An Integrated Analysis of Migration and Remittances: Modeling Migration as a Mechanism for Selection

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Abstract

Migrant remittances have become one of the largest sources of external finance for many developing countries in the world, yet the distributional impact of these flows in origin communities is poorly understood due to theoretical and methodological problems in prior work. To study remittances, researchers typically focus on migrants, effectively treating migrating and remitting as independent processes, and report mixed empirical findings that suffer from sample selection bias. This study develops a theoretical framework that connects migration and remittance decisions and draws implications for distributional outcomes. The framework is demonstrated using an integrated statistical model that treats migration as a mechanism for selection in a censored bivariate specification of remittances. This model is tested on data from Mexico-U.S. migration flows between 1950 and 2006. The findings show that controlling for migrant selectivity dramatically alters our conclusions about the distributional impact of remittances. While a conventional approach of modeling remittances in isolation leads to ambiguous implications about the trend in inequality, the integrated model unequivocally points to increasing inequality in the origin as a result of remittances. These results suggest that remittance flows are likely to increase disparities in migrant-sending communities of Mexico, and potentially other developing countries, and shape future trends in global income inequality.

INTRODUCTION

Scholarly interest in remittances, funds and goods sent by migrants to their origin families and communities, has grown dramatically in recent years due to the significant increase in the amount and perceived developmental potential of these flows. Recent estimates indicate that international remittances to developing countries have reached US$ 265 billion annually, becoming the second largest source of external finance for these countries after foreign direct investment (Ratha and Xu, 2008).

Remittances to developing countries serve the vital purpose of relaxing budget and credit constraints of origin households, and creating opportunities for investment in origin communities (Durand, Parrado, and Massey 1996; Rapaport and Docquier 2003; Rempel and Lobdell 1978; Russel 1992; Taylor 1999). Remittance flows also provide a potential pathway for income redistribution and poverty reduction as they are directed toward the most deprived regions of the world (Jones, 1998).

While scholars and policymakers alike have emphasized the developmental potential of remittances, they have remained silent on the distributional impact of these flows in receiving regions. Today, remittances comprise a substantial percentage of the GDP of many developing countries. Due to their staggering magnitude, these flows have enormous potential to disrupt the distribution of income in migrant-sending regions, and to create a new system of social stratification in developing countries.

Recent research on global inequality tells us that disparities between countries have stabilized in the past decades (Bourguignon and Morrisson, 2002; Firebaugh, 1999, 2003). Then, the direction of trends in global income inequality depends on the current changes in disparities within countries (Firebaugh, 2000). Through their effect on income disparities in developing countries, remittance flows are likely to also shape the future trends in global income inequality.

Focusing on migration flows to the United States from Mexico, one of the most unequal regions of the world (Portes and Hoffman, 2003), this study seeks to understand how remittances shape the distribution of economic resources in migrant-sending communities. While substantial

sociological research studies the effect of direct investment on disparities in receiving countries, no sociologists, and only few economists, have studied the distributional consequences of remittance flows (McKenzie and Rapoport, 2007; Stark, Taylor and Yitzhaki, 1986; Taylor et al. 2005). Different than direct investment flows, which target regions or countries and can be studied from a macro-level perspective, remittance flows are directed toward specific migrant-sending households and require a micro-level approach. This study seeks to fill this gap in the literature, and identify the individual-level mechanisms (migration and remittance decisions) underlying macro-level trends in inequality in sending regions.

Understanding how economic disparities are reconfigured as a result of migration-remittance flows requires asking two related questions: Who migrates, individuals from wealthier or poorer households? Who, among the migrants, sends back remittances, the wealthy or the poor? Prior work has typically asked these questions separately, and conceptually treated migration and remittance decisions as independent. Students of migration theorized about individual or household level factors that foster migration, disregarding the implications for subsequent remittance behavior. Similarly, studies of remittances identified altruistic or contractual mechanisms as explanations for why some migrants remit while others do not, without considering the connections to migration. Yet, theoretically, explanations for remittances entail implicit assumptions about individuals' reasons for migrating, and similarly, theories of migration posit expectations about prospective remittance behavior. Empirically, insofar as similar factors influence both migration and remittance patterns, it is important to specify an integrated model that unifies explanations for these outcomes. Statistical models that account only for individuals' remittance behavior, while omitting individuals' selection process into migration, are likely to produce biased estimates.

This study, for the first time, establishes a conceptual link between theories of migration and theories of remittances, exclusively focusing on how individuals' wealth status impacts their propensity to migrate and remit, in order to draw implications for potential trends in inequality. This conceptual link helps us sharpen and unify these theories, but also provides a methodological direction to specify an integrated model for migration and remittances, where similar factors are related to both outcomes. This integrated model manages sample selection bias which confounds the conclusions of prior empirical work on remittances.

This model is tested on data from the largest contemporary migration stream in the world, between Mexico and the United States. The data come from the Mexican Migration Project, and cover 118 migrant-sending communities and the period from 1950-2006. Comparing results from the integrated model of migration and remittances to those from an isolated analysis of remittances yields dramatically different conclusions about the distributional impact of these flows in sending communities.

In the remainder of the paper, to develop the unified theoretical framework, I briefly review theories of migration and remittances, and prior work connecting remittances to inequality. After introducing the study setting, I propose statistical methods to reflect the theoretical framework and present the results, comparing them to those obtained by the conventional approach in the literature. I conclude by summarizing the findings, and discussing their implications for future work, and future trends in global income inequality.

BACKGROUND

Remittances and Inequality

Understanding within-country inequalities has become crucial to predict global patterns of inequality, as disparities between countries stabilized in the recent decades (Firebaugh 1999, 2003). Remittance flows to developing countries have been increasing consistently in the past decade, reaching 20 percent of the GDP in many countries in Latin America and Africa (World Bank, 2008). An influx of funds of this magnitude is bound to create disruptive effects on the distribution of income in these countries. Yet, the vast majority of the research so far has focused on the amount and potential economic benefits of remittances rather than their distributional impact in migrant-sending communities.

By contrast, there is substantial sociological research on the effects of direct investment on income distribution in developing countries (Bornschier, Chase-Dunn, and Rubinson 1978; Bornschier and Chase-Dunn 1985; Dixon and Boswell 1996; Evans and Timberlake 1980; Firebaugh 1992, 1996). This line of research links trends in investment flows to trends in

inequality within regions or countries. While relevant, this macro-level approach is not sufficient to study the distributional impact of remittances, which, unlike direct investment targeting regions or countries, reach specific migrant-sending households. To the extent that migrant-sending households differ from the overall population, in terms of income or wealth, the impact of remittances on the overall inequality cannot be determined a priori. Therefore, one needs a micro-level approach that first establishes the characteristics of the migrant population, and then studies how inequality is likely to change as a result of remittances.

Migrant Selectivity and Inequality

The link between migrant selectivity and the distributional impact of remittances has been established in prior work by Stark, Taylor, and Yitzhaki (1986). Akin to a Kuznets curve, which suggests an inverted-U curvilinear relationship of income inequality to development, these authors envisioned a non-linear relationship of income inequality with migration prevalence. They expected inequality to increase in the initial take-off period of migration in a community, and then to gradually level off and begin to decline as a community reached high levels of migration. The reason underlying this pattern, the authors suggested, is the declining selectivity of migration with increasing migration prevalence. Initial migrants in a community incur high costs to migration, and hence typically come from middle or upper parts of the income distribution. As migration gains prevalence, experiences of prior migrants help mitigate the costs of migration, and individuals from lower income strata can afford to migrate. Then, in communities where migration is already prevalent, remittances are expected to decrease inequality, with the opposite outcome envisioned in communities at the initial stages of migration.

Empirical studies to date provided mixed empirical evidence for the suggested curvilinear relationship between remittances and inequality (Adams, 1989, 1992; McKenzie and Rapoport, 2007; Milanovic, 1987; Taylor et al. 2005). Moreover, the assumption underlying this relationship, that migrant selectivity declines with migration prevalence in a community, was not supported by evidence from different settings. While researchers reported declining selectivity of migrants from Mexico to the United States in communities with high levels of

migration experience (Massey, Goldring and Durand, 1996), others found persistently selective streams in the rural-urban migration in Thailand (Garip and Curran, 2009).

These inconsistencies reflect the complex and context-dependent nature of migrant selectivity, which cannot be fully captured by community migration prevalence alone. This paper instead proposes an individual-level model of migrant selectivity, which takes into account several factors, such as economic conditions in origin and destination, household and individual characteristics, that shape who migrates in a community. By doing so, the paper seeks to identify the micro-level processes that underlie the trends in economic inequality.

The paper also seeks to provide a unified theoretical framework to understand individuals' migration and remittance behavior. Research to date has focused on explaining either migration or remittances, rarely connecting the two. Students of migration theorized about individual or household level factors that foster migration, disregarding the implications for subsequent remittance behavior. Similarly, studies of remittances identified altruistic or contractual mechanisms as explanations for why some migrants remit while others do not, without considering the connections to migration. This serious theoretical shortcoming has also manifested itself in methodological problems as discussed later in the paper.

In the context of this paper, to understand how inequalities are reconfigured as a result of remittances, we need to understand, first, where in the income (or wealth) distribution the migrants are drawn from, and second, which income (or wealth) groups within migrants send remittances. This requires establishing a conceptual link between theories of migration and theories of remittances, which are briefly reviewed below.

A Theoretical Framework for Migration and Remittances

Migration is a complex process shaped by economic, social, demographic, historical and political factors. Due to the specific focus of this paper on economic inequality, I exclusively review theories that link individuals' wealth status to their propensity to migrate.

Neoclassical microeconomics focuses on individuals' relative earning potentials in origin and destination (Hay, 1980; Kalzuny, 1975; Nakosteen and Zimmer, 1980; Navratil and Doyle, 1977, Todaro, 1969; Yezer and Thurston, 1976). Individuals migrate when the expected gain from migrating to a destination is greater than that from staying in the origin. Net gains to migration typically hinge on human capital, measured by education or occupation, which plays a key role in determining who will migrate in a community. Then, individuals, whose education or occupation permits higher earnings in destination compared to origin, and who live in sufficiently poor households to find migration attractive, are the most likely migrants.

This view, although still prominent, has been challenged by work within the vein of the so-called New Economics of Labor Migration (NELM). These researchers argued for the centrality of the household, rather than the individual, in making the migration decision (Stark, Taylor, and Yitzhaki 1986; Stark and Taylor 1989; Stark 1991; Stark and Bloom 1985). They also suggested a different motive for migrating: diversifying risks to household income or wealth. Then, individuals from wealthy households are likely to migrate to secure income streams in destination that provide a hedge against risks to household wealth.[1]

These two theories provide different expectations about the position of migrants in the wealth distribution of the community, and also differ in their predictions about remittances. An individual migrant, in the neoclassical realm, has no incentives to remit. By contrast, within the domain of NELM, individual's migration reflects the household strategy to diversify risks, of which remittances are an essential component. Before delineating these connections more clearly, I briefly review theories of remittances that specifically link migrants' remittance propensity to their wealth status.

[1] Prominent theories of migration describe other factors determining who will migrate in a community. Social network and cumulative causation theories emphasize ties to prior migrants, which reduce costs to migrating (Massey and Garcia-Espana, 1987; Massey and Espinosa, 1996). Demographers highlight the importance of family composition and life cycle stage. Research from multiple disciplines (sociology and economics) shows the importance of macro-level factors in shaping selectivity of migrant streams, such as changing labor demand in destination, composition of population in origin, or social norms in the region (Balan et al., 1973). Although the theoretical emphasis is not on these factors, the empirical analysis in the paper controls for the alternative explanations of migration.

The two principal competing explanations in the literature relate remittances to either altruistic or contractual motives. Models of remittances as altruism, presented in the works of Banerjee (1984) and Johnson and Whitelaw (1974), simply embed the utility of other household members in the migrant's utility function, and suggest that migrants remit to improve their households' welfare. By definition, altruism carries an initial cost to the individual, although positive consequences may accrue over time (DeWaal, 2008). Models of contractual motives, on the other hand, view remittances as part of a self-enforcing, cooperative contract between the migrant and household. This contract may involve remittances as part of current or future exchanges of favors in a household. In return for remittances, household members may provide household chores or child-care (Lee, Parish and Willis 1994), loans to subsidize migrants' education or travel to destination (Ahlburg and Brown, 1998; Cai, 2003; Durand et al., 1996; Regmi and Tisdell, 2002), or promise future inheritances (de la Briere et al., 2002; Hoddinott, 1994). Remittances may also represent a premium paid by migrants for future insurance against unemployment or low wages (Agarwal and Horowitz, 2002; Stark, 1991; Stark and Levhari 1982).

Empirical studies to date yielded inconsistencies in attributing migrants' remittance behavior to either altruistic or contractual motives. Survey data cannot adequately measure individuals' motives, hence in empirical studies, the presence of extrinsic rewards in the family (such as wealth for inheritance or child-care provision) is taken to signal contractual remittance behavior. The presence of these extrinsic rewards also signifies a household's ability to enforce a contract on the migrant. In the absence of any extrinsic rewards, migrants are assumed to remit altruistically to their families (de la Briere et al., 2002; Hoddinott, 1994; Lucas and Stark, 1985; VanWey, 2004). This study seeks to relate remittance behavior to wealth status, therefore, I focus only on household wealth as the extrinsic reward offered to a migrant in a contractual arrangement.

If remittances are related to altruistic behavior, defined restrictively as migrants equating their own welfare with their household's welfare, then individuals from poorer or more relatively deprived households are more likely to send remittances. If remittances are related contractual

behavior, assuming that only wealthy households can provide rewards and hence enforce a contract, then individuals from wealthier households are more likely to send remittances.[2]

It is not difficult to see the theoretical connections between migration and remittance behavior, which is crucial to explore inequality outcomes. In the neoclassical view, individuals migrate to improve their earnings, and are likely to come from poorer households that cannot offer them alternative economic means. Remittances sent by these individuals are likely to be classified as altruistic, since their origin households do not own wealth to offer as a reward and/or to enforce a contract. If individuals from poor households migrate and send remittances, as neoclassical theory of migration and altruistic view of remittances suggests, then one expects the inequality within the sending community to eventually decline.[3] By contrast, according to the NELM theory, individuals migrate to diversify risks to household income, and hence, are likely to be members of wealthier households with consistent income streams. Remittances from these individuals are considered contractual, as the migrant and household members are likely to be hedging against the risks each face (e.g., job loss for the migrant, and decline in farm income for the household due to, say, weather conditions). Then, if individuals from wealthy households migrate and send remittances, as NELM theory of migration and contractual view of remittances imply, one expects the inequality in the sending community to gradually increase. Table 1 summarizes these expectations.

--[Table 1]--

Connecting migration and remittances theories is necessary not only for theoretical completeness, but also to reach credible empirical conclusions. The disconnect between theories of migration and remittances manifests itself in the methodological problems in empirical work.

[2] This strategy of classifying remittances sent by individuals from poor households as 'altruistic', and those from wealthy households as 'contractual,' constitutes the main approach in the literature. Although I recognize the limitations of using observable characteristics, like household wealth, as signifiers of motives, this study aims to make a different point, that migration and remittance theories are linked, and follows the mainstream literature otherwise.

[3] The underlying assumption is that migrants earn a higher amount in destination than what they would have earned in the origin, which is the necessary condition for them to migrate according to the neoclassical view.

Because migration and remittances are conceptually viewed as independent processes, prior studies on remittances focus exclusively on migrants, a non-random segment of the population, confounding the determinants of remitting with the selection process into the migrant sample. This issue of sample selection poses a serious methodological problem with potentially dramatic consequences for substantive conclusions.

When a portion of the data is systematically excluded, both external and internal validity of the conclusions are threatened (Berk, 1983). In our case, remittances are only observed for migrants, but researchers are typically interested in the distributional effects of remittances in the overall population. Estimating a model of remittances on a sample of migrants, as commonly done in the literature, leads to biased conclusions about the effects of remittances in the overall population.

Imagine a community where only rich individuals can afford to migrate due to high costs of migrating, and these individuals are equally likely to remit once they migrate. If we estimate a model of remittances on a sample of migrants only, we will underestimate the effect of wealth, concluding that it is not important for remitting behavior. However, in the overall population, wealth is the most important characteristic influencing remittances, as it determines whether a person will be a migrant in the first place (Lieberson, 1985). Excluding non-migrants from our sample compromises the external validity of our conclusions.

Internal validity is also vulnerable to sample selection even when researchers seek to make statements on the censored population alone, migrants in our case. Assume that families send more responsible sons or daughters as migrants, and these individuals are more likely to command greater earnings, and send remittances. This unobserved characteristic affects both migration and remittance behavior, and leads to biased conclusions about the latter, which is problematic even if one's interest lies only on migrants, not the overall population[4] (Berk, 1983; Heckman, 1979).

[4] More specifically, excluding observations in a systematic manner (non-migrants, who are individuals with lower earning potential in this hypothetical case), leads to a specification error where an omitted characteristic (how responsible an individual is) is correlated with an included regressor (earnings of a migrant). The confounding of the error term with the regressor leads to biased parameter estimates.

To obtain credible empirical results, one needs to consider how migrant selectivity might influence remittance outcomes. Few studies, to my knowledge, have considered migrant selectivity in modeling remittances. Using a small sample of 215 Kenyan households, Hoddinott (1994) was the first to employ a Heckman two-stage model of remittances to control for migrant selectivity. Two recent studies by Taylor, Rozelle and de Brauw (2003) and Rivera (2005), employed a similar model of selection correction in the case of China and Mexico, respectively, yet relied on untested assumptions for identification.[5] These studies also did not consider the implications of the integrated migration-remittance model for inequality.

The present study builds on these prior studies to take into account migrant selectivity in modeling remittances. It diverges from prior work due to its focus on inequality, its much broader scope (data from the largest migration flow in the world, and one of the largest migration surveys available) and its credible empirical strategy for selection correction. It also diverges from prior work in its objective: I seek to not only statistically control for migrant selectivity, but to actually theorize and model its connections to remittance behavior and subsequent inequality outcomes.

STUDY SETTING: MEXICO

The labor migration of workers from Latin America to the United States constitutes the largest contemporary international migration flow in the world. The region is characterized by large inequalities among individuals, where the income share of the richest 20 percent of the population is at least 18 times that of the poorest 20 percent (World Bank, 2008). Mexico is the recipient of the largest remittance flows in the region, amounting to $US 25 billion annually (Ratha and Xu, 2008). Hence, Mexico is the perfect setting to study how remittance flows shape income and wealth inequality in a country, where wide disparities are already entrenched. Below, I describe the Mexico-U.S. migration context, briefly introduce the study data, and then

[5] A crucial assumption of their model is the existence of a variable that is correlated with the migration decision, but not the remittance behavior. Both studies used migrant networks to satisfy this so-called 'exclusion restriction.' However, migrant networks are likely to be related to factors like development level or income opportunities in origin community, which are also likely to affect remittances. Hence, it is not clear that exclusion restriction is satisfied, and identification is credible in these applications.

present results that descriptively explore how the distribution of income in our sample changes with increasing migration flows.

The Context of Mexico-U.S. Migration

Although the origins of Mexico-U.S. migration can be traced back to 1800s, the movement across the borders started to gain prevalence with the Bracero program sponsoring Mexican laborers in the U.S. from 1942 through 1964. The U.S. immigration policy enacted in 1965 ended this period, but continued to strengthen migration links by allowing family reunification (Kanaiaipuni, 2000). During the 1970s, deteriorating economic conditions in the United States increased the salience of Mexican migration as a political issue, and led to the reversal of earlier family reunification policies. The legal immigration fell dramatically as a result, but migration rates continued to increase, initiating the 1986 Immigration Reform and Control Act (IRCA). IRCA was an attempt to reduce undocumented immigration by increasing border enforcement and the imposition of employer sanctions, and providing amnesty to two million undocumented workers (Massey et al., 2002). As an unintended consequence, IRCA created higher incentives for the Mexican relatives of the now-legalized U.S. migrants to also migrate (Massey and Espinosa, 1997). In addition, from 1980 to 1989, Mexican GDP per capita fell by 9 percent, and the percentage of households in poverty rose to 60 percent (Sheahan, 1991). Devaluation of the Mexican peso in 1982 was followed by another devaluation in 1994. With worsening conditions in Mexico, despite increasing measures in the United States, undocumented migration continued to increase against all attempts to prevent it.

Migration and Inequality in Mexico

To study how migration streams to the United States, and subsequent remittance flows to Mexico, altered economic inequalities, I use individual-level data from the Mexican Migration Project (MMP), collected from about 18,000 household heads in 118 communities in Mexico and migrants in the United States. Although the survey data were collected between 1982 and 2006, the retrospective life history information from individuals allows us to capture migration patterns going back to 1950s.

Prior research suggests that remittance flows to a region will initially have a destabilizing effect on the income distribution, and inequality will increase (McKenzie and Rapoport, 2007; Stark, Taylor and Yitzhaki, 1986). This initial effect, due to the positive selectivity of early migrants on income or wealth, will eventually be offset by increasing migration prevalence in a community, which mitigates the costs of migration and allows for lower-income individuals to migrate as well. I explore this compelling idea using the MMP data.

Table 2 displays wealth and income inequality measures for 118 communities grouped into low, medium and high migration prevalence categories. Migration prevalence is defined as the percentage of individuals who have ever migrated in a community.[6] The inequality in the distribution of household income is highest in the high prevalence group, followed by the medium and low prevalence communities.[7] This pattern is consistent across three different inequality measures (gini, coefficient of variation and standard deviation of logarithm of income). Similarly, household land and properties owned are both more unequally distributed in high prevalence communities compared to the medium or low prevalence group.

-- [Table 2] --

The Lorenz curves for household income displayed in Figure 1 support this conclusion.[8] In low prevalence communities, the poorest 80 percent of households receive about 60 percent of all income, while, in the high prevalence communities, the poorest 80 percent of households receive less than 30 percent of all income in those communities.

--[Figure 1]--

[6] Migration prevalence is in the range of 1-10% in the low category, 11-25% in the medium category and 26-89% in the high category. Cut-points for categories are based on the tertiles of the migration prevalence distribution.

[7] Household income is defined as the wages earned (in 2000 constant U.S.$) by the household head in Mexico or the United States during the survey year.

[8] Lorenz curve is a plot of cumulative fraction of population, starting from the poorest, on the x-axis against cumulative fraction of household income on the y-axis. If resources were equally distributed, with everyone receiving the same, the Lorenz curve would be the 45-degree line. In the case of complete inequality, where the richest person has everything, the Lorenz curve would run along the x-axis with a right angle at (1,0) to terminate at (1,1).

Lorenz curves play an important role in characterizing the robustness of inequality measures (Atkinson, 1970). If two different Lorenz curves do not cross, as is the case in our figure, the upper one represents an unambiguously more egalitarian distribution, one that will show a lower level of inequality using any measure of inequality that respects the principle of transfers.[9] In our case, the Lorenz curve for medium prevalence communities lies everywhere outside the Lorenz curve for low prevalence communities. Similarly, the Lorenz curve for high prevalence group lies everywhere outside the Lorenz curves for low prevalence groups. Hence, there can be no dispute that household income is more unequally distributed in high or medium prevalence communities compared to low prevalence communities.

These result show that, in contrast to the theoretical expectation of Stark, Taylor, and Yitzhaki (1986), income and wealth inequality seem to increase with the prevalence of migration in Mexican communities. The remaining analyses in this paper seek to identify the individual-level mechanisms that underlie this unexpected relationship between migration and income inequality in study communities.

THE STUDY DATA

The Mexican Migration Project (MMP) data used in this study were collected in 118 Mexican communities during the winter months of 1982-2006, when migrants are likely to visit their origin households.[10] In each community, about 200 households were randomly selected, and all household members were interviewed. Migrants from a community, who were absent at the time of the survey, were also followed up in the United States, but located non-randomly through snowball sampling. Detailed migration information was collected only for household heads, mostly men, in the form of a retrospective life history survey.

[9] The principle of transfers states that an income transfer from a richer person to a poorer person should decrease (or at least not increase) inequality (Dalton, 1920; Atkinson, 1970). Not all inequality measures satisfy this condition. One example is interquartile ratio – transfers within the same quartile have no effect on inequality.

[10] The Mexican Migration Project is a collaborative research project based at the Princeton University and the University of Guadalajara. Detailed information is available on the project website. http://mmp.opr.princeton.edu/

Although the life history survey recorded all migration trips by an individual, detailed remittance information was collected only for the migrant's last trip to avoid recall bias. For this reason, for migrants, I include in the sample the observation from the year of the migrant's last trip to the United States, and discard the rest of the life history observations. For non-migrants, I include in the sample a single-observation from a randomly-selected year after an individual turns 18 years old. By keeping one observation for each individual in the sample (from the year of the last trip for migrants and from a randomly-selected year for non-migrants), I seek to have a balanced number of migrants and non-migrants in each year observed.[11] I supplement the individual-, household- and community-level data available through the MMP, with several macroeconomic indicators on Mexico and the United States provided by Massey and Espinosa (1997). I restrict my sample to individuals between the ages of 18 to 65, and to years between 1950 and 2006.[12]

OPERATIONAL MEASURES

The study aims to theoretically and empirically connect migration and remittance behavior. The dependent variables, then, are binary indicators of whether a person migrates to the United States in a year, and whether a person sends remittances (or brings home savings) in a year. Sending monthly remittances or bringing home savings upon return represent two strategies migrants employ to transfer funds to their origin households. For the purposes of this study, both strategies are referred to as remittances. The total amount of remittances, which is the dependent variable in one of the analyses, is computed by adding up the total remittances and savings sent by a migrant during the last trip.

[11] An alternative approach is to keep observations for non-migrants from the survey year (e.g., a year between 1982 and 2006, depending on when the community was surveyed). Since most migration moves are observed prior to the survey year, this approach leads to a sample with most migrants clustered in earlier time periods, and non-migrants clustered in later years. Another alternative is to include each year in the life history (i.e., have multiple observations for each individual) and model the mechanism for missing data. The methods for this strategy are not well-developed, making it out of the scope of this paper.

[12] 18-65 year olds represent the age group facing the highest risk to migration. The survey data were collected from 1982 to 2006, but due to the availability of life history information, we have observations going back to 1900s. Because the number of observations per year is rather small prior to 1950, I restrict the analysis to the 1950-2006 period.

The paper focuses specifically on how migration-remittance behavior may be related to individuals' income or wealth status. Number of land parcels owned and number of properties (houses, apartments, etc.) owned are the independent variables that measure household wealth. These indicators were recorded annually in the life history survey, and are lagged by a year to prevent simultaneity with migration or remittance behavior. Considering wealth may have a non-linear effect on migration and/or remittance outcomes, I create binary indicators to represent categories of land and property owned. High land category includes households with 2 or more parcels of land, and medium land category includes those with a single parcel. Households with no land are the reference group in the statistical analysis. Similarly, high property category includes households that own 2 or more houses, and medium property category includes those that own a single house. Households with no property are the reference category. Another variable of interest, household income, is measured only in the survey year, and hence follows migration or remittance decisions, rather than preceding them in time. Due to this limitation, I only include household wealth indicators in the analysis.

Several individual level characteristics, likely to be related to migration and/or remittance behavior, are available in the data and included in models: age, sex, education (primary, secondary, advanced), marital status (also if spouse is in the United States), and the number of children in the household. Prior findings in this and other settings show that individuals are more likely to migrate if they have prior migration experience, or if they are related to prior migrants through household or community ties. To capture this pattern, I measure individuals' prior migration experience by their accumulated number of trips (up through the previous year) to the United States. Prior migration experience in the household is captured by two indicators: (i) whether an individual's parents were U.S. migrants, and (ii) the number siblings who were U.S. migrants. Community experience is measured using an indicator for the proportion of individuals who have ever migrated in a community. The communities in the data vary dramatically by size and location. This variation is captured by binary indicators of four community types: metropolitan area (reference category), small urban area, town or rancho (small village).

These variables are related to both migration and remittance behavior, and included in models for both outcomes. There are other characteristics that are specific to migrants, and hence

included only in the remittance models. Prior findings show that remittances decrease as migrants' ties to origin weaken over time. I include an indicator of years since migrated, and another for whether migrant has documentation in the United States to capture this idea. Proportion of remitters in the community (lagged by a year) captures the local remittance norms which might also influence migrants' remittance behavior. Other control variables are binary indicators for migrants' occupation (unemployed, agriculture, manufacturing, service and other), which proxies their income levels, and binary indicators for their destination in the United States (Northeast, Midwest, South and West).

-- [Table 3] --

Table 3 includes descriptive statistics for all the independent variables. The table displays the means separately for the overall sample, migrants and remitters (among migrants) along with results from difference-of-means tests, which suggest that the three samples differ significantly on almost all variables.

EMPIRICAL STRATEGY

This paper seeks to identify the determinants and distributional consequences of remittance behavior, while taking into account individuals' selection process into migration. To assess the determinants of remittances, ideally, one would like to compare the actual remittance behavior of the migrant group with the expected behavior of the non-migrant group had they migrated. However, the only data available for estimating remittances come from the migrants, a group that is not randomly selected. Hence, an accurate evaluation of the determinants of remittances requires a correction for migrant selectivity. That is, we need to model both the process by which individuals are selected as migrants, and also the mechanism that determines their remittance behavior once they are migrants.

The conventional approach in the literature is to model migration and remittances separately. Given migration and remittance outcomes that are observed discretely, the following model structure is typically used. Let migration and remittance decisions by an individual be represented by two binary dependent variables y_1 and y_2. Assuming that each of these

equations is generated by a probit equation, if the errors from these two equations are independent, our model is:

$$y_1^* = x_1\beta_1 + \varepsilon_1 \qquad (1)$$

$$y_2^* = x_2\beta_2 + \varepsilon_2 \qquad (2)$$

where *x* represent independent variables, β are corresponding coefficients, and y_j^* are unobserved latent variables, related to our binary dependent variables as follows:

$$y_j = \begin{cases} 1 & \text{if } y_j^* > 0 \\ 0 & \text{if } y_j^* \le 0 \end{cases} \quad j = 1,2$$

If we assume that the error terms ε_1 and ε_2 are independent and identically distributed (i.i.d.) standard normal, the probability π_j of observing a positive outcome is:

$$\pi_j = \Phi(x_j\beta_j)$$

where Φ is the standard normal cumulative distribution function. The inverse transformation of the above equation, which gives the linear predictor as a function of the probability, gives rise to two probit models (for *j*=1,2).

A weakness of this approach with separate probit models is that it assumes a priori that the error terms from migration and remittance equations are uncorrelated. Yet, this assumption may be untenable if the unobserved factors that influence migration behavior are also related to the remittance outcome. Migration behavior may be shaped by motivations (e.g., individuals' entrepreneurial spirit, or concern for the welfare of family) that are not readily observable or adequately measurable. It is reasonable to assume that these unobservable motivations also influence remittance behavior. If that is the case, migration process generates a non-random sample of individuals for observing remittance outcomes, and consequently, standard estimation of remittances on this sample (e.g., using a univariate probit model as in (2)) leads to biased results.

The direction of the bias is unclear. Suppose that some individuals have an unobserved characteristic (e.g., sense of responsibility to parents) that makes them send remittances at any level of family wealth. If these individuals happen to have higher wealth, then the probit estimate of the effect of wealth will be upward-biased. Another bias, this time downward, may

arise if the effect of wealth on remittances varies across the population, and if individuals with lower levels of wealth experience a higher increase in the propensity of remittances.

Joint modeling of migration and remittance outcomes, where migration is treated as a mechanism for selection, handles the source of bias. It takes into account the fact that remittance decision, y_2, is observed if and only if a person migrates ($y_1 = 1$). Then, if $y_1 = 0$, there is no information on y_2. This leads to a specification where the first probit equation for migration is completely observed, but for the second equation of remitting, we have a selected sample. In the case of a non-zero correlation (ρ) between the error terms $(\varepsilon_1, \varepsilon_2)$, separately estimating the migration and remittance equations will lead to selectivity bias in the estimates of the latter.

We can account for the sample selection bias by employing a variant of Heckman's (1979) two-step selection model. Because in our case both the selection and outcome equations have binary dependent variables, we end up with a censored bivariate probit specification which has previously been used by Boyes, Hoffman and Low (1989), Dubin and Rivers (1989), Reed (2000), and van de Ven and van Pragg (1981). Note that if the two equations are indeed correlated, this specification corrects for sample selection bias in the remittance equation. Conversely, if there is no correlation, then this procedure is identical to estimating the two equations separately. By observing the magnitude and significance of the correlation term, ρ, we can determine whether sample selection indeed biases our results.

The censored bivariate probit model employs the same structure displayed in (1)-(2), but recognizes that y_2 is observed only if $y_1 = 1$, and that error terms $(\varepsilon_1, \varepsilon_2)$ may have a non-zero correlation (ρ). This specification leads to the following log-likelihood function for sample of *N* observations (Meng and Schmidt 1985; van de Ven and van Praag 1981):

$$\ln L = \sum_{i=1}^{N} \{ y_{i1} y_{i2} \ln \Phi_2(z_{i1}, z_{i2}, \rho) + y_{i1}(1 - y_{i2}) \ln[\Phi(z_{i1}) - \Phi_2(z_{i1}, z_{i2}, \rho)] + (1 - y_{i1}) \ln[1 - \Phi(z_{i1})] \}$$

where Φ_2 is the standard bivariate normal distribution function, Φ is the standard normal distribution function and $z_{ij} = x_{ij}\beta_j$. The first and second terms on the right-hand side relate to migrants that remit and do not remit respectively. The third term relates to the censored individuals that do not become migrants.

Using Geographic Variation as an Instrument for Migration

To manage a censored sample, it is necessary to have one independent variable, known as an instrument or exclusion restriction, in the migration (selection) equation not be included in the remittance (outcome) equation. This restriction is not strictly required for identification. However, if the set of regressors are identical for the selection and outcome equations, then the estimation will be poor due to high multicollinearity (Achen, 1986; Berk, 1983).

A consistent estimate of the effect of wealth and other characteristics can be obtained if there is a variable that affects the selection, but does not directly affect outcomes, nor is it correlated with the unobservables affecting outcomes (Moffitt, 2003). If migration were randomly assigned, for example, then the realization of the randomizing process could be used to estimate the remittance equation by instrumental variables (Angrist and Krueger, 1991). In the absence of pure random assignment, however, one needs to identify a determinant of migration that can be legitimately excluded from the remittance equation.

Environmental or geographic variables have been used as exclusions in various applications, based on the underlying assumption that individuals have no control over the characteristics of the region in which they live in (Moffitt, 2003). In the Mexican case, the proximity to the U.S. border may be such a variable. Individuals who live in a community far from the border face higher travel costs to migration. One expects that these higher costs to reduce migration propensity, especially for individuals from low-wealth families with limited financial resources.

Establishing the Relevance of Distance as an Instrument

To check the relevance of the distance indicator for migration outcomes, I apply a descriptive analysis suggested by Card (1993).[13] I split the 118 communities in the data into three categories based on their distance to the U.S. border. A community is considered far if it is more than 750 km away from the U.S. border, medium distance if it is 500 to 750 km away, and close otherwise. I then fit a probit model to migration outcomes of individuals who live in far villages.[14] I include in the model indicators for age, sex, education, migration experience by individual, household and community, family land and properties, community type and year, deliberately excluding the distance indicator. Predicted migration probabilities are computed for the whole sample based on this model. After dividing the sample into quartiles of the predicted migration probability, I observe whether the odds of migrating differ by distance to the border in each quartile.

-- [Figure 2] --

Figure 2 plots the odds ratios of migration in close versus far communities by quartile of predicted migration probability.[15] For individuals in the two highest predicted quartiles of migration, the effect of distance to border is modest (odds ratio is around 1.1). For individuals in the first and second quartiles, by contrast, the odds ratios are 1.8 and 1.6, respectively. As expected, distance to border has its strongest effect on individuals with the lowest propensities to migrate. A similar pattern, of high odds ratios in the lowest quartiles that decline and reach unity in the higher quartiles, is observed in a comparison of close versus medium-distance

[13] Card (1993) uses this analysis to establish the relevance of geographic proximity to schools as an instrument for years of education.

[14] This is a conservative approach. By fitting the model to only far villages, I aim to better capture the migration probabilities for this presumably disadvantaged group. Put differently, I try to explain as much variance as possible in the migration outcomes in far villages using all available indicators (but distance). By doing so, I aim to minimize the possibility that distance proxies other disadvantages faced by individuals living in far villages. The results are much stronger if the model is fit to the overall sample in the subsequent analysis presented in Figure 2.

[15] Odds ratio in close versus far communities is defined as $\frac{p_C/(1-p_C)}{p_F/(1-p_F)}$ where p_C and p_F are the proportion of migrants in the close and far communities respectively.

communities. These results suggest that distance to border is an important detriment to migration, especially for individuals who have lower propensities to migrate.

Establishing the Exogeneity of Distance as an Instrument

For the distance indicator to serve as legitimate instrument, it must affect individuals' migration outcomes but exert no direct effect on remittances. As an initial test of this claim, Table 4 presents estimates from probit models of individuals' migration and remittance behavior. Column (1) of Table 4 shows the coefficient of the distance indicator in the migration model. Individuals' likelihood of migrating declines with distance of their community to the U.S. border. Column (2) displays a model that includes indicators for household wealth, demographic characteristics, prior migration experience in addition to the distance measure. The effect of distance remains robust to the inclusion of other factors, increasing only slightly in magnitude. Columns (3)-(5) show the coefficients of the distance variable in a probit model of whether a migrant sends remittances. In all three specifications, which gradually introduce controls, the coefficient for distance remains small and insignificant, suggesting the exogeneity of distance to remittance behavior. Additional robustness checks for the exogeneity assumption are provided in Appendix A.

--[Table 4] --

An Alternative Approach

Even with a credible instrument, the Heckman-type two-stage model could lead to highly imprecise estimates, especially in small samples. The model aims to reduce bias, but in some cases the reduction in bias is counteracted by decreased efficiency (Hartman, 1991; Stolzenberg and Relles, 1997). To take into account this possibility, and ensure the robustness of the results, I use an alternative approach proposed by Sartori (2003). This approach relaxes the requirement for the exclusion restriction, and instead relies on a different assumption that error terms are identical in the selection and outcome equations. This assumption is likely to be true in our case since similar factors affect migration and remittance decisions. That is, the decision to migrate is closely related to the subsequent decision to send remittances; similar factors (demographic and economic) influence both decisions; and the decisions occur within a short time frame

(Sartori, 2003). The results displayed in Table A2 of the Appendix B are mostly in agreement with those given by the censored bivariate probit (Heckman-type model), and suggest the robustness of findings to different specifications. (The reader should refer to the Appendix B after reading the Results section.)

RESULTS

This paper provides a theoretical framework that connects explanations for migration and remittance behavior. The empirical demonstration involves an integrated statistical model of remittances that treats migration as a mechanism for selection. I estimate this model on data from Mexico-U.S. migration flows, and compare the results to those provided by a conventional analysis that neglects selection. The objective is to understand whether, by considering migrant selectivity, we can better understand the determinants of remittances, and predict their impact on the economic inequalities in sending regions.

Table 5 displays the estimates from three empirical specifications to model migration and remittance behavior: (i) a univariate probit model of migration, (ii) a univariate probit model of remittances on the sample of migrants (conventional approach) and (iii) a censored bivariate probit model of migration and remittances on the entire sample. Due to our focus on inequality, the coefficients for the wealth indicators are of main interest.

--[Table 5]--

Migration

The first column reports the coefficient estimates for the migration equation. Land parcels and properties owned both have a nonlinear effect on the propensity to migrate. Compared to those with no land, individuals who own 2 or more parcels of land are significantly more likely to migrate. Similarly, individuals with 2 or more houses are more likely to migrate compared to those with no properties. Individuals who own lower amounts of land (single parcel) or property (single house) do not differ in migration prospects from those who do not own anything.

The fact the wealthier individuals are more likely to migrate may be due to the considerable costs of crossing the border. In addition to the cost of transportation, the smuggling fee for undocumented migrants reportedly ranged from $1200 to $1500 in 2001 (Cornelius, 2001). Given these costs, it is understandable that migrants come from the middle or upper part of the income distribution, those who are sufficiently wealthy to afford migration (Massey et al., 1996). It is still curious that the wealthiest individuals in our sample find migration desirable, given their potential access to other economic means. Rather than the costs of migration, a more plausible explanation for this pattern is provided by the New Economics of Labor Migration theory (Stark, Taylor and Yitzhaki, 1986). Wealthier individuals may be migrating as part of a household strategy to diversify risks to domestic income.

In addition to the financial costs, migrants incur substantial social and psychological costs. The uncertainties faced in the destination, related to finding jobs or accommodation, are aggravated by parting with family members and moving to a foreign country. To alleviate these costs, individuals typically rely on the experience or support of family and community members who are current or prior migrants. The estimates in the table show that, in the Mexican case, having family members who are prior U.S. migrants, or living in a community with a high proportion of prior migrants, significantly increases the likelihood of migration.[16]

Migrants are likely to be selected not only on wealth and social ties to prior migrants, but also on other demographic characteristics. Probability of migrating increases with age until an individual reaches middle-age (around 40) and then decreases. Men are more likely to migrate, partially due to a gender bias in the data which come from household heads alone. Due to the patriarchal norms in Mexico, migrants to the United States have been predominantly males of working age, and usually household heads (Reichert, 1979; Massey et al., 1987). Female migration has gained prevalence in the last two decades, yet our data is likely to underestimate these trends.

[16] Prior migration experience by an individual can also lower the costs of re-migration. In our sample, an indicator of individuals' prior trips predicts migration almost perfectly, and is not included in the migration model. Note that the sample includes an individual's last migration move only, when remittance information is recorded, and accordingly, most migrants (63 percent) have prior experience.

Individuals are more likely to migrate if they have a spouse already in the United States. Having a spouse in Mexico, which is the case for the majority of migrants (about 64 percent), does not alter the migration probability. Because wives typically stay home due to a traditional division of labor within the family, having young children should not affect men's migration probability (Boyd, 1989). The sample is mostly (86 percent) men, and the small and insignificant coefficient for minor children reflects this expectation.

Migrants from Mexico are typically negatively selected on education, because educated individuals secure desirable jobs in the domestic labor market, and face a high opportunity cost to migrating (Kanaiaupini, 2001). In this sample, the likelihood of migrating is lower for individuals with secondary education (compared to those with primary education or less), and lowest for those with advanced degrees. Individuals living in small urban areas, towns or ranchos are more likely to migrate compared to those living in metropolitan regions (reference category), with the likelihood of migration increasing with decreasing community size.

Remittances

These results show the patterns of selectivity in Mexico-U.S. migration flows. I describe the implications of migrant selectivity for determinants of remittances in the following analysis. To establish a baseline, I start with a conventional analysis of remittances, which neglects selectivity and derives estimates from a sample of migrants alone. The results from this univariate probit model are displayed in the second column of Table 5. The focus is on the coefficients of wealth indicators in order to draw implications for economic disparities in communities.

Individuals living in medium wealth households (owning a parcel of land and/or a house) are more likely to send remittances compared to those without any wealth. Individuals from wealthiest households in our sample (2 or more parcels of land, 2 or more houses) are not distinguishable in remittance propensity from individuals without any wealth. This finding does not provide any conclusive evidence for the altruistic or contractual explanations of remittances. Altruistic behavior is observable in the survey data only for poorer individuals, whose household members cannot provide any other economic incentives to send remittances. In our

case, the poorest individuals, who are likely to engage in this behavior, are not likely to afford the costs of migrating. Thus, medium-wealth individuals could be the lower bound in who can afford to migrate in a community. For these individuals, if household wealth is not sufficiently large to form an incentive for remitting (e.g., an expensive dwelling to be passed on as inheritance), then remittance behavior could be classified as altruistic. If, on the other hand, household wealth is substantial enough to enforce a contractual arrangement, these individuals' remittances may be part of a household strategy to diversify risks to wealth or income.[17]

The model includes indicators for demographic and household characteristics, prior migration experience, also included in the migration model, as well as measures specific to migrants: destination, occupation, ties to origin household and remittance norms in origin community. Remittance propensity is higher for men and for migrants with spouses in Mexico and young children, and lower for those with spouses in the United States. Migrants from smaller communities are more likely to remit compared to those living in metropolitan areas. Proportion of remitters in the origin community significantly increases migrants' likelihood to remit, suggesting a strong effect of the social context. The longer migrants stay in the destination, the less likely they are to remit, attributable to a weakening of ties to origin household. Similarly, migrants who have documentation in the United States are less likely to remit, signifying an increasing commitment to destination. Remittance propensities differ by occupation: migrants in agriculture are more likely to remit (compared to those reportedly unemployed) followed by manufacturing and service workers, and those in other occupations. Destination region in the United States is not related to remittance outcomes.

The third column in the table reports the results from an integrated model of migration and remittances, where migration is the selection equation in a censored bivariate probit specification. Compared to the conventional probit model of remittances presented in the second column, the coefficients for wealth indicators remain virtually unaltered in the integrated model. The estimated effect of other indicators, such as sex, having a spouse in the United

[17] These broad categorizations are not meant to precisely represent sources of individuals' remittance behavior, which is unobservable with survey data. Instead, I am using the dominant approach in the literature to classify types of remittance behavior, to demonstrate how sensitive such conclusions are to migrant selectivity. Questioning this dominant approach, and its potential shortcomings, could be a paper topic in itself.

States, community type and destination, change only slightly. The coefficient of the correlation between the errors of the migration and remittance equations, rho (ρ), is positive and considerable in magnitude (0.18), but significant only at the 0.06 level.[18]

--[Table 6]--

Given that the coefficient estimates remain more or less intact, should we conclude that migrant selectivity does not significantly alter our conclusions? The answer is no, and owes to a fact that is often neglected in empirical studies using censored regression models. A lack of change in coefficient estimates only signifies that the unobserved factors influencing migration do not significantly alter the effect of the observed factors on remittances. Put differently, focusing on a sample of migrants only, and ignoring selectivity, does not seem to threaten the internal validity of our conclusions. The effect of wealth and other variables on remittances are accurately estimated for migrants using a univariate probit model. Yet, the external validity of our conclusions, that is, their generalizability to the overall population, is still questionable.

Specifically, the coefficient estimates for the censored model, presented in the third column, capture only the direct effect of regressors on remittances, and can be misleading. Because the same set of variables influence migration and remittance outcomes, each variable affects remittances directly as well as indirectly through its influence on migration. For example, individuals' wealth affects their likelihood of migrating, as well as their subsequent propensity to remit. To assess the overall impact of a given variable, then, we need to consider how a change in its value alters the joint probability of migrating and remitting.

As Greene (1998) notes, whether the effects of variables on the conditional probability of remitting or on the joint probability of migrating and remitting are of interest reflect the intended inferences of the study. Most empirical studies in the literature confine their analyses to migrants only, and evaluate the effects of regressors on the conditional probability of remitting. Because this study seeks to assess the implications of remittances for inequality in the

[18] The positive sign suggests that the unobserved factors that affect migration behavior also increase the prospects for remitting.

overall population (migrants and non-migrants), the effects of regressors on the joint probability of migrating and remitting are of interest.

In respective columns, Table 6 presents the marginal effects of the wealth indicators on (i) the probability of migrating (univariate probit model), (ii) the conditional probability of remitting (univariate probit model), and (iii) the joint probability of migrating and remitting (censored probit model). (Marginal, or partial, effects show the change in the probability of outcome in response to a change in the variable of interest while holding other continuous variables at their means and discrete variables at their modes.[19])

The marginal effects of wealth indicators on remittance probability change dramatically in direction and/or significance from the univariate to the censored model. In the conventional probit model estimates in column 2, the probability of remitting increases by 4 percent if a landless migrant acquires a parcel of land. Similarly, buying a house, and moving out of the no property group, increases an individual's probability of remitting by 3 percent.

Being in the highest land or property group (owning at least 2 parcels of land, and/or at least 2 houses) has no direct effect on the remittance probability in the univariate model. This estimate does not reflect the fact that individuals in the highest wealth categories are in fact more likely to migrate. Put differently, because wealth indicators positively affect migration probability, as displayed in the first column, they exert an indirect positive effect on remittances. When both the direct and indirect effects are taken into account in the integrated model in column 3, the partial effects of the highest land category (2 or more parcels) and the highest property category (2 or more houses) are much larger and significant compared to the univariate model estimates. Moving into the highest land category (2 or more parcels) increases the remittance probability by 9 percent. The marginal effect of owning a single parcel, by contrast, becomes insignificant once migrant selectivity is taken into account. Similarly, acquiring 2 or more houses increases an individual's likelihood of migrating and remitting by 5 percent. Moving into the single house category increases the likelihood by 2 percent.

[19] Coefficients may be misleading because of the nonlinearity of the probit specification, yielding a distorted picture of the response of the outcome to a change in the explanatory variables (Greene 2003). Marginal effects provide a more accurate picture.

Hence, in the censored probit model, and observing the joint probability of migrating and remitting, the marginal effects of the wealth indicators are substantially different than a probit analysis of remittances. These estimates naturally lead to different substantive conclusions. Using a conventional approach, and modeling remittances separately, one finds that medium wealth individuals are the most likely group to send remittances to origin households. This pattern could be attributed to either altruistic or contractual behavior, as both theories make testable predictions about the extremes of the wealth distribution, but not the middle part.

An integrated model of migration and remittances, on the other hand, allows us to make more precise statements. Considering migrant selectivity, I find that the wealthiest individuals in the sample are the most likely group to migrate and send remittances. This finding supports the predictions of the NELM theory that wealthy households send migrants (and receive remittances) as a risk diversification strategy. In fact, this result provides a stronger test of this theory than prior work which modeled individuals' migration outcomes alone, making assumptions about the subsequent remittance behavior. Hence, the integrated model of migration and remittances improves, not only our conclusions about remittances, but also our understanding of the determinants of migration behavior.

The results from the integrated model also suggest that remittance behavior in the Mexican setting is likely to be contractual, as typically defined and measured in the literature. Wealthier households, not only have the incentives to send migrants to hedge against the risks to domestic income as the NELM theory suggests, but they are also able to enforce a contractual arrangement with the migrant using their wealth as a collateral.

Unlike the ambiguous findings from a conventional model, the results based on the integrated model carry direct implications for future patterns of income inequality in sending communities. Before discussing these implications, I provide a number of robustness checks.

Robustness Checks

This study models whether an individual remits or not, a binary outcome, rather than the amount of remittances sent by a migrant. This choice is initially curious, especially given the

focus on economic inequality. For example, although the results show that wealthier individuals are more likely to send remittances, it might be the case that they send very little, while the few poor individuals who migrate remit in large amounts. Such a pattern would cast doubt on the conclusions I draw about inequality. The reason for using the binary remittance outcome as a dependent variable is the potential measurement error in the remittance amount. Studies from other settings show that migrants systematically underreport their remittances, for example to qualify for government funding in Thailand (Garip, 2009). Although there is no evidence that this might be the case in the Mexican data, I take a conservative approach and focus on the binary remittance outcome. To ensure this choice does not affect any of the conclusions, I repeat the analysis using the remittance amount (logged) as the dependent variable in Appendix C and Table A3. The results and main conclusions remain unaltered in this alternative specification.

The reader may also be concerned about the operationalization of wealth categorically. Since land is measured in parcels (ranging from 1 to 4) and properties are measured as counts (ranging from 1 to 6), a continuous indicator is not appropriate. An analysis with continuous indicators (linear and quadratic terms) nevertheless leads to the exact same conclusions as the analysis with categorical variables (available from author upon request). A related concern is the small proportion of individuals in higher wealth categories (about 2 percent for both land and property), which is due to the coarse measurement of these characteristics in the data. Ideally, one would like to draw finer distinctions among people in terms of wealth, in order to better identify its effect on remittance behavior. Household income could be another variable of interest, yet it is measured only in the survey year, and is likely to be subsequent to the remittance decisions. Despite these limitations, as a supplementary analysis, Appendix D provides a descriptive figure (Figure A1) exploring how remittance flows vary across income categories. The results are consistent with those based on the statistical analysis using wealth indicators, and furthers my confidence in the robustness of the conclusions.

A final issue is the potential endogeneity of the variables of interest, specifically household wealth. I assume that the variation in household wealth is exogenous to migration and remittance decisions, which is untenable if wealth is the result of past migration and remittance behavior. The ideal way to discard this possibility would be to find an instrument, a source of

exogenous variation (e.g., an economic shock randomly affecting some communities under study) in household wealth. One could then identify the effect of wealth on migration and/or remittances solely from the differences in exposure to the random shock (Angrist and Krueger, 2001).

Because such an instrument is not available, as an alternative strategy, I lag the household wealth indicators by a year to ensure that wealth is not caused by current migration-remittance decisions. This method does not solve the endogeneity problem if current remittance decisions are correlated with past remittances, which could affect household wealth in the past. Then, as a second strategy, one could restrict the analysis to individuals who are first-time migrants and first migrants in their households. Because such households will be receiving remittances for the first time, the source of the household wealth cannot be past remittances. In our data, the number of observations reduce dramatically (from 5715 to 1180 migrants) under this restriction, hence one cannot draw any significant conclusions.[20]

IMPLICATIONS FOR INEQUALITY

This study seeks to understand how migration-remittance flows shape economic inequalities in origin communities of Mexico. A necessary step is to explore which income or wealth groups in a community receive remittances. The findings show that taking into account migrant selectivity significantly alters our conclusions about how individuals' wealth is related to their remittance behavior. While an isolated analysis of remittances suggests that medium wealth individuals are more likely to remit, an integrated analysis of migration and remittances shows that the wealthiest individuals are the most likely group to migrate and send remittances.

To assess the implications of these findings for inequality in the Mexican case, I explore how remittance probabilities for different wealth groups change over time based on the two alternative perspectives (isolated or integrated) on remittances. I use post-estimation simulations

[20] Even with these checks, concerns for omitted variables would remain: household wealth may be a proxy for unobservable characteristics, such as household entrepreneurial spirit or ability that may also affect migration and/or remittance decisions. This study cannot account for these concerns, which plague all the other empirical studies of migration to date. There is an urgent need for studies that can establish the causal link between wealth and migration, which is out of the scope of the present study due to data limitations.

to compute the predicted probabilities, and also to construct confidence intervals around them that reflect the estimation uncertainty. Predicted probabilities for three levels of land ownership are generated across the entire range of time, while holding other variables at their means.[21]

--[Figure 3]--

The results are shown in Figure 3 for the probit model of remittances, which ignores migrant selectivity. The probability of remitting increases for all land groups steadily over time. The remittance probabilities for no land and high land groups are not distinguishable (i.e., the confidence bands overlap) but are lower than the remitting probability of the group with medium land. The uncertainty associated with predicted probabilities are highest for the high land group, as the vertical bars representing the confidence intervals are longest. Focusing only on the mean predicted probabilities, one observes that the medium land category is the most likely to receive remittances, followed by the no land and high land groups respectively. The results based on the property indicators are identical, hence not shown.

These results, based on the conventional model of remittances, lead to ambiguous conclusions about the likely trends in wealth inequality among households in migrant-sending communities of Mexico. The disparities among households with wealth are likely to decline, as the medium-wealth group sends higher rates of remittances compared to the high-wealth group. Yet, the inequality between households with and without wealth is likely to increase, since medium-wealth individuals are the more likely senders of remitters compared to those with no wealth. The trends in the overall inequality depend on the net effect of these two opposing forces.

--[Figure 4]--

Figure 4 displays the predicted probabilities for the three land groups based on the integrated model, which controls for migrant selectivity. The results show that the estimated probabilities for each land group are lower compared to those in Figure 3. This outcome is expected because

[21] The simulation procedure for the probit model is implemented in the statistical software *Clarify* (King, Tomz and Wittenberg, 2000). I implemented the simulation algorithm for the censored probit model in STATA, and the code is available for the interested readers upon request.

the joint probability of migrating and remitting is considered in Figure 4 instead of the conditional probability of remitting alone. The trends for migration probabilities are more distinct across the three land groups, compared to the patterns in the preceding figure. Namely, the wealthiest individuals are indisputably the most likely group to migrate and send remittances. The predicted probabilities for households with medium wealth and those with no wealth are undistinguishable, but significantly lower than the probability for the wealthiest category, especially in the later periods.

These results from the integrated model carry dramatically different implications for trends in inequality, compared to the ambiguous conclusions provided by the isolated model of remittances. Because the wealthiest individuals are more likely to send remittances, the income (or wealth) inequality among households is likely to increase over time.

This link between migration-remittance flows and inequality trends is congruent with the theoretical elaboration. The NELM theory suggests that wealthy households send migrants in order to receive remittances and hedge against potential risks to domestic income. The remittances sent by these individuals from wealthier households are classified as contractual behavior. If this is the dominant strategy in a community, inequalities among households are likely to increase. All of these expectations were confirmed in the empirical analysis in the Mexican case. More importantly, as initial descriptive analysis demonstrated (Table 1 and Figure 1), the income inequalities are indeed much higher in communities with high levels of migration prevalence in Mexico. The theoretical and empirical analyses presented in this paper suggest one mechanism that may account for these increasing patterns of inequality. This mechanism operates at the micro level, through the selection of individuals into migrant streams, but creates macro-level income disparities among households by shaping remittance flows.

CONCLUSION

In a period when inequalities between countries have reached a “great plateau,” understanding the disparities within countries became crucial to predict future trends in global inequality (Firebaugh, 1999, 2000). Despite their growing magnitude and importance for the developing

regions of the world, remittance flows have not been considered as an integral component of within-country inequalities. This study focused on the largest contemporary migration flow in the world from Mexico, a country located in one of the most unequal regions and a major recipient of remittance flows, to the United States.

I explored the distributional impact of migration-remittance flows in 118 communities of Mexico by asking two related questions: Where in the wealth distribution are migrants drawn from? Which wealth groups within migrants send remittances? Answering these questions required first establishing a conceptual link between theories of migration and theories of remittances. I connected the Neoclassical and New Economics of Labor Migration (NELM) perspectives of migration to altruistic and contractual explanations of remittances, to derive expectations about how individuals' wealth status affects their migration-remittance behavior, and to draw implications for future trends in inequality.

This theoretical connection helped address the methodological problems in prior work. Most empirical work in the literature models migration and remittances separately, treating them as independent processes. Because remittance behavior is only observed among migrants, a non-random segment of the population, the determinants of remitting can be confounded with the selection process into the migrant sample. To address this problem, I presented an integrated statistical model, which treated migration as a mechanism for selection in a censored bivariate specification of remittances.

Comparing the results from the integrated model to a conventional isolated model of remittances led to dramatically different conclusions about the determinants and distributional impact of remittances. Using a conventional approach, and modeling remittances separately, the results suggested that medium wealth individuals are the most likely group to send remittances to origin households, providing mixed support for the altruistic or contractual theories of remittances. These results also failed to provide a clear direction for the future trends in inequality as a result of remittances. Considering migrant selectivity in an integrated model, on the other hand, I found that the wealthiest individuals are the most likely migrants and remitters. This finding supported the NELM theory of migration and the contractual explanation of remittances. It also implied increasing disparities between the wealthy and the poor as a result

of remittances, matching the empirical observations of increasing inequality with greater migration prevalence in Mexican communities.

In sum, the integrated model of migration and remittances gave substantially more meaningful and accurate results than a conventional isolated analysis of remittances, and also improved the forecasts related to inequality. These results showed that, conceptually and empirically, migration and remittance decisions are related processes, and underlined the need for more theoretical work to link the disparate explanations for the two outcomes.

By connecting migrant selectivity to remittances, this study also uncovered the individual-level mechanisms that account for macro-level trends in inequality outcomes. This strategy differed from the mainstream approach to study inequality, which involves a focus on macro-level economic indicators, rather than individuals, to study patterns of inequality.

The methods of this paper are potentially applicable to other questions where behavior is observed for a limited proportion of the population. Despite its pervasiveness in sociological data, the issue of sample selection is often neglected by sociologists (Berk, 1983; Stolzenberg and Relles, 1997; Winship and Mare, 1992). This study showed the theoretical and empirical importance of sample selection in the context of the distributional impact of remittance flows. Similar questions, asked by students of stratification specifically, could benefit from focusing on individuals or households and considering the theoretical and empirical implications of selectivity.

To conclude, the increasing inequality observed in the migrant-sending communities of Mexico identified in this paper points to the need to think critically about the implications of remittances. Researchers and policy makers have consistently emphasized the positive and multiplier effects of remittances for receiving countries. Yet, as this study suggests, remittances may also have enormous disruptive effects on the income or wealth distribution in a country. To determine the overall implications of remittance flows, it is necessary to weight their positive effects on the average income by the negative distributional impact that potentially leads to increased income inequality.

APPENDIX

(A) Additional Analysis of the Exogeneity of Distance as an Instrument

Although distance does not seem to have a direct effect on remittance outcomes, it might still affect remittances indirectly through its correlation with the unobserved determinants of remittances. For example, due to proximity, migrants from close communities may frequently visit and maintain ties to their origin households or communities. These migrants may eventually become more likely to support their families through remittances, or invest in their origin communities. This implies a positive correlation between the distance indicator and the errors from the remittance equation, and renders the exogeneity assumption questionable. To discard this possibility, I included an indicator of migrant's trips to the village in the remittance equation, which obtained a small and insignificant coefficient (see Table 5). I also used an alternative dependent variable, whether a migrants brings back savings upon return (excluding monthly-sent remittances). This outcome is less likely to have a positive correlation with distance, compared with monthly remittances, as it only requires a single trip by the migrant to transfer the funds. The results (available upon request) remained unaltered.

As a final check of the exogeneity assumption, I used an insight provided in Figure 2, which showed stronger effects of distance on the migration of individuals with lower propensities to migrate. Studies show that having family ties to prior migrants increases individuals' likelihood of migrating (Palloni at al., 2001). Therefore, individuals who do not have any family ties to prior migrants should be less likely to migrate, and their migration propensities should be more negatively affected by distance to U.S. border. It is possible to use the interaction between family ties to prior migrants (measured by the number of U.S.-migrant siblings) and distance as an instrument in the migration equation. We can then include the distance indicator in the remittance equation, and hence relax the exogeneity assumption. The maintained assumption in this identification strategy is that the direct effect of distance to the border on remittances does not vary by individual's or family's prior migration experience. The resulting estimates displayed in the Appendix Table A1 provide no evidence against the hypothesis that distance is an exogenous determinant of remittances. The coefficient estimates for wealth indicators, our main variables of interest, based on the interaction of prior experience and distance as an

instrument are similar to the estimates based on instrumenting on distance alone, presented in Table 5.

--[Table A1]--

(B) Alternative Specifications to Heckman-type Censored Bivariate Probit Model

Table A2 presents the coefficients for wealth indicators estimated by the Sartori specification (Sartori, 2003). Unlike the Heckman-type model, this specification does not require an exclusion restriction (that is, distance indicator can be included in both migration and remittance equations), but instead assumes a perfect positive correlation between the errors from the migration and remittance models. The coefficients for low land (1 parcel) and low property (1 house) indicators are similar to those given by the Heckman model (Column 3, Table 5). The coefficient for the high land (2 or more parcels) is significant and larger in magnitude compared to that in Table 5. This is due to the assumption of the Sartori model that errors from migration and remittance equations are identical. Specifically, high land indicator has a large and significant effect on migration (column 1 of Table 5). Because Sartori model assumes perfect correlation of errors, this large effect also presents itself in the remittance equation of Table A2. Apart from this difference, Sartori and Heckman models provide consistent results, suggesting that the patterns observed are not particular to my choice of specification.

--[Table A2]--

(C) Alternative Specifications – Modeling Remittance Amount Using a 2SLS Specification

My strategy to model the remittance amount mirrors the analyses for the binary remittance outcome displayed in Table 6. I begin with a conventional approach: Focusing on migrants alone and ignoring selectivity, I estimate an ordinary least squares (OLS) model of remittance amount using the same set of independent variables as in Table 6. The second, integrated approach, takes into account migrant selectivity, and estimates a Heckman-type two-stage least squares (2SLS) model. The resulting marginal effects for the wealth indicators are displayed in the respective columns of Table A3. The OLS estimates in the first column suggest that

individuals in the medium wealth group (owning 1 parcel of land and/or 1 parcel of property) send higher amounts of remittances. The integrated 2SLS model estimates, on the other hand, show that individuals from the wealthiest group send higher amounts of remittances. These patterns are identical to those given in the binary models of remittances (Table 6). Hence, I conclude that the results are robust to the choice of a binary or continuous indicator of remittances.

--[Table A3]--

(D) Establishing the Relationship between the Remittance Amount and Household Domestic Income

This descriptive analysis seeks to explore how the amount of remittances varies by household head's domestic income. Household income is measured only in the survey year, and hence follows migration or remittance decisions, rather than preceding them in time. Hence, the statistical analysis is limited to household wealth indicators alone. The shortcoming of wealth indicators is that they are measured as counts in the data, and have limited variation. Here, I use household income, making the assumption that it is stable over time, to see if similar patterns that are observed between wealth and remittances are also discovered in the relationship between income and remittances. Specifically, I compute quintiles of household income, and observe the distribution of remittance amounts across the quintiles. The resulting box plot in Figure A1 shows that remittance amount continually increases with households' domestic income. This pattern is in congruence with the findings from the statistical analysis suggesting that that the wealthiest group is the most likely to send remittances to origin households.

--[Figure A1]--

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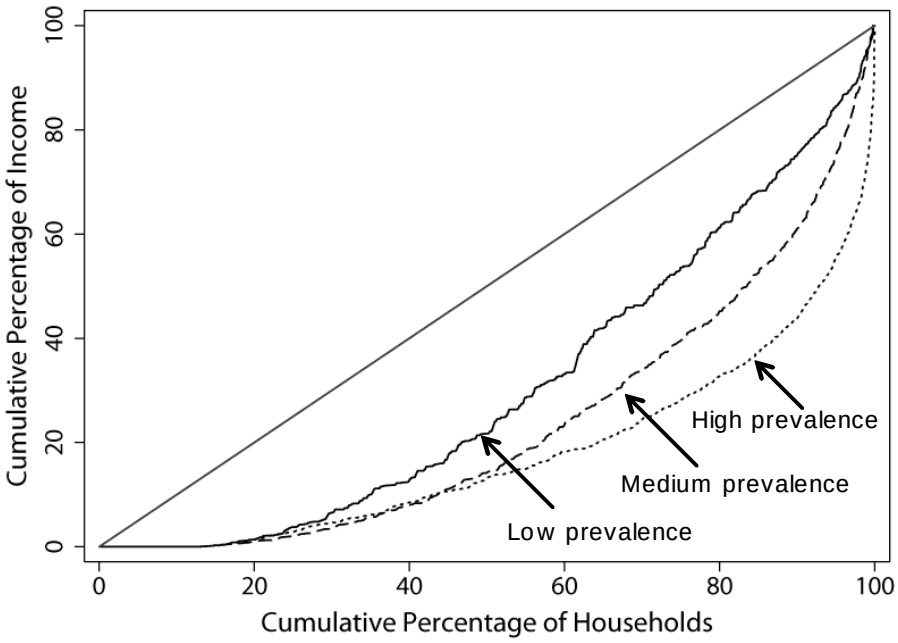
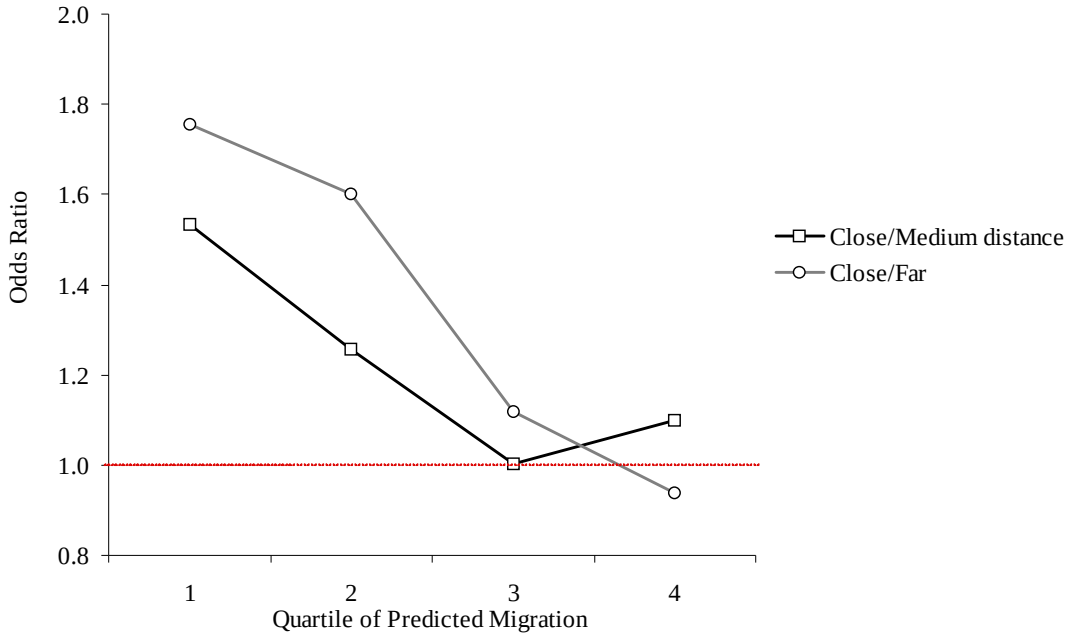
FIGURES AND TABLES

Figure 1. Lorenz Curves for Household Income by Community Migration Prevalence, Mexico



Source: Author's calculations based on Mexican Migration Project Data, 1982-2006.

Figure 2. Odds Ratios of Migration by Distance to the U.S. Border across Quartile of Predicted Migration



Note: Prediction equation does not contain distance indicators and is fit to subsample of far villages to the border (>750 km).

Figure 1. Probit Model Estimate of the Probability of Remitting by Household Land

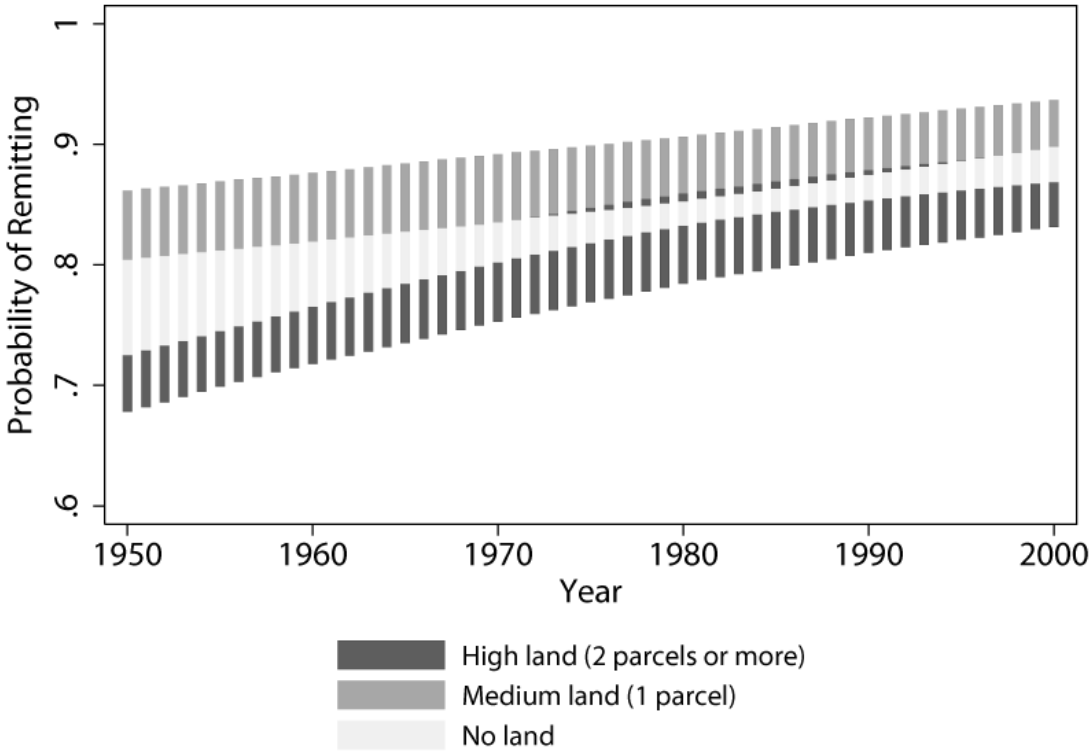


Figure 2. Censored Bivariate Probit Model Estimate of the Probability of Migrating & Remitting by Household Land

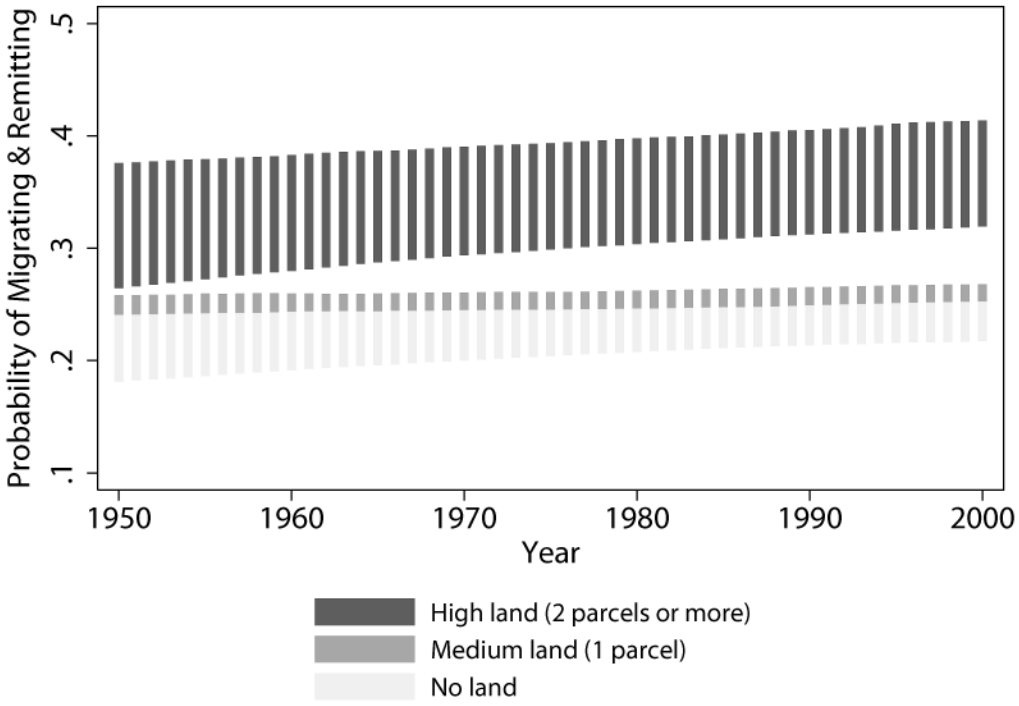


Table 1. Migration Theories' Predictions about Characteristics of Migrants, Nature of Remittance Behavior and Trends in Within-Community Inequality

	Migration Theories	
	Neoclassical	New Economics of Labor Migration
Characteristics of migrants	Low wealth	Middle/High wealth
Nature of remittance behavior	Altruistic	Contractual
Trends in within-community inequality	Decline	Increase

Table 2. Wealth and Income Inequality Measures by Migration Prevalence, Mexico

	Migration Prevalence		
	Low	Medium	High
Income			
Gini	0.46	0.53	0.57
Coefficient of Variation	1.33	1.53	1.67
Std dev of logarithms	2.07	2.31	2.60
Land owned			
Gini	0.91	0.91	0.88
Coefficient of Variation	6.08	5.34	4.22
Std dev of logarithms	0.53	0.63	0.83
Property owned			
Gini	0.17	0.21	0.24
Coefficient of Variation	0.44	0.50	0.57
Std dev of logarithms	0.24	0.27	0.31
Number of individuals	6717	6613	6396

Source: Author's calculations from the Mexican Migration Project data (1982-2006).

Table 3. Sample Characteristics for the Overall Sample, Subset of Migrants and Subset of Remitters

Variable	All	Migrants[a]	Remitters[b]
Household wealth			
No land (%)	87.5	84.3	83.3
Land owned: 1 parcel (%)	10.2	11.7	12.7
Land owned: 2 or more parcels (%)	2.3	4.1	3.9
No properties (%)	56.2	52.5	49.6
Properties owned: 1 house (%)	42.0	44.0	47.0
Properties owned: 2 houses or more (%)	1.8	3.5	3.4
Demographic characteristics			
Age (mean)	33.4	33.3	33.7
Sex (Male=1) (%)	86.5	96.1	97.2
Primary education or less (%)	16.8	17.8	16.9
Secondary education (%)	8.8	6.8	6.2
Advanced education (%)	5.2	2.4	2.1
Spouse in Mexico? (%)	64.1	68.1	71.5
Spouse in the U.S.? (%)	2.2	6.8	5.5
Number of children under 18 (mean)	2.1	2.4	2.5
Prior migration experience			
Trips by individual (mean)	0.9	2.8	2.9
Parents U.S. migrants? (%)	11.2	23.3	22.5
Number of U.S.-migrant siblings (mean)	0.6	1.3	1.3
Proportion ever migrated in community (mean)	0.1	0.2	0.2

(continued)

(Table 3, continued)

Variable	All	Migrants[a]	Remitters[b]
Distance			
Kilometers to U.S. border (mean)	618.6	629.5	632.9
Community Characteristics			
Live in a metropolitan area? (%)	25.2	13.6	11.4
Live in a small urban area? (%)	23.9	27.9	27.9
Live in a town? (%)	29.8	32.1	32.6
Live in a rancho? (%)	21.0	26.5	28.0
Migrant's ties to origin household			
Have documentation in the U.S.? (%)		38.8	36.3
Years since migrated (mean)		3.1	2.4
Proportion of remitters in community (mean)		0.03	0.03
Migrant's Occupation			
Unemployed (%)		2.6	1.5
Agriculture (%)		35.2	37.4
Manufacturing (%)		39.3	39.0
Service (%)		20.9	20.5
Migrant's Destination			
Northeast (%)		3.3	3.3
Midwest (%)		12.1	12.6
South (%)		21.4	22.4
West (%)		63.2	61.5
N	18658	5715	4738

[a] Means for migrants and nonmigrants (not shown) differ significantly ($p<.05$) for all variables except the indicator for age.

[b] Means for remitter and non-remitter migrants (not shown) differ significantly ($p<.05$) for all variables except the indicators for land owned (2 parcels or more), property (2 or more houses), number of U.S.-migrant siblings, community type (small urban area), manufacturing worker and service worker.

Table 4. Estimates of the Effect of Village Distance to District on Migration and Remittances - Probit coefficients (standard errors)[a]

Variable	Migration		Remittances		
	(1)	(2)	(3)	(4)	(5)
Distance					
Kilometers to U.S. border (in 1000 kms)	-0.21 ** (0.04)	-0.24 ** (0.05)	-0.09 (0.09)	-0.10 (0.09)	-0.16 (0.10)
Household wealth, demographic characteristics, prior migration experience	no	yes	no	yes	yes
Migrant's ties to origin household, occupation and destination	-	-	no	no	yes
N	18658		5715	5715	5715
R^2	0.03	0.23	0.02	0.08	0.13

**p<.01, *p<.05.

[a] The dependent variable in columns 1 and 2 is whether a person is a migrant in a given year. The dependent variable in columns 3-5 is whether a migrant has sent remittances to his or her household. All models include a linear year term and three indicators of community type (small urban, town and rancho - metropolitan area is the reference category). Including year fixed-effects does not alter any of the coefficients.

Table 5. Estimates of the Effect of Household Wealth on Migration and Remittances - Probit coefficients (standard errors)[a]

Variable	Migration (1)		Remittances (2)		(3) Selection bias corrected[b]	
Household wealth						
Land owned: 1 parcel	-0.01		0.20	*	0.19	*
	(0.04)		(0.08)		(0.08)	
Land owned: 2 parcels or more	0.42	**	-0.03		0.01	
	(0.07)		(0.11)		(0.11)	
Properties owned: 1 house	0.003		0.14	**	0.14	**
	(0.03)		(0.05)		(0.05)	
Properties owned: 2 houses or more	0.29	**	-0.07		-0.06	
	(0.09)		(0.12)		(0.12)	
Demographic characteristics						
Age	0.07	**	0.01		0.02	
	(0.01)		(0.02)		(0.02)	
Age squared/100	-0.09	**	-0.02		-0.03	
	(0.01)		(0.02)		(0.02)	
Sex (Male=1)	0.90	**	0.47	**	0.58	**
	(0.04)		(0.10)		(0.12)	
Spouse in Mexico?	0.01		0.13	*	0.13	*
	(0.03)		(0.06)		(0.06)	
Spouse in the U.S.?	2.29	**	-0.36	**	-0.21	
	(0.14)		(0.08)		(0.13)	
Secondary education	-0.27	**	-0.05		-0.08	
	(0.04)		(0.08)		(0.08)	
Advanced education	-0.75	**	-0.12		-0.19	
	(0.06)		(0.13)		(0.13)	
Number of children under 18	-0.003		0.03	*	0.03	*
	(0.01)		(0.01)		(0.01)	
Prior migration experience						
Trips by individual[c]			0.01		-0.01	
			-(0.01)		(0.01)	
Parents U.S. migrants?	0.42	**	0.06		-0.03	
	(0.04)		-(0.03)		(0.06)	
Number of U.S.-migrant siblings	0.30	**	0.01		0.02	
	(0.01)		(0.02)		(0.02)	
Proportion ever migrated in community	1.90	**	0.19		-0.11	
	(0.01)		-(0.11)		(0.23)	

(continued)

(Table 5, continued)

Variable	Migration (1)		Remittances (2)		(3) Selection bias corrected[b]	
Distance						
Kilometers to U.S. border	-0.25	**				
	(0.05)					
Community Characteristics						
Live in a small urban area?	0.37	**	0.24	**	0.28	**
	(0.03)		(0.07)		(0.07)	
Live in a town?	0.39	**	0.28	**	0.32	**
	(0.03)		(0.07)		(0.07)	
Live in a rancho?	0.44	**	0.36	**	0.40	**
	(0.04)		(0.08)		(0.08)	
Migrant's ties to origin household						
Have documentation in the U.S.?			-0.19	**	-0.19	**
			(0.05)		(0.05)	
Years since migrated			-0.03	**	-0.03	**
			(0.00)		(0.00)	
Proportion of remitters among migrants in community			1.28	*	1.27	*
			(0.50)		(0.50)	
Migrant's Occupation						
Agriculture			0.96	**	0.95	**
			(0.10)		(0.10)	
Manufacturing			0.78	**	0.77	**
			(0.10)		(0.10)	
Service			0.78	**	0.77	**
			(0.10)		(0.10)	
Other			0.47	*	0.46	*
			(0.22)		(0.21)	

(continued)

(Table 5, continued)

Variable	Migration (1)	Remittances (2)	(3) Selection bias corrected[b]
Migrant's Destination			
Midwest		0.28	0.28 *
		(0.14)	(0.14)
South		0.07	0.08
		(0.13)	(0.13)
West		-0.04	-0.03
		(0.13)	(0.13)
Year	-0.001	0.01 **	0.01
	(0.001)	(0.00)	(0.00)
Intercept	-1.38 **	-19.33 **	-19.90
	(1.78)	(4.29)	(4.26)
			0.18
N	18658	5715	5715
R^2	0.23	0.13	-

**p<0.01, *p<0.05.

[a] The dependent variable in column 1 is whether a person is a migrant in a given year. The dependent variable in columns 2 and 3 is whether a migrant has sent remittances to his or her household. dependent variable in columns 3-5 is whether a migrant has sent remittances to his or her household. Reference individuals are those with no land, no property, living in a metropolitan area, and if migrants, unemployed in destination. All models include a linear year term and three indicators of community type (small urban, town and rancho - metropolitan area is the reference category). Including year fixed-effects does not alter any of the coefficients.

[b] In column 3, the specification is a bivariate probit of migration and remittances where the exclusion restriction is the distance indicator.

[c] Individual trips predict migration almost perfectly (89% of individuals with prior trips migrate), hence are not included.

Table 6. Estimates of the Marginal Effect of Household Wealth on Remittances [a]

	Univariate Probit		Univariate Probit		Censored Probit[b]	
	Δ P(Migrate)		Δ P(Remit|Migrate)		Δ P(Migrate&Remit)	
Household wealth						
Land owned: 1 parcel	-0.003		0.04	**	0.02	
	(0.012)		(0.01)		(0.01)	
Land owned: 2 parcels or more	0.15	**	-0.01		0.09	**
	(0.03)		(0.03)		(0.02)	
Properties owned: 1 house	0.001		0.03	**	0.02	*
	(0.009)		(0.01)		(0.008)	
Properties owned: 2 houses or more	0.10	**	-0.02		0.05	*
	(0.03)		(0.03)		(0.03)	
N	18658		5715		18658	

**p<0.01, *p<0.05.

[a] Marginal effects show the change in probability when a wealth dummy changes from 0 to 1. Continuous variable are kept at their mean, and binary variables are kept at their mode. The dependent variable is whether a migrant has sent remittances to his or her household. Both models include indicators of household wealth, demographic characteristics, prior migration experience, migrant's ties to origin household, occupation, destination and year.

[b] The specification is a bivariate probit of migration and remittances where the exclusion restriction is the distance indicator.

APPENDIX
FIGURES AND TABLES

Figure A1. Distribution of Remittance Amount (in 2000 US$) By Quintile of Household Domestic Income

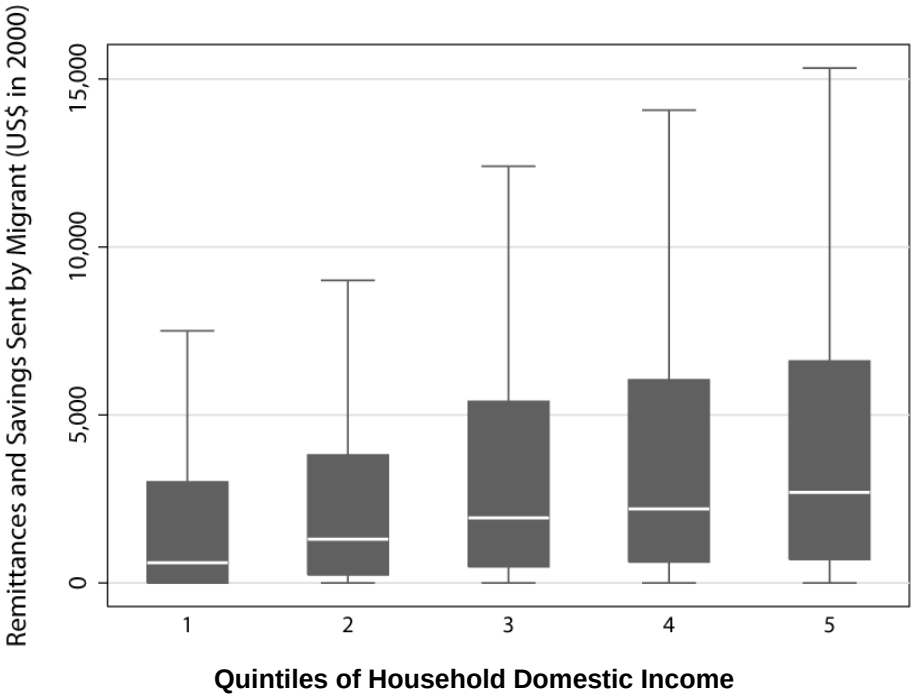


Table A1. Estimates of the Effect of Household Wealth on Remittances Using Interaction of Distance and Number of U.S.-migrant Siblings as Exclusion Restriction - Probit coefficients (standard errors)[a]

Variable	Migration	Remittances[b]	
	(1)	(2)	(3)
Distance			
Kilometers to U.S. border	-0.31 **	-0.16	-0.19
	(0.05)	(0.11)	(0.10)
Kilometers to U.S. border *No. of U.S.-migrant siblings[c]	0.14 **	-0.001	-
	(0.04)	(0.05)	
Household Wealth			
Land owned: 1 parcel	-0.01	0.19	0.19 *
	(0.04)	(0.08)	(0.08)
Land owned: 2 parcels or more	0.42 **	-0.03	0.02
	(0.07)	(0.11)	(0.11)
Properties owned: 1 house	0.004	0.14	0.14 **
	(0.03)	(0.05)	(0.05)
Properties owned: 2 houses or more	0.28 **	-0.06	-0.04
	(0.09)	(0.12)	(0.12)
			0.21 *
N	18658	5715	5715
R^2	0.23	0.13	-

**p<.01, *p<.05.

[a] The dependent variable in columns 1 and 2 is whether a person is a migrant in a given year. The dependent variable in columns 3-5 is whether a migrant has sent remittances to his or her household. All models include indicators for demographic characterstics, prior migration experience, community characteristics and year. Model in column 1 additionally includes indicators for distance to district. Models in columns 2 and 3 include indicators for migrants' ties to origin households, occupation and destination.

Table A2. Estimates of the Effect of Household Wealth on Remittances with No Exclusion Restrictions (Sartori Model) - Probit coefficients (standard errors)[a]

Variable	Migration (1)	Remittances (2)
Household Wealth		
Land owned: 1 parcel	0.10 **	0.14 **
	(0.04)	(0.04)
Land owned: 2 parcels or more	0.52 **	0.37 **
	(0.07)	(0.07)
Properties owned: 1 house	0.02	0.07 **
	(0.02)	(0.02)
Properties owned: 2 houses or more	0.14	0.11
	(0.08)	(0.08)
Distance	yes	yes
Demographic characteristics, prior migration experience	yes	yes
Migrant's ties to origin household, occupation and destination	-	no
Ξ		1.00 (assumed)
N	18658	5715
R^2	-	-

**p<.01, *p<.05.

The dependent variable in column 1 is whether a person is a migrant in a given year.

[a] The dependent variable in column 2 is whether a migrant has sent remittances to his or her household. All models include a linear year term and three indicators of community type (small urban, town and rancho - metropolitan area is the reference category).

Table A3. Estimates of the Marginal Effect of Household Wealth on the Amount of Remittances (in log scale)[a]

	OLS		Heckman[b]	
	E(Remit|Migrate)		E(Remit)[c]	
Household wealth				
Land owned: 1 parcel	0.32	*	0.08	
	(0.14)		(0.07)	
Land owned: 2 parcels or more	-0.02		0.67	**
	(0.22)		(0.15)	
Properties owned: 1 house	0.36	**	0.10	*
	(0.10)		(0.05)	
Properties owned: 2 houses or more	0.07		0.44	**
	(0.24)		(0.17)	
N	5715		5715	

**p<0.01, *p<0.05.

[a] Marginal effects show the change in expected value when a wealth dummy changes from 0 to 1. Continuous variable are kept at their mean, and binary variables are kept at their mode. The dependent variable is the logarithm of total remittances sent by migrant in constant 2000 US$.

[b] The specification is a two-stage least squares model of remittance amount corrected for selection into migration where the exclusion restriction is the distance indicator.

[c] Remittance amount is assumed zero for non-migrants.