate the impact of migration on final schooling levels.

The concerns just outlined are dealt with in ongoing work focusing on education levels (McKenzie and Rapoport [2005]).

Notes

[1] To give just one figure, the averaged Gini coefficient for Latin America is as high as 0.52, well above the coefficient for the other regions (de Ferranti *et al.* [2004]).

[2] See Rapoport and Docquier [2005] for a comprehensive survey of the remittances literature.

[3] Survey methodology, summary tables and questionnaires are contained in INEGI [1999].

[4] The sample proportion is 0.23. The survey provides sample weights designed for the purpose of obtaining state-level rates of demographic indicators, and using these weights gives a proportion of 0.21. After we restrict our sample to rural households in communities with more than 50 households which have secondary school-aged children, the sample weights provided are not designed to provide population estimates for this population, and so for the remainder of our analysis we do not use the population weights, report results for the large sample we have.

[5] A first pass is to compare our results from Hanson and Woodruff [2003], who report that 38.2% of migrant households with children aged 10 to 15 receive remittances. Using the census definition of migrant status, the corresponding number is 28.6% for our sample and 31.6%, if we restrict our sample to communities of population size less than 15,000 as they do.

[6] This difference is statistically significant at the 1% level. For 16 to 18 years old, we are missing maternal education data for 15.8% of children in migrant households and 18.6% of children in non-migrant households.

[7] Hanson and Woodruff [2003]; McKenzie and Rapoport [2004]; López-Córdova [2004]; and Hildebrandt and McKenzie [2005] all employ historic migration rates as instruments for current migration.

[8] Thanks to Chris Woodruff for supplying these historic rates.

[9] Land ownership data were kindly provided by Ernesto López-Córdova.

[10] The first stage is even stronger if we use the 1955-1959 migration rates used by Hanson and Woodruff [2003]. We choose to use the 1924 historic rates on the grounds that the greater period of time elapsing between these rates and present day migration strengthens the assumption of exogeneity needed for our instrumental variables procedure.

[11] As we run the regressions separately by gender and age group, very few households have multiple children within a given age-gender range. Nevertheless, clustering also allows for correlation in the error structure of individuals of the same age and gender range within a household.

[12] Omitted are the Federal District (Mexico City), and Baja California North and South, which have insufficient rural observations.

Table 1

Summary Statistics of Key Variables

	Number of Observations	All Households		Migrant Households		Non-Migrant Households	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Household Variables (for households with a child aged 12 to 18)							
Proportion of Households with a Migrant	9758	0.23	0.42	1.00	0.00	0.00	0.00
Proportion of Households with a Migrant by Census Definition	9758	0.12	0.33	0.53	0.50	0.00	0.00
Proportion Receiving Remittances	9758	0.05	0.22	0.18	0.38	0.01	0.12
Percentage Share of Income from Remittances	9336	3.15	15.40	11.62	28.13	0.71	7.11
Individual Variables							
Years of Schooling of Mother for Children Aged 12 to 18	14987	4.36	3.73	4.26	3.32	4.40	3.85
Years of Schooling of Males 12 to 15	5148	6.08	2.02	6.01	1.94	6.11	2.04
Years of Schooling of Males 16 to 18	3459	7.74	2.77	7.45	2.67	7.81	2.80
Years of Schooling of Females 12 to 15	5137	6.30	1.96	6.40	1.82	6.27	2.01
Years of Schooling of Females 16 to 18	3452	7.74	2.82	7.66	2.49	7.77	2.92

Table 1 (continued)

Summary Statistics of Key Variables

Community Level Variables	Number of Communities	All Communities		< Median Prevalence		> Median Prevalence	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Community Migration Prevalence	214	0.213	0.202	0.047	0.046	0.379	0.154
Gini of Years of Education for Males 12 to 15	109	0.166	0.045	0.165	0.043	0.167	0.046
Gini of Years of Education for Males 16 to 18	45	0.186	0.057	0.176	0.057	0.200	0.054
Gini of Years of Education for Females 12 to 15	118	0.155	0.044	0.159	0.052	0.152	0.034
Gini of Years of Education for Females 16 to 18	49	0.177	0.052	0.186	0.053	0.169	0.050
State Migration Rate in 1924	214	0.006	0.008	0.003	0.006	0.010	0.009
Proportion of Rural Households Qwning Land in 1910	210	2.746	1.973	2.356	1.997	3.121	1.884
Male School Attendance in 1930 (6 to 10 years old)	214	44.740	11.780	45.540	12.640	43.930	10.860
Female School Attendance in 1930 (6 to 10 years old)	214	43.520	13.110	42.940	13.390	44.090	12.870
Gini of Household Income in 1960	214	0.758	0.094	0.762	0.104	0.753	0.082
Number of Schools per 1000 Population in 1930	214	1.236	0.423	1.321	0.468	1.151	0.355
Gini of Years of Schooling for Males 15-20 in 1960	214	0.514	0.095	0.514	0.094	0.513	0.096
Gini of Years of Schooling for Females 15-20 in 1960	214	0.529	0.111	0.539	0.113	0.520	0.109
Average Male Years of Schooling in 1960	214	2.900	0.812	2.830	0.815	2.969	0.807
Average Female Years of Schooling in 1960	214	2.755	0.903	2.625	0.905	2.884	0.885

Note: Educations Ginis are only reported for communities with 20 or more children in the given age category.
Source: Own calculation from ENADID 1997 communities with population < 100,000 and 50 or more households sampled.

Table 2

Years of Schooling by Migrant Status

Full sample	Males			Females		
Age of Child	Migrant Household	Non-Migrant Household	T-test p-value	Migrant Household	Non-Migrant Household	T-test p-value
10	3.34	3.24	0.11	3.57	3.39	0.01
11	4.22	4.01	0.01	4.44	4.27	0.02
12	5.03	4.82	0.01	5.33	4.98	0.00
13	5.80	5.53	0.01	5.96	5.65	0.00
14	6.36	6.22	0.19	6.67	6.29	0.00
15	6.79	6.63	0.25	7.05	6.82	0.10
16	7.26	7.06	0.18	7.41	6.99	0.01
17	7.13	7.25	0.50	7.54	6.99	0.00
18	7.25	7.21	0.84	7.43	7.04	0.04
12 to 15	5.96	5.76	0.00	6.27	5.91	0.00
16 to 18	7.21	7.17	0.69	7.46	7.00	0.00
Children with Mother's Education 0-2 years						
12 to 15	5.43	5.14	0.01	5.79	5.13	0.00
16 to 18	6.39	6.31	0.64	6.77	6.03	0.00
Children with Mother's Education 3-5 years						
12 to 15	5.93	5.80	0.15	6.23	6.06	0.08
16 to 18	7.31	7.32	0.92	7.65	7.53	0.47
Children with Mother's Education 6 years or more						
12 to 15	6.53	6.70	0.05	6.84	6.87	0.77
16 to 18	8.59	8.82	0.18	8.71	9.18	0.01

Note: Households in all communities with populations less than 50,000.
Source: Own calculations from ENADID 1997.

Table 3

Impact of Migration on Male Years of Schooling

	Ages 12 to 15				Ages 16 to 18			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Child is in a Migrant Household	-0.1285	-0.0332	0.0600	-0.1030	-0.3965	0.0261	-1.4017	-0.9404
	(1.46)	(0.32)	(0.13)	(0.23)	(2.21)*	(0.07)	(2.91)**	(2.12)*
Migrant Household* Mother Has 3-5 Years Schooling		-0.0646		-0.4683		-0.4151		-1.0820
		(0.52)		(0.96)		(1.09)		(1.40)
Migrant Household* Mother Has 6+ Years Schooling		-0.2960		-0.5194		-0.5498		-2.1113
		(1.96)		(0.78)		(1.53)		(2.04)*
Proportion of Rural Households Owning Land in 1910	0.0010	-0.0190	-0.0005	-0.0185	0.0374	0.0439	0.0493	0.0671
	(0.03)	(0.84)	(0.01)	(0.81)	(0.81)	(1.00)	(0.97)	(1.20)
Male School Attendance in 1930 (6 to 10 years old)	0.0008	-0.0004	0.0010	-0.0006	-0.0017	0.0038	-0.0010	0.0053
	(0.10)	(0.06)	(0.12)	(0.10)	(0.19)	(0.43)	(0.13)	(0.86)
Gini of Income in 1960	2.0098	0.8465	1.9849	0.8782	3.8819	1.3936	4.0527	1.6217
	(4.13)**	(2.61)*	(4.36)**	(2.60)**	(5.97)**	(1.48)	(6.20)**	(2.43)*
Number of Schools per 1000 Population in 1930	-0.1361	-0.1123	-0.1113	-0.1550	0.4691	0.1989	0.3669	0.0506
	(1.01)	(1.25)	(0.87)	(1.89)	(2.40)*	(0.77)	(1.95)	(0.28)
Gini of Male Years of Schooling for 15-20 years old in 1960	-2.9661	-1.4797	-2.9447	-1.6131	-2.0272	-1.8466	-2.0461	-1.6266
	(1.91)	(1.36)	(2.01)*	(1.56)	(1.38)	(1.10)	(1.54)	(1.27)

Table 3 (continued)

Impact of Migration on Male Years of Schooling

	Ages 12 to 15				Ages 16 to 18			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Average Male Years of Schooling in 1960 for 15-20 years old	-0.0294	-0.1021	-0.0421	-0.0908	0.1338	-0.2910	0.1791	-0.1905
	(0.19)	(0.93)	(0.26)	(0.82)	(0.67)	(1.29)	(0.86)	(0.95)
Mother Has 3-5 Years Schooling		0.5400		0.6571		1.0784		1.3074
		(7.01)**		(4.30)**		(7.57)**		(6.22)**
Mother Has 6+ Years Schooling		1.5361		1.5886		2.4809		2.7563
		(23.49)**		(10.33)**		(18.15)**		(9.69)**
Observations	4995	4559	4995	4559	3336	2930	3336	2930
R-squared	0.16	0.27			0.04	0.17		
P-value for testing the impact of migration is zero by mother's education								
Mother Has 0-2 Years of Education		0.754		0.819		0.941		0.034
Mother Has 3-5 Years of Education		0.265		0.162		0.040		0.001
Mother Has 6+ Years of Education		0.010		0.169		0.015		0.003

Notes: All regressions also contain a constant, age and age squared, and controls for population size.
T-statistics are in parentheses with standard errors clustered at the state level.
Instruments are 1924 state-level migration rate and its interaction with mothers year of schooling categories.
* significant at 5%; ** significant at 1%.

Table 4

Impact of Migration on Female Years of Schooling

	Ages 12 to 15				Ages 16 to 18			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Child is in a Migrant Household	0.0666	0.4272	0.0420	0.0138	-0.0970	0.5850	-1.7059	-1.9298
	(0.60)	(2.62)*	(0.12)	(0.03)	(0.47)	(2.37)*	(1.45)	(2.09)*
Migrant Household*Mother Has 3-5 Years Schooling		-0.3548		-0.1937		-0.7663		-1.0127
		(1.70)		(0.42)		(2.51)*		(0.87)
Migrant Household*Mother has 6+ Years Schooling		-0.4856		-0.4924		-1.1656		-2.4555
		(2.94)**		(0.74)		(3.98)**		(2.15)*
Proportion of Rural Households Owning Land in 1910	0.0258	0.0157	0.0260	0.0183	0.0149	0.0346	0.0402	0.0855
	(0.60)	(0.49)	(0.61)	(0.55)	(0.15)	(0.35)	(0.34)	(0.68)
Female School Attendance in 1930 (6 to 10 years old)	0.0092	0.0089	0.0093	0.0095	0.0100	0.0049	0.0131	0.0085
	(2.27)*	(2.59)*	(2.26)*	(2.99)**	(1.04)	(0.40)	(1.31)	(0.80)
Gini of Income in 1960	1.6037	0.6672	1.6166	0.8659	3.0006	1.2839	3.7525	2.6446
	(5.72)**	(3.42)**	(4.22)**	(3.15)**	(6.03)**	(1.45)	(4.50)**	(2.73)**
Number of Schools per 1000 Population in 1930	0.0461	0.0811	0.0422	0.0241	0.3119	0.3916	0.0539	-0.0971
	(0.63)	(1.45)	(0.44)	(0.32)	(1.52)	(1.66)	(0.17)	(0.27)
Gini of Female Years of Schooling for 15-20 years old in 1960	-0.9639	-1.3936	-0.9484	-1.1546	-2.3170	-1.7999	-0.9339	0.4432
	(1.00)	(1.91)	(0.98)	(1.43)	(1.00)	(0.80)	(0.37)	(0.17)

Table 4 (continued)

Impact of Migration on Female Years of Schooling

	Ages 12 to 15				Ages 16 to 18			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	OLS	OLS	IV	IV	OLS	OLS	IV	IV
Average Female Years of Schooling in 1960 for 15-20 years old	0.0637	-0.1889	0.0676	-0.1272	0.1329	-0.2984	0.4472	0.2889
	(0.51)	(2.18)*	(0.52)	(1.14)	(0.45)	(1.24)	(1.21)	(0.68)
Mother Has 3-5 Years Schooling		0.7048		0.6783		1.2040		1.2415
		(6.16)**		(4.30)**		(6.24)**		(3.19)**
Mother has 6+ Years Schooling		1.5397		1.5321		2.7650		2.9581
		(13.98)**		(7.85)**		(17.90)**		(9.85)**
Observations	4981	4495	4981	4495	3332	2539	3332	2539
R-squared	0.19	0.31			0.05	0.20		
P-Value for Testing the impact of Migration is Zero by Mother's Education								
Mother Has 0-2 Years of Education		0.014		0.972		0.025		0.037
Mother Has 3-5 Years of Education		0.658		0.516		0.516		0.011
Mother Has 6+ Years of Education		0.261		0.346		0.346		0.036

Notes: All regressions also contain a constant, age and age squared, and controls for population size.
T-statistics are in parentheses with standard errors clustered at the state level.
Instruments are 1924 state-level migration rate and its interaction with mothers year of schooling categories.
* significant at 5%; ** significant at 1%.

Table 5

Impact of Migration on Inequality
Instrumental Variable Results Using Gini of Years of Schooling as Dependent Variable

	Not controlling for mean level of schooling				Controlling for mean level of schooling			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	m 12-15	m 16-18	f 12-15	f 16-18	m 12-15	m 16-18	f 12-15	f 16-18
State-level Migration Prevalence	-0.021	-0.006	-0.042	-0.006	-0.025	-0.050	-0.034	-0.052
	(0.36)	(0.08)	(1.02)	(0.09)	(0.90)	(1.01)	(0.96)	(1.80)
Mean Level of Schooling in State					-0.055	-0.050	-0.033	-0.052
					(7.37)**	(5.70)**	(1.65)	(6.78)**
Proportion of Rural Households Owning Land in 1910	0.001	0.003	-0.001	0.003	0.001	0.003	-0.000	0.001
	(0.47)	(0.91)	(0.61)	(0.52)	(0.42)	(1.18)	(0.23)	(0.63)
School Attendance in 1930 (6 to 10 years old)	-0.001	0.000	-0.001	-0.001	-0.000	0.000	-0.000	-0.000
	(0.87)	(0.03)	(1.93)	(1.04)	(1.41)	(0.74)	(0.72)	(0.80)
Gini of Income in 1960	-0.027	-0.141	-0.003	-0.140	0.031	0.001	0.046	0.002
	(0.55)	(2.31)*	(0.08)	(2.36)*	(0.94)	(0.01)	(1.12)	(0.08)
Number of Schools per 1000 Population in 1930	0.022	-0.026	-0.006	0.002	0.012	-0.017	-0.006	0.008
	(1.30)	(1.31)	(0.79)	(0.12)	(0.98)	(1.29)	(0.95)	(0.68)
Gini of Years of Schooling for 15-20 years old in 1960	0.227	0.098	0.169	0.218	0.044	-0.074	0.098	-0.041
	(1.86)	(0.71)	(1.72)	(1.07)	(0.59)	(0.52)	(1.07)	(0.32)
Average Years of Schooling in 1960	0.017	-0.014	0.015	-0.004	0.008	-0.016	0.014	-0.010
	(1.26)	(0.90)	(1.19)	(0.15)	(0.93)	(1.21)	(1.49)	(0.99)
Observations	*29*	*29*	*29*	*29*	*29*	*29*	*29*	*29*

Notes: Robust T-statistics are in parentheses.
Instruments are 1924 state-level migration rate.
* significant at 5%; ** significant at 1%.

Table 6

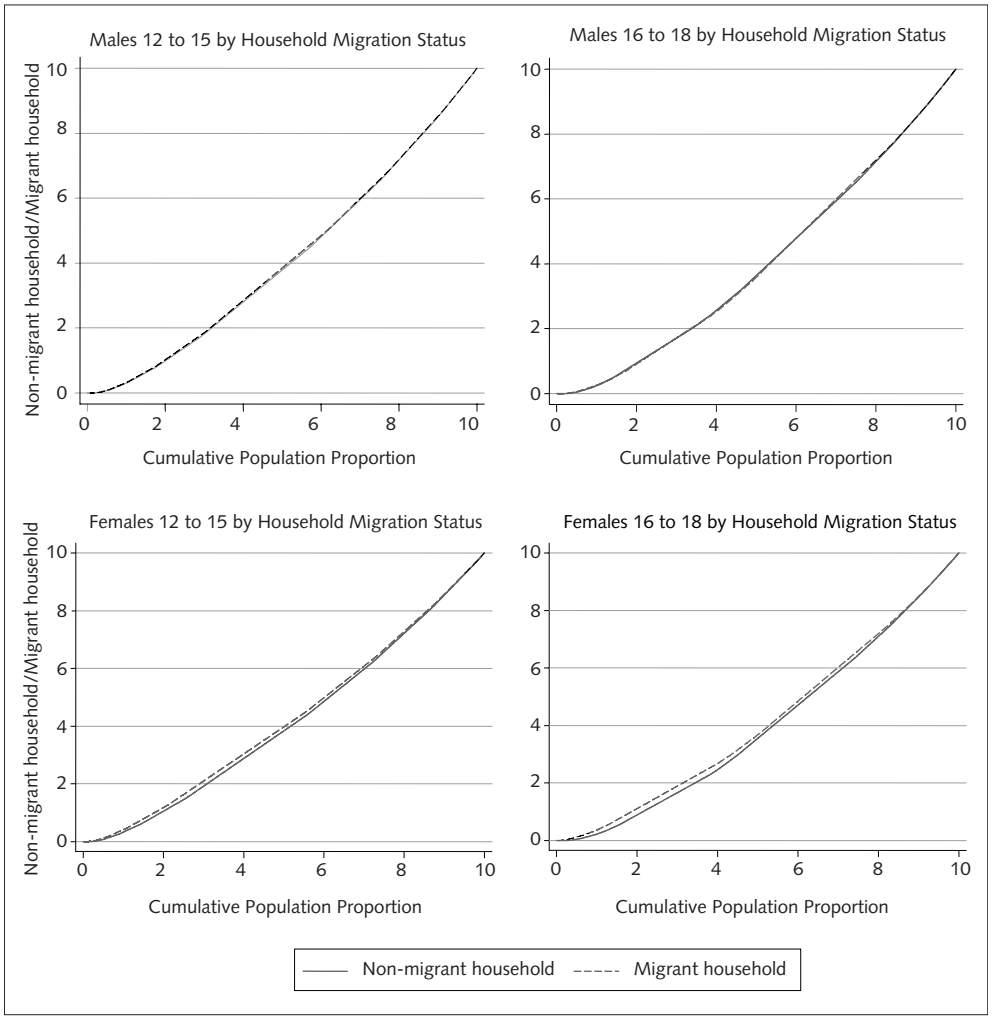
Impact of Migration on Inequality
OLS and IV Coefficients on State Migration Prevalence for Different Measures of Inequality

	Coefficient on state migration prevalence			
	(1)	(2)	(3)	(4)
	m 12-15	m 16-18	f 12-15	f 16-18
Gini of Years of Schooling:				
OLS	-0.023	-0.013	0.001	-0.053
	(1.30)	(0.41)	(0.06)	(2.53)*
IV	-0.025	-0.050	-0.034	-0.052
	(0.90)	(1.01)	(0.96)	(1.80)
IV, No State-Level Controls Apart from Mean Education Level	-0.032	-0.033	-0.015	-0.090
	(1.29)	(0.63)	(0.48)	(3.07)**
Coefficient of Variation of Years of Schooling				
IV	-0.014	-0.052	-0.038	-0.073
	(0.32)	(0.64)	(0.66)	(1.54)
IV, No State-Level Controls Apart from Mean Education Level	-0.020	-0.044	0.003	-0.124
	(0.39)	(0.55)	(0.06)	(2.88)**
GE(0.5) of Years of Schooling				
IV	0.022	0.021	-0.030	-0.028
	(0.43)	(0.29)	(0.59)	(0.45)
IV, No State-Level Controls Apart from Mean Education Level	0.026	-0.035	0.013	-0.053
	(0.33)	(0.55)	(0.28)	(0.83)

Notes: Robust T-statistics are in parentheses. Instruments are 1924 state-level migration rate.
* significant at 5%; ** significant at 1%.
Controls are as in columns (5) - (8) of Table 5.

Figure 1

LORENZ CURVES FOR EDUCATION IN MIGRANT AND NON-MIGRANT HOUSEHOLDS



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Remittances and Healthcare Expenditure Patterns of Populations in Origin Communities: Evidence from Mexico

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Summary

Workers' remittances to Mexico represent one of Mexico's most important sources of foreign income, only second to petroleum sales. This paper attempts to measure the elasticity or responsiveness of healthcare use to remittances. Do remittances increase healthcare use by a large or a small percent? Is the responsiveness of healthcare use to remittances dependent on the type of healthcare being sought-whether it is for financing routine healthcare purchases, or hospitalization? This study may help inform Mexican policy-makers on the role of the repatriated incomes from Mexican migrants in the US in affecting healthcare expenses of family members left back home.

I. Introduction

Workers' remittances to Mexico have grown to US$ 14.5 billion during 2003 (Lee [2003]; Thompson [2003]). This figure represents one of Mexico's most important sources of foreign income, only second to petroleum sales (US$ 18.6 billion).[1] In fact, even if in relative terms remittances only represent 2% of Mexico's Gross Domestic Product (GDP) in 2003, remittance flows from Mexican migrant workers to their relatives, friends, and origin communities back in Mexico have been recognized to play a significant role in economic growth and in the well being of their recipients (for example, Keely and Tran [1989] pp. 500-525; Taylor and Wyatt [1996] pp. 899-912; Rozelle *et al.* [1999] pp. 287-291). In particular, it has been estimated that each "migradollar" (a dollar sent by a Mexican worker working abroad) increases GDP by US$ 2.9 dollars (Durand *et al.* [1996] pp. 423-445).

In a country where median annual household income is less than US$ 5,000,[2] these money inflows can also make a significant impact at the individual level. Almost 6% of Mexican households,[3] a large fraction of them residing in rural areas, receive remittances from abroad. A significant fraction of remittances appears to be sent back to Mexico to finance the purchase of food, clothing, housing, and educational expenses of younger siblings and children left home, as well as to finance land and businesses investments (for example, Durand [1996]; Durand *et al.* [1996]; Massey and Parrado [1994]). However, the single largest category reported in migrant surveys with a detailed breakdown of the intended use of migrants' remittances has been health expenses. Indeed, according to the Mexican Migration Project (MMP) 93 (Table 1) approximately 46% of remitters declare health expenses as the primary purpose for their remittances. This percentage is significantly higher than the ones reported for any of the other most prominent categories, including food or maintenance (30%), construction or repair of a house (7.5%), debt payment (5%), and purchase of consumer goods (4.5%).[4, 5] Yet, despite the significant fraction of migrants declaring to be sending funds home to cover family health expenses, relatively little attention has been paid to assessing the relationships between remittances and healthcare access of the Mexican population in origin communities.

There are various reasons for advocating the need to carefully examine the implications of international transfers on the healthcare access of communities in Mexico. First, as noted by Appleton ([1996] pp. 1811-1827), health -often-conditioned on adequate access to healthcare- is a crucial dimension of people's well being. To properly evaluate and track economic progress we need to understand healthcare access. Second, a variety of studies have emphasized the potential effects of migration on health through two channels that may directly impact healthcare access and lifestyles (Kanaiaupuni and Donato [1999] pp. 339-353). One is through the flow of monetary funds in the form of remittances as these can serve to relieve income constraints when seeking appropriate healthcare. A second channel involves the exchange of informational resources that occurs. Social and migration networks may facilitate informational exchanges and the adoption of either more or of less healthy lifestyles. Both channels are particularly important in Mexico, a country with a deep-rooted tradition of US migration.[6] A third reason for focusing on the health implications of international transfers involves the wide disparities observed in health outcomes within the Mexican population (Frenk *et al.* [1989] pp. 29-39). What role do remittances play in increasing or decreasing these disparities? Given that migrants tend to originate from economically disadvantaged families, and given that an estimated 50.3 million Mexicans (approximately 50% of the population) were uninsured as of the year 2002 (Secretaría de Salud [2002]), it is of interest to understand how families' healthcare access in Mexico is affected by these remittance flows.

In this paper, we attempt to measure the elasticity or responsiveness of healthcare use to remittances. Do remittances increase healthcare use by a large or a small percent? Is the responsiveness of healthcare use to remittances dependent on the type of healthcare being sought-whether it is for financing routine healthcare purchases, or hospitalization? We make use of the *Encuesta Nacional de Ingresos y Gastos de los Hogares (ENIGH)* to examine the relationships that exist between the receipt of international remittances and healthcare access. This study may help inform Mexican policy-makers on the role of the repatriated incomes from Mexican migrants in the US in affecting healthcare expenses of family members left back home.

II. The Potential Role of Remittances in Improving Healthcare

For a variety of reasons, we view current access to healthcare on the part of the Mexican population as suboptimal. Mexico spends 5.7% of its GDP on health, a figure low even by Latin American standards, where spending on health as a percentage of GDP is on average 6.1%. Mexico's lagging health investments become particularly notable when we consider the fact that the country ranks second in Latin America in per capita income (Economist [2004]). Furthermore, approximately 42% of the dollar amount spent on health in Mexico comes from public funds, while 58% is funded through private funds, in the form of co-payment fees and purchases of medicines (*Secretaría de Salud* [2003]). According to the World Health Organization (WHO), out-of-pocket expenses are among the least optimal for financing healthcare because out-of-pocket financing discourages the use of preventive services. Additionally, such a system significantly reduces access to healthcare by the poorest segment of the population who are often uninsured. Finally, per capita public health spending in Mexico is 35% lower in institutions that attend to the uninsured (that is the Ministry of Health) than in the institutions comprising the Social Security System which service those employed in the formal sector. Therefore, it is not surprising to find that Mexico ranks 144 in financial contribution fairness among 191 countries (WHO [2000]).

To better analyze and appreciate the potential role of remittances on the healthcare insurance and healthcare use of Mexicans, it is imperative to understand the healthcare system in Mexico and the constraints it faces. Who does the system cover? Who is left uninsured? How many are uninsured? Where do they reside? How can remittances contribute to healthcare?

The basic organization of the Mexican healthcare insurance system, which predominately falls under the public sector, is described in Figure 1. Formal sector employees (and retirees from that sector) along with their dependents and elders are covered under what is referred to as the Social Security System. The Social Security System consists of numerous institutions; its largest and most important being the Mexican Institute of Social Security (*Instituto Mexicano del Seguro Social - IMSS*), which was established in 1943 to address the needs of workers in the private sector and their dependents. The IMSS is funded through government tax revenue, as well as employers' and employees' contributions. Next in importance is the Institute for Governmental Workers (*Instituto de Seguridad y Servicios Sociales de los Trabajadores del Estado - ISSSTE*), founded in 1960 to accommodate government employees and their families. Other smaller public systems within the Social Security System are Petroleros Mexicanos (PEMEX), *Secretaría de Defensa Nacional (SEDENA)* and *Secretaría de Marina (SECMAR)*, which provide medical services to employees of the national oil company, the national defense ministry, and the navy ministry, respectively. All the Social Security System's institutions providing healthcare services to public sector employees are funded exclusively through government tax revenues. The institutions providing health care to private sector employees are funded through a combination of tax revenues, employer and employee contributions.

In contrast, the Ministry of Health concerns itself with the needs of informal sector workers. Individuals covered through one of the Social Security System's institutions or through private insurance are referred to as insured. The remaining population, composed of non-contributing informal sector workers, the self-employed, agriculture workers, the unemployed, retired informal sector workers and their dependent, are labeled uninsured. In theory, the Mexican healthcare system guarantees free or low-cost health care to the uninsured. However, in practice, the ability of this universal system to ensure access

to preventive and treatment services is limited. Families in rural areas with healthcare services limited to primary care may need to travel to Mexico City for specialized care and for surgery. While the Ministry of Health will cover for the care obtained in the city, these families will still need to finance their trip to Mexico City and, in some instances, contribute toward the costs via a co-pay.

Finally, and in addition to the public institutions offering primary and specialized healthcare services, there is a private market for medical services both at the bottom and at the top of the income distribution (Roemer [1991], Getzen [2003]). Only a small minority of Mexicans-around 1% of the population- receive healthcare paid for through private health insurance.

How can remittances make a difference in healthcare utilization in the context of this system? While in theory the healthcare institutions within the Social Security System do not charge for their services nor for medical prescriptions, often enough these entities are unable to provide the required services and medications required for treatment, subjecting the insured to seek treatment elsewhere and imposing additional costs on families seeking healthcare. As for the Ministry of Health services, despite being inexpensive, they do require small co-payments on the part of the patient who are expected to self-finance the purchase of prescribed medications. Furthermore, due to the difficulty of accessing public health care and due to its poor quality, many Mexicans across all socioeconomic classes prefer to use private services, requiring even greater out-of-pocket expenses. Under such circumstances, remittances may play a vital role in increasing healthcare access to these families by filling in for the shortfalls in the healthcare resources available to them due, in part, to the limited public funds dedicated to health (WHO [2000]).

How large is the uninsured population in Mexico and who are they? Although the percentage of the population that is uninsured varies greatly depending on the source of the information, all estimates concur that a high percentage are uninsured. Official records of the Social Security System institutions claim that about 40% of the population is uninsured, while results from the national census indicate that this percentage is as high as 60%. Official estimates from the Ministry of Health claim that out of the 102.4 million inhabitants of the country in 2002, 50.3 million were uninsured -amounting to 49.1% of the population (*Secretaría de Salud* [2002]). One of the reasons for this large figure is that while the Social Security System provides insurance to the employees of private or public companies, their families, and retirees, it does not cover a large number of Mexicans who work in the informal sector nor those who are self-employed or unemployed (Frenk *et al.* [2003] pp. 1667-1671). These exclusions affect, by and large, the most vulnerable sectors of society; that is, individuals in rural communities and those belonging to the lowest income percentiles. Indeed, according to Figure 2, approximately 78% of the people living in communities with less than 15,000 inhabitants are uninsured, while only 46% of larger community dwellers are uninsured (*Instituto Nacional de Salud Pública* [2000]). The states with greater percentages of insured individuals are largely located in the north (with the exception of Mexico City and the small western states of Colima and Aguascalientes). Overall, less than 30.5% of the population is insured in 9 of the 32 Mexican states. These states are located in central, southern and eastern Mexico. It is for these uninsured individuals that remittances can make an important difference, enabling them to pay for medical bills given their low incomes (*Instituto Nacional de Salud Pública* [2000]).

III. Brief Literature Review on Migration, Remittances and Health

There is a small literature addressing a variety of health outcomes among non-migrating household members, with some studies concluding that the migration of household members contributes to the deterioration of health outcomes for the non-migrating family members, while others measure ultimate improvements.

In this vein, using data consisting of 150 to 200 households from the MMP, Kanaiaupuni and Donato ([1999] pp. 339-353) find that the migration of family members is initially associated with increases in infant mortality. The disruptive effect of family separations is thought to explain this outcome. This pessimistic view of the impacts of migration on health outcomes may be reinforced by the detrimental impacts of some "social remittances", that is, the transmission of habits and lifestyles that are incompatible with good health (Levitt [1997] pp. 509-526). Additionally, migration may contribute to poor health outcomes in communities that experience much out-migration by facilitating the importation and dissemination of disease, as in the case of tuberculosis (Perez-Stable *et al.* [1986] pp. 643-646). Similarly, the transmission of HIV by migrant workers in sub-Saharan Africa to their families residing elsewhere is an important example of the potentially negative impact that migration can impose on the health of certain communities (Economist [2000] p. 48).

While some studies speak to the unfavorable impacts of migration on health outcomes, most also note that migration has the potential to improve health outcomes for the families that remain behind once we account for other long-run dynamic impacts of migration. For example, Kanaiaupuni and Donato [1999] argue that, despite the initial disruptive effects of family separations, over time, as migration becomes "institutionalized" and the household receives monetary remittances, infant mortality drops by a significant amount. Using a representative sample of Mexican household from the 1997 *Encuesta Nacional de la Dinámica Demográfica*, Frank and Hummer ([2002] pp. 746-765) also find evidence of improved health outcomes (measured as higher birth weights) for all families with a migrant member relative to non-migrant families.

In addition, monetary transfers or remittances relieve liquidity constraints that might otherwise constraint healthcare use and may result in improved health (Levitt [1997]). López-Córdova [2004] considers the impact of international remittances on infant mortality rates in Mexico by taking advantage of variation in the rates of remittance receipt by municipalities. He asks, do municipalities that are known to receive large inflows of remittances experience different levels of infant mortality when compared with municipalities for which the remittance receipt rates are know to be lower? After controlling for other determinant of infant mortality and the endogeneity of remittance receipt with health outcomes, he concludes that remittances do lower infant mortality rates. Sumata ([2002] pp. 619-628) and Martin *et al.* ([2002] pp. 83-102) also report on these links by noting the large contributions that emigrants have made toward the construction of hospitals and clinics in the Democratic Republic of Congo and in Mali.

Hildebrandt and McKenzie [2004] also find overall improved health outcomes in migrant families. Of particular interest is their method for attributing these gains to distinct by -products of migration- increases in monetary resources and increases in health knowledge. They show that both contribute to increasing birth weights and to reducing infant mortality rates.

In an attempt to further understand the channels by which migration affects health, Duryea *et al.* [2005] link remittances to the acquisition of healthier conditions (for example, improved housing and water, refrigeration of food). They show that decreases in infant mortality rates due to remittances can be further explained as resulting from the acquisition of these better infrastructures through monetary remittances.

We are aware of only one study that undertakes a comprehensive effort to measure the impact of remittances on healthcare demand. Murrugarra ([2002] pp. 25-47) focuses in Armenia and finds that, if we are willing to assume that remittances are exogenous, they do not have an impact on healthcare utilization. Murrugarra further examines the crowding-out effect of public transfers on remittances, finding out that a one-unit increase in public transfers reduces (or crowds-out) remittances by about one-quarter to one-third unit.

Summarizing, the small literature on this topic appears to have focused on the link between remittances and health outcomes, ignoring other health related issues, such as healthcare utilization (with the exception of the Murrugarra paper referred to above). We will address this gap in the literature with an analysis of the links between remittances and healthcare expenditures incurred by Mexican households that takes into account the potential endogeneity of remittance income.

IV. Data

The empirical analysis uses data from the ENIGH, a nationally representative survey carried out by the Mexican statistical institute (*Instituto Nacional de Estadística, Geografía e Informática - INEGI*) with the purpose of providing information on the size, structure, and distribution of Mexican households' income and expenditures. The survey is intended to be nationally representative and distinguishes between households in rural areas (with fewer than 2,500 inhabitants) and urban areas (with more than 2,500 inhabitants). The ENIGH begun in 1984 and, from 1992 onwards, has been carried out biennially. In this project we use the 2002 survey, which is rich in its coverage of healthcare expenditures.

In addition to general socio-demographic and employment information on household members, the survey collects detailed information on all income flows received monthly by the household, including international remittances. Figures on the magnitude of these flows are provided in Table 2. About 6% of households were recipients of international remittances in 2002, with the average peso figure for this transfer reaching 5,786.

Additionally, the ENIGH contains detailed information on a variety of household expenditures. Of interest to this study are health expenditures. The ENIGH collects data on the costs of preventive and treatment medical services received by families, as well as on expenditures on non-prescribed medicines, hearing, dental and vision aids and prescription drugs per quarter. The figures in Table 3 provide an estimate of the number of families reporting any healthcare expenses during that period. Over a 3 month period in 2002, about 57% of the households reported some type of medical expense. However, due to the availability of public medical services, medical costs only accounted for approximately 5% of total household expenditures. Nonetheless, hospitalization expenditures as a percentage of total income are much higher, on average 27% of total income.

Table 4 describes health usage by different categories of families. Families in rural areas and female-headed households are less likely to report any healthcare expense. In addition, health expenditures are lower among female-headed and rural households.

Preliminary descriptive statistics on the likelihood of incurring any healthcare expense conditional on remittance receipt are displayed in Table 5a. In 2002, the proportion

of households who incurred some healthcare expenses given that the household reported receiving remittances was 69%, relative to 57% for non-recipient households. This pattern continues to hold as we examine different subcategories of healthcare services. With the sole exception of pregnancy and delivery expenditures, households receiving remittance transfers from abroad are more likely to incur healthcare expenditures.

Table 5b displays average healthcare expenditures in remittance-recipient and non-recipient households. Overall, households who receive remittances spend about 1,203 pesos per quarter relative to 846 pesos spent per quarter by non-recipient households. Despite the fact that the overall numbers suggest that recipient households spend on average 357 *pesos* more per quarter and that this difference is statistically different from zero, it is worth noting that the disaggregated numbers suggest otherwise. In fact, only in the case of pregnancy/delivery expenses do we find a statistically significant difference in expenditures between remittance-receiving and non-receiving households. Furthermore, in that instance, non-recipient households experience greater expenditures than their remittance-receiving counterparts.

While the data give rise to the notion that remittance receipt leads to greater healthcare expenses, it is unclear how remittances impact the level of medical expenditures. It is important to note that these results are solely conditioned on household remittance receipt, thus ignoring other concurrent household characteristics. The possibility exists that remittance recipient households embody a variety of characteristics that give rise to differential healthcare expenditure patterns relative to non-recipient households. In the following section, we describe the modeling used in this paper to disentangle the various determinants of household healthcare expenses.

V. Methods

As with other production and investment activities (Stark [1982] pp. 63-70; Taylor [1992] pp.187-208; Rozelle *et al.* [1999] pp. 287-291), healthcare expenses (HCE) are constrained, by remittance income (R), other household non-remittance income and, in particular, adequate health insurance coverage, as important elements helping the household overcome this constraint; all of which are included in the vector Z along with other pertinent household characteristics. Therefore, household healthcare expenses can be modeled as follows:

$$HCE = \alpha_0 + \alpha_1 \mathrm{R} + \alpha_2 Z_{HCE} + \varepsilon_{HCE} \quad (1)$$

However, the coefficient estimate for remittance income in equation (1) may be biased in the event of any correlation between the household remittance receipt and the error term. There are two potential sources for this noted correlation. The first source originates in the presence of unobserved heterogeneity and omitted variable bias, while the second one is endogeneity or reverse causality. Household remittance income may be related to household wealth or even the existence of family genetic problems affecting household employment, income, and, in turn, correlated to the healthcare expenses incurred by the household. This correlation may result in biased estimates of the impact of household remittance income on healthcare expenses. The second source of potential correlation between household remittance income and the error term in equation (1) results from the likely joint determination of household remittance income and healthcare expenses. In other words, household remittance income may be dependent on the household's healthcare needs as reflected by its household expenses, along with other

household characteristics, including other sources of household income and the household demographic composition. Therefore, household remittance income and household healthcare expenses may be endogeneous.

In order to address the potential omitted variable biases and the joint determination of household remittance income and its corresponding healthcare expenses, we instrument remittance income in equation (1) using information on the percent of migrants in the state of residency and on the per capita count of Western Union offices in the state during the previous year. These regional variables are interacted with the household composition variables (the percentage of children 6 years of age or younger and the percentage of resident household members 65 years of age or older) in order to guarantee the variability of the instrument at the household level. Our instrumental variables are inspected to ascertain their significant correlation with monthly per capita remittance income. Additionally, we test for the exogeneity of the instruments used to model remittance income following Wooldridge ([2003] p. 507). Overall, the estimated coefficient allows us for an assessment of the responsiveness of household healthcare expenditures to changes in remittance income.

Finally, given the marked differences in healthcare expenses displayed by households according to residency in urban versus rural areas and according to whether the household is female or male-headed in Table 4, we carry out the analysis separately for each of these household categories. Likewise, we break up the analysis of overall healthcare expenses to distinguish between what may be considered primary healthcare expenses, which include non-prescribed medicines, primary care, and pregnancy/delivery expenses, as distinct from hospitalization expenses.

VI. Results

The results from estimating equation (1) with and without instrumental variable techniques are presented in Tables 6 through 9 for the four subcategories of health expenditures under consideration in this study. Overall, the estimated coefficients are signed as expected and display plausible magnitudes. For instance, turning first to the non-IV estimates of primary care healthcare expenditures for the entire sample (column 1 in Table 6), female headed households and households with insurance coverage incur lower primary care expenditures. In contrast, even after controlling for the size of the household, primary healthcare expenditures rise with the number of educated, working, or elderly individuals residing in the household. Likewise, non-remittance income appears to increase primary healthcare expenditures by the household, although by a very small amount (half a cent per additional peso).

The main variable of interest to us, however, is remittance income. Therefore, in what follows, we will focus on the estimated coefficient for this variable in the various specifications of each healthcare expense category being examined. In the case of primary healthcare expenditures, the non-IV estimate for remittance income suggests that remittance income raises households' primary health expenditures. However, due to the endogeneity of remittances and healthcare expenditures, we may not be able to base our inferences in these Ordinary Least Squares (OLS) estimates. We thus test for the exogeneity of remittance income for the overall sample at the bottom of Tables 6 through 9. The test statistics exceed the 5% critical values, thus rejecting the null hypothesis of exogeneity of the remittance income variable with respect to household healthcare expenditures.

Therefore, we instrument remittance income using information on the percent of migrants in the state of residency and on the per capita count of Western Union offices in the state during the previous year, both highly correlated with remittance income. We also interact our two instruments with household composition variables in order to guarantee the variability of the instrument at the household level. To the extent that we have more than one instrumental variable, we test whether some of them are uncorrelated with the error term. This is done with the over-identification tests included at the bottom of Tables 6 through 9. Our test statistics do not exceed the 5% critical values and, as such, we accept the null hypothesis and conclude that our instruments are exogenous to the extent that the error terms in the equations predicting monthly per capita remittance income and healthcare expenses are uncorrelated. As a result, we center our attention on the IV estimates hereafter which, as is commonly the case when we use instruments, increase in magnitude. In this particular case, the estimated coefficient for the impact of remittance income on the household primary care expenses fluctuates between 0.06 and 0.09 depending on whether we are examining the entire sample or distinguishing according to the gender of the household head or the household's region of residence. As a result, with the exception of rural households, each additional peso in an international remittance transfer raises households' primary healthcare expenditures anywhere between 6 to 9 cents. When compared to the estimated impact of other sources of household income, remittances appear to be more responsive to emerging healthcare needs.

Table 7 reports on households' hospitalization expenditures. As with primary care expenditures, the IV estimates for the overall sample indicate that families endowed with greater levels of education and with a greater number of elderly members, as well as families residing in areas with a greater concentration of doctors per capita (as of the previous year), spend more on hospitalization services. In contrast, female headed households, households residing in rural areas, and households with insurance coverage are more likely to spend less on hospitalization. When focusing on our variable of interest, remittance income, we find that each additional peso received through international transfers dramatically raises households' spending on hospitalization. Specifically, each additional peso increases households' hospitalization expenditures anywhere between 12 and 20 cents; the exception being female-headed households, for whom remittance income does not seem to have a significantly different from zero impact on their hospitalization expenditures.

Table 8 reports on the impact of remittance income on yet another category of healthcare expenditures: pregnancy and delivery charges. The IV estimates for the overall sample indicate that, as is the case with other healthcare expenditures, female-headed households spend less on these services than their male-headed counterparts. However, education and income seem to promote greater spending on this healthcare category, although by a very small amount in the case of non-remittance household income. Even remittance income appears to have a limited impact, with each additional peso received as an international transfer rising household spending on pregnancy/delivery services by 5 cents among male-headed households.

Lastly, Table 9 informs on household spending on non-prescribed medicines. As is often the case with other healthcare expenditures, spending on non-prescribed medicines is larger among households with a larger number of elderly or college-educated members. Additionally, households with greater income levels (excluding remittances), households with insurance coverage, and households residing in areas with a greater concentration of doctors per capita exhibit higher spending levels on non-prescribed

medicines. Only in the case of households with a larger number of young children or households residing in rural areas do we find the spending on this healthcare category to be significantly smaller. At any rate, it is worth noting that each additional peso of remittance income raises households' spending on non-prescribed medicines anywhere between 2 and 4 cents, depending on whether the household is female or male headed and depending on the household's region of residence.

VII. Final Remarks

Overall, our findings indicate that healthcare expenditures rise in response to the receipt of remittances. Hospitalization expenditures display the largest responsiveness to remittance income received by the household, possibly a by product of the higher cost of these medical services. However, primary care expenditures are also significantly higher among households with higher remittance inflows, which spend between 5 and 9% of remittance receipts on primary care services. To the extent that primary care expenditures are likely to have significant impacts on health outcomes given their preventative-type nature, remittance income can play an important policy role in partially financing the healthcare expenditures of migrants' families back home.

Our findings also uncover the differential impact that remittance income has on spending on health relative to other sources of income. Specifically, while positive, the effect of increases in non-remittance income on household healthcare expenditures is considerably smaller than the impact of remittance income. The possibility exists that remittance inflows embody both monetary as well as social remittances, with the latter shifting households' spending priorities towards human capital investments in the form of healthcare. Alternatively, the differential impact of remittance income relative to other sources of household income may reflect households' greater flexibility to redirect remittance income towards unplanned household expenses, as is often the case with healthcare expenditures. As such, remittances may play a crucial role in supplementing any deficiencies in the public provision of medical services.

Notes

[1] Sales of crude petroleum and others = US$ 18.6b; crude petroleum alone = US$ 16.8b in 2003. Information obtained from the website of Mexico's Central Bank on July 9th, 2004: *http://www.banxico.gob.mx*.

[2] According to 2002 data from the National Institute of Statistics, Geography and Information of Mexico (INEGI).

[3] Tabulated by the authors, *INEGI - Encuesta Nacional de Ingresos y Gastos de los Hogares* [2002]).

[4] Other individual level surveys that provided information on the uses of remittances (such as the *Encuesta de Emigración a la Frontera Norte de Mexico - EMIF*) do not separate health expenditures from other general household expenditures. Overall, respondents in the EMIF declare that 64 percent of their remittances are spent on general household expenditures, approximately 20% on housing, and the remaining 16% on the acquisition of businesses, cars, or tools.

[5] Note, however, that despite the fact that 46% of respondents claim that health expenses are a primary motive for remitting, it does not follow that 46% of remittances are used to this end. It is possible that health expenditures are frequent but represent only a small fraction of total remittance expenditures.

[6] As of the year 2002, approximately 8 million illegal migrants resided in the U.S., of whom more than half came from Mexico (Griswold [2002]).

Table 1

Reason for Remitting Funds to Mexico

Reason	Share
Health Expenses	46.18
Food and Maintenance	29.79
Construction or Repair of House	7.47
Debt Payment	5.42
Purchase of Consumer Goods	4.46
Other	2.38
Savings	1.39
Purchase of House or Lot	1.02
Start/Expand a Business	0.46
Purchase of Agriculture Inputs	0.36
Education Expenses	0.36
Purchase of Livestock	0.33
Recreation	0.30
Purchase of Vehicle	0.03
Finance a Special Event	0.03

Note: Author's tabulations using the MMP93.

Table 2

Sources of Household Income

Number of Households Reporting	Count	As a Percent of All Households
Total Number of Households	17,167	---
Job Earnings	12,448	72.50
Business Earnings	7,400	43.11
Property Returns	587	3.42
Income Transfers	7,127	41.51
Capital Returns	3,542	20.63
Remittances from Abroad	1,009	5.88
Household Sources of Income:	Average Amount in *pesos*	
Total Income	19,272	
Job Earnings	15,731	
Business Earnings	9,454	
Property Returns	7,413	
Income Transfers	4,853	
Capital Returns	5,727	
Remittances from Abroad	5,786	

Notes: Figures correspond to 3rd quarter, 2002.
Source: INEGI [2002].

Table 3

Household Healthcare Expenditures

Number of Households Reporting	Count	As a Percent of All Households
Total Number of Households	17,167	---
Household Healthcare Expenditures	9,900	57.67
Primary Healthcare Expenditures	5,618	32.73
Hospitalization Expenditures	331	1.93
Pregnancy and Delivery Expenditures	502	2.92
Expenditures on Non-prescribed Medicines	4,867	28.35
Household Expenditures	**Mean Expenditures in *pesos***	**As a Percent of Average Total Income**
Total Income	19,272	---
Household Healthcare Expenditures	871	4.52
Primary Healthcare Expenditures	489	2.54
Hospitalization Expenditures	5,170	26.83
Pregnancy and Delivery Expenditures	1,707	8.86
Expenditures on Non-prescribed Medicines	107	0.56

Notes: Figures are in *pesos* and correspond to 3rd quarter, 2002.
Source: INEGI [2002].

Table 4

Household Healthcare Expenditures by Demographic Characteristics

Likelihood of Incurring Healthcare Expenditures	Proportion	t-statistic
By Area where Household is Located		
Household is located in rural area	0.53	-
Household is not located in rural area	0.60	8.24
By Head of Household		
Household is female-headed	0.54	-
Household is not female-headed	0.58	4.26
Average Healthcare Expenditures	Mean Expenditures in *pesos*	t-statistic
By Area where Household is Located		
Household is located in rural area	711	-
Household is not located in rural area	926	3.62
By Head of Household		
Household is female-headed	669	-
Household is not female-headed	917	5.56

Notes: Figures correspond to expenditures during 3rd quarter, 2002.
Source: INEGI [2002].

Table 5a

Likelihood of Incurring a Particular Type of Healthcare Expenditure Conditional on Remittance Receipt

Likelihood of Incurring Healthcare Expenditures	Proportion	t-statistic
Likelihood of Incurring Any Healthcare Expenditure		
Household receives remittances	0.69	-
Household does not receive remittances	0.57	-8.27
Likelihood of Incurring Primary Healthcare Expenditures		
Household receives remittances	0.43	-
Household does not receive remittances	0.32	-6.95
Likelihood of Incurring Hospitalization Expenditures		
Household receives remittances	0.03	-
Household does not receive remittances	0.02	-2.20
Likelihood of Incurring Pregnancy and Delivery Expenditures		
Household receives remittances	0.03	-
Household does not receive remittances	0.03	-0.64
Likelihood of Incurring Expenditures on Non-prescribed Medicines		
Household receives remittances	0.34	-
Household does not receive remittances	0.28	-4.17

Notes: Figures correspond to 3rd quarter, 2002.
Source: INEGI [2002].

Table 5b

Remittance Receipt and Household Healthcare Expenditures in 2002

Average Healthcare Expenses	Mean Expenditures in *pesos*	t-statistic
All Healthcare Expenditures		
Household receives remittances	1,203	---
Household does not receive remittances	846	-2.52
Primary Healthcare Expenditures		
Household receives remittances	542	---
Household does not receive remittances	484	-0.99
Hospitalization Expenditures		
Household receives remittances	7,116	---
Household does not receive remittances	4,969	-0.90
Pregnancy and Delivery Expenditures		
Household receives remittances	1,075	---
Household does not receive remittances	1,752	2.34
Expenditures on Non-prescribed Medicines		
Household receives remittances	111	---
Household does not receive remittances	107	-0.27

Notes: Mean expenditures are in *pesos* and correspond to 3rd quarter, 2002.
Source: INEGI [2002].

Table 6

Impact of Remittance Income on Primary Care Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Remittance Income	0.009***	0.089***	0.007**	0.094*	0.008	0.049	0.012***	0.062*	0.008**	0.089***
	(0.003)	(0.027)	(0.003)	(0.050)	(0.005)	(0.032)	(0.003)	(0.034)	(0.003)	0.033
Female Headed Household	-36.173**	-49.528***	-41.289**	-54.676***	-14.794	-25.320	-	-	-	-
	(14.558)	(15.592)	(16.255)	(18.318)	(32.175)	(33.431)	-	-	-	-
Household Size	-18.928***	-18.360***	-23.875***	-26.206***	-11.580	-8.925	-13.329	-17.579**	-19.493***	-17.150**
	(5.546)	(5.683)	(6.699)	(6.994)	(10.056)	(10.342)	(7.965)	(8.726)	(6.542)	(6.741)
N° of Young Kids	7.554	1.499	18.187*	11.443	-10.175	-13.698	-3.505	-24.495	9.201	7.652
	(8.453)	(8.901)	(10.262)	(11.197)	(14.932)	(15.298)	(13.557)	(19.966)	(9.788)	(10.007)
N° of Elderly Members	58.549***	58.917***	84.503***	88.867***	10.826	8.531	60.357***	69.640***	58.264***	56.193***
	(11.006)	(11.274)	(13.583)	(14.144)	(18.967)	(19.209)	(15.427)	(17.149)	(13.015)	(13.307)
N° of Members with College	72.759***	80.184***	75.365***	82.723***	99.534**	114.703**	31.719**	45.287***	77.307***	83.706***
	(9.665)	(10.218)	(9.956)	(11.029)	(43.458)	(45.336)	(14.520)	(17.605)	(11.355)	(11.866)
N° of Members with HS	17.490***	16.314***	20.780***	21.480***	1.505	1.083	4.109	0.592	18.999***	19.233***
	(5.847)	(6.002)	(6.737)	(6.918)	(12.219)	(12.327)	(8.450)	(9.059)	(6.894)	(7.036)
N° of Working Memb. in Mexico	14.580**	16.356**	15.235**	19.142**	11.106	10.912	8.644	21.603*	15.431**	13.691*
	(6.448)	(6.632)	(7.650)	(8.151)	(12.012)	(12.115)	(9.095)	(12.865)	(7.629)	(7.816)

Table 6 (continued)

Impact of Remittance Income on Primary Care Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Income Excluding Remittances	0.004***	0.004***	0.004***	0.004***	0.010***	0.009***	0.007***	0.006***	0.004***	0.004***
	(2.136e-04)	(2.479e-04)	(2.182e-04)	(2.53e-04)	(9.046e-04)	(0.001)	(0.001)	(8.843e-04)	(2.369e-4)	(2.645e-4)
Rural Household	-5.902	-22.963	-	-	-	-	-0.888	-20.111	-6.123	-21.376
	(14.082)	(15.554)	-	-	-	-	(19.631)	(24.118)	(16.683)	(18.083)
Insurance Coverage	-50.160***	-29.488**	-49.526***	-29.451	-80.484**	-60.343*	-41.689**	-23.64	-54.122***	-34.352
	(12.916)	(14.992)	(14.157)	(18.458)	(31.651)	(35.438)	(17.276)	(21.645)	(15.481)	(17.664)
Doctors *per capita*	-0.026	0.090	-0.060	0.038	0.022	0.191	-0.206	-0.103	0.017	0.1253
	(0.114)	(0.124)	(0.121)	(0.136)	(0.339)	(0.366)	(0.143)	(0.164)	(0.139)	(0.148)
Observations	17,167	17,167	12,405	12,405	4,762	4,762	3,368	3,368	13,799	13,799
F-statistic	60.04	57.26	53.15	50.55	17.03	16.72	24.35	21.87	49.25	47.52
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Endogeneity Tests: H_0: Regressor is exogenous					*Over Identification Tests: H_0: IVs are uncorrelated with error term*					
Wu-Hausman F test statistic	F(1,17153)	9.014			Sargan N*R^2 test statistic				Chi-sq(5)	1.514
Durbin-Wu-Hausman Chi2 test statistic	Chi-sq(1)	9.017			Sargan (N-L)*R^2 test statistic				Chi-sq(5)	1.513
					Sargan Pseudo-F test statistic				F(5,17154)	0.303

Notes: *** Signifies statistically different from zero at the 1% level or better, **at the 5% level or better, *at the 10% level or better. The regression includes a constant.

Table 7

Impact of Remittance Income on Hospitalization Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Remittance Income	0.001	0.159***	0.004	0.209*	-0.005	0.120**	0.003	0.082	0.001	0.175***
	(.005)	(0.051)	(0.007)	(0.096)	(0.008)	(0.055)	(0.005)	(0.053)	(0.006)	(0.062)
Female Headed Household	-70.146***	-96.434***	-85.688***	-117.264***	-22.847	-54.266	---	---	---	---
	(26.903)	(28.902)	(31.146)	(35.535)	(54.015)	(57.134)				
Household Size	15.214	16.332	12.967	7.470	10.018	17.942	-25.258**	-32.084**	23.878**	28.887**
	(10.248)	(10.535)	(12.836)	(13.568)	(16.881)	(17.675)	(12.438)	(13.653)	(12.202)	(12.652)
N° of Young Kids	-13.252	-25.162	-17.438	-33.347	-1.733	-12.250	-14.572	-48.286	-10.209	-13.521
	(15.621)	(16.499)	(19.663)	(21.721)	(25.068)	(26.145)	(21.172)	(31.240)	(18.256)	(18.782)
N° of Elderly Members	100.866***	101.596***	146.688***	156.980***	20.673	13.823	14.779	29.690	117.872***	113.446***
	(20.340)	(20.898)	(26.026)	(27.439)	(31.842)	(32.829)	(24.092)	(26.831)	(24.276)	(24.976)
N° of Members with College	43.990**	58.596***	43.631**	60.988***	41.259	86.538	24.961	46.754*	48.782**	62.463***
	(17.861)	(18.942)	(19.076)	(21.396)	(72.958)	(77.480)	(22.675)	(27.545)	(21.179)	(22.271)
N° of Members with HS	8.257	5.944	0.528	2.179	38.636	37.376*	36.640***	30.990**	2.056	2.556
	(10.806)	(11.127)	(12.909)	(13.421)	(20.513)	(21.068)	(13.197)	(14.173)	(12.859)	(13.205)
N° of Working Memb. in Mexico	-10.272	-6.779	-6.960	2.256	-11.098	-11.677	31.001**	51.815***	-20.600	-24.320*
	(11.917)	(12.294)	(14.658)	(15.812)	(20.166)	(20.706)	(14.204)	(20.128)	(14.229)	(14.669)

Table 7 (continued)

Impact of Remittance Income on Hospitalization Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Income Excluding Remittances	0.001***	0.001	0.001***	0.001	0.004***	9.230e-06	0.001	-0.001	0.001***	0.001*
	(3.948e-04)	(4.596e-04)	(4.181e-04)	(4.907e-04)	(0.002)	(0.002)	(0.001)	(0.001)	(4.419e-04)	(4.963e-04)
Rural Household	-31.718	-65.277**	---	---	---	---	29.564	-1.313	-46.698	-79.307**
	(26.024)	(28.832)					(30.657)	(37.735)	(31.118)	(33.939)
Insurance Coverage	-92.483***	-51.820*	-100.171***	-52.817	-42.253	17.868	10.684	39.668	-119.077***	-76.811**
	(23.868)	(27.790)	(27.126)	(35.807)	(53.136)	(60.564)	(26.980)	(33.869)	(28.876)	(33.152)
Doctors *per capita*	0.308	0.537**	0.312	0.543**	0.008	0.512	-0.200	-0.035	0.472*	0.704**
	(0.211)	(0.229)	(0.231)	(0.263)	(0.569)	(0.625)	(0.223)	(0.256)	(0.258)	(0.278)
Observations	17,167	17,167	12,405	12,405	4,762	4,762	3,368	3,368	13,799	13,799
F-statistic	7.28	7.7	7.92	7.75	1.94	2.24	1.84	1.91	7.38	7.74
Prob > F	0.000	0.000	0.000	0.000	0.030	0.011	0.042	0.034	0.000	0.000
Endogeneity Tests: H_0: Regressor is exogenous					*Over Identification Tests: H_0: IVs are uncorrelated with error term*					
Wu-Hausman F test statistic	F(1,17153)	10.213			Sargan N*R^2 test statistic				Chi-sq(5)	2.406
Durbin-Wu-Hausman Chi2 test statistic	Chi-sq(1)	10.216			Sargan (N-L)*R^2 test statistic				Chi-sq(5)	2.404
					Sargan Pseudo-F test statistic				F(5,17154)	0.481

Notes: *** Signifies statistically different from zero at the 1% level or better, ** at the 5% level or better, * at the 10% level or better. The regression includes a constant.

Table 8

Impact of Remittance Income on Pregnancy/Delivery Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Remittance Income	1.5e-04	0.045*	0.001	0.076	-0.001	0.021	0.004*	0.002	-0.001	0.054*
	(0.003)	(0.025)	(0.004)	(0.052)	(0.002)	(0.013)	(0.002)	(0.022)	(0.003)	(0.030)
Female Headed Household	-21.573	-29.060**	-27.019	-38.527**	0.227	-5.110	---	---	---	---
	(13.318)	(14.053)	(17.155)	(19.174)	(13.110)	(13.684)				
Household Size	-16.984***	-16.666***	-23.701***	-25.704***	-1.674	-0.328	-0.142	0.006	-19.640***	-18.071***
	(5.073)	(5.123)	(7.070)	(7.321)	(4.097)	(4.233)	(5.264)	(5.577)	(6.082)	(6.207)
N° of Young Kids	61.876***	58.481***	73.865***	68.067***	38.824***	37.038***	35.982***	36.710***	64.779***	63.742***
	(7.732)	(8.022)	(10.831)	(11.720)	(6.084)	(6.262)	(8.960)	(12.760)	(9.099)	(9.214)
N° of Elderly Members	0.488	0.694	3.901	7.653	-5.462	-6.626	0.582	0.260	0.249	-1.138
	(10.068)	(10.161)	(14.336)	(14.805)	(7.728)	(7.863)	(10.196)	(10.960)	(12.099)	(12.252)
N° of Members with College	24.144***	28.307***	27.498***	33.823***	13.118	20.810	3.273	2.803	28.059***	32.344***
	(8.841)	(9.210)	(10.507)	(11.545)	(17.707)	(18.557)	(9.596)	(11.251)	(10.556)	(10.925)
N° of Members with HS	10.917**	10.257*	12.308*	12.910*	8.748*	8.534*	6.891	7.013	11.371*	11.528*
	(5.349)	(5.410)	(7.110)	(7.242)	(4.979)	(5.046)	(5.585)	(5.789)	(6.409)	(6.478)
N° of Working Memb. in Mexico	4.632	5.628	10.422	13.781	-8.871*	-8.969*	-6.475	-6.924	6.812	5.647
	(5.899)	(5.978)	(8.074)	(8.532)	(4.894)	(4.959)	(6.011)	(8.222)	(7.092)	(7.196)

Table 8 (continued)

Impact of Remittance Income on Pregnancy/Delivery Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Income Excluding Remittances	0.001***	0.001***	0.001***	0.001***	0.001***	-5.190e-05	0.001***	7.717e-04	0.001***	0.001***
	(1.954e-04)	(2.235e-04)	(2.303e-04)	(2.648e-04)	(3.686e-04)	(5.942e-04)	(3.578e-04)	(5.652e-04)	(2.203e-04)	(2.435e-04)
Rural Household	-12.086	-21.650	---	---	---	---	10.650	11.317	-16.630	-26.844
	(12.882)	(14.019)					(12.974)	(15.414)	(15.509)	(16.649)
Insurance Coverage	-10.671	0.918	-11.944	5.314	-13.118	-2.905	14.012	13.386	-16.041	-2.802
	(11.815)	(13.513)	(14.941)	(19.321)	(12.896)	(14.506)	(11.418)	(13.835)	(14.392)	(16.263)
Doctors *per capita*	0.063	0.128	0.022	0.106	0.382***	0.467***	-0.028	-0.031	0.090	0.163
	(0.104)	(0.111)	(0.127)	(0.142)	(0.138)	(0.150)	(0.095)	(0.104)	(0.129)	(0.136)
Observations	17,167	17,167	12,405	12,405	4,762	4,762	3,368	3,368	13,799	13,799
F-statistic	11.49	11.56	9.24	9.13	5.35	5.42	3.54	3.29	9.99	10.07
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000	1.000e-04	2.000e-04	0.000	0.000
Endogeneity Tests: H_0: Regressor is exogenous					*Over Identification Tests:* H_0: IVs are uncorrelated with error term					
Wu-Hausman F test statistic	F(1,17153)	3.3845			Sargan N*R^2 test statistic				Chi-sq(5)	1.513
Durbin-Wu-Hausman Chi2 test statistic	Chi-sq(1)	3.3866			Sargan (N-L)*R^2 test statistic				Chi-sq(5)	1.512
					Sargan Pseudo-F test statistic				F(5,17154)	0.302

Notes: *** Signifies statistically different from zero at the 1% level or better, ** at the 5% level or better, * at the 10% level or better. The regression includes a constant.

Table 9

Impact of Remittance Income on Non-Prescribed Medicine Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Remittance Income	4.1e-04	0.025***	0.001	0.042***	-3.8e-04	0.014**	0.001	0.013	2.2e-04	0.027***
	(0.001)	(0.006)	(0.001)	(0.012)	(0.001)	(0.006)	(0.001)	(0.010)	(0.001)	(0.007)
Female Headed Household	3.306	-0.866	3.518	-2.911	2.895	-0.749	---	---	---	---
	(3.118)	(3.426)	(3.599)	(4.406)	(6.316)	(6.678)				
Household Size	-1.241	-1.064	-1.127	-2.246	-1.255	-0.336	-2.221	-3.241	-0.965	-0.189
	(1.188)	(1.249)	(1.483)	(1.682)	(1.974)	(2.066)	(2.383)	(2.580)	(1.355)	(1.439)
N° of Young Kids	-1.832	-3.723*	-2.195	-5.434**	-0.730	-1.950	-2.046	-7.080	-1.786	-2.299
	(1.810)	(1.956)	(2.272)	(2.693)	(2.931)	(3.056)	(4.056)	(5.903)	(2.027)	(2.136)
N° of Elderly Members	4.971**	5.086**	5.833	7.929**	3.078	2.283	6.004	8.230	4.807	4.121
	(2.357)	(2.477)	(3.007)	(3.402)	(3.723)	(3.837)	(4.615)	(5.070)	(2.696)	(2.840)
N° of Members with College	12.451***	14.771***	11.955***	15.489***	24.477***	29.729***	0.863	4.117	14.356***	16.477***
	(2.070)	(2.245)	(2.204)	(2.653)	(8.531)	(9.056)	(4.343)	(5.205)	(2.352)	(2.533)
N° of Members with HS	2.507**	2.140	1.891	2.227	2.520	2.374	2.281	1.437	2.372	2.449
	(1.252)	(1.319)	(1.492)	(1.664)	(2.399)	(2.462)	(2.528)	(2.678)	(1.428)	(1.502)
N° of Working Memb. in Mexico	1.778	2.333	2.282	4.159**	0.413	0.346	2.357	5.464	1.594	1.018
	(1.381)	(1.457)	(1.694)	(1.960)	(2.358)	(2.420)	(2.721)	(3.803)	(1.580)	(1.668)

Table 9 (continued)

Impact of Remittance Income on Non-Prescribed Medicine Expenditures
S.E. in Parentheses

	All		Urban		Rural		Female Headed		Non-female Headed	
	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs	No IVs	IVs
Income Excluding Remittances	2.516e-04***	1.448e-04***	2.179e-04***	1.181e-04*	0.001***	2.957e-04	0.001***	3.194e-04	2.307e-04***	1.419e-04**
	(4.58e-05)	(5.450e-05)	(4.830e-05)	(6.080e-05)	(1.776e-04)	(2.899e-04)	(1.619e-04)	(2.614e-04)	(4.910e-05)	(5.640e-05)
Rural Household	-1.771	-7.101**	---	---	---	---	-4.871	-9.481	-1.000	-6.055
	(3.016)	(3.148)					(5.872)	(7.130)	(3.455)	(3.860)
Insurance Coverage	1.224	7.682**	1.281	10.922**	-4.540	2.434	1.990	6.317	0.843	7.395**
	(2.766)	(3.294)	(3.135)	(4.439)	(6.213)	(7.079)	(5.168)	(6.400)	(3.206)	(3.770)
Doctors *per capita*	0.049**	0.086**	0.023	0.070**	0.237***	0.295***	-0.015	0.010	0.066**	0.102***
	(0.024)	(0.027)	(0.027)	(0.033)	(0.067)	(0.073)	(0.043)	(0.048)	(0.029)	(0.032)
Observations	17,167	17,167	12,405	12,405	4,762	4,762	3,368	3,368	13,799	13,799
F-statistic	12.66	12.90	8.79	8.19	6.16	6.27	2.67	2.63	11.83	12.07
Prob > F	0.000	0.0000	0.000	0.000	0.000	0.000	0.0021	0.0024	0.000	0.000
Endogeneity Tests: H_0: Regressor is exogenous					*Overidentification Tests: H_0: IVs are uncorrelated with error term*					
Wu-Hausman F test statistic	F(1,17153)	19.193			Sargan N*R^2 test statistic				Chi-sq(5)	2.335
Durbin-Wu-Hausman Chi2 test statistic	Chi-sq(1)	19.187			Sargan (N-L)*R^2 test statistic				Chi-sq(5)	2.333
					Sargan Pseudo-F test statistic				F(5,17154)	0.467

Notes: *** Signifies statistically different from zero at the 1% level or better, **at the 5% level or better and *at the 10% level or better. The regression includes a constant.

Figure 1

Organization of Healthcare Coverage

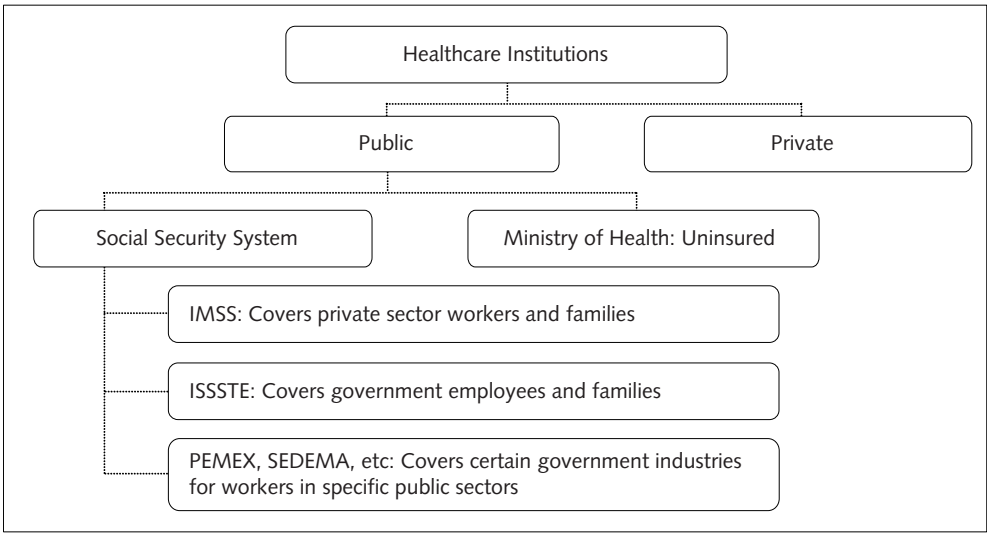
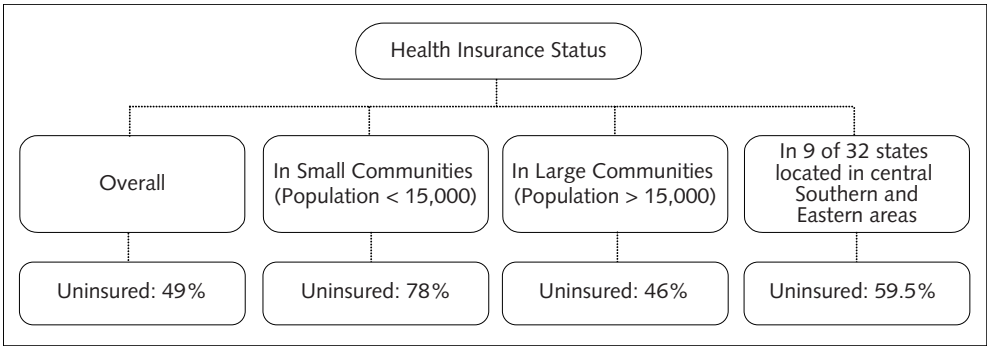


Figure 2

Health Insurance Status Conditional on Geographic Location



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Mexican Microenterprise Investment and Employment: The Role of Remittances

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Summary

Using data from Mexican surveys of Microenterprises conducted between 1992 and 1998, we examine the association between migration to the US and investment in microenterprises, the use of paid and unpaid labor, and the earnings of micro entrepreneurs. We find that investments in microenterprises are positively associated with migration rates and that in enterprises owned by females, migration is also associated with greater use of unpaid labor. For males, the connection between migration and the log of invested capital grew much stronger during the 1990s. Given the rapid increase in out-migration and remittance flows during the 1990s, this is consistent with expectations. These results apply to the migration rate of the microenterprise owner's state of birth, regardless of his/her current state of residence, and hold when current migration rates are instrumented for using historical migration rates. Kernel densities show that entrepreneurs born in high migration regions in Mexico have higher earnings, especially after controlling for characteristics of the entrepreneur.

I. Introduction

There is a growing literature assessing the impact of remittances on development in migrant sending countries. This research is altering the conventional wisdom that remittances are used for consumption but not investment. For example, there is evidence from several countries that remittance flows are associated with higher educational attainment among receiving families. (See Yang [2004] for evidence from the Philippines, Cox-Edwards and Ureta [2003] for El Salvador; and Hanson and Woodruff [2003] for Mexico). Hildebrandt and McKenzie [2004] show that migration is associated with better health outcomes among children, measured by higher birth weights and lower mortality rates. There is evidence that remittances are associated with investment in microenterprises as well. (See, for example,

Woodruff and Zenteno [2005]; Mesnard [2004]; Mesnard and Ravallion [2005]). None of these studies suggest that the majority of remittances are used for productive investments. But they do suggest that some part of remittances is used for local development, and that the cumulative impact of these investments over time is significant.

The literature has identified the impacts of migration on investments in the migrants' country of origin in a number of ways. Here we focus on intertemporal changes in the flow of remittances. Remittances flowing to Mexico increased quite rapidly during the 1990s, from US$ 3.1 billion in 1992 to US$ 5.6 billion in 1998, a compound growth rate of almost 11% per year. On a *per capita* basis, remittances were US$ 36 in 1992 and US$ 58 in 1998. If remittances are being channeled into microenterprises, we should observe an increase in the strength of the association between migration and microenterprise investment between the first half and second half of the decade.

Woodruff and Zenteno [2005] use the geographic pattern of migration to identify impacts of migration on microenterprises in Mexico. The proportion of individuals migrating to the US varies markedly across states in Mexico, with the highest migration rates occurring in the central-western states. Moreover, current migration patterns have deep historical roots. Migration during the latter half of the 1990s is highly correlated with migration during the latter half of the 1950s. Using the geographic variation in migration rates, Woodruff and Zenteno find that individuals born in regions with higher migration rates have larger enterprises, regardless of whether they continue to live in those regions or not.

Woodruff and Zenteno use data from the 1998 version of the same survey of microenterprises used in this paper. Because the data come from a single crossed section, they are subject to the criticism that the association between migration and remittances found in the data is the result of unmeasured regional differences. That is, it may be that individuals from high migration regions are more entrepreneurial than individuals from low migration regions. In that case, migration and investment levels will be correlated, but not in a causal manner. This paper addresses this concern by looking at the connection between migration and microenterprises across time. If the connection between migration and investment levels identified by Woodruff and Zenteno is the result of unmeasured differences, then we would expect to find that the association is as strong in 1992 as it is in 1998. If, on the other hand, migration is causally related to investment levels, we should find that the link becomes stronger during the 1990s, as remittance flows increase.

In addition to examining the effect of migration on the level of investment in microenterprises, we also examine the association between migration and employment in enterprises. We should stress that this analysis is limited to the impact of migration on employment in microenterprises. Since the survey we use is limited to firms with fewer than five employees (or 15 in the manufacturing sector), we will not uncover the impacts of remittances on employment generation in larger firms. Nevertheless, the use of both paid labor and unpaid family labor by microenterprises is an interesting area for analysis. Only a minority of enterprises employ anyone aside from the owner. Among those headed by males, 27% have at least one paid employee and 17% at least one unpaid employee. Among female-owned enterprises, unpaid employment is more common, with 30% having at least one unpaid employee and 16% a paid employee.

Finally, the well being of households in Mexico comes not from increased investment or labor, but from increased profits which those investments generate. Is migration associated with higher rates of profits for microenterprises? In the penultimate section of the paper, we examine kernel densities of raw earnings and of earnings adjusted for measured characteristics.

The paper relates to a growing literature on the impact of migration on sending country development. Much of the rather large literature on the relationship between migration and economic development of sending regions focuses on rural-urban migration within countries (Stark [1978], [1980]; Rozelle, Taylor and DeBrauw, [1999] pp. 287-291). The earliest studies focused on international migrants examined the impact in rural areas, which are the largest source of international migrants in many countries, including Mexico. Lucas ([1987] pp. 313-330) and Lucas and Stark ([1985] pp. 901-918) analyze the impact on earnings returned by migrant workers in South African mines. Taylor ([1992] pp. 187-208) and Taylor and Wyatt ([1996] pp. 899-912) examine agricultural asset accumulation in a sample of rural households receiving remittances in Mexico.

There is more recent literature focusing on self-employment impacts in migrant-sending countries. This literature is quite geographically dispersed. Early evidence of a correlation between migration, remittances and entry into self-employment in Nicaragua is provided by Funkhouser ([1992] pp. 1209-1218). The employment choices of migrants returning to Pakistan are examined by Ilahi ([1999] pp. 170-186). Mesnard ([2004] pp. 242-262) and Mesnard and Ravallion [2005] examine employment choices of Moroccan immigrants returning from abroad, and Dustmann and Kirchkamp ([2002] pp. 351-372) analyze data on Turkish immigrants returning from Germany. These authors find evidence that migrants are more likely to enter self-employment upon returning to their home country, and that the likelihood of entering self-employment is increasing in the amount of savings accumulated while working abroad. With respect to Mexico, there is some direct evidence on the importance of remittance in enterprise investment for small, regionally-focused samples. Massey and Parrado ([1998] pp. 1-20) examine enterprise formation in a sample of 30 communities in Central-West Mexico, including five neighborhoods in large cities. They conclude that earnings from work in the US provided an important source of startup capital in 21% of the new business formations. Escobar and Martinez [1991] report that earnings from US migration were an important source of startup capital in seven of 19 manufacturing firms they surveyed in Guadalajara.

The main challenge in understanding the impact of migration or remittances on the economies of sending countries is identification. For migration, the cleanest identification strategies in the existing literature derive from short-terms shocks.[1] Munshi ([2003] pp. 549-599) uses changes in rainfall (e.g., droughts) to identify the strength of migration networks among a set of communities in high migration states in Mexico. Yang [2004] uses the Asian currency crisis as a source of changes in the value of remittances received by Filipino families with migrants overseas. He takes advantage of the fact Filipino migrants work in many different countries. The use of data from repeated cross sections during a period of time in which migration and remittance flows increased dramatically is clearly not as clean an identification strategy as that employed by Munshi and Yang. But so long as the establishment of historical migration networks is exogenous to the outcomes we measure, as Section II argues is the case, then the results here should be interpreted as measuring a longer term impact of migration on microenterprises in Mexico. These may differ from the response to transient shocks identified through shocks like weather and exchange rates.

II. Migration Networks

Our main interest is in the impact of migration and remittances on investment, labor and profits of microenterprises. Of course, migration may be related to economic

outcomes for any of several reasons. Importantly, migration may either be the cause of or an effect of some economic outcome. Or, economic conditions unmeasured in available data may cause both migration and economic outcomes. For example, migration from Mexico to the US may be associated with entrepreneurial activity because migration provides the capital necessary to open a business, or because families who are entrepreneurial enough to send migrants to the US are also more likely to start businesses.

To make a credible claim that migration is a cause of an economic outcome, these endogeneity issues must be addressed. We address them here by using historical migration rates as an instrument for current rates. The argument has three steps. (1) Mexico-US migration has a distinct geographic pattern: migration is more likely among households in some states than in others. (2) This pattern has deep historical roots. At the state level, the correlation between migration rates in the 1950s and migration rates in the 1990s was 0.71. (3) The pattern was established for reasons that are exogenous to entrepreneurial ability or the environment for microenterprise. The central-western part of Mexico has high migration rates because that is where the rail lines went in the early 20th century, when migration flows began. We discuss each of these points in turn.[2]

In the empirical work, we also use differences in migration and remittance flows across time to test the importance of migration networks on microenterprises. Migration from Mexico to the US and remittance flows back to Mexico both increased dramatically during the 1990s. If migration networks are exogenous to other factors affecting microenterprises, then the importance of attachment to migration networks should have increased during the 1990s. If the association between migration and enterprise investment identified by Woodruff and Zenteno is driven by unobservable factors associated with migration networks, then the impact of migration networks should not have changed during the 1990s.

Patterns of Migration and their Causes

The map in Figure 1 and the first column of Table 1 show the state-level rates of out-migration in the 1995-2000 period. Both of these use data from the 10% sample of Mexico's 2000 population census (*Instituto Nacional de Estadística, Geografía e Informática* - INEGI [2000]). Households in the census were asked a series of questions about the migration of household members to other countries during the 1995-2000 period. The questions referred to either temporary or permanent migration, for any purpose. We focus on migration to the US because that migration is most likely to be for the purpose of working.[3] Migration to the US represents about 95% of emigration from Mexico. The first column of Table 1 shows the percentage of households in the 2000 population census reporting that at least one member migrated to the US during the 1995-2000 period. States are grouped in the table by region, using the 4 migration regions identified by Durand (Durand, Massey and Zenteno [2001]): the historical region includes states in the central-western part of Mexico in which migration rates have historically been highest; the border region includes states in the northern part of Mexico; the central region is Mexico City and surrounding states; and the southeast includes both the southern state of Chiapas and the Yucatan peninsula. The state level pattern is shown on Figure 1.

Among states in the historical migration region, just under 10% of households report sending at least one member to the US during the 1995-2000 period. About 5% of households in Mexico City and the surrounding states report US migration, while 3% and 1.4% of households in the northern border region and the southeast, respectively, report US-bound migrants. Columns 3 and 4 of Table 1 show the remittances *per capita* and Gross

Domestic Product (GDP) *per capita* in 1995. The remittances data are from the *Banco de Mexico* and the GDP data are from INEGI. Remittances are clearly an important part of income in states that make up the historical migration region. They represent more than 17% of income in Michoacan and almost 7% of income in the region as a whole.

The correlation between contemporary migration and historical migration is shown by the data in the second column of Table 1. These show migration as a percentage of the states population during the second *Bracero* -or guest worker- program, which was in effect from 1942 to 1965. Column 2 shows the total number of migrants during the peak years of the program, 1955 to 1959, divided by the state's estimated population in 1957.[4] The correlation between migration in the second half of the 1950s and the second half of the 1990s is 0.72.

The geographic pattern of out-migration from Mexico dates back to the early 1900s. Mexican workers were recruited to work in the US in large numbers during the first two decades of the 20th century. As migration from Europe slowed during and after World War I, the US established the first *Bracero* program. Pulled by the promise of work and pushed by the chaos of the Mexican revolution, large numbers of workers left Mexico for the US during the 1910s and 1920s. The recruiters going to Mexico in search of laborers and the migrants going north to the US both used the major north-south rail lines which were built between 1880 and 1910. The Central Mexican Railroad went from the state of Colima on the Pacific Coast through Guadalajara, turning north through the states of Guanajuato, Zacatecas and Chihuahua before terminating on the Texas border at what is now Ciudad Juárez. The Mexican International railroad connected Durango to Piedras Negras. The third major line was the Mexican National Railroad, which went north from Mexico City through San Luis Potosí and Monterrey, terminating Nuevo Laredo and Brownsville in eastern Texas. The first two lines were more important because they connected with US railroads at El Paso and Eagle Pass. The major migrant-sending states, both during the *Bracero* era and currently, were all served by these rail lines. The rail lines were the foundation of migration networks which survive to the present.[5]

Of course, it may be the case that migration rates are high in certain states because the people there are naturally more entrepreneurial, or because economic conditions there make migration an appealing option. The historical rates will not filter out the endogenous component of current migration if the former is true, and they will not do so if the latter is true and the conditions causing migration also create an environment conducive to microenterprises. The routes of the railroads were largely determined by their endpoints, making it unlikely that their location was driven by a desire to cross through areas with particularly high levels of entrepreneurial ability. But even if they did not pass through such areas by design, they might have done so by happenstance.

However, the available data suggest no positive correlation between entrepreneurial activity prior to the wave of migration that began in 1942 and subsequent migration rates. State-level rates of self-employment calculated from the 1940 Mexican population census show an insignificant but negative (-0.05) correlation with *Bracero* era migration rates. The correlation between the 1940 self-employment rate and current (1995-2000) migration rates is positive but very low (0.07). There are similarly small and insignificant correlations between *Bracero* migration rates and occupation structure in 1940.[6] There is some correlation between levels of education and subsequent migration rates. Migration rates are higher in states with a larger percentage of residents with less than 6 years of schooling (0.31) and smaller in state with more population having 6-8 years

of schooling (-0.31) or 9-11 years of schooling (-0.19), though the latter correlation is not significant at the 0.10 level. To the extent that educational attainment is correlated with entrepreneurial ability (a standard assumption in the literature), these last data suggest that there may be some negative correlation between migration rates and entrepreneurial ability. This would make finding a positive connection between migration and enterprise size more difficult to find. The lack of any positive correlation between pre-*Bracero* entrepreneurial activity and subsequent migration supports the validity of the historical migration rates as instruments for current migration.

Migration Flows across Time

In this paper, we subject the exogeneity of migration networks to a further test by looking at the relationship between migration and microenterprise investment across time. Both migration and remittance flows increased markedly during the 1990s. Data from the US Population Census indicate that the Mexican-born population resident in the US more than doubled during the 1990s, increasing from 4.3 million in 1990 to 9.2 million in 2000. The *Banco de México* estimates that flows of remittances more than tripled during the 1990s. Flows more than doubled between 1992 and 1998, the two end points of the survey data used in this paper, increasing from US$ 3.07 billion in 1992 to US$ 6.53 billion in 1998. Given the rapid increase in both migration and remittance flows during the 1990s, the association between migration and enterprise size should be stronger in the late 1990s than it was in the early 1990s.

Before turning to the regression results, we present some direct evidence of a connection between remittances and microenterprises from the Mexican population census. The data on Table 2 report rates of remittance receipts for individuals between the ages of 18 and 65 residing in urban areas (with population above 100,000) by job type. We are particularly interested in knowing whether self-employed workers are more likely than others to receive remittance payments, a pattern which might indicate that remittance flows are supporting microenterprise investments. The three columns report the percentage of all individuals, males and females who receive remittances. For all individuals, remittance rates are highest among those not employed (1.59%), followed by the self-employed (1.03%), and wage workers (0.65%). Among females (Column 3), the self-employed receive remittances at a rate 75% higher than wage workers (1.76% vs. 1.01%).[7] Note that self-employed females are at least twice as likely to receive remittances as are self-employed males. (Compare Column 2 with Column 3). The remittance patterns on Table 3 suggest that remittances may indeed be a source of capital for the self-employed in urban areas. The impact appears to be greater for females than for males.

Demand and Supply Side Effects

Though historical rates may allow us to examine the effect of the exogenous component of migration on microenterprises, remittances may still affect the size of microenterprises through either of two channels. First, remittances may increase the level of spending on goods and services supplied by microenterprises. The increase in demand for their products might lead to an increase in investments. Second, remittances may alleviate capital/wealth constraints among recipient households, leading them to make additional investments in enterprises.

We separate these channels by focusing on connections to migration networks coming through an individual's state of birth rather than his state of residence. The simple framework developed by Woodruff and Zenteno shows that remittances associated with higher migration in the state of residence affect the size of enterprises through either the demand for goods or supply of capital channel. Remittances associated with the state of birth, however, do not affect the size through the demand for capital, so long as firms sell in local rather than national markets. Given the small size of the enterprises in the survey used in this paper, this is a reasonable assumption.

The microenterprise data we use in this paper do not contain information on direct remittance receipts by owner of the enterprises or other members of his/her household. Given both measurement and endogeneity issues, it is not clear how useful such data would be in any case. What the data do tell us is the state of residence and the state of birth of the enterprise owner. We expect that individuals residing in states with higher rates of migration are more likely to receive remittances. If individuals retain family and social networks from their state of origin even after they relocated to another state, we would also expect individuals born is states with higher migration rates to be more likely to receive remittances. In other words, if an individual relocates from a high migration state to a low migration state, that individual has a higher probability of receiving remittances than his neighbors do. While his business operates in an area with low remittance flows, and hence the demand for his output is not affected by remittances, remittances may still affect his investment through the wealth/liquidity channel.

Data from the 2000 Mexican population census confirm that migration networks survive internal relocation. The population census asks individuals if they receive remittances from outside Mexico. The regressions reported on Table 3 show that ties to regions with higher rates of migration survive when an individual migrates within Mexico. Individuals born in states/regions with higher migration rates generally have higher migration rates regardless of where they currently live. On Table 3, Columns 1 (for males) and 3 (for females) show the results of a probit where the dependent variable is one if the individual reports that he/she receives remittances, and zero he/she does not. The regression includes controls for the individual's age and education, but for brevity we show in Table 3 only two variables representing migration rates.[8] The first is the average migration rate among households in the respondent's state of current residence. The second is the average migration rate among households in the respondent's state of birth. For males and for females, the probability of receiving remittances is increasing in the migration rates in both the state of residence and the state of birth. The migration rate in the state of residence has a larger effect, but the migration rate in the state of birth also has an important effect on the likelihood a household receives remittances. For males, the effects of state of residence and state of birth are of roughly the same magnitude. For females, the effects of state of residence are more than twice as large as the effects of state of birth. Columns 2 and 4 limit the sample to internal migrants, those living in a state other than their state of birth. Again, the migration rates of both the state of residence and state of birth are positively related to receipt of remittances.

In sum, migration from Mexico has a distinct geographical pattern. This pattern was established through links to early rail lines, and available evidence indicates that migration is not positively associated with entrepreneurial ability at the state level. In order to separate the impact of individual's connection to a migration network from broader community level impacts of migration and remittances, we measure an individual's connection to migration networks with the migration rate in the individual's state of birth.

III. Enterprise Data

The microenterprise data come from the National Survey of Microenterprises (*Encuesta Nacional de Micronegocios* - ENAMIN). The survey was conducted by the INEGI, four times during the 1990s. The first three surveys were carried out in the first quarter of 1992, 1994, and 1996, respectively. The fourth was carried out during the fourth quarter of 1998.

The ENAMIN was administered in urban areas. The sample is drawn from the quarterly household labor survey, the *Encuesta Nacional de Empleo Urbano* (ENEU). Enterprise owners employing fewer that five people -15 in manufacturing- were eligible for the ENAMIN survey. Nationally, the sample was more than 10,000 in each of the four years. For the analysis, we limit the sample to individuals between the ages of 22 and 60 who work full time, at least 35 hours per week. Eliminating firms with missing data, the sample is 19,433 in all, with between 3,342 and 5,776 observations per year. The first three surveys sampled in 18 different states,[9] while the final survey sampled in at least one city in all 32 federal entities in Mexico. When we compare enterprises across time, we limit the sample to data from only the states included in the first three surveys.

The largest number of firms are involved in retail trade. These represent 33% of the sample. An additional 17% of the firms are in repair services, and 13% in manufacturing. The remaining firms are divided between construction (8%) restaurants/hotels (8%), professional services (8%), transportation (7%), and miscellaneous services (6%).

Capital investment is measured in the ENAMIN as the replacement cost of equipment used in the business plus inventories. The questions regarding equipment are asked with respect to tools, machinery, buildings, transportation equipment, and other equipment. The median level of capital invested in the enterprises over the four surveys is US$ 801. The distribution is skewed to the right; the mean investment level is US$ 4,553. Enterprises owned by males (median US$ 865) are larger than those owned by females (median US$ 640). The median investment level is somewhat higher in the earlier surveys: US$ 841 in 1992 and US$ 1,044 in 1994, compared with US$ 735 in 1996 and US$ 741 in 1998.

There are some differences between the survey instruments used in the different years, but they are generally consistent. The most important difference is that the 1992 survey does not specifically ask about buildings and real estate in the list of assets. It is unclear whether owners reported buildings as a part of "other assets" in the survey. The median investment level is similar in 1992 to that in 1996 and 1998. There is also consistency in the percentage of firms with paid and unpaid employees across time. 23% of enterprises have paid employees in 1992 and 1998, 25% in 1996 and 27% in 1994.

Before turning to regressions, we show the raw data for entrepreneurs born in high migration states and low migration states separately. Table 4 shows raw data on the log of capital investment and the log of labor hours worked by paid and unpaid employees for a sample of entrepreneurs born in states with historical migration rates (1955-1959) above 1.9% (the ten highest migration states) and entrepreneurs born in states with migration rates lower than 0.5% (the ten lowest migration states). The data are divided by gender and shown for each of the four survey years.

The intention of Table 4 is to show the trend of enterprise characteristics among high migration entrepreneurs relative to the trend among low migration entrepreneurs. For example, among males in 1992, the log of the average investment by high migration entrepreneurs was 6.92, while the log of capital invested by low migration entrepreneurs

invested 6.87, a difference of 5 log points. By 1998, this difference had increased to 28 log points (an average log investment of 6.64 for high migration entrepreneurs compared with an average log investment of 6.36 for low migration entrepreneurs). Given the rapid increase in migration and remittances during the 1990s, this is exactly the trend we would expect to find if remittances are being channeled into microenterprises. For females, however, the raw trend much less clear. The difference between high- and low-migration entrepreneurs is greatest in 1992, smallest in 1994, and in between these levels in 1996 and 1998. In use of labor, the clearest trends are with unpaid labor. For females, the ratio of unpaid labor is increasing during the 1990s, consistent with a migration-remittances effect, while among male-owned enterprises, the trend appears to go in the opposite direction. Of course, many factors affect the capital investment and use of labor in enterprises, so these raw differences may be misleading. In the next section, we control for some of these other factors in regressions.

IV. Regression Results

We begin by estimating the following empirical model:

$$Y_{ijkl} = c + \varphi w_{kl} + \beta \Gamma_i + \gamma \Omega_j + \eta_1 M_j + I_l + \varepsilon_{ijkl} \quad (1)$$

where Y is either the log of invested capital in the microenterprise, the log of hours worked by paid employees, or the log of hours worked by unpaid family members.[10] The regressors include a vector of entrepreneur and firm level characteristics Γ_i (for example, education, age, and age of firm), a vector of characteristics of the state of birth Ω_j (for example, *per capita* income), the wage rate in the state and industry in which the firm operates w_{kl}, the migration rate in the state of birth of the entrepreneur M_j, and an error term.

Because our main variable of interest is measured at the state-of-birth level, and because the controls for characteristics of the state of residence are unlikely to capture all of the factors affecting the environment for microenterprises, we also estimate the following model with state of residence and survey year fixed effects:

$$Y_{ijkl} = c + \beta \Gamma_i + \gamma \Omega_j + S_k + \eta_1 M_j + I_l + Y + \varepsilon_{ijkl} \quad (2)$$

Where S_k is a state fixed effect for the state of residence, Y is the year fixed effects, and the other regressors are as described above. The state fixed effects control for all differences in the state of residence of the entrepreneur. Since the fixed effects also wash out most of the variation in the state-industry wage rates, that variable is dropped from equation 2 as well.

We begin by examining capital investment in the enterprises. Tables 5 and 6 report regressions for males and females, respectively. The first column in each of the tables reports the results of an Ordinary Least Squares (OLS) regression, with errors clustered at the state-of-birth level. For both males and females, we find that the migration rate in an entrepreneur's state of birth is positively associated with the log of invested capital in the enterprise. For males, a one standard deviation increase in the migration rate (0.036) is associated with an increase of 16.5 log points. For females, the effect is slightly larger -23

log points-. The second columns in both tables reports the results when current migration is instrumented using the migration rate in the 1950s. The migration effect remains highly significant for both males and females, and increases in magnitude, especially for males. However, once we add state of residence and year fixed effects to the IV regression (Column 3), the coefficients become smaller. In the case of females, the migration effect becomes insignificant. For males, the effect remains significant at the 0.05 level. The bottom panel of both tables reports the first stage regressions. Historical migration rates are quite a strong instrument, with partial r-squares in the 0.60 range.

Next, we break the sample into two time periods. Column 4 reports results for the survey years 1992 and 1994, and Column 5 for the survey years 1996 and 1998. For males, the migration effect is nearly zero in the early part of the decade, and positive and significant in the second half of the decade. Consistent with the idea that remittances are being channeled into microenterprises, the association between migration and enterprise investment grows during the decade. Indeed, when the sample is broken by survey year, the measured effect of migration on enterprise investment shows a monotonically increasing trend: -1.88 in 1992, 1.24 in 1994, 1.97 in 1996, and 5.63 in 1998 (results not shown on table). For females, however, we find no increasing trend across the decade. The results reported on Table 6 show that the effect is larger in the first two survey years than in the last two. There is also no clear trend when separate regression are run for each survey year. We will speculate on explanations for these differences in the concluding section.

Next, we ask whether remittances are associated with the use of labor in the enterprise. Among enterprises owned by males, 27.5% hire at least one paid employee and 17.5% at least one unpaid employee. Among those owned by females, unpaid employees are much more common -only 15.5% of enterprises have at least one paid employee, but 31.5% have at least one unpaid employee-. Is there an association between migration and the use of labor in the enterprises? Table 7 reports regressions with the log of hours (plus one) worked by paid employees, using the specification given by equation (2), with state and year fixed effects. Both OLS and IV results are reported. For males, there appears to be no association between migration and the use of paid labor. For females, the measured effect is larger than for males, but is still well below the 0.10 level of significance. There are no clear trends across the decade. Migration is not significantly associated with the use of paid labor either in the first half or the second half of the 1990s.

We do find a positive association between migration and the log of unpaid hours (plus one) employed in the enterprise among female owners. The effect is quite strong, and of very similar magnitude in the OLS and IV regressions. A one standard deviation increase in the migration rate is associated with an increase of almost 28 log points. In enterprises owned by males, the measured effect is actually negative, but not significantly so. Again, there are no clear trends across the decade. Migration is significantly associated with use of unpaid labor in female owned enterprises in both the early and later period, and the measured effect is nearly the same. The labor hours regressions also include indicators for the presence of children aged 0-5, 6-12, and 13-18 in the household. For both males and females, the use of unpaid labor is strongly correlated with the presence of children between the ages of 13 and 18 in the household.

Migration is associated with an increase in capital investment and, for females at least, the increase in the hours worked by unpaid employees. Both of these would be expected to lead to an association between migration and the earnings of the micro entrepreneurs. Estimating the returns to self-employment is complicated due to the level

of noise in earnings data and the large range of capital stocks. Parametric estimates which impose a functional form may smooth over important non-linearities in earnings.[11] Given this, we use kernel densities to examine profits. Figure 2a shows the kernel densities of earnings for males born one of the ten states with the lowest migration rates in the 1955-1959 period and males born in one of the ten states with the highest migration rates during that period. To make the graphs more readable, the data are presented only for individuals earning less than US$ 1,000 per month. Figure 2b shows the kernel densities for females in the same two groups. For males, there is a perceptible shift to the right in the earnings densities among individuals born in high migration states. For females, the two densities appear similar.

As the data on Table 1 indicate, high migration states have lower *per capita* incomes on average than do low migration states. Among males, those born in one of the high migration states have education levels which are almost a year lower than those born in low migration states. For females, the difference is about a half a year in the same direction. Hence, all else equal, we might have expected profits to be higher in low migration states. We next look at earnings densities controlling for some of the differences in characteristics of the micro entrepreneurs. We do this by first regressing log profits against the same controls for entrepreneur and enterprise characteristics, but not controlling for capital stock. The controls are the same ones used in the investment regressions reported on Tables 5 and 6. We then plot kernel densities of the residuals from these regressions. These are shown on Figures 3a (males) and 3b (females). In the residual plots, the rightward shift is clear for both males and females. These densities provide support for a connection between access to migration networks and the profitability of enterprises. These data suggest that connection to migration networks is associated with higher levels of income among Mexico's microentrepreneurs.

V. Conclusions

Both migration to the US and remittance flows back to Mexico increased dramatically during the 1990s. If remittances are being channeled into microenterprises, the relationship between migration and investment in microenterprises should have strengthened during the decade. Both the raw data and regressions suggest that this is exactly what occurred in enterprises owned by males. Attachment to migration networks is positively associated with enterprise size in the latter half of the decade, but not in the earlier part of the decade. The measured effect of migration on invested capital increases in each of the survey years between 1992 and 1998.

The pattern for females is different. Though we generally find a positive association between migration and enterprise investment, the effect is at least as large early in the decade as it is later in the decade. It is not entirely clear why there should be a difference between the two genders. The sample size is much smaller for females, so differences may simply be harder to identify in the female sample. Alternatively, we note the 1990s were a period of rapidly increasing out-migration, but also a period of increasing return migration. Before the 1990s, males were more likely to migrate to the US than were females. Thus, migrants returning in the early 1990s were more likely to be males. It could be the case that money channeled to enterprises run by the female spouses of migrants early in the decade was used by males returning from the US later in the decade. Unfortunately, the ENAMIN data do not allow us to examine this possibility more carefully.

With respect to the use of labor in enterprises, we find limited evidence that migration is associated with increased demand for workers in microenterprises. Among females, we do find robust evidence of an association between migration and the use of unpaid family workers. However, we find no evidence that this association strengthened during the 1990s. Kernel densities of profits, adjusted for measured characteristics such as the entrepreneurs education level, do suggest that migration is associated with higher profits for microenterprises. Though the difficulty of estimating profit regressions limits the evidence in this regard, this is certainly one of the most important indicators of the migration effect.

Surveys asking households in Mexico how they use remittances routinely find that the overwhelming majority of remittances are spent on current consumption. The ENAMIN data suggest that either these surveys understate the amount of remittances allocated to microenterprise investment, or that the small amounts (usually around 5%) reported in these surveys cumulate over time to produce a significant effect on enterprise investment. The Inter-American Development Bank (IDB) has recently begun projects in several Latin American linking microlenders in migrant-sending countries with remittance transmission firms in the migrant-receiving countries. Perhaps these projects will provide additional evidence on the link between remittances and productive investments in the migrant-sending countries.

Notes

[1] Mesnard and Ravallion [2005] use a change in policies by destination countries of Tunisian migrants as a source of exogenous variation.

[2] The discussion of these issues here is somewhat informal. Exogeneity of migration networks and selection of who chooses to migrate to the US are both dealt with more formally in Woodruff and Zenteno [2005].

[3] The purpose of migration was not among the questions asked in the census, but the characteristics of European migrants and their households (for example, age of migrants and education of household heads) suggest that a larger portion of migration to Europe is for educational purposes. Since migration to the US represents 95% of all migration from Mexico, the results discussed in the paper are not impacted by the focus on migration to the US.

[4] González Navarro [1974] provides data on the number of migrants registered in the *Bracero* program by year and state. The population data are estimated using a linear extrapolation of the 1950 and 1960 population census data.

[5] Munshi [2003] shows the importance of migration networks both in the migration decision and in the likelihood of finding employment in the US.

[6] The correlation between *Bracero* migration rates and the percentage of employment in agriculture (0.07), trade (-0.10), manufacturing (-0.07) and professional services (-0.03) are all low and highly insignificant.

[7] The fact that those not working are most likely to receive remittances raises the possibility that remittances might allow some individuals to stay out of the workforce. If remittances result in the most marginal of the self-employed choosing to stay out of the labor force, then remittances might be associated with higher average investment levels simply because they truncate the lower tail of the distribution of investment levels. Woodruff and Zenteno [2005] report results of regressions which show no effect of migration on overall self employment rates.

[8] For the regressions, the sample is limited to people between the ages of 18 and 65 who currently reside in a city with more than 100,000 people. Those born outside of Mexico are also removed from the sample. The sample criteria mimic those used in the microenterprise investment regressions reported below. All standard errors are adjusted for clustering based on groups representing the individual's state of birth.

[9] There were a small number of observations -less than 10- in an additional 6 states. Where the sample is limited to states present in all four surveys, these observations are eliminated.

[10] For both paid and unpaid labor, we take the log of hours worked plus one, since many enterprises do not employ any paid or unpaid workers.

[11] See Woodruff and Zenteno [2005] for parametric profit regressions using the 1998 ENAMIN data.

Table 1

State Level Data

	Households with International Migrants, 1995 to 2000 (%)	% of Residents Migrating Annually, 1955-1959	Remittances *per Capita*, 1995 in US$	*Per capita* GDP, 1995 in US$
	(1)	(2)	(3)	(4)
Border:				
Baja California	2.65	0.84	14.75	1,912
Baja California Sur	1.56	0.84	11.81	1,947
Coahuila	3.08	2.75	31.12	2,058
Chihuahua	4.80	3.38	23.04	2,062
Nuevo León	2.65	2.66	10.82	2,586
Sinaloa	4.09	0.46	45.20	1,195
Sonora	1.89	0.53	13.32	1,803
Tamaulipas	3.62	0.88	18.46	1,623
	3.04	*1.54*	*21.06*	*1,898*
Center:				
Distrito Federal	2.05	0.10	23.10	3,823
Guerrero	7.56	1.32	76.89	796
Hidalgo	8.62	0.26	33.85	966
Mexico State	3.24	0.57	13.76	1,205
Morelos	8.74	0.79	90.58	1,263
Oaxaca	5.47	0.83	49.32	653
Puebla	4.55	0.30	38.47	1,006
Querétaro	6.18	1.44	56.61	1,817
Tlaxcala	3.20	0.52	24.88	823
	5.51	*0.68*	*45.27*	*1,372*
Historical:				
Aguascalientes	9.01	3.22	132.59	1,728
Colima	6.82	1.34	56.08	1,600
Durango	9.28	5.49	53.48	1,329
Guanajato	11.40	4.06	85.41	1,062
Jalisco	8.16	1.99	77.87	1,479
Michoacán	13.02	3.06	154.19	901
Nayarit	8.39	0.81	64.20	914
San Luis Potosí	8.67	2.49	54.49	1,094
Zacatecas	15.12	5.94	85.64	878
	9.99	*3.16*	*84.88*	*1,221*
Southeast:				
Campeche	1.05	0.01	5.69	2,341
Chiapas	0.94	0.00	5.50	678
Tabasco	0.71	0.20	1.87	951
Quintana Roo	0.90	0.02	6.95	2,437
Veracruz	3.66	0.04	11.31	912
Yucatán	1.26	0.18	7.35	1,159
	1.42	*0.08*	*6.44*	*1,413*

Notes: Columns 1 and 2 are calculated using data from the 2000 census of population. Column 4 are registered participants in the Bracero program between 1955 and 1959, from González Navarro [1974]. Column 4 is an estimate from the Bank of Mexico. The GDP data were taken from the website of INEGI.

Table 2

Percent of Individuals Receiving Remittances			
	All Individuals	Males	Females
Not Working	1.59%	1.61%	1.59%
Wage Worker	0.65%	0.43%	1.01%
Self Employed	1.03%	0.68%	1.76%

Source: Mexican Population Census [2000].

Table 3

Receipt of Remittances				
	Full Sample (Male)	Internal Migrants Only	Full Sample (Female)	Internal Migrants Only
	(1)	(2)	(3)	(4)
Migration Rate in State of Residence	3.34	4.49	11.12	12.82
	(2.69)	(3.32)	(5.40)	(5.79)
Migration Rate in State of Birth	2.58	3.27	4.47	5.68
	(3.32)	(3.96)	(4.83)	(7.28)
Variable Indicating Person is Internal Migrant	0.05		0.09	
	(1.31)		(1.33)	
Number of Observations	827656	278778	913490	312079
% of Sample Receiving Remittances	0.63	0.69	1.40	1.51
Psuedo R-squared	0.036	0.035	0.035	0.027

Notes: T-values in parentheses. Standard errors are for the migration rate in state of residence are adjusted for clustering at the level of state of residence, and standard errors for migration rate in the state of birth are adjusted for clustering at the level of the state of birth. All regressions also include 9 age and 6 schooling indicator variables.

Table 4

Log Capital Stock and Hours Worked by Paid and Unpaid Employees

	MALES								
	Log Capital Stock			Log Hours, Paid Employees			Log Hours, Unpaid Employees		
	10 High Migration States	10 Low Migration States	Difference	10 High Migration States	10 Low Migration States	Difference	10 High Migration States	10 Low Migration States	Difference
1992	6.92	6.87	0.05	1.11	1.18	-0.07	0.63	0.53	0.10
1994	6.92	6.76	0.16	1.39	1.05	0.34	0.73	0.55	0.19
1996	6.48	6.33	0.15	1.22	1.10	0.12	0.62	0.58	0.04
1998	6.64	6.36	0.28	1.15	1.02	0.13	0.57	0.69	-0.12
	FEMALES								
	Log Capital Stock			Log Hours, Paid Employees			Log Hours, Unpaid Employees		
	10 High Migration States	10 Low Migration States	Difference	10 High Migration States	10 Low Migration States	Difference	10 High Migration States	10 Low Migration States	Difference
1992	6.70	5.98	0.72	0.835	0.635	0.20	1.235	1.260	-0.02
1994	6.14	6.24	-0.10	1.110	1.445	-0.34	1.219	1.160	0.06
1996	6.23	5.96	0.27	0.594	0.497	0.10	1.244	0.807	0.44
1998	6.29	5.97	0.32	0.582	0.565	0.02	1.088	0.880	0.21

Source: ENAMIN survey data, various years. Sample limited to individuals 22-60 years of age working 35 or more hours per week.

Table 5a

Regression Results - Males Log of Replacement Cost of Invested Capital					
				1992-1994	1996-1998
	OLS	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)
State Level Variables:					
Migration Rate in the State of Birth	4.64	7.03	2.60	-0.38	3.29
	(4.45)	(4.13)	(2.02)	(0.17)	(1.83)
State FE	No	No	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes
Number of Observations	15387	15387	15387	6491	7427
R-Squared	0.282	0.281	0.301	0.289	0.324

Table 5b

First Stage for IV Regressions Migration Rate in the Entrepreneur's State of Birth					
				1992-1994	1996-1998
	OLS	IV	IV	IV	IV
	(1)	(2)	(3)	(4)	(5)
Migration Rate 1955-1959		1.54	1.85	1.91	1.81
		(5.74)	(8.92)	(7.95)	(9.92)
State Fixed Effects		No	Yes	Yes	Yes
Year Fixed Effects		No	Yes	Yes	Yes
Industry Controls		Yes	Yes	Yes	Yes
Number of Observations		15387	15387	6491	7427
Partial R-Sq of Instrument		0.56	0.60	0.62	0.60

Notes: t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 22-60 years of age working at least 35 hours per week. The regressions also include the following variables measuring individual owner and enterprise characteristics: years of schooling and its square; experience calculated as experience-age-6; age of the enterprise and its square; a dummy indicating the enterprise was started within the past 6 months, a dummy indicating the owner owns more than one enterprise, and the log *per capita* income in the owner's state of birth.

Table 6a

Regression Results - Females Log of Replacement Cost of Invested Capital					
	OLS	IV	IV	1992-1994 IV	1996-1998 IV
	(1)	(2)	(3)	(4)	(5)
State Level Variables:					
Migration Rate in the State of Birth	6.53	7.30	4.37	6.11	4.31
	(4.37)	(4.06)	(1.33)	(1.92)	(1.25)
State Fixed Effects	No	No	Yes	Yes	Yes
Year Fixed Effects	No	No	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes
Number of Observations	4046	4046	4046	1409	2013
R-Squared	0.148	0.147	0.203	0.221	0.191

Table 6b

First Stage for IV Regressions Migration Rate in the Entrepreneur's State of Birth					
	OLS	IV	IV	1992-1994 IV	1996-1998 IV
	(1)	(2)	(3)	(4)	(5)
Migration Rate 1955-1959		1.67	1.82	1.926	1.788
		(6.15)	(8.47)	(6.58)	(11.12)
State Fixed Effects		No	Yes	Yes	Yes
Year Fixed Effects		No	Yes	Yes	Yes
Industry Controls		Yes	Yes	Yes	Yes
Number of Observations		4046	4046	1409	2013
Partial R-Sq of Instrument		0.59	0.59	0.61	0.62

Notes: t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 22-60 years of age working at least 35 hours per week. The regressions also include the following variables measuring individual owner and enterprise characteristics: years of schooling and its square; experience calculated as experience-age-6; age of the enterprise and its square; a dummy indicating the enterprise was started within the past 6 months, a dummy indicating the owner owns more than one enterprise, and the log *per capita* income in the owner's state of birth.

Table 7

Regression Results
Hours Worked by Paid Employees

	Males				Females			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			1992-1994	1996-1998			1992-1994	1996-1998
	OLS	IV	IV	IV	OLS	IV	IV	IV
State Level Variables:								
Migration Rate in the State of Birth	0.01	0.40	1.05	0.21	2.45	2.10	1.92	0.27
	(0.01)	(0.29)	(0.49)	(0.14)	(1.38)	(1.30)	(0.57)	(0.17)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	12641	12641	5500	7162	3109	3109	1156	1945
R-Squared	0.089	0.089	0.111	0.088	0.174	0.174	0.317	0.122

Notes: t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 22-60 years of age working at least 35 hours per week. Dependent variable is the 1 plus the log of hours worked by paid employees. The regressions also include the following variables measuring individual owner and enterprise characteristics: years of schooling and its square; experience calculated as experience-age-6; age of the enterprise and its square; a dummy indicating the enterprise was started within the past 6 months, a dummy indicating the owner owns more than one enterprise, the number of children in the owners household between the ages of 0 and 5, 6 and 12, and 13 and 18, and the log *per capita* income in the owner's state of birth.

Table 8

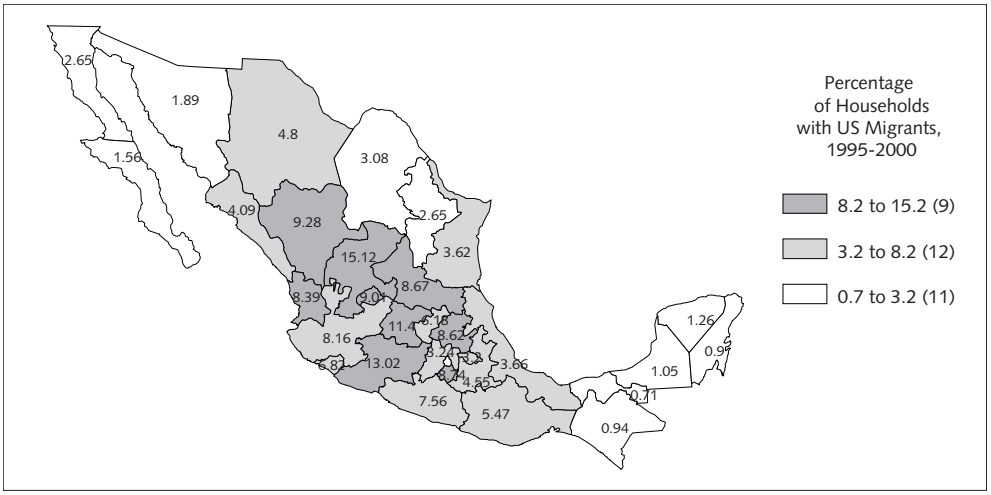
Regression Results
Hours Worked by Unpaid Employees

	Males				Females			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
			1992-1994	1996-1998			1992-1994	1996-1998
	OLS	IV	IV	IV	OLS	IV	IV	IV
State Level Variables:								
Migration Rate in the State of Birth	-0.88	-1.32	-0.51	-1.96	7.79	7.75	7.78	7.13
	(1.24)	(1.13)	(0.39)	(1.38)	(4.28)	(3.21)	(4.06)	(1.89)
State Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Number of Observations	12643	12643	5500	7164	3109	3109	1156	1945
R-Squared	0.156	0.156	0.127	0.175	0.110	0.110	0.141	0.139

Notes: t-values in parentheses. Standard errors are corrected for clustering at the state of birth level. Sample limited to owners 22-60 years of age working at least 35 hours per week. Dependent variable is the 1 plus the log of hours worked by unpaid employees. The regressions also include the following variables measuring individual owner and enterprise characteristics: years of schooling and its square; experience calculated as experience-age-6; age of the enterprise and its square; a dummy indicating the enterprise was started within the past 6 months, a dummy indicating the owner owns more than one enterprise, the number of children in the owners household between the ages of 0 and 5, 6 and 12, and 13 and 18, and the log *per capita* income in the owner's state of birth.

Figure 1

Migration Rate by State



Note: The rate for the Federal District is 2.05%.

Figure 2a

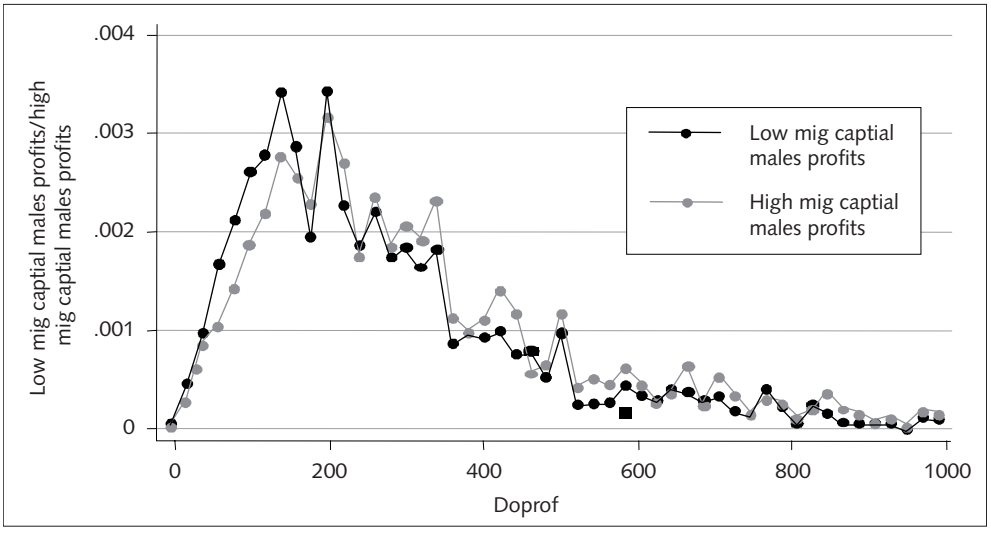


Figure 2b

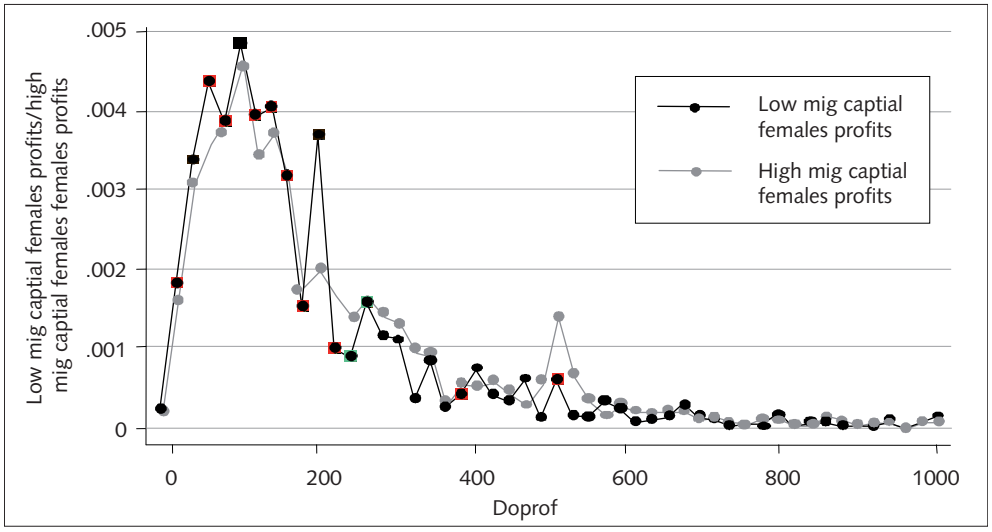


Figure 3a

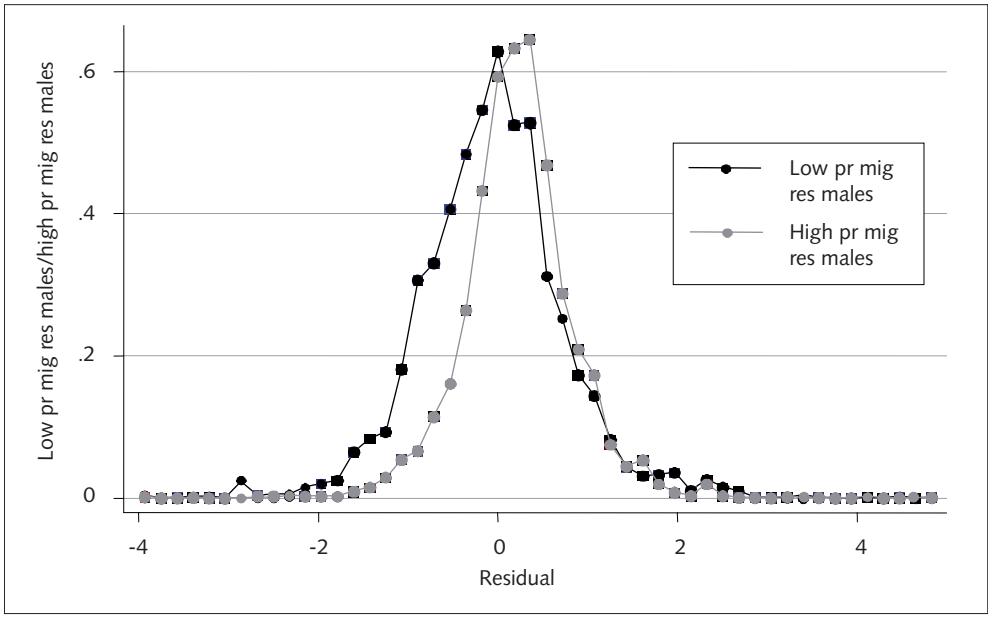
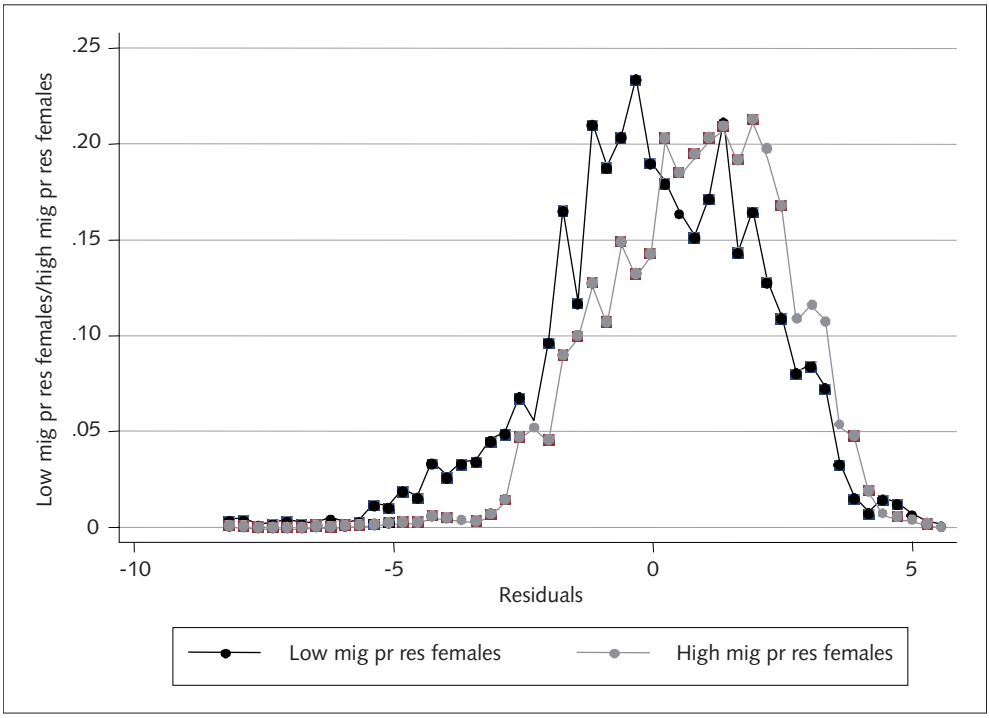


Figure 3b


.25
.20
.15
.10
.05
0
Low mig pr res females/high mig pr res females
-10
-5
0
5
Residuals
Low mig pr res females
High mig pr res females

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Leveraging Efforts on Remittances and Financial Intermediation

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Summary

This report seeks to analyze the efforts among financial institutions to leverage the relationship between financial intermediation and remittance transfers. The impact of family remittances has been highlighted in the literature as an important one for development. A development impact is one that addresses issues relating to the distribution of wealth and overall improvements in the quality of people's lives. More recently, policy recommendations have stressed the importance of linking remittances to financial intermediation as a strategy to harness the development impact of such earnings. This paper attempts to identify emergent trends in the remittance and finance world that potentially point to a deepening connection between remittances and development vis-à-vis *financial intermediation. It is a case study analysis of nine financial institutions, and focusing on three basic indicators: institutional ability to provide remittance transfers to its clients and community, to offer low cost remittance services, and to compliment transfer services with other financial services.*

I. Introduction

This report seeks to analyze the efforts among financial institutions to leverage the relationship between financial intermediation and remittance transfers. The impact of family remittances has been highlighted in the literature as an important one for development. A development impact is one that addresses issues relating to the distribution of wealth and overall improvements in the quality of people's lives. More recently, policy recommendations have stressed the importance of linking remittances to financial intermediation as a strategy to harness the development impact of such earnings. Financial intermediation of remittance flows, is argued, can provide both senders and recipients with access to asset building, which -as with education and health- is essential to achieving development (Orozco and Hamilton [2005]; Robinson [2004]).

In practical terms, the notion that financial intermediation of remittances can lead to development is rooted in the concept that money transferred through financial institutions paves the way for senders and recipients to gain access to other financial products and services, which they might not have otherwise. The provision of remittance transfer services gives banks a vehicle for reaching out to unbanked recipients -or recipients with limited financial intermediation- and an ensuing banking relationship potentially affords recipients the ability to establish credit histories, to take advantage of health and educational savings plans, among other investments. Intermediaries might even develop products and services that specifically cater to remittance senders and/or recipients, as will be demonstrated here.

Indeed, a recent cross-country analysis found that in countries with better developed financial intermediaries, the income earnings of the poor improve even more so than the non-poor, demonstrating that financial intermediaries play an important role in reducing income inequalities (Beck, Demirgüç-Kunt and Levine [2004]). Indeed, poverty and low development in Latin American are connected to low penetration and outreach of financial institutions. For example, roughly a third of Mexicans, 20% of Guatemalans and 10% of Nicaraguans have bank accounts. There are several reasons explaining the low penetration of financial intermediaries in Latin America, including lack of risk among financial institutions to work with the average citizen, mistrust of the banking system, limited knowledge of how banks function and of the asset building opportunities they can offer, and so on.

Although addressing the concerns related to market failures is beyond the scope of this paper, what is intended here is to highlight some current and ongoing efforts by financial institutions to insert themselves into the remittance transfer marketplace in receiving communities, and in doing so, augment the ranks of the banked in Latin America.

This paper attempts to identify emergent trends in the remittance and finance world that potentially point to a deepening connection between remittances and development *vis-à-vis* financial intermediation. Are banking and non-banking financial institutions participating in remittance transfers while offering other financial services to recipients? What is the magnitude of such a trend? Furthermore, to what extent and how is the international donor community involved in harnessing remittances for development?

This paper is a case study analysis of nine financial institutions, and focusing on three basic indicators: institutional ability to *provide remittance transfers* to its clients and community, to *offer low cost remittance services*, and to *complement transfer services with other financial services*. One important finding resulting from the analysis suggests that the scope of an institution's distribution -of remittance transfers and complimentary financial services- depends on its institutional resources and existing presence in a community. Moreover, when looking at low cost transaction costs, it seems that such is not a priority. However, to a certain degree most institutions do offer other financial services such as savings accounts, though the majority does not have a systematic strategy for marketing these financial products to recipients.

Section II of the paper looks at the range of policy issues that link remittances to development. Although this is not an exhaustive list, it highlights some of the most relevant aspects. The third and fourth sections analyse these nine institutions by looking at the indicators, which are outlined in the paper. This paper also reviews what the donor community is doing in this area. Many donors stress the importance of leveraging remittances for development; however, there are only a few institutions investing in this field.

The paper concludes that in order to improve the capacity of financial institutions to work in this field it is important to pay attention to technical assistance to small savings and credit institutions about strengthening their marketing and product design capacity.

II. Policy Issues on Remittances

Within the context of the changing dynamics and realities in Latin America and the Caribbean, there are important development alternatives to consider. Remittances[1] pose a very important financial stream in rural areas of Latin America. The Dominican Republic, El Salvador, Guatemala, Guyana, Haiti, Mexico and Nicaragua are all countries where at least one quarter of remittances goes to their rural areas. If adequately addressed, remittances can become a major form of foreign savings energizing an economy.

The financial activities of migrants in the form of remittances have a more complex impact than what is generally perceived. It is important to recognize, however, that while remittances primarily go to the poor, remittances alone are not a solution to the structural constraints of poverty. In many and perhaps most cases, remittances provide a temporary relief to a families' poverty, but seldom provide a permanent avenue into financial security. To do this, structural reforms regarding inequality in Latin America as well as specific policies for integration and financial democracy for sending and receiving homes are necessary (Orozco [2004a]). Thus, the various relationships that immigrant communities have with their home country demand strategies that have a direct impact on issues relating to reducing transaction costs, leveraging the capital potential of remittances through banking and financing, promoting tourism, nostalgic trade, and investment, and establishing a state policy that attends to a country's diasporas. A description of policy issue and opportunities are as follows:

Diaspora Outreach Policy

An outreach policy aimed at the community residing abroad is key to any migrant-sending country's economic strategy. This should be the first step in addressing the linkages with the immigrant community living abroad.

Cost Reduction

The transmission costs of remittance sending -fees incurred through the use of intermediaries- continue to be a significant concern to immigrants, development agencies, and other actors involved in the process. Sending money to home countries entails costs of between 4 and 10% of the funds sent. However, as options for reducing costs -such as the formation of strategic alliances between money transfer companies and banks, and between banks in Latin America and North America, and the use of debit card technologies- permit more direct transfers, money transmissions are becoming less expensive.

Banking the Unbanked

Many people in remittance-recipient societies lack access to the formal banking system: for example, in El Salvador, only two in ten have access to bank accounts. The effects of being unbanked include a higher susceptibility to greater transaction costs and the lack of the opportunity to establish credit records and obtain other benefits from financial institutions. Remittances are an alternative source of funding in the absence of banking systems and provide

capital to recipients for different forms of investment, insurance and precautionary savings. Micro-finance institutions and credit unions in remittance-recipient countries demonstrate the potential to respond to this growing demand for financial transactions.

Investment and Micro-enterprise Incentives

Studies have shown that, on average, around 10% of remittances received are saved and invested, and a percentage of people are in a position to use their money for an enterprising activity. Both private sector and development players can insert themselves as credit partners for these potential investors. The effect is the provision of credit, supported by remittances, in local communities that lack the presence of active markets and production networks. Tying remittances to micro-lending has a development potential to enable the enhancement of local markets.

Hometown Associations as Agents of Development

The philanthropic activities of Hometown Associations as Agents (HTAs) have a development potential. Some of the infrastructure and economic development work performed by these associations represents an opportunity for development agents to partner in local development. Governments can work with international organizations and HTAs to jointly figure income generation schemes for their local communities.

Tourism

Although a significant percentage of immigrants visit their home countries as tourists, there is still no tourism policy aimed at diasporas. The lack of such policy reflects not only Government neglect but also a lost opportunity. Governments and the private sector can participate in joint ventures to offer their diasporas tour packages to visit traditional and non-traditional sites to rediscover and discover their home countries. They can also work out investment alliances with diasporas interested in partnering to establish joint ventures relating to tourism.

Nostalgic Trade

There is a significant demand for nostalgic goods, and many of the small businesses created by diasporas rely on the importation of such goods. Governments, development agencies and the private sector, particularly local artisan businesses, find a natural opportunity to enhance their productive and marketing skills by locating their products with small ethnic businesses in North America, where a demand exists.

Some initiatives have been pursued in countries like Ecuador, El Salvador, Guatemala, Guyana, Jamaica and Mexico, either by governments or private organizations, and typically as a result of international collaboration between all the players involved. These examples demonstrate progress and success in innovative approaches to cross-marketing remittance transfer services with other financial products. Perhaps even more importantly, these initiatives lay the foundation for mechanisms that can be applied elsewhere, particularly in communities where such a range of financial alternatives has never before been available.

This report looks at a range of initiatives taking place as they relate to remittance transfer services. The lessons learned here were gathered through data analysis and interviews with key representatives of the organizations profiled. The selection of

institutions is based on a review of more than forty financial institutions in Latin America offering remittance transfers. The choice of these institutions focused on their size, location and interest in the remittance market.

III. Remittances and Financial Intermediation

In 2006, Latin America received more than US$ 60 billion in remittances from the US, Japan, Europe, Canada and Latin America itself. The transmission costs of remittance sending -fees incurred through the use of intermediaries- continue to be a significant concern to immigrants, development agencies, and other actors involved in the process. Sending money to home countries entails costs of between 4 and 10% of the funds sent (Orozco [2003]). However, as options for reducing costs -such as the formation of strategic alliances between money transfer companies and banks, and between banks in Latin America and North America, and the use of debit card technologies- permit more direct transfers, money transmissions are becoming less expensive. (Orozco [2006]).

Concurrent to concerns about high transfer costs is the fact that many people in remittance-recipient societies lack access to the formal banking system: For example, in El Salvador, only two in ten have access to bank accounts. The effects of being unbanked include a higher susceptibility to greater transaction costs and the lack of an opportunity to establish credit records and obtain other benefits from financial institutions. Remittances are an alternative source of funding in the absence of banking systems and provide capital to recipients for different forms of investment, insurance and precautionary savings (Table 1).

Because remittances intersect with financial intermediation micro-finance institutions, credit unions and banks in remittance-recipient countries have the potential to respond to the growing demand for financial transactions. In order to understand how financial intermediation can leverage the development role of remittances, it is important to look at basic indicators that demonstrate the relationship between remittances and financial intermediation. This paper identifies three basic indicators, namely: remittance market service coverage, the provision of competitively low cost remittance transfers, and the availability of financial services. These indicators are minimal, as there are other factors that should be taken into consideration in measuring the success of financial institutions at leveraging remittances for expanding financial intermediation. However, they are presented as a minimum criterion in the consideration of the intersection between remittances and finance.

A. Remittance market service coverage. The institution provides remittance transfer operations to its clients or members, as well as to the communities where its branches operate.

B. Low cost remittance transfer. The institution seeks to offer a competitive pricing product, making it attractive to sender and recipients. Simultaneously, lower transaction costs mean more money available to the migrant and remittance recipient households.

C. Accessible financial services. The institution markets, designs and provides recipients with an array of various product options, including savings, credit, insurance, pension funds.

The indicators were analyzed by looking at nine financial institutions, including banks, credit unions, microfinance institutions, and regulatory bodies. This preliminary analysis reveals that there are key factors which define the ability of financial institutions to leverage remittances, which include the institution's resources and its existing presence in the community. In other words, does the institution possess the necessary financial resources,

as well as knowledge of -and reputation in- the community that it serves, to facilitate its entry into the remittance transfer marketplace? Below is the list of institutions analyzed for this report. The list includes institutions in countries where there is large remittance presence, such as Mexico, Guatemala, El Salvador, and Ecuador, as well as Paraguay where intraregional flows are very important to the local Paraguayan economy. The list also includes other countries where financial institutions operate as remittance payers and are seeking to provide financial services, such as Haiti, Dominican Republic and Jamaica (Table 2).

Remittance Market Service Coverage

In terms of coverage, banks will typically partner with a remittance transfer service provider that is sufficiently well positioned in both the sending and receiving communities. *Banco Industrial* (BI) established an alliance with King Express, a US-based courier and money order company. One of Guatemala's largest private banks, BI acts as a complement to King Express by offering value-added services. Through the alliance, remitters can go to King Express to buy a money order, which will be immediately paid out to beneficiaries in Guatemala by presenting the document and a form of identification.

BI promotes the service by marketing the immediacy of the money order retrieval, the fact that an account with the bank is not a requirement and that it offers a better market exchange rate. Marketing strategies include direct mail, open advertising, raffles on occasions such as Christmas and Mother's Day, and participation in events in the communities where it has branches. King Express is responsible for marketing on the US side, where it utilizes its large database for direct mail marketing. King Express also has a close relationship with the community, participating in many social events at restaurants and clubs frequented by Latin Americans. It also puts on promotions at Guatemalan fraternities in cities with large populations like Chicago, Miami, New York and various parts of California.

Aside from these savvy marketing techniques, the mechanism itself is attractive to users in large part because of the widespread presence of both King Express outlets in the US and BI's national network of over 850 points of service (branches, kiosks, Automated Teller Machines-ATMs, etc.). A survey of 200 BI remittance recipient clients showed that the majority withdraws the money in urban areas and that 80% of recipients are women. Although the average withdrawn is US$ 250, 46% receive less than US$ 150 a month (Table 3).

The alliance with King Express for remittances has been very successful, with BI averaging 200,000 transactions per month and 90,000 of its affiliates using the service.

The National Savings and Financial Services Bank (*Banco del Ahorro Nacional y Servicios Financieros* - BANSEFI), is a program of the Mexican Government with the mandate to increase the financial products and services available to the Mexican population, particularly those Mexicans with low incomes. BANSEFI created a pool of popular banks, micro-finance institutions and credit unions to act as a remittance distributor. BANSEFI established arrangements with companies like GiroMex and Dolex and has extended its partnerships to Vigo, MoneyGram, *El Camino Transferencias*, Via America, and Moneyda. BANSEFI also works with US Bank and has plans to expand agreements to other community and national banks. In September 2004 the Federal Reserve Banks and the *Banco de México* announced two new developments in the FedACH International[SM] Mexico Service that will result in lower transaction costs for electronic payments sent to Mexico, and that will create a greatly expanded distribution channel in Mexico for bank transfers. The distribution network will be enhanced by the participation of BANSEFI, which will provide a greatly enlarged distribution channel in Mexico for making bank-to-bank account transfers from the US.

BANSEFI offers financial products and tries to give individuals a sense of financial culture. It is also working with other institutions to teach people about the benefits of using the account-to-account transfer system. Saving and Credit Institution's (SCI's) are beginning to play an active role in this market. Together with BANSEFI, 69 SCIs have created a commercial alliance called *L@Red de la Gente*. This alliance has enabled SCIs to participate in the distribution network of remittances through contracts negotiated by BANSEFI. Under this scheme the members of *L@Red de la Gente* are offering remittance transfer services in mostly low-income urban and rural areas that experience significant emigration to the US, and where the formal financial system has no coverage.

On the marketing side, the Mexican Foreign Ministry's Institute for Mexicans Living Abroad and BANSEFI invite banks like US Bank, Wells Fargo, Bank of America, HSBC and Citigroup to discuss remittance and other services with HTA leaders. Individual banks will then follow up with HTAs, invite them to the branch, let them observe their Spanish-speaking employees and make them feel comfortable. Word of mouth has been effective in the US and proved the best strategy in Mexico. In mid-March 2004, BANSEFI opened an office in the Mexican Consulate in Chicago as a pilot marketing program. The office distributes information about BANSEFI's remittances and other products.

Like BI and BANSEFI, *Banco Solidario* (BSol) has formed strategic alliances with international banks throughout Spain, Italy, Bolivia, Peru and soon the US, marketing its remittance transfer and other banking services under the name Andean Link (*Enlace Andino*). In Spain, BSol has alliances with six popular banks (*cajas*) and one commercial bank. BSol began working with its first bank, *Caja Murcia*, in the beginning of 2003, which is located in an area of high Ecuadorian concentration. In Spring 2003, it started more formal operations with *Caixa* and *Caja Madrid*, later reaching agreements with BanCaja, *Monte Caja de Huelva y Sevilla*, *Caixa Catalunya* and *Banco de Valencia*. In Italy, BSol recently began working with *Banca Popolare di Milano*, *Banca Sella and Banca Iccrea*. BSol's alliances with Spanish *cajas* and Italian *bancas* allow clients to access nearly 9,500 European outlets to send money.

Also forming part of BSol's multi-regional Andean Link is *Banco Solidario* in Bolivia with 34 outlets, and in Peru BSol has begun working with *MiBanco*. Meanwhile, BSol is receiving assistance from *ACCIÓN Internacional* to replicate its successful European model through an alliance with Citibank in the US. In Ecuador, BSol has created a network of 15 national cooperatives, which provides 110 locations at which clients can receive remittances. BSol focuses marketing on its distribution channels, although it also utilizes radio and television ads focusing on price and service. Word of mouth is also common there.

Banco Salvadoreño (BSal) on the other hand has essentially created its own international alliance by offering remittance products through its US affiliate, BancoSal Inc. In the bank's strategic plan devised in 2002, it determined that there is a major US niche and established reaching the compatriot segment as one of its priorities. At the bank level it began looking at how it could transport money for that segment as well as how the bank could benefit by placing other products in the market.

Through its *Salvadoreño Emprendedor* program, established in July 2003, beneficiaries open a savings account for funds sent directly from accounts opened at any of BancoSal Inc.'s now seven agencies in the US. Projected to reach eleven, these agencies are located in areas of high Salvadoran migrant concentration, including major cities in California, Nevada and Texas. Using their VISA Electron debit card, recipients in El Salvador can access funds any time through any one of the bank's 154 Automated Teller Machines (ATMs), and pays bills over the Internet, telephone

or at kiosks. In addition to radio spots, print media and television, the bank also participates in Salvadoran community events, where it distributes brochures and other promotional materials.

Despite its success, however, BSal faces aggressive competition with banks installing themselves in the US, among them *Banco de Comercio*, which has opened 17 agencies. To expand its reach, BSal intends to form alliances with other remittance transfer companies. The bank briefly offered King Express services, but is now pursuing other alternatives that can guarantee increased transactions for the institution and help BSal to expand its potential client base.

Several banks have adopted BSal, BSol and BANSEFI's dual approaches to remittances; that is, they design products to respond to both the needs of senders and recipients. Large banks in particular issue specially designed debit cards for sending and receiving remittances. On the US side, Wells Fargo and it's *Intercuenta* Express have had greater success than other major banks with remittance products, having placed branches in locations with highly diverse populations. Its marketing efforts have proven successful, according to officials for Cross-Border payments. They noted double-digit growth in revenues, transaction volume and planned acquisition growth.

Savings and credit cooperatives generally have more initiatives and outreach to remittance senders and recipients than typical banks, something that BANSEFI has leveraged through its *L@Red de la Gente* commercial alliance described above. In 1994, the Federation of Salvadoran Savings and Credit Cooperatives (*Federación de Asociaciones Cooperativas de Ahorro y Crédito de El Salvador de R.L.* - FEDECACES) initiated the IRnet system, which provides international wire transfers among credit unions, in alliance with the World Council of Credit Unions. This initiative originally faced limitations due to lack of resources. In particular, it required developing computer software that would allow for a more efficient money transfer system that could operate throughout their branches and member institutions. The Inter-American Development Bank (IDB), however, provided a line of support to address some of their limitations. As a result, the program has been able to attract clients into its money transfer system that encompasses 26 points of service in El Salvador, in addition to its central offices and the participation of 18 cooperatives.

Prior to this expansion, between January and September 2001, FEDECACES transferred US$ 483,068. Because of its newly expanded reach, remittance transactions in the last three years have grown significantly to represent 5% of market share (Figure 1).

FEDECACES' relationship with other financial institutions underscores arguments this report makes about best practices and the advantages of enabling environments that facilitate flows, customer empowerment, and related economic and social benefits.

In Guatemala, Salcajá has provided remittance transfer services since 2001 through VIGO, as a member of the National Federation of Savings and Credit Cooperatives (*Federación Nacional de Cooperativas de Ahorro y Crédito de Guatemala* - FENACOAC). FENACOAC, with its 28 member cooperatives and 104 branches, is now concluding negotiations for an alliance with MoneyGram.

In 2004, Salcajá averaged 1000 remittance transactions per month, processing over US$ 29.6 million for the year. These figures become especially significant considering Salcajá operates in relatively small rural communities in and surrounding Quetzaltenango and San Cristóbal Totonicapán in western Guatemala: 62% of the transfers are distributed in Totonicapán and 35% in Quetzaltenango. One interesting aspect is that 33% of recipients are existing members of Salcaja, 18% enrolled the cooperative after cashing the money through them, and 49% are only remittance customers (Pisabaj Flores interview).

El Comercio, a microfinance institution with nearly 30 years of experience in Paraguay's rural and agricultural sectors, just recently (August 2004) began offering remittance transfer services as one of only two authorized Western Union agents in the country. After four months, *El Comercio* has cleared 800 transactions (de Velilla interview).

Besides widespread coverage and 24 hour Spanish language customer assistance, another benefit of the Western Union alliance is that it provides *El Comercio* with access to market information and other remittances related data. However, *El Comercio* also conducts its own research, and recently completed a sample survey among 500 clients (7%), offering the institution a better glimpse into their target market and its growth potential. Nearly 19% of its clients are remittance recipients. More men (56.8%) than women (43.2%) receive remittances, and nearly a third receive their money from a sibling working abroad. Migrants mostly remit from either Spain (35%), the US (26%) or Argentina (15%). The majority of recipients (66.3%) are employed in the trade and services sectors. On average, half of the funds received are allocated to "family expenses" (consumption), followed by loan repayment (26%) and housing (12%).

Low Cost Remittance Transfer

It is hypothesized here that an institution's ability to offer competitively priced remittance transfers makes it an attractive service for senders and recipients. Simultaneously, lower transaction costs mean more money remains available to the migrant and remittance recipient households for investment in other financial products and services.

Low cost remittance transfers depend significantly on the nature of the agreement established between the financial institution and the money transfer company, and the money transfer company itself. Those institutions that work with more competitive companies will likely be able to offer a lower cost than others, which is the case with Fedecaces, Bansefi, and *Banco Solidario*.

Originally, FEDECACES would only transfer remittances from a US based credit union such as L.A. based *Comunidades*. In order to expand its service in the US, it then arranged to send money through three money transfer companies; Vigo International, Rapid Money, and Viamericas, all companies which charge lower prices than their business competitors. Competition enhanced through expansion places downward pressure on remittance transfer fees, and from 2002 to 2003, FEDECACES was able to slice its fees in half, from 8 to 4.1%. FEDECACES' remittance service tripled (Figure 1) from the moment in expanded its activities to include the money transfer companies.

Competing with FEDECACES's fees, BSal's ability to provide remittance transfers through its own US-based affiliate has allowed the bank to charge consistently competitive fees: 4.15% on average between 2001 and 2004, compared to the national average of 5.3%. Attractive fees, as well as efficiency and accessibility, have helped the bank capture a 12% share of El Salvador's remittance market. This figure is impressive considering that it relies on just seven branches to transfer an average of 100,000 transactions per branch a year.

Like BSal, BSol is able to offer virtually seamless transactions by enlisting clients into its "My Family, My Country, My Return" accounts. BSol transfer fees originating in Europe generally range between € 6-9, but are waived for account holders, which naturally presents a strong incentive to become a BSol client.

Wells Fargo's *Intercuenta* Express is another example of an account-to-account service allowing customers at Wells Fargo branches to pay US$ 8 to transfer up to US$ 3,000 directly into their beneficiary's BBVA-Bancomer account in Mexico.

Wells Fargo recently reduced the transfer fee by 20% and tripled the allowable transfer amount. Wells Fargo also offers *Dinero al Instante*, a cash-to-cash service initiated in spring of 2002 and based in California, Arizona and Texas, which for a US$ 10 fee, allows non-customers to wire money to Mexico.

As part of its Partnership for Prosperity program between the Mexican and US Government, BANSEFI disseminates information about the prices of US remittances. BANSEFI's *L@Red de la Gente* commercial alliance provides remittance transfers using MoneyGram, Vigo, US Bank, Giromex, Order Express, Moneyda, Viamericas, *El Camino*, Dolex and Enramex. Total costs are 5.4% of the transfer amount, which is equal to market cost.

While fees have decreased since BI began providing remittance transfers in late 2002, they remain nearly three quarters of a percentage point higher than the national average (Figure 2). Taking note of the lessons learned by institutions like FEDECACES about diversification, BI has commenced negotiations with at least two other remittance transfer companies. Increasing its alliances will certainly provide additional coverage at a more competitive price. Likewise, while slightly more competitive than BI, Salcajá's remittance transfer fees remain above market cost. Salcajá is also reaching out to form other alliances.

El Comercio charges on average 9.8% of the remittance amount. Compared with the other institutions in this report and in general, *El Comercio*'s remittance transfer fees are expensive. This can largely be attributed to a lack of formality and competition in Paraguay's remittance transfer marketplace for the Argentina-Paraguay corridor. The benefits of diversification are there to be had, similar to that experienced by FEDECACES, however *El Comercio* provides transfers through Western Union, a company that requires exclusivity.

Accessible Financial Services

In addition to money transfer services, key to the intersection between remittances and financial institutions is the ability to provide other services in the financial intermediation industry. A first step is to offer bank accounts, savings and checking. Moreover, providing credits, small or large, is another indication of the extent or depth of intermediation by these institutions leveraging remittances received. Some banks like *Banco Industrial, Solidario and Salvadoreño* have pursued a banking strategy. But small institutions like Salcajá or *El Comercio* have also sought to leverage remittance recipients income through other financial services.

When clients enter a BI branch in Guatemala to use remittance services, the bank offers its other financial services. The bank tends not to overwhelmed clients with many products at once, but instead takes a gradual approach. Savings accounts are usually the first product that remittance recipients select. The bank teaches the client how to manage the account and about the financial institution.

Banco Industrial also offers special promotions for opening accounts through gifts and raffles for prizes like home appliances. It has had satisfactory results in turning remittance clients into full bank clients, but it believes more can be accomplished. According to bank officials, 30% of clients who use remittances also hold a bank account (a recent survey among 200 remittance clients showed that 40% have a savings account, and 24% have a checking account, half of whom hold their accounts with BI). Advertising remittances, rather than other financial services, has proved a much more successful way to attract clients (Rivera interview).

BSal views family remittance recipients as potential clients for other services, such as insurance and certificates of deposit. Like BI's more personalized approach, BSal has discovered that the most effective cross-marketing tools are its branches' "*Señoras*

de Bienvenidas" (like hostesses) who demonstrate various products and instruct clients on how to use ATMs and kiosks. In marketing other bank services, BSal's goal is to convince remittance clients that opening an account is secure and that they can make withdrawals according to their necessity.

Besides the savings account used in electronic money transfers, the second most common product is the certificate of deposit. In its efforts to convert mere remittance recipients into bank account holders, BSal has managed to penetrate nearly 10% of this segment -or 17,000 remittance beneficiaries- second only to *Banco Agrícola* and significant considering nearly 50% of that market remains untapped (Figure 3).

Like BI and BSal, the BSol customer making a transfer is given preferential treatment with the mindset that the bank wants to establish a long-term relationship. The goal is to attend to relatives and create incentives for them to use the bank's services. BSol's main strategy has been to transnationalize its clientele with financial products designed for both remittance senders and recipients. As part of its Enlace Andina, BSol created a special account called "My Family, My Country, My Return", which offers clients bundled savings options. The segment most frequently uses credit lines, housing and home buying credits, savings accounts and insurance. Two hundred and fifty-three remittance recipients have bought homes through credit.

After less than two years of operating in the remittance transfer marketplace, BSol holds between five and eight percent market share, and expects to attain between 8 and 12% market share by the end of 2005. It's growth is evidenced in Table 4.

As part of its cross-marketing efforts, BSol will also soon be offering credit cards personalized for each cooperative and their corresponding associates within the national network. BSol's other banking products include the *Chauchera* smart card that allows clients to make transactions through the POS network used by pre-established providers. The product is for all clients but is commercially sold as a value-added for emigrants. And the bank offers small credit loans for urgent needs.

While a remittance transaction does not necessarily translate into the opening of a savings account, members of *L@ Red de la Gente* are encouraged to open savings accounts once their remittance has been paid. On average, BANSEFI by January 2005 had transferred 25,000 transactions a month, and opened accounts for 10% of the individuals who come in for remittance services, an improvement from 6% in 2003. *L@ Red de la Gente*, together with BANSEFI, has over 1,000 branches and will soon expand to more than 1,200 branches as more SCIs are integrated into the alliance.

Much of BANSEFI's success has to do with establishing trust with its clients. While the bank believes the number of account holder will grow, BANSEFI is not where it wants to be in terms of banking the remitting sector. The bank has also found that individuals still use traditional remittances because they are a proven method that works. The idea is to find out how to reach Hispanic populations in the US especially given the lack of market information available. BANSEFI's Mexican branches are located where people don't hold accounts. For the year that it has been involved in banking the unbanked via remittances, the bank has been successful, though it could be much more aggressive, especially with a larger budget.

Wells Fargo, Bank of America, Harris Bank and Wells Fargo are the largest banks involved in seeking ways to capitalize on money transfers as a way to increase their assets, by attracting immigrants to open deposit accounts (Orozco [2004a]). Each has either developed partnerships or made major acquisitions in Mexico, which have facilitated the roll-out of relatively competitive transfer services. Financial institutions catering to

immigrants focus on three areas: building relationships, addressing the specific preferences of this new customer base (expanding hours, hiring bilingual tellers, and opening branches near immigrants' residences) and developing new product and approaches. The end result is an increase of at least 500,000 new customers in banks and credit unions. That amounts to about 5% of the estimated eight million Latino immigrants who lack bank accounts.

Regarding to the essential business of building trust among clients, many banks find that their Hispanic clients want individual attention, which can be more time consuming. One bank representative estimated that the average new account takes 20 to 35 minutes to set up, whereas Hispanic customers were more likely to take an hour. Bank respondents consistently emphasized the need to establish trust with Hispanic customers. Wells Fargo's bundled service option, Gold Pack, includes *Intercuenta* Express, a checking account, discounted money orders, check-cashing, and insurance services, and is intended as a relationship-building product. Wells Fargo considers it a success but will continue adjusting it until the right mix of products is found that will sell the bank, rather than the product, in the consumer's mind.

Measuring the success of outreach efforts to attract new accounts is challenging. In part, banks are only beginning to track the presence of Hispanics in their institutions, and usually rely on surname lists to identify them, which is not always accurate. Wells Fargo reports that it has attracted 250,000 new accounts since offering *Intercuenta*.

Creating a more user-friendly environment and building trust among potential clients often comes more naturally to smaller-scale credit unions and microfinance institutions. To reach clients, Salcajá has take advantage of social capital networks, using word of mouth, and ensures that its branch tellers and representatives are well informed and capable of transmitting information about the remittance services it offers, as well as other products available to recipients. Meanwhile, the institution is formalizing a cross-marketing strategy, and plans are underway to install at least one client-service window at each branch dedicated solely to attending remittance recipients. The goal is to expand Salcajá's current base of nearly 15,000 clients by offering recipients other specialized financial services, including: pension funds, life insurance, medical insurance, small business credit, home equity funds, and various savings packages.

Because of its social orientation, Salcajá is also heavily focused on education, particularly that of youngsters and pre-teens who are the most susceptible to viewing migration as the only means to advancement. In addition to providing academic scholarships, the institution has designed products such as the Infant/Youth Savings Plan (*Plan de Ahorro Infantil/Juvenil*), which encourages parents to invest in their children's schooling over the long-term. Salcajá currently averages 1000 remittance transactions per month, and remittance recipients represent nearly half of their clientele.

Approximately 25% of remittance recipients who choose FEDECACES to receive their remittance are also FEDECACES clients. To determine how best to tap the other 75% potential client base, FEDECACES commissioned a needs assessment with financial support from the IDB. Among other things, the exercise revealed that many recipients do not understand what it means to hold a savings account, having never been offered this type of financial alternative. FEDECACES intends to share these findings with other cooperatives operating in El Salvador, in the hopes that jointly they can work towards fostering a more pervasive savings culture among remittance recipients.

FEDECACES is significant because, like Salcajá, it is an alternative savings and credit institution with a commitment to work with low-income households as well as to operate in

rural areas. This latter point is very important considering that forty percent of remittances go to rural areas where the existence of commercial banks is very limited, especially outside the main departmental cities. Institutions like FEDECACES and other microfinance operations have offices and branches in many areas neglected by the larger banks (Mena interview).

In Mexico, one successful microbank operates in the Mixteca region in Oaxaca, *Xuu Ñuu Ndavi* (Money of the Poor People). The residents in this indigenous town have relatives living abroad and remitting money home. Of the US$ 170,000 received in remittances after the first year of operation, the microbank's 168 members (83 of whom are women) accumulated US$ 160,000 in savings. The experience of this bank demonstrated that remittance-receiving households have a propensity to save, and to do so in financial institutions, in this case, microfinance banks. Key to the success of this and similar microbanks is their level of trust with the local population.

El Comercio is also designing financial products to be cross-sold with remittance transfers. *El Comercio* currently works with 7000 clients. Besides a range of micro-credit options ranging from micro-enterprise to credit cards and housing loans, *El Comercio* also offers a range of savings accounts. To this end, *El Comercio* has plans to conduct a more detailed market study and is seeking technical assistance for institutional capacity building in order to fully implement remittance relevant product offerings and launch corresponding marketing campaigns. One key issue however is that 40% of those already those receiving remittances have savings programs, and a majority also has a demand of personal loans.

IV. Remittances and Financial Institutions: on the Way to Financial Intermediation?

Looking at the performance of these institutions in relationship to the indicators addressed, some issues are identified. First, transfer costs are not necessarily a critical factor in the ability of institutions to attract remittance recipients as clients. Second, the institutional strength of a business helps determine their distribution capacity. Third, targeting remittance recipients in the provision of financial products and services appears to depend more on the institution's initiative rather than its institutional resources.

Most institutions offer a competitive transfer cost when compared nationally with other providers, however, their costs are mostly close to the national averages. What does matter, however, is the institution's ability to secure as many contracts with money transfer companies as possible, as this becomes a mechanism for providing client -as well as potential-client- remittance recipients a wider range of transfer options, securing the institution a more competitive position in the remittance transfer marketplace. Here a disadvantage lies in that smaller cooperatives and microfinance institutions are not as capable as the larger banks at penetrating the remittance transfer marketplace due to less bargaining power to negotiate agreements with large money transfer companies.

The transformation of remittance recipients into account holders continues to be challenging. However, looking at these institutions, large or small, shows that about one fifth of recipients have also become bank clients (Table 5). One reason relates to the level of trust cultivated by the institution, and/or the ability of the institution to transnationalize its cross-selling tools (this is particularly the case of BANSEFI and BanSal). However, while BSal's success in the placement of its own agencies in migrant sending communities may be well beyond the scope of smaller institutions, it is worth noting that an alliance seeking strategy such as BSol's can be scaled down and replicated at their level.

Meanwhile, it is the more intimate contact with clients and their communities that afford the smaller operations a great deal of social capital to be leveraged and penetrated with uniquely tailored financial products that should be highly attractive when cross-marketed with remittance transfer services. Salcajá is a prime example, and the larger institutions do well by adopting this approach through community outreach and socially oriented product offerings, such as BANSEFI. Moreover, investing the time and resources into analyses of existing and potential clients, particularly those who receive remittances, provides a wealth of information to any institution regardless of size. *El Comercio* and FEDECACES have indisputably benefited from such exercises. Table 6 maps out each institution profiled, highlighting the strengths and weaknesses of their best practices initiatives, in the context of the aforementioned indicators.

V. Donor Activities and Practices

Discussions on leveraging remittances for development have reached many in the donor community. In the case of Latin America, a range of donor institutions are seeking ways in which to mobilize these funds as savings, or that are already working on different aspects related to leveraging these funds -including *vis-à-vis* financial intermediation- for development. Here, we provide a description of what some institutions are doing in various parts of Latin America and the Caribbean. Broadly, these donors are only in the earlier stages of working on this field. Four institutions combined have invested nearly US$ 50 million in grants to leverage remittances development role. The IDB is the only institution that has gradually systematized its work. Yet, it is important to identify all possible lessons learned from the projects funded.

The Multilateral Investment Fund of the Inter-American Development Bank

One of the pioneering institutions in addressing the link between remittances and development has been the Multilateral Investment Fund (MIF) of the Inter-American Development Bank. The MIF has addressed the issue from a research, advocacy and operational perspective. Since 1999, the MIF engaged in a series of discussions and studies about the impact of remittances in Latin America and the policy problem posed by high transaction costs. As its research and public discussion ensued, the Fund moved one step forward by taking the initiative to fund projects aimed at modernizing a financial infrastructure that could attract money transfers at lower cost, while addressing the financial needs of unbanked remittance receiving households.

To that effect the MIF has funded over 20 million dollars in projects in several countries in Latin America (Brazil, Colombia, Dominican Republic, Ecuador, El Salvador, Mexico, Nicaragua), many of which go to microfinance institutions or alternative savings and credit institutions. Table 7, identifies some of the more known projects funded and related to remittance transfers.

Some of the success cases identified above, such as that of BANSEFI in Mexico, FEDECACES in El Salvador, and *Banco Solidario* in Ecuador, have been related to projects funded by the MIF in those institutions. The end result has been an accumulated knowledge of activities and issues linked to operations currently underway.

More recently, the Fund has decided to engage in partnerships with other donors and institutions. For example, it now has an alliance with the International

Fund for Agricultural Development (IFAD) of the United Nations. In April 2004, the two institutions announced the creation of a 7.6 million dollar fund aimed at funding remittance related projects that addressed microfinance and investment. Under this agreement, to which MIF provided US$ 4 million local counterpart organizations, such as microfinance institutions and credit unions, are expected to commit US$ 1.6 million to the projects they propose (IDB-MIF [2006a]).

The United States Agency for International Development

The United States Agency for International Development (USAID) has followed the issue of remittances since 2000, considering it an area of attention within its programmatic plans. Some missions have decided to participate in some projects linking with micro-finance, banking and hometown associations. The following section highlights USAID's work in Mexico, and Jamaica as well as the work of USAID's Global Development Alliance, a recently created unit within the agency.

In 2002 the Latin American regional office of USAID, began a pilot program on remittances focusing mostly on Mexico. USAID initiated four specific programs related either to the financial aspects of remittances. Their efforts pertaining to financial activity deal with expanding the financial services accessible to recipients of personal remittances. In September 2002, USAID gave a US$ 500,000 grant to the World Council of Credit Unions, Inc. (WOCCU) to amend an ongoing project with *Caja Popular Mexicana* to help the latter connect to WOCCU's remittance services and market related services to recipients. In September 2002 USAID granted US$ 166,000 to *Acción Internacional* for their research examining the links between microfinance and remittances in order to gauge the interest of microfinance institutions in becoming involved in the service.

USAID has planed future projects that will include partnerships with microfinance organizations, cooperatives and banks in order to extend banking services to the low-income sectors in the countries and communities where the agency is engaged. The agency will provide US$ 900,000 annually from 2004-2008 aimed at improving financial services to low income remittance senders and receivers. While USAID's projects related to remittances are still in the early phases and the traditional results from development projects are not yet available, preliminary indications appear promising. The program linking WOCCU to *Caja Popular Mexicana* processed US$ 9 million in transactions from its launch August to December 2003.

USAID is also working on a number of economic growth issues in Jamaica, with a particular focus on improving the business environment. One aspect of this effort focuses on access to financing through microenterprise and remittance programs. In November 2003 USAID entered into an agreement with the Jamaica National Building Society (JNBS), one of the country's remittance companies. Through the program with USAID, JNBS introduced smart card technology to reduce the cost of money transfers and create greater accessibility to funds. After eighteen months of work 21% of remittance recipients were withdrawing their money with debit cards.

Moreover, JNBS leveraged the savings created from the implementation of the smart card into development work. The building society participated with USAID in acquiring computers from US companies and donating them to different schools in Jamaica. JNBS helped pay for the costs in Jamaica of setting up computer connections and possible training in the technology.

The Global Development Alliance

GDA is the section of USAID dedicated to forging public-private alliances with between Governments, businesses and civil society. To date, GDA has not allocated a significant amount of resources into remittance and development programs, leaving that up to the various USAID missions. However, over the past year GDA has become involved in the area by partnering with the Foundation for International Community Assistance (FINCA) and Hewlett Packard separately to develop new technology, such debit cards, to lower transaction costs of remittances. In late January of 2004, GDA announced a US$ 600,000 grant to expand a public-private alliance with VISA and FINCA towards electronic microfinance. The program will take place over five phases, beginning in Central America, and provide a business model that VISA and USAID will customize for other nations.

GDA's primary foci are: (1) increasing market driven alternatives to large wire transfer companies such as Western Union and Money Gram; (2) strengthening the capacity building of HTAs and broker groups; and (3) developing alternate technology to reduce transaction costs of remittances. GDA provided an estimated US$ 1 million in funds over the past year for such activities. According to the personnel interviewed for this study, the fact that there is no single person dealing with the remittances and development issue within the GDA constitutes a significant barrier for the agency.

Ford Foundation

The Ford Foundation has a number of different programs, many of which focus on microfinance and access to financial services for poor people. The foundation began making grants to broader projects dealing with remittances in 2002. The foundation's focus is on family and individual remittances, rather than collective (HTA) remittances. It is interested in programs that allow individuals to build financial assets and let financial institutions become intermediaries in rural communities. The Ford Foundation has 10 migration and development programs with remittance components totaling an estimated US$ 700,000 in grants. It typically spends a few hundred thousand or more annually on such projects.

Recipients of the Ford Foundation's funding include the Mexican Association of Social Sector Credit Unions (*Asociación Mexicana de Uniones de Crédito del Sector Social* - AMUCSS), the California Credit Union League and UCLA's North American Integration and Development Center's effort to incorporate immigrants in Santa Maria, California into credit unions to access financial services and find a means to send back money to the town of Santa Cruz, Mixtepec through a microbank. As another part of the program, the groups worked with HTAs to connect people to financial services in California.

The foundation has worked with microfinance networks at the regional, Mexican and Central American level. The Ford Foundation made a US$ 235,000 grant to the Interdisciplinary Group on Women, Work and Poverty to support 35 student fellowships at Mexican universities to research how poor women use remittance income to improve their livelihoods and welfare of their families. The foundation has granted US$ 60,000 to the organization *Alianza para el Desarrollo de Microempresas* (ALPIMED), which has done significant work on remittance transfers.

The Ford Foundation's future plans will focus on the relationship between remittances and microfinance institutions. The foundation is interested in promoting efforts that will shed light on how microfinance institutions can effectively deal with remittance flows. Once particular area of concern for the Ford Foundation is to determine how remittance activity will relate both technically and legally with unregulated microfinance institutions.

International Fund for Agricultural Development

Another case where institutional relationships and partnerships have occurred between the International Fund for Agricultural Development (IFAD) of the United Nations, and other players. In the area of remittances, IFAD, together with the MIF of the IDB, recently created a program to support binational rural development projects in remittance receiving communities. The program, which is headquartered at the Inter-American Dialogue, supports funding in three areas: knowledge development for community-based organizations and rural development, development of rural financial services, and development of rural productive investment. Eligible institutions include NGOs, immigrant philanthropic groups working to support their home communities, as well as savings and credit institutions (Table 8).[2]

Other Initiatives

This paper focuses primarily on efforts at financial intermediation among remittance recipients, while remittance senders represent another, yet equally important, side of the equation. The Federal Deposit Insurance Corporation (FDIC) and the Consulate General of Mexico launched The New Alliance Task Force (NATF) in May 2003. The initiative is comprised of a coalition of over 30 banks, 25 community based organizations, and government agencies all striving to provide immigrants with necessary financial and education and support services to access the US banking system. The NATF is made up of four working groups: Financial Education, Mortgage Products, Bank Products and Services, and Social Projects.

Prior to the launch, the Mexican Consulate had been promoting how the *Matrícula Consular* could be used to promote banking services. This coincided with the FDIC's conclusion that immigrants' primarily challenge to entering the banking system is obtaining the proper from of identification. The FDIC began presenting the *Matrícula* as an alternative and engaged in a two-year educational process with banks. Currently 118 banks nationwide accept both the *Matrícula* and the Individual Taxpayer Identification Number (ITIN) as alternative forms of identification to open bank accounts. Eighty-six of such banks are located in the Midwest. Over 20 banks in the Midwest offer bank products with remittance features.

The Task Force holds quarterly meetings in Chicago to take an inventory of who is doing what, share best practices, and report on new laws. Each of the working groups meets regularly. The Financial Education Working Group employs the FDIC's Money Smart financial curriculum to help adults outside the financial mainstream improve their money skills and creating positive banking relationships. The program is offered in Spanish and three other languages. Future classes will be held on topics such as homebuyer information, predatory lending, taxpayer education, and use of alternative forms of identification, among others. Eighteen organizations including banks, non-profits, and others would be involved. Banks, such as Bank of America, have donated ATMs for in-class simulation purposes.

The Mortgage Products Working Group helps banks develop loan programs for immigrants that can be held in the bank's portfolio, as well as be sold on the secondary market. The Task Force has created a model loan product called the New Alliance Model Loan Product (NAMLP). It is intended for use by potential homeowners who pay taxes using an ITIN. The NAMLP is based on developed unconventional mortgage programs to help immigrants qualify for existing home loan programs created by Second Federal Savings and Loan Association in Chicago and Mitchell Bank in Milwaukee.

One of the highlights of the Bank Product and Services Working Group was the December 10, 2003 conference held at the Mexican Consulate in Chicago. Thirty national, regional and community banks gathered for a showcasing of current and future remittance products. Bank of America, North Shore Bank, Mitchell Bank and Fifth Third Bank featured their four different remittance products with four different features. These programs demonstrated that such products are needed by the community as well as are a means to involve the 30 "unbanked". The business case for banking the "unbanked" has been successful and there is real interest in the economics of the issue. The Task Force has also been successful in receiving input from community organizations. While the profits do not necessarily come from accounts for remittance senders, banks are looking to the long term. They want clients to enter the system and then cross over into other products like credit cards, auto loans, small business loans, etc., where the profits lie. There is a tremendous loyalty in the immigrant market, once you get individuals into the system, they are unlikely to leave and that they usually bring in another 10-15 people.

In its December 10, 2003 press release the Mexican Consulate highlighted the promising preliminary results of NATF. So far, more than US$ 100 million in deposits have been invested in financial institutions that accept the Mexican *Matrícula*. Official reports from over 30 banks that operate in the Midwest indicate that over 50,000 new bank accounts had been opened in the Midwest by December 2003 by formerly "unbanked" customers, with an average balance of US$ 2000. The Task Force estimates that new accounts represent over US$ 100 million in deposits. As of December 2003, over 35,000 immigrants in the Midwest have participated in education classes or workshops using the FDIC's Smart Money curriculum and similar financial education programs. In the 2002 tax filing season, almost 7,500 immigrant working families were served in Chicago area free tax preparation sites, with EITC refunds of US$ 9.3 million, saving immigrants US$ 750,000 in preparation fees.

According to FDIC personnel interviewed, mortgage loans will be of major interest to banks. Banking the unbanked has been a three stage process, beginning with (1) learning about the *Matrícula Consular* and learning regulators views; (2) offering remittance features to bring in clients; and (3) offering mortgage loans. Some banks are providing mortgage loans using ITIN numbers -six in the Milwaukee and Chicago area-. To date, 15 of the 35 NATF-member banks offer mortgage products that utilize ITIN numbers, totaling 659 loans -approx US$ 93 million in originations-. The Wisconsin Housing & Economic Development Authority (a NATF member) purchases these loans in the secondary market from local banks in Milwaukee, WI.

The FDIC has now expanded the program throughout the Midwest, California (Los Angeles), Texas (Austin), Iowa and Georgia (Atlanta), New York and Boston and has formed working groups in these areas.

Notes

[1] Our understanding of remittances refers to the sending of migrant worker earnings to families. It does exclude any notion of "collective" flows, or immigrant capital investment.

[2] FAD has also worked in other areas of funding to hometown associations, a topic outside the analysis of this report.

Table 1

People with Bank Accounts
Remittance Recipients and Non-recipients

Country	Dom. Rep.	Jamaica	Colombia	Ecuador	Bolivia
Recipient	66%	65%	52%	46%	44%
Non-recipient	58%	60%	45%	34%	35%

Country	Guatemala	Peru	Honduras	El Salvador	Mexico	Nicaragua
Recipient	41%	37%	34%	31%	29%	10%
Non-recipient	17%	35%	16%	19%	28%	10%

Source: *Receptores de Remesas en México* (October, 2003); *Receptores de Remesas en Guatemala, El Salvador y Honduras* (September, 2003); *Receptores de Remesas en Ecuador* (May, 2003). Washington, DC: MIF-IDB. *Receptores de remesas en República Dominicana* (September, 2004); *Receptores de Remesas en Bolivia, Perú* (September, 2005).

Table 2

Banks, Credit Unions and Microfinance Institutions Offering Remittances

Institution	Country	Type
Banco Industrial (BI)	Guatemala	Commercial bank
Cooperativa de Ahorro y Crédito Salcajá	Guatemala	Credit Union
Banco Salvadoreño (BSal)	El Salvador	Commercial bank
Federation of Salvadoran Savings and Credit Cooperative (FEDECACES)	El Salvador	Credit Union
Banco Solidario (BSol)	Ecuador	Transformed MFI
National Savings and Financial Services Bank (BANSEFI)	Mexico	State bank
Oaxaca Bank	Mexico	Microbank
Wells Fargo	Mexico	Commercial bank
Financiera El Comercio	Paraguay	MFI

Source: Information compiled by author through interviews with institutions.

Table 3

REMITTANCE RECEIVED BY CUSTOMERS OF BANCO INDUSTRIAL

Amount	Percentage of customers	Amount	Percentage of customers
Less than US$ 50	3.5	US$ 151 to US$ 200	19.0
US$ 51 to US$ 100	35.0	US$ 201 to US$ 250	3.5
US$ 101 to US$ 150	8.0	US$ 251 to US$ 300	12.0
		Over US$ 300	19.0

Source: Orozco, Manuel. Survey commissioned to *Borge & Asociados*, 2004.

Table 4

BANCO SOLIDARIO REMITTANCE TRANSFERS AND BANKING INFORMATION
2002-2004

Year	Transfers	Volume	Accounts	Credits		
2002	1,800	US$ 6,000,000	270	US$ 150,000	50	US$ 70,000
2003	14,000	US$ 23,000,000	860	US$ 670,000	230	US$ 525,000
2004	60,000	US$ 50,000,000	4,000	US$ 3,500,000	1,700	US$ 4,000,000

Source: *Banco Solidario* officials' interview, January 2004 & 2005.

Table 5

TRANSFER VOLUME, NUMBER OF ACCOUNT HOLDER AND BRANCHES BY INSTITUTION

	Transfer cost (company / market average)	Volume of transfers per month	Number of remittance recipients that are clients	Total number of clients	Number of branches
FEDECACES	3.9% / 4.2%	17,500	4,375	90,000	26
Banco Salvadoreño (BSal)	3.9% / 4.2%	58,000	17,000	n/a	110
Salcajá	6.1% / 5.8%	1,000	7,650	15,000	3
El Comercio	9.8% / 8.7%	200	1,330	7,000	11
Banco Industrial (BI)	6.5% / 5.8%	200,000	150,000	500,000	Over 250
Banco Solidario (BSol)	0% /	12,000	4,000	91,600	32
BANSEFI	5.4% / 5.4%	25,000	2,500	500,000	550
Wells Fargo	5.4% / 5.4%	70,000	250,000	Over 1 million	Over 3000

Source: Orozco, Manuel. Survey commissioned to *Borge & Asociados*, 2004; Institutional interviews, January 2004-2005.

Table 6

EXTENT OF FINANCIAL OUTREACH BY INSTITUTIONS

Institution	Coverage	Cost	Financial Services
Banco Industrial (Guatemala)	- Participation in community events - Widespread nation-wide presence - Strong marketing through alliance	- Above market cost (King Express) - Expanding its alliances	- Cross-markets remittances with other products - "Little-by-little" approach, starting with savings accounts - Promotions and gift incentives
Salcajá (Guatemala)	- Operates in rural areas, some without other financial alternative - Knowledgeable representatives promote services and facilitate access	- Above market cost (Vigo) - Expanding its alliances	- Designing complementary products & cross-selling tools - Preferential treatment of remittance recipients - Strong focus on educational savings plans
Banco Salvadoreño (El Salvador)	- Its own agencies placed in highly concentrated migrant communities. - Sophisticated marketing campaigns. - Widespread nation-wide presence. - Knowledgeable representatives promote services and facilitate access.	- Competitive fees, below market cost (BancoSal). - Installing more US based agencies. - Expanding its alliances.	- Transnational bank accounts. - Cross-markets remittances with other products.
FEDECACES (El Salvador)	- Member of IRnet. - Operates in rural areas. - Collaboration with other cooperatives to foment "savings culture".	- Competitive fees, below market cost (IRnet, Vigo, Rapid Money, Viamericas, etc.).	- Cross-markets remittances with other products. - Commissioned needs assessment. - Promotions and gift incentives.
Banco Solidario (Ecuador)	- Strong global alliances with well established banks, marketed under one recognizable name (*Enlace Andino*). - Expansion into neighboring countries. - Widespread nation-wide presence. - Credit cards customized to cooperatives.	- Fees waived for account holders - Expanding alliances.	- Transnational bank accounts. - Cross-markets remittances with other products. - Preferential treatment of remittance recipients.

Table 6 (continued)

Extent of Financial Outreach by Institutions			
Institution	Coverage	Cost	Financial Services
BANSEFI (Mexico)	- Strong network with widespread nation-wide presence, especially in rural areas. - Educational campaigns targeted at diaspora.	- Competitive fees, below market cost (Vigo, Money Gram, *El Camino* Transferencias, Via America, Moneyda, etc.). - FedACH International Mexico Service. - *L@ Red de la Gente*.	- Bank-to-bank account transfers. - Cross-markets remittances with other products.
Oaxaca Microbank (Mexico)	- Knowledgeable of local rural population in which it operates.	- High level of trust.	- Cross-markets remittances with savings.
Wells Fargo (US-Mexico)	- Widespread and well-placed global presence. - Bundled services designed as "relationship building" products.	- Competitive fees, below market cost.	- Transnational account-to-account service through *Intercuenta* Express. - Cross-markets remittances with other products. - Specialized attention, focused on building trust.
El Comercio (Paraguay)	- Operates in rural areas. - Widespread remittance transfer company presence.	- Expensive fees, (Western Union).	- Designing complementary products & cross-selling tools. - Commissioned needs assessment.

Source: Data elaborated by author.

Table 7

PROJECTS FUNDED BY THE MULTILATERAL INVESTMENT FUND
2005-2006

Project	Country	Amount (US$)
Promoting Financial Democracy by Supporting *FEDECREDITO*	El Salvador	3,339,000
Create a Housing Finance Market for Transnational Families	El Salvador	5,250,000
Development of Services to Improve Remittances Access and Management	Bolivia	291,610
Remittances and Training for Brazilian Migrants and their Beneficiaries	Brazil	470,000
Analysis of the Portugal/Brazil Remittances Market	Brazil	47,350
Remittances and Rural Development in the Dominican Republic	Dominican Republic	321,500
Remittances and Rural Development in El Salvador	El Salvador	366,000
"More than Remittances"	Guatemala	198,000
Social-Cultural Financial Services Adaptation	Guatemala	103,662
Enhance Development Impact of Workers' Remittances	Guatemala	5,200,000
Enhancement of the Remittances Services to and within Rural Haiti	Haiti	260,000
Support for the Economic Development of *La Piedad-Michoacan*	Mexico	32,000
Pilot Project 3x1 for Migrants	Mexico	7,000,000
Direct Savings by Mexicans Living in USA toward Purchase of Housing in Mexico	Mexico	5,250,000
International Migration, Remittances and Impact on Rural Communities in Zacatecas	Mexico	55,000
Facilitation of Access to Housing Finance for Recipients of Remittances	Mexico	1,700,000
Bringing Unbanked Remittance Recipients into Formal Financial System	Paraguay	222,000
Remittances Valuation of Peruvian Immigrants in Italy	Peru	49,000
Voluntary Return Migration Model Based on Entrepreneurship Development	Regional	3,975,000
Application of General Principles for Remittance Markets	Regional	1,759,300
Immigrant Remittance Corridors	Regional	167,500
Support for MIF Office	Regional	13,400
Improving Central Bank Remittance Reporting and Procedures	Regional	1,306,884
Total		*37,377,206*

Source: IDB-MIF 2006b.

Table 8

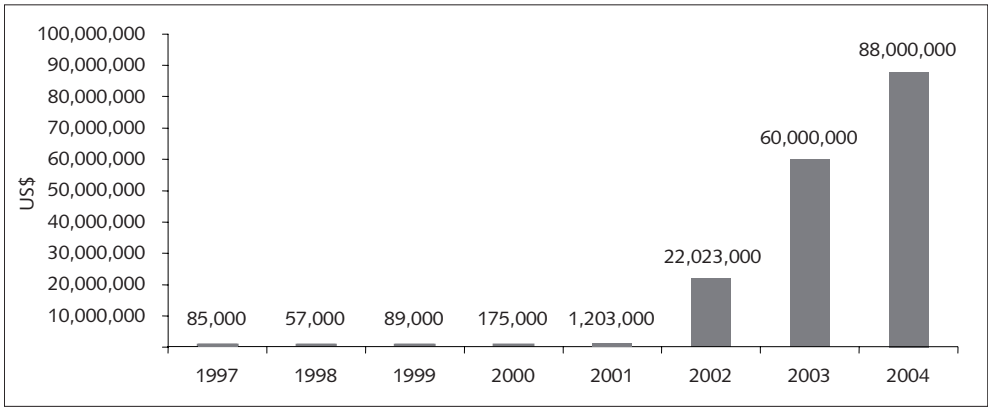
Investment on Remittance Related Projects
by International Donors in Latin America and Caribbean

Donor	Aggregate Investment 00-05 (US$)
IDB	68,417,616*
USAID	10,000,000
Ford Foundation	700,000
IFAD	1,000,000
Rockefeller	200,000

Note: *Aggregate Investment 2001-2006.
Source: Information compiled by the author through interviews with institutions.

Figure 1

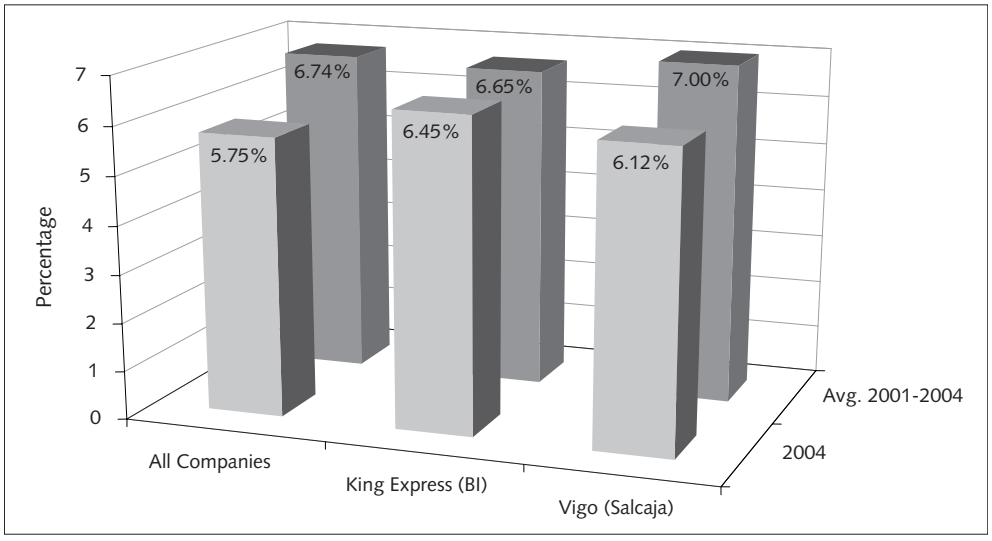
REMITTANCE TRANSFERS BY FEDECACES



Source: FEDECACES officials' interview, January 2004 & 2005.

Figure 2

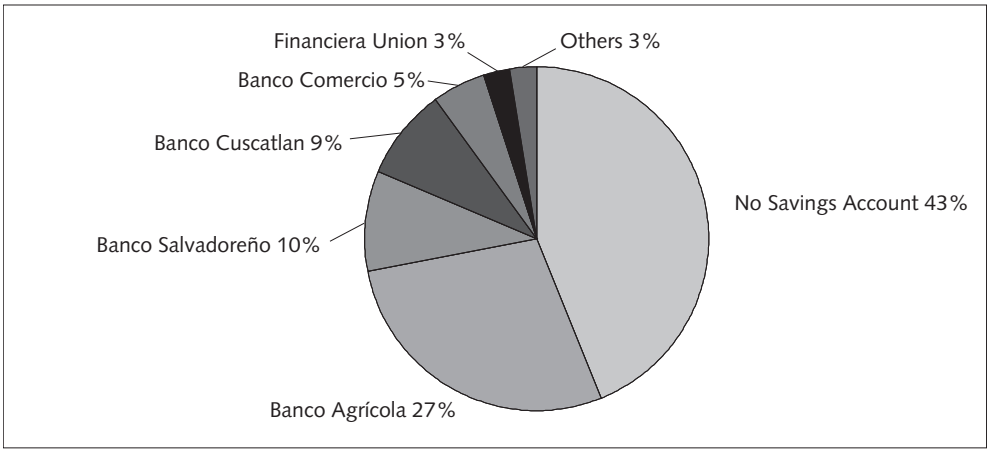
TRANSFER FEES IN GUATEMALA
As a Percentage of Total Amount Remitted



Source: Pricing data compiled by Manuel Orozco.

Figure 3

INSTITUTIONS WHERE REMITTANCE RECIPIENTS HOLD SAVING ACCOUNTS IN EL SALVADOR



Source: Orozco, Manuel. Survey commissioned to *Borge & Asociados*, 2004.

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Frias, Michael. Community Affairs Director. FDIC.

Islas Torres, Alberto. *Director de Coordinación Técnica. BANSEFI, México.*

Jimenez Muñoz, Efraín. Executive Projects Director. *Federación de Clubes Zacatecanos del Sur de California.*

Mena de Morán, Bertha Silvia. *Gerente de Negocios y Administración. FEDECACES, El Salvador.*

Myhre, David Myhre. Project Officer for Development Finance and Economic. The Ford Foundation.

Peñafiel, Juan Carlos. *Jefe de Productos Emigrantes. Banco Solidario, Ecuador.*

Pisabaj Flores, G. Rumaldo. General Manager. *Salcajá, Guatemala.*

Pyle, Kay. Representative for El Salvador. Inter-American Foundation.

Rivera, Juan Bernardo. *Banco Industrial, Guatemala.*

Rosekrans, Kristen. Education Team Leader. *USAID El Salvador*.

Runde, Daniel. Outreach and Development Manager. USAID GDA.

Security. Ford Foundation, Mexico.

Smith, Jeremy. Development Finance Director. USAID Mexico.

Terry, Donald. Multilateral Investment Fund. Inter-American Development Bank.

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Integration & Trade

INTAL

The Institute for the Integration of Latin America and the Caribbean (IDB-INTAL) was created in 1965 pursuant to an agreement between the Inter-American Development Bank (IDB) and the Government of Argentina. The Institute is part of the IDB Vice-Presidency for Countries and also coordinates activities with the Integration Sector, from the Vice-Presidency for Sectors and Knowledge. Since its beginnings INTAL has supported the Bank's regional integration strategy. Its activities are mainly focused on trade issues; regional integration and cooperation; technical assistance, specially directed to institutional strengthening and dialogue with civil society, including the private sector.

Its general objective is to promote and consolidate Latin American and Caribbean integration at the sub-regional, regional, inter-regional, hemispheric and international levels.

Current INTAL priorities relate to three components:

- *Capacity-building in trade and integration.*
  - *Specialized training programs for government officials and civil society representatives in trade and integration matters. Most of the activities take place within the framework of the Joint IDB/INTAL-WTO Program to Support Trade Negotiations in Latin America and the Caribbean.*
  - *Technical assistance to increase efficiency in government consultations with civil society for the formulation and enforcement of trade and integration policies.*
- *Support to research networks for sustaining policy reforms to reinforce the efficiency of research centers and individual experts, thus facilitating decision-making on integration and trade-related issues in the public and private sectors. The following are ongoing networks:*
  - *The Integration Research Network (RedINT)*
  - *The Latin American/Caribbean-Asia/Pacific Economic and Business Association (LAEBA)*
  - *The Euro-Latin Study Network on Integration and Trade (ELSNIT)*
  - *Latin American and the Caribbean Studies Network on Asia-Pacific (REDEALAP)*
  - *The INTAL Award*
- *Public outreach*
  - *Organization of workshops, fora and special events bringing civil society into contact with expert opinions so as to generate policy recommendations on integration and trade in the public and private sectors and greater civil society awareness.*
  - *Publications on integration and trade-related lines of action targeted to the public at large and to specialized groups:*
    - *Integration & Trade Journal (published every six months in English and Spanish)*
    - *INTAL Monthly Newsletter (in Spanish, English and Portuguese)*
    - *Working and Dissemination Papers*
    - *Special Reports*
    - *Publications arising from Research Networks or from Fora, Seminars and Regional Technical Cooperation.*
  - *Setting up of databases and documentation services on the Internet*
    - *The INTAL Documentation Center (CDI) is in charge of disseminating information and bibliography regarding integration and trade in Latin America and the Caribbean and in other extra-regional blocs and has become a cooperative regional information center.*
    - *The Trade Statistics System for the Americas (DATAINTAL) enables economic agents inside and outside the region to have access to the system.*
    - *Database of integration Treaties and Legal Instruments.*

INTAL's above-mentioned activities focus on the following thematic areas:

(i) The development of physical infrastructure; (ii) Legal aspects of Integration Agreements; (iii) Macroeconomic coordination and convergence; (iv) Integration and changes in the Latin American and Caribbean productive structure; (v) Social issues at the sub-regional level; (vi) Integration and development of border areas; (vii) Readiness of the region's countries to adhere to NAFTA or relate to the European Union or APEC, and participate in hemispheric convergence; (viii) Intra-sub-regional direct investment flows prompted by integration and economic complementation agreements; (ix) Harmonization of services market regulations; and (x) Development of sub-regional information systems.

Since 2001, INTAL is the Secretariat for the Technical Coordination Committee of the IIRSA project - Initiative for Regional Infrastructure Integration in South America. This Committee is made up of the Inter-American Development Bank (IDB), the Andean Development Corporation (CAF) and the Financial Fund for the Development of the River Plate Basin (FONPLATA).

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