Impact of Remittances on Poverty in Mexico

Working Paper
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Abstract

This paper investigates the impact of remittances on poverty in Mexico across time. In order to do this we estimate the marginal impact of remittances on all three Foster-Greer-Thorbecke measures of poverty. We conduct our analysis using two separate sources of data: nationally representative INEGI ENIGH survey data and data derived from the Progresa/Oportunidades conditional cash transfer program for the poorest of the poor. The impact of remittances on poverty in a particular year depends both on the number of poor families receiving remittances in that year and on the amount of the remittance. We attempt to separate both components by conducting our analysis separately for households receiving remittances. Despite being much smaller in amount we find that internal remittances often have a larger impact on poverty than remittances from abroad due to their higher prevalence across families.

Introduction:

In an increasingly globalized world, a growing slice of a country's population lives abroad. Between 1995 and 2000, individuals living outside of their home countries grew from 2.2% to 2.9% of the world's population which amounts to about 180 million people (UN 2002). A large percentage of these individuals immigrate to improve living conditions for themselves and for those at home. International remittances sent back home by migrants have an enormous impact on the developing countries of Asia, Africa, Latin America, and the Middle East (Adams and Page 2005). In fact, official international remittances totaled $79 billion in 2002, far exceeding total official development aid ($51 billion) (Yang and Martinez 2005). Remittances also serve as an important source of foreign exchange reserves for developing countries, making them an increasingly important result of enhanced global economic integration.

But international migration hardly captures the entire story. A far greater number migrate from rural to urban areas within their own country, ostensibly in search of higher
wages and a better quality of life. As developing countries modernize, urban areas expand rapidly as labor shifts from agriculture to manufacturing and services. The proportion of urban population worldwide has risen from 13% (220 million) in 1900 to 49% (3.2bn) in 2005 (UN). Undoubtedly, rural to urban migration was an important cause of this massive transformation.

Both internal and international migration are commonplace in modern day Mexico. According to the World Bank’s Migration and Remittances Factbook, there are over 11.5 million international immigrants from Mexico amounting to over 10% of its population. Most Mexican migrants immigrate to the United States (where they form the largest immigrant group), followed by Canada and Spain. Migration had an especially important impact on rural Mexico. Between 1990 and 2002, the share of Mexico's rural population working in the United States rose from 7% to 14% (Taylor et al. 2005). International remittances are a substantial source of income for Mexico amounting to about 3% of Mexico’s GNI in 2006. A significant and rising number of Mexican households benefit from these funds. According to census information for the year 2000, about 4.4% of households received remittances (López-Córdova). The increase in remittances is particularly striking for rural households – household surveys show that the fraction of rural families receiving remittances rose from 6.2% in 1992 to 12.6% in 2002 (Ibid).

Moreover, besides remittances from abroad, internal transfers within Mexico, mostly from urban to rural areas, accounted for a large share of family earnings. Internal migrants accounted for 15% of Mexico's rural population (Ibid). For the purposes of this paper, remittances from abroad will be referred to as external remittances while transfers
to family members from within Mexico are referred to as internal remittances.

**Literature Review:**

Despite the overwhelming importance of migration to both Mexico and the United States, relatively little is known about the impact of remittances on poverty in Mexico. There is, however, a significant body of literature on the impact of remittances on poverty in other sending countries/regions. For example, Adams (1991) describes the effect of international remittances on poverty in rural Egypt. To estimate the effect of remittances on poverty he first predicts what factors are related to a decision to work abroad, and then uses household indicators, including land ownership, education levels, number of males of working age within the family, and so on, to predict income net of remittances, finally adding a migration dummy to predict income including remittances. He finds that remittances reduce head count poverty by just under 10% in rural Egypt.

A large amount of academic discourse focuses on the selection bias, i.e. does migration tend to occur more among wealthier families that may be more mobile, or among the poorer who have a lower opportunity cost of migration. Scholars disagree about the direction of the selection bias with respect to migration, and thus indirectly with respect to remittances. Contrary to some scholarly work (Stahl 1982, Lipton 1980), which argues that migration (particularly to a foreign country) is an expensive venture and therefore only accessible to economically better-off households, Stark and Taylor (1989) find that in rural Mexico relatively deprived households are more likely to engage in international migration than are better-off households. Adams (2004) finds that there is little selection bias with respect to families belonging to either the having 'migrant' or
'non migrant' categories. That is, migrant and non-migrant families are fairly randomly selected.

In a cross-country survey, Adams and Page (2005) find that remittances have a strong and statistically significant impact on reducing poverty in the developing world. Using a counterfactual methodology and instrumenting for the possibility of international remittances being endogenous, the authors find that a 10% increase in per capita official international remittances leads to a 3.5% decline in the percentage of people living in poverty.

Taylor, Mora and Adams (2005) focus on the impact of a change in remittances on the three Foster-Greer-Thorbecke poverty measures. Using national sample survey data from Mexico in 2002, they find that a 10% increase in international remittances causes a 0.53% decrease in the Poverty Gap Squared measure (described below) while a 10% increase in internal remittances causes only a 0.30% decrease in that poverty measure. They also analyze their results on a geographical region–by-region basis and find large variations across regions. While a 10% increase in international remittances reduces poverty by 1.64% in the West-Center region, the same increase causes only a 0.11% in the South-Southwest region of Mexico.

Our contribution analyzes the case of Mexican remittances and replicates the methodology of Taylor, Mora and Adams, but with some key differences. First, instead of estimating changes caused by a 10% increase in remittances we increase remittances by only 1%, in order to capture the real marginal effect of remittances on poverty. Second, while Taylor, Mora and Adams focused on cross-regional differences, analyzing data from a single year, our work analyzes the effect of remittances across a number of years.
Finally, we compare and contrast results obtained from two separate household datasets – the INEGI ENIGH national sample survey dataset as well as data from the Progresa/Oportunidades conditional cash transfer program, which targets poorer families in the seven relatively poor states that are close to Mexico City.

**Data Sources:**

The dataset from INEGI (Instituto Nacional de Estadística Geografía y Informática) is derived from the nationally representative Mexican National Survey of Income and Education (ENIGH). The data used, is obtained from biennial surveys from 1992 to 2004 and an additional 2005 survey. The sampling design of the ENIGH guaranties a representative cross-section of Mexico at the national level. Only the rural sector is included in our analysis, which is defined as localities with not more than 2,500 inhabitants. The ENIGH dataset deployed has about 5000 rural households for each sample year ranging from 3,306 in 2000 to 6,354 in 2005. These included households from all 32 states.

One potential concern with the ENIGH data is the phrasing of the questions we use to calculate internal and external remittance receipts. What we call a remittance is recorded in the ENIGH survey as “income coming from other countries” in the case of external remittances and “income coming from other parts of Mexico” in the case of internal remittances. Moreover, the ENIGH survey is completely lacking in information about migrants from the household. This makes it difficult for us to analyze the relationship between the prevalence of migration and the impact of remittances on
poverty in a given year.

The *Progresa/Oportunidades* data is derived from villages included in the first round of the *Progresa/Oportunidades* conditional cash transfer program that began in Mexico in early 1998. Under the program, the national government of Mexico gives cash to households with children in both rural and semi-urban areas on the condition that the children attend school and visit health clinics for inoculations. Localities were included in the program based on their high level of marginality as well as logistical and financial conditions. The Progresa data is from 505 localities that were identified as some of the poorest regions in 7 states near the capital, Mexico City. Only rural localities were included in our dataset. All values were inflated/deflated to 2002 peso levels for the ENIGH data and to 1997 levels for the *Progresa* data.

The representative nature of selection for the ENIGH data meant that households in the ENIGH dataset tended to have much higher per capita income and education levels than those in the *Progresa/Oportunidades* dataset. While the average per capita household income for the *Progresa* data was 16.48 Pesos per capita per day (which in 2002 Pesos amounts to 27.25 Pesos per capita per day), the average per capita income for the ENIGH data was 48.4 Pesos per capita per day. Families in the ENIGH dataset were much more likely to receive external remittances than families in the *Progresa/Oportunidades* dataset, with 9.41% of families in the ENIGH dataset receiving foreign remittances while only about 1.7% of families in the *Progresa* dataset received such remittances. While 15.97% of households in the ENIGH dataset received internal remittances, only 2.18% of households in the *Progresa* dataset received internal remittances. Average internal and external remittances are also much lower for families in
the *Progresa* than in the ENIGH dataset. More detailed summary information is presented shown in Tables 1 and 2 in the appendix.

Both the INEGI and *Progresa* data offer detailed income source information. For both datasets, total household income, including transfers, financial income, government aid, income from jobs and tertiary activities etc., is used for our analysis. Three poverty lines are used for the analysis based on values given by Mexico's Secretaría de Desarrollo Social (SEDESOL): 28.1 pesos per capita per day, which is defined as the 'Heritage Poverty' line for rural areas and includes a basket of basic food, housing, health, public transport and education, 18.9 pesos per capita per day or the 'Capabilities poverty' line which includes just food, housing and education and 15.4 pesos per capita per day which is defined as the 'Nutrition or food poverty' line. These poverty lines are in 2000 Pesos and were inflated/deflated according to the year of analysis.

**Theory:**

The impact of remittances on poverty depends heavily on the demographic group within a society that is at the receiving end of the transfer. The optimistic view with respect to remittances and poverty argues that remittances enhance income by shifting people from low-income, low-productivity areas to a higher income area characteristic of an urban or foreign economy. The pessimistic view is that poor households have limited liquidity and are thus unable to have access to migration. In this scenario, remittances and migration will benefit those already in a relatively higher income stratum, doing little to affect absolute poverty in rural areas.
The poverty measures we use consist of the Foster-Greere-Thorbecke (hereafter FGT) poverty index (1984).

The FGT poverty measure is defined as:

$$
FGT_{\alpha} = \frac{1}{N} \sum_{i=1}^{H} \left( \frac{z - y_i}{z} \right)^\alpha
$$

(1)

Where $N=$Total number of households, $z$ is the poverty line, $H$ is the total number of households living under the poverty line, and $y_i$ represents the income of a family below the poverty line.

The three variants (depending on three values of $\alpha$) of the poverty index used to estimate the impact of changes in remittances on poverty are:

1. The Headcount Index ($\alpha=0$) measures the share of the population living below the poverty line.
2. The Poverty Gap Index ($\alpha=1$) measures the depth of poverty, that is the amount by which an average poor family is below the poverty line. Thus a Poverty Gap Value of 0.1 means that the total deficit of the poor relative to the poverty line, when averaged over all households equals 10% of the poverty line $z$ (Ravallion and Huppi 1991).
3. The Poverty Gap Squared Index ($\alpha=2$) measures the severity of poverty and, unlike the other two measures, is sensitive to changes in the distribution of income among the poor (Adams & Page 2003). It satisfies the important “transfer axiom” for a desirable poverty measure which requires that “given other things, a pure transfer of income from a person below the poverty line to anyone who is
richer must increase the poverty measure” (Sen 1976).

Naturally, the FGT poverty indices in the Progresa data tend to be much higher than poverty values for the ENIGH dataset. In 1998, a year covered in both the Progresa and ENIGH datasets, the headcount ratio for the lowest 15.4 pesos poverty line (inflation adjusted according to the year of comparison) was 36.4% for the ENIGH data while it was 75.3% for the Progresa data. The Poverty Gap Squared index in 1998 was 6.7% in the ENIGH data but as high as 31.6% for the Progresa data. The poverty statistics for all three poverty lines and all FGT indices are presented in the lower panels of Tables 1 and 2 in the appendix.

Following the example of Reardon and Taylor (1996) and Taylor, Mora and Adams (2005) we decompose the FGT poverty coefficient by income source to understand the impact of a small percentage change in remittances on poverty.

First we represent $y_i$ in the equation above as the sum of household $i$’s income from $K$ sources:

$$y_i = \sum_{k=1}^{K} x_{ik}$$

We then substitute for $y_i$ in equation 1 above:

$$FGT_\alpha = \frac{1}{N} \sum_{i=1}^{H} \left( \frac{z - \sum_{k=1}^{K} x_{ik}}{z} \right)^\alpha$$

To assess the extent to which remittances have an impact on poverty, we evaluate the impact at current levels of poverty for a small (marginal) change in remittances. Let this marginal change be $\varepsilon_{ir}$ such that for each household $i$, with income from remittances
equal to $x_{ir}$, the household’s income from remittances increases to $(1 + \varepsilon_{ir})x_{ir}$. Then, as per the equation obtained by Reardon and Taylor (1996), we get:

$$\frac{\partial FGT_{\alpha}}{\partial \varepsilon_r} = \frac{1}{N} \sum_{i=1}^{H_0} \alpha(z - y_i)^{\alpha-1}x_{ir} - \sum_{H_-} (z - y_i)\varepsilon_{ir}^\alpha + \sum_{H_+} (z - y_i)\varepsilon_{ir}^\alpha$$

In the above equation, $H_0$ denotes the number of households in poverty both before and after the change in income, $H_-$ ($H_+$) denotes the number of households that leave (enter) poverty as a result of the remittance change (Ibid). For a positive change in an income source, such as an increase in remittances, the last term in the above equation drops out, and the poverty effect is negative or zero (if no impoverished households receive income from the income source) (Ibid).

To assess this marginal impact of remittances on poverty, we increase, in turn, both internal remittances (from migrants within Mexico) and external remittances by 1% and assess the percent difference in poverty for the three FGT measures described above.

Figure 1 illustrates this process for the Poverty Gap Squared index using ENIGH data. Internal remittances are increased from 80% of their original value to 110% (Poverty Line = 18.9 Pesos per capita per day). The graph shows that as internal remittances are increased from 80% of their original value to 110%, the Poverty Gap Squared for the entire sample declines from
about 0.0705 to 0.0687. In order to capture the true marginal effect at the current poverty levels, we increase remittances by just 1%.

In addition to evaluating the change in poverty caused by a change in remittances to the entire population, we also conduct the same evaluation but only including families that receive remittances. We do this in order to separate the change caused by year-to-year differences in the number of families receiving remittances and the change caused by different remittance amounts.

**Empirical Results:**

Overall, poverty decreases as remittances go up. This is obvious as a result of the nature of the experiment, as we keep other sources of income constant while increasing remittances by 1%. Results for the ENIGH and *Progresa* data are presented in Figures (1-3). Each graph shows the percent change in the three FGT indices of poverty caused by a 1% increase in internal remittances.

Generally, for the ENIGH data (upper panels of Figures 1-3), internal remittance increases of 1% cause a larger decline in poverty than do external remittances. This is likely because a much larger number of people receive internal rather than external remittances. The percent change (for all three FGT measures) caused by a 1% increase in both internal and external remittances is similar for the 15.4 and 18.9 pesos per capita per day poverty lines, but is lower for the tough 28.1 pesos poverty line. Of the three FGT measures, the Poverty Gap and Poverty Gap Squared tend to exhibit considerably lower variance across years than the head count measure. In terms of the amount of poverty
reduction, the Poverty Gap Squared measure tends to show the most change, followed by the Poverty Gap. The head count measure ($\alpha=0$) varies from showing the most change in some years, to showing little or no change in many others. A likely cause of this is that while a shift in the headcount index requires a “jump” over the poverty line (as a result of the 1 percent remittances increase), any change in income for families in poverty causes a change in the Poverty Gap and the Poverty Gap Squared measures. The years from 1996-2005 seem to reflect a period when the impact of a 1 percent change in remittances first increases (from 1996-2000) and then decreases (from 2000-2005). While it is difficult to pinpoint the cause of this trend, a possible explanation with respect to the external remittances is the boom in the US economy through the late 90’s which was followed by the technology led recession in 2001.

Results for the Progresa data are presented in the lower panels of Figures 1-3. Like in the ENIGH data, the percent change in poverty caused by a 1% increase in remittances, diminishes across the poverty lines as we move from 15.4 to 28.1. Unlike in the ENIGH data, internal remittances do not seem to have noticeably more impact than external remittances; in fact, for many years, the opposite is true. The headcount index here too shows the most variance, for the same reason already mentioned. The impact of internal remittances on poverty for the Progresa/Oportunidades data seems to show a similar reversal to the one for the ENIGH data, albeit a shorter one, increasing from 1997-1998 and decreasing from 1998-2000. Correlation estimates for the two across the same period, however, have negligible results. The same trend is not seen in the impact of external remittances on poverty in Mexico, which increase from 1997 to 1999 and decrease from 1999 to 2000.
Poverty change with a 1% increase at 28.1 pesos per day

Figure 1
Poverty change with a 1% increase at 18.9 pesos per day

Figure 2
Poverty change with a 1% increase at 15.4 pesos per day

**Figure 3**

[Graphs showing poverty change over time for different remittance sources and programs (ENIGH and Progresa).]
Poverty change with a 1% inc. at 28.1 pesos per day

Figure 4
The impact of a 1% change in remittances on poverty is much lower for households in the Progresa/Oportunidades dataset, where it ranges around the 0.006% mark, while for the ENIGH data set it ranges around the 0.07% mark across the years for all three FGT indices. This is probably because fewer families in the Progresa dataset receive remittances and the average remittance amount tends to be lower. The lack of visible correlation between the graphs observed for the Progresa and ENIGH data suggests that different trends impact the poorest families versus the general rural population.

Next, we carry out the same test at the 28.1 pesos per capita per day poverty line but including only families receiving remittances. This was done separately for internal and external remittances for both the ENIGH and Progresa data (Figure 4). In the case of the ENIGH data, the results are very similar to those including all households; but the absolute impact of a 1% change in remittances of course increases significantly, since every family included is now affected. The increase and subsequent decrease in impact from 1998 to 2004, noticed earlier for the ENIGH dataset, persists, but is less apparent, suggesting the impact of both an increase in the number of remitters as well as in the amount remitted. In the case of external remittances, this pattern almost disappears. The impact of external remittances is also significantly greater than that of internal remittances if only families receiving each type of remittance are included (NOTE: The two graphs have different scales on the y axis), indicating that the lower impact of external remittances on the entire population is likely the result of fewer households receiving them, rather than a sign that external remittances tend to mostly benefit families above the poverty line.
The *Progresa* data show a large change in both trends and impact when only families receiving remittances are included. The impact increases more than 10-fold, showing the very low prevalence of remittances in the *Progresa* data. The trends across the four years also look very different if only remittance receiving families are included, possibly suggesting that it was a change in the number of poor households receiving remittances across the years that caused the earlier mentioned trend. More so than in the ENIGH data, external remittances in this evaluation tend to have a much higher impact on poverty than only internal remittances. A likely cause of this is the much higher amount normally associated with remittances from abroad as shown in the summary tables in the Appendix.

**Conclusions and suggestions for further research:**

The above findings illustrate the impact of remittances on different poverty measures across the 1990s in Mexico. We find that in our representative ENIGH sample, internal remittances tend to have a larger impact on poverty than external remittances, while it is unclear which has a larger impact in the *Progresa* sample. However, when we confine our analysis to families receiving internal/external remittances, we find that the marginal impact of external remittances is much higher. This, along with literature suggesting that most external migrants tend to remit (Amuedo-Dorantes et al 2005), suggests that an increase in external migration and hence external remittances is likely to have the highest impact on poverty reduction.

The poor correlation between the ENIGH and *Progresa* results seems to indicate
that few of the trends found above were either geographically or socio-economically universal. A fuller explanation is needed which would require further research into the sample selection methodology for both ENIGH and Progresa data.

This paper has analyzed the impact of remittances on poverty, while keeping all other factors constant. In reality this is unlikely to be the case, as some household output may be lost or possibly even increased by the migration of a working member of the family. Perhaps further work could use household indicators and migrant education indicators to assess poverty in a counterfactual scenario where no migration has taken place. Taking into account the fact that remittances might be partly an income substitute rather than an income addition might provide surprising results.
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# APPENDIX

## Table 1

Summary Statistics

### Summary Statistics for INEGI Data - National

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<th>year</th>
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<th>Total</th>
<th>Mean(Peso,daily-percapita)</th>
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### Summary Statistics for Poverty Values

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## Table 2

### Summary Statistics

#### Summary Statistics for Progresa Data - National

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#### Summary Statistics for Poverty Values

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