

REMITTANCES AND INEQUALITY IN RURAL MEXICO

PINAR KESKIN

ABSTRACT. In this paper, we investigate the impact of internal and external remittances on rural income inequality in the context of Mexico, and try to understand how that impact evolved over time. Using income decomposition techniques on a Mexican household panel carried out every two years, the paper finds that both internal and external remittances have a positive effect on rural equality. Although the external remittances become more and more equalizing over time, we find that internal remittances are always more equalizing than external ones. However, after imputations for the potential home lost in the earnings of migrant families, our findings indicate that external remittances actually may have been increasingly unequalizing for rural Mexican households.

1. INTRODUCTION

The importance of migrant remittances as an external flow to developing countries has grown rapidly in the past decade, and the growth of remittances has exceeded that of private capital flows and development assistance in this period. Once overshadowed by development assistance or foreign direct investment to these countries, as of 2001 remittance income in developing countries was 260% of total official development assistance and counted for more than 40% of total foreign direct investment (Ratha, 2005).

Given the increasing magnitude and the potential growth-enhancing impacts of migrant remittances, many economists examined the impact of remittances on the origin countries in recent years. Indeed, these studies investigated many important aspects of the remittances-origin country relationship: relaxation of credit constraints, increasing investment in micro enterprises, improved educational attainment of children, etc.¹ One of the key messages of these studies is the fact that migrant remittances can help the receiving households increase income and consumption. Moreover, it's been well-documented that remittances flows can help families to cope with economic shocks.

However, little is still known about the impact of remittances on income inequality in these regions. In fact, many studies attempted to study the remittance-inequality relationship in a developing country context. However, most of the time, these studies offered conflicting results about the impact of remittances on inequality.²

There may be several reasons for these conflicting outcomes. First, each of these studies focuses on different countries, i.e. different economic and social environments. Second, these researchers have examined the distributional effects of migrant remittances using different techniques: with and without endogenous migration costs, by using income-source decompositions of inequality measures, by comparing migration outcomes with no-migration counterfactuals, etc. Finally, although there is a general consensus in

¹See, for example, Lucas (1987); Rozelle et al. (1999); Hanson and Woodruff (2003); Dustmann and Kirchkamp (2002); Woodruff and Zenteno (2007).

²See, among others, Lipton (1980); Stark, Taylor and Yitzhaki (1986); Adams (1989, 1991); Adams and Alderman (1992); Taylor and Wyatt (1996); Barham and Boucher (1998); Rodriguez (1998); Taylor et al. (1999); Taylor et al. (2005); Acosta et al. (2008).

the literature that the impact of remittances on regional inequality varies over time depending on the particular stage of migration, most of these studies are static. Thus, they focus on a certain point in the migration history of a country.

In the present study, we examine the impact of internal and external remittances on rural income inequality in the context of rural Mexico.³ Our main contribution to the literature will be the dynamic setting we use by utilizing a Mexican household survey carried out by INEGI every two years. We will be able to follow Mexican states over time, starting from 1992 to 2005 by using this nationally representative dataset to estimate the marginal effects of both international and internal migrant remittances on income inequality among Mexican rural households and how these effects changed over time. Later, we test the robustness of our finding by using an alternative dataset, Progresa.

Our study is closest in spirit to the Stark, Taylor and Yitzhaki (1986) paper on remittances and inequality. In their paper, the authors argue that migration out of a rural community has some risks which cannot be totally foreseen by the migrants. Moreover, migration potentially brings a large cost to the budget of a rural household in terms of information gathering, transportation expenses, etc. Obviously, these costs and uncertainty will be a lot higher in the case of international migration. Such reasoning makes the authors believe that earlier migrants tend to come from richer households, and remittances sent by these migrants are more likely to increase income inequality in the remittance-receiving communities. However, as time passes, information about the destination region is spread in the migrant-sending regions by the help of migrant networks. This information spread dissolves some uncertainty, reduces costs, and potentially reverses the initial unequalizing impacts of remittances by increasing the rate of migration among members of the poorer households. In our work, we will have a chance to test the hypotheses proposed by Stark, Taylor and Yitzhaki (1986) and see how the impacts of internal and external remittances on rural inequality changed over time.

³In the last couple of decades, international migration, in particular migration to the United States, gained increasing importance in Mexico. According to Mishra (2007), the share of Mexican population working in the United States, as a percentage of the Mexican labor force, increased fivefold, from 3% in 1970 to 16% in 2000. In the same period, remittance transfers to Mexico also rose rapidly. In 2004, remittances are estimated to exceed the foreign direct investment inflow of the country and reach 16.6 billion dollars, which is equal to 2.5% of GDP. This number is approximately as high as 80% of the crude oil exports of Mexico.

The remainder of the paper is organized as follows. Section 2 summarizes the analytical framework we use in our study. Section 3 describes the data used in the analysis and presents our empirical results, while Section 4 concludes.

2. ANALYTICAL FRAMEWORK: INCOME SOURCE GINI DECOMPOSITION

To be able to analyze the impacts of internal and external remittances on rural income distribution, first we need to answer two important questions:

- (1) Which inequality index should we use?
- (2) What is the appropriate unit of analysis for our study, households or the individual members of the households?

In our study, we will use the Gini coefficient as a measure of the inequality of income distribution. The Gini coefficient is defined as a ratio with values between 0 and 1: the numerator is the area between the Lorenz curve of the distribution and the uniform distribution line; the denominator is the area under the uniform distribution line. Thus, a low Gini coefficient indicates a more equal income distribution, while a high Gini coefficient indicates a more unequal distribution. The reason that we choose the Gini coefficient as a measure of income dispersion lies in its clear correspondence to the Lorenz curve and thus the fact that it is very straightforward to interpret for our purposes.

Following Lerman and Yitzhaki (1985), the Gini coefficient for total income inequality, G , can be represented as:

$$(1) \quad G = \sum_{i=1}^I R_i G_i S_i$$

where S_i is component i 's share of total income, G_i is the relative Gini of component i (income from source i), and R_i is the Gini correlation between income component i with the distribution of total income.

Using this equation for our analysis permits us to decompose the impact of internal and external remittances on total rural income inequality. As is easily seen, both internal and external remittances will contribute to total inequality as the product of its own inequality (i.e. how equally or unequally distributed is the income source, measured by

G_i), its share of total income (i.e. how important the income source is with respect to total income, measured by S_i) and its correlation with the rank of the total income (i.e. how strongly the income source is correlated with total income, measured by R_i).

We can explain this mechanism with the help of an example. If remittances represent a large share of the total income of a rural community, one may think that this remittance flow has a large impact on rural inequality. However, it is obvious that if these remittances are equally distributed across households in this community, they may not have an impact on inequality in the community even if they are very large in magnitude. On the other hand, if remittances are large as an income component but unequally distributed across households, they may either increase or decrease inequality, depending upon which households receive them. In this case, the Gini coefficient may be lower or higher with remittances compared with their absence.

Following Stark, Taylor and Yitzhaki (1986), we can estimate the effect of small changes in remittances on inequality, holding income from all other sources constant, by using a simple Gini decomposition technique. Let us consider a small percentage change in income from *source* j (say, remittances) equal to e , such that $y_j(e) = (1 + e)y_j$. Then:

$$(2) \quad \frac{\partial G}{\partial e} = \frac{R_j G_j S_j}{G} - S_j$$

where S_j , G_j and R_j denote the *source* j income share, the source Gini, and the Gini correlation respectively, and G denotes the Gini index of total income inequality prior to the remittance change. This equation states that the percentage change in inequality resulting from a marginal percentage change in remittances equals the initial contribution of remittances relative to overall inequality minus the contribution of remittances to total income. We will use this equation repeatedly in our analysis.

The natural second step is to choose our unit of analysis. We will follow the literature and assume that household income is distributed uniformly among household members (Cowell, 1995). Therefore the income measure we will use is the per-capita household income i.e. total household income divided by the number of household members.

3. EMPIRICAL ANALYSIS

3.1. *Data*

We use two separate data sets to conduct our empirical analysis. The first is the Mexican National Survey of Income and Education (ENIGH) conducted by the Instituto Nacional de Estadística Geografía y Informática (INEGI). The second dataset which we have utilized in our study is a combination of several datasets collected by the Mexican government to evaluate its nationwide conditional cash transfer program, Progresa.

3.1.1. *ENIGH Data.* The ENIGH dataset we use is composed of 6 biennial household surveys between 1992 and 2002. ENIGH is designed by INEGI to measure the consumption and earnings of Mexican households. The fact that ENIGH data spans a decade gives us the chance to analyze not only the impact of remittances on rural income inequality in Mexico at a point in time, but also how the dynamics of these relationships have changed over time.

The number of households in the ENIGH and some questions vary over the sampling period we consider in this paper. However, the main concepts remain the same and allow comparisons of results across the years between 1992 and 2002. The survey is stratified according to urban and rural locations. The ENIGH sample design assures that households are representative of geographic clusters with the probability of being included proportional to cluster size.

The income data and especially the consumption data are very disaggregated. The survey reports 43 income categories subdivided into monetary, non-monetary and financial income. The consumption data consist of more than 600 different entries, about half of which are food items. Food and manufacturing products and services are finely disaggregated.

3.1.2. *Progresa Data.* Progresa is a conditional cash transfer program which aims to reduce extreme poverty in rural Mexico. The program was initiated in 1997. One of the key targets of these cash transfers is the development of human capital in the poor households through improved nutrition, health and education. Two forms of cash transfers are

provided to households to meet these objectives: a food grant and a school scholarship. Each component is linked to separate and independent conditional requirements.

The Progresa data combines multiple household surveys collected before the initiation of the program and afterwards to be able to evaluate the impacts of the program. The first dataset we use is the census conducted in November 1997. This census data includes all 495 communities which had been considered to participate in the Progresa program. The 1997 census is later used to select the beneficiary households. The other datasets we use are from 1998, 1999 and 2000. These latter ones were collected to evaluate the outcomes of the program. Thus, these follow-up surveys have been collected in 495 communities in seven states.

3.1.3. *More on Data.* All values were inflated or deflated to 2002 peso levels for the ENIGH dataset and 1997 levels for the Progresa dataset. Moreover, all values were converted to a per capita basis. To create per capita household incomes, we first add all monetary personal income for each household, then add all the nonmonetary income sources and finally divide by household size. We included only rural households, i.e. places of less than 2,500 people.

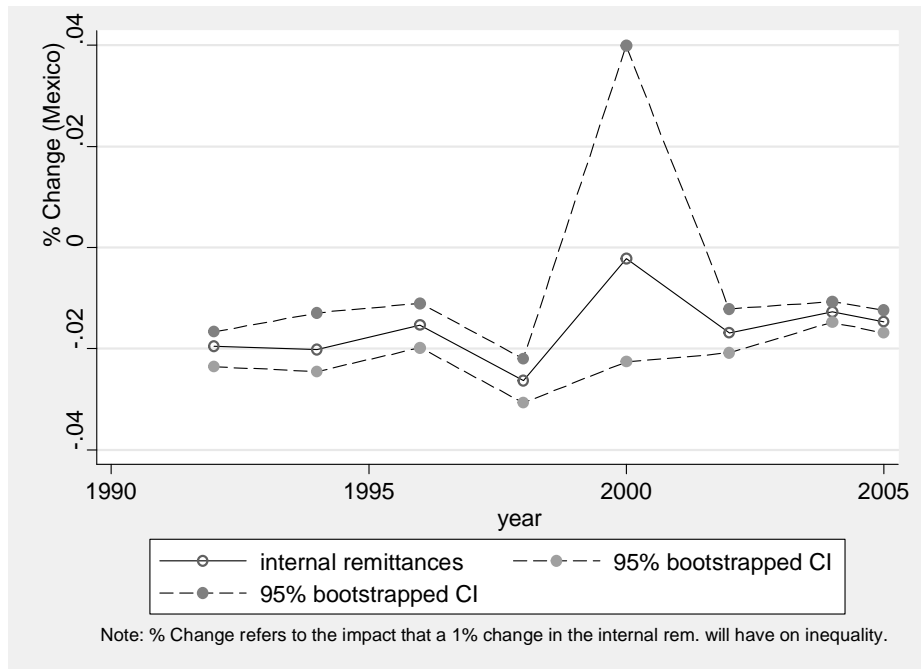
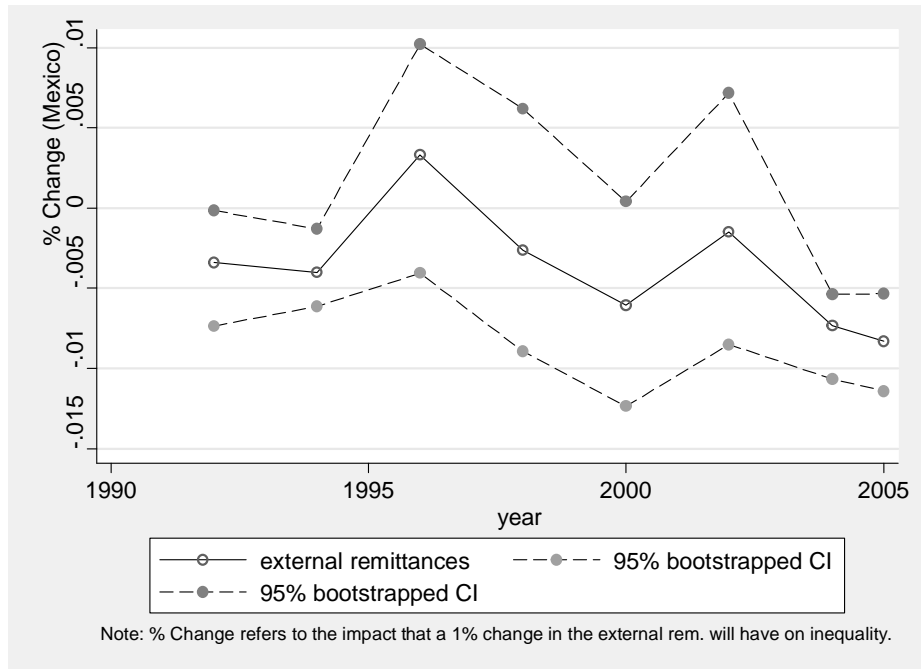
3.2. *Empirical Results*

3.2.1. *Effects of Migrant Remittances on Income Inequality.* Figure 1 summarizes the estimated effects of a 1 percent increase in international and internal migrant remittances, respectively and show us how the equalizing impact of internal and external remittances evolved over time for rural Mexico as a whole. Remember that a more negative number on the vertical axis means a higher equalizing impact of the corresponding remittances' change. In these graphs we used bootstrapping to construct 95% confidence intervals.⁴ There are three important points we need to emphasize about these graphs.

First, internal remittances are always more equalizing than the external ones. This finding is indeed quite intuitive. So far, we have discussed that the distributional impacts of the remittances depended on the relative income groups from which migrants' originally came.

⁴Appendix A reports a similar calculation with a regional break-down.

Figure 1: Change in the impact of a 1% change in remittances on income inequality over time



In case of internal migration, it may be easier for the poorer households to afford the initial costs of migration. This fact narrows the income gap between high and low income classes.

Second, starting in 1996 we observe a reduction in the initially unfavorable effect of remittances on income inequality and the external remittances become more and more equalizing over time. Indeed, the initial unequalizing impact of external remittances in 1996 has become equalizing. Thus, in line with the arguments presented in the Stark, Taylor and Yitzhaki (1986), it is likely that over time as the migration networks grow in the destination country, the information and the other factors that facilitate migration become diffused through the population. This, in turn, makes the households at the lower end of the income distribution gain access to migrant labor markets in the foreign countries. This increasing access of the poor reverses the initial unequalizing effect of remittances in the country of origin.

Third, external remittances have a higher variance in terms of their impact on inequality compared to internal remittances over time. One can interpret this result with the relatively stable nature of internal migration costs and the constantly easy access of low-income households to the migrant networks in the other Mexican regions.

3.2.2. Non Migrant Counterfactuals. The Stark, Taylor, Yitzhaki (1986) approach we used so far, treats remittances as an exogenous income source. However, the inequality decomposition results presented above may be over or underestimated if we imagine that remittances are a substitute for the earnings that migrants could have potentially had if they were staying in their households instead of another town or another country. For instance, if the remittance-sending member of the household had some non-zero income before migration, the household's overall non remittances per capita income might be lower after migration compared to what it would be in the absence of any migration. Hence, to be able to estimate the potential impact of remittances on inequality, we need to take into account a counter-factual scenario and calculate an imputed per capita income that the household would have received if the remittance-sending member of the family had chosen to stay in the same household instead of migrating.

In an influential study, Adams (1989) introduces a new approach which treats remittances as a substitute for home earnings of the migrants. This study compares the observed household income distribution with a counterfactual income scenario, which doesn't include migration. In his paper, Adams (1989) estimates a household income function for non migrant households. Then, he uses the coefficient estimates for the household income function and the observable characteristics of migrant households to impute their earnings under a counterfactual scenario without migration. An important shortcoming of this new approach was the fact that Adams (1989) treats the migrant and non migrant observations as if they were drawn randomly from the population. In other words, this study neglects the selection problem involved in the original migration decision. There have been many attempts later in the literature to make the necessary correction.⁵

In our study, we impute per capita household income for migrant families under a counter-factual scenario in which we use household observable characteristics such as number of household members, education level of household head, region and year. We do this by predicting per capita income levels for households with remittances on the basis of a reduced-form specification for the determinants of income among households without remittances. The estimated equation is the following:

$$(3) \quad \log(Y_{ist}) = \beta_1 + \beta_2 Char_{ist} + \beta_3 Head_{ist} + \varphi_s + \varphi_t + \varepsilon_{ist}$$

where Y_i represents per capita non remittances income, $Char_i$ is a vector of covariates that captures the household characteristics such as size of the household or the location, and $Head_i$ is another vector that captures some characteristics of the household head such as age and education level. The inclusion of the state fixed effects (φ_s) will allow me to control for time-invariant characteristics of each state that affect the outcome measure and the year dummies (φ_t) control for macroeconomic shocks that are common for all of Mexico. Finally, ε_{ist} is unobserved heterogeneity in income generation.

We estimate Equation (3) for the households that do not receive remittances. We, then, apply the estimated coefficients to predict a counterfactual non-migration income for the

⁵See, for instance, Rodriguez (1998); Barham and Boucher (1998); Adams (2006).

households which receive remittances. In the absence of information on migrant characteristics, which is the case for the ENIGH dataset, it is necessary to make some basic assumptions about the number and the demographics of migrants. Following Rodriguez (1998), we assume that on average remittances are sent by an adult male family member who has the average years of education of other adults in the household.

In the absence of a random selection of households into migrant and non migrant subgroups, the OLS estimates of Equation (3) would be inconsistent and our estimates would suffer from selection bias. To address this issue, following Acosta et al. (2007), we add a new variable that represents the *propensity to migrate*. Our approach uses the two-step estimation framework proposed by Heckman (1979).

The exclusion restrictions that we employ for the non remittances selection equation is the percentage of households that receive remittances in the native state of the migrant. We use this information as a proxy for the presence of migrant networks. We also create four dummy variables to capture the income quartiles each household belongs to and include these dummies and their interaction with our network proxy as part of our identification strategy.⁶

Once we set up our estimation model and exclusion restrictions, we impute the counterfactual non remittances per capita household income for the households which receive remittances. We, then, calculate the levels of inequality that would have existed had migration and remittances not taken place.

Table 1 shows estimates of the Gini coefficient using counterfactual (imputed) and reported non remittances income for the households which receive external remittances. That is, despite the fact that we found an equalizing or neutral impact of remittances using only the reported income information, after our imputation exercise we find that remittances have in fact been unequalizing for rural Mexican households.

In Appendix A, we repeat the same imputation exercise with a regional break down. Our results from the regional break down are similar to the results obtained for rural Mexico as a whole.

⁶The underlying assumption which justifies the use of the interaction term is the fact that different households from different income groups utilize migrant networks to different extents.

Table 1: Remittances and inequality under a counter-factual scenario (for rural Mexico as a whole)

	Before remittances income		After remittances
	Imputed	Reported	income
1992	0.61	0.55	0.57
1994	0.53	0.55	0.54
1996	0.52	0.55	0.53
1998	0.52	0.57	0.56
2000	0.47	0.53	0.53
2002	0.47	0.50	0.51

Data source: ENIGH

3.2.3. *Comparing INEGI and Progresa Datasets.* We replicate the results from Table 1 using the Progresa dataset described in Section 4. Note that our findings using the Progresa data are different from the results obtained from the ones presented in Table 3. Using INEGI data, we found an equalizing or neutral impact of remittances using only the reported income information, after our imputation exercise found that remittances indeed had been unequalizing for rural Mexican households. On the other hand, using Progresa data, we find that remittances income have an unequalizing impact for Mexican households both in case of imputed and reported (non remittances) income information.

Table 2: Remittances and inequality under a counter-factual scenario (for rural Mexico as a whole)

	Before remittances income		After remittances
	Imputed	Reported	income
1997	0.48	0.49	0.52
1998	0.52	0.52	0.59
1999	0.53	0.54	0.55
2000	0.53	0.57	0.60

Data source: Progresa

This contradictory result may well be explained by the selection issues in the Progresa dataset. The ENIGH dataset has a nationally representative sample, which aims to measure household income and expenditures in the country. On the other hand, Progresa data has been collected in around 500 communities that were identified as some of the poorest regions in 7 states near the capital, Mexico City. The choice of the poor regions for the data collection is consistent with the fact that the initial reason for the data collection was to determine the recipients of a conditional cash transfer. As a result, the households sampled in the ENIGH dataset tended to have much higher per capita income and education levels than those in the Progresa dataset. Moreover, families in the ENIGH dataset were much more likely to receive external remittances than families in the Progresa dataset.

4. CONCLUDING REMARKS

In this paper, we investigate the impact of internal and external remittances on rural income inequality in the context of Mexico, and try to understand how that impact evolved over time. Using income decomposition techniques on a Mexican household panel carried out every two years, the paper finds that both internal and external remittances have a positive effect on rural equality. In particular, we find that starting in 1996 the initially unfavorable effect of remittances on income inequality was reduced and the external remittances become more and more equalizing over time. We also show that internal remittances are always more equalizing than external ones.

However, once we start to treat remittances as non-exogenous transfers, i.e. as substitutes for the home earnings that migrants would have had if they had not decided to leave Mexico to work in a foreign country, our findings indicate that external remittances actually had been increasingly unequalizing for rural Mexican households.

Our findings shows that despite the fact that remittance income is an important part of overall household income, its role as an equality-increasing transfer is limited by the ease of access to the foreign labor markets by the poorer households in the population.

Needless to say, over time as the migration networks grow in the destination country, the information diffusion that facilitate migration increases. This, in turn, makes

the households at the lower end of the income distribution gain access to migrant labor markets in the foreign countries. This increasing access of the poor reverses the initial unequalizing effect of remittances in the country of origin. In the meantime, considering that remittances would only reduce inequality if the less-privileged classes were also able to migrate, policies might be designed to allow those in the lower income groups greater degrees of access to migration facilitating factors such as subsidies for transportation costs, information offices especially in the rural areas, etc.

APPENDIX A: REGIONAL DIFFERENCES

Appendix Table 2 summarizes the contribution of different sources of income to per capita income as well as to income inequality for each Mexican region between 1992 and 2005. For our analysis, we divide Mexico into five regions: Center, South-Southeast, West-Center, Northwest, and Northeast. This division is consistent with INEGI's standard regionalization of the country. The distribution of states into these regions is summarized in Appendix Table 1. Note that we only analyze rural households.⁷

Appendix Table 1: Regionalization of Mexico

South-Southeast	Guerrero, Veracruz, Oaxaca, Tabasco, Chiapas, Campeche, Yucatan, Quintana Roo
Center	Estado de Mexico, Distrito Federal, Morelos, Hidalgo, Puebla, Tlaxcala
West-Center	Zacatecas, San Luis Potosi, Queretaro, Guanajuato, Michoacan, Colima, Jalisco, Aguascalientes, Nayarit
Northwest	Baja California, Baja California Sur, Sinoloa, Sonora
Northeast	Chihuahua, Durango, Coahuila, Nuevo Leon, Tamaulipas

⁷All areas not classified by the Census Bureau as urban are defined as rural and generally include places of less than 2,500 persons.

Appendix Table 2: Gini Decomposition by Income Source (Rural households by region)

Source	S _k	G _k	R _k	Share	% Change	Source	S _k	G _k	R _k	Share	% Change
1992						1994					
						Northwest					
						internal1994	0.023	0.923	-0.192	-0.008	-0.031
						external1994	0.015	0.978	0.656	0.020	0.005
						family1994	0.962	0.506	0.984	0.988	0.026
						total income		0.485			
						Center					
internal1992	0.037	0.959	0.262	0.023	-0.015	internal1994	0.048	0.951	0.460	0.038	-0.011
external1992	0.052	0.975	0.664	0.081	0.029	external1994	0.012	0.987	0.427	0.009	-0.003
family1992	0.911	0.453	0.909	0.897	-0.014	family1994	0.940	0.586	0.971	0.953	0.014
total income		0.418				total income		0.561			
						Northeast					
internal1992	0.098	0.871	0.309	0.066	-0.032	internal1994	0.043	0.923	0.053	0.005	-0.039
external1992	0.095	0.925	0.328	0.073	-0.023	external1994	0.017	0.972	0.151	0.006	-0.012
family1992	0.807	0.498	0.853	0.862	0.054	family1994	0.940	0.496	0.962	0.990	0.050
total income		0.398				total income		0.453			
						West Center					
internal1992	0.027	0.934	0.026	0.001	-0.026	internal1994	0.044	0.959	0.422	0.037	-0.007
external1992	0.028	0.938	0.136	0.006	-0.022	external1994	0.035	0.917	0.029	0.002	-0.033
family1992	0.945	0.658	0.974	0.993	0.048	family1994	0.921	0.524	0.956	0.961	0.040
total income		0.610				total income		0.480			
						South-Southeast					
internal1992	0.058	0.902	0.265	0.030	-0.027	internal1994	0.048	0.918	0.183	0.015	-0.033
external1992	0.008	0.993	0.267	0.004	-0.003	external1994	0.002	0.994	0.699	0.003	0.001
family1992	0.935	0.491	0.957	0.965	0.031	family1994	0.950	0.555	0.974	0.982	0.032
total income		0.456				total income		0.523			

Notes:

Percent Change = the impact that a 1 percent change in the respective income source will have on inequality
Share = the share of each income source in total inequality, **S_k** = the share of each income source in total income
G_k = the source gini, **R_k** = the gini correlation of income from source k with the distribution of total income

Appendix Table 2: Gini Decomposition by Income Source (Rural households by region) [CONT.]

Source	S _k	G _k	R _k	Share	% Change	Source	S _k	G _k	R _k	Share	% Change
Source 1996						Source 1998					
Northwest						Northwest					
internal1996	0.014	0.967	0.064	0.002	-0.012	internal1998	0.021	0.929	-0.162	-0.006	-0.027
external1996	0.020	0.981	0.623	0.027	0.006	external1998	0.004	0.977	-0.260	-0.002	-0.006
govt1996	0.013	0.963	0.694	0.019	0.006	govt1998	0.002	0.985	0.276	0.001	-0.001
family1996	0.953	0.477	0.971	0.953	0.000	family1998	0.974	0.517	0.992	1.008	0.034
total income		0.463				total income		0.495			
Center						Center					
internal1996	0.049	0.916	0.232	0.022	-0.027	internal1998	0.031	0.948	0.153	0.010	-0.021
external1996	0.029	0.973	0.618	0.036	0.007	external1998	0.025	0.963	0.177	0.009	-0.016
govt1996	0.005	0.953	-0.430	-0.004	-0.010	govt1998	0.002	0.986	-0.006	0.000	-0.002
family1996	0.917	0.521	0.952	0.947	0.030	family1998	0.942	0.500	0.975	0.981	0.039
total income		0.481				total income		0.468			
Northeast						Northeast					
internal1996	0.046	0.904	0.216	0.021	-0.025	internal1998	0.028	0.944	-0.138	-0.009	-0.038
external1996	0.092	0.877	0.356	0.068	-0.024	external1998	0.020	0.960	-0.138	-0.006	-0.026
govt1996	0.030	0.947	0.240	0.016	-0.014	govt1998	0.010	0.977	-0.178	-0.004	-0.015
family1996	0.832	0.513	0.883	0.895	0.063	family1998	0.942	0.458	0.958	1.020	0.078
total income		0.421				total income		0.405			
West Center						West Center					
internal1996	0.055	0.942	0.464	0.051	-0.005	internal1998	0.024	0.942	0.134	0.007	-0.017
external1996	0.087	0.899	0.431	0.070	-0.016	external1998	0.075	0.929	0.451	0.069	-0.006
govt1996	0.005	0.982	0.403	0.004	-0.001	govt1998	0.004	0.974	0.445	0.004	0.000
family1996	0.854	0.540	0.904	0.875	0.022	family1998	0.897	0.501	0.929	0.920	0.023
total income		0.476				total income		0.453			
South-Southeast						South-Southeast					
internal1996	0.033	0.947	0.311	0.018	-0.015	internal1998	0.041	0.937	0.203	0.015	-0.026
external1996	0.021	0.985	0.536	0.021	0.000	external1998	0.023	0.977	0.528	0.023	0.000
govt1996	0.005	0.974	0.095	0.001	-0.004	govt1998	0.006	0.957	-0.010	0.000	-0.006
family1996	0.942	0.563	0.968	0.961	0.019	family1998	0.931	0.548	0.956	0.962	0.031
total income		0.534				total income		0.507			

Notes:

Percent Change = the impact that a 1 percent change in the respective income source will have on inequality

Share = the share of each income source in total inequality, S_k = the share of each income source in total income

G_k = the source gini, R_k = the gini correlation of income from source k with the distribution of total income

Appendix Table 2: Gini Decomposition by Income Source (Rural households by region) [CONT.]

Source 2000	S _k	G _k	R _k	Share	% Change	Source 2002	S _k	G _k	R _k	Share	% Change	
Northwest												
internal2000	0.052	0.899	0.109	0.012	-0.041	internal2002	0.032	0.915	0.098	0.006	-0.027	
external2000	0.011	0.986	0.593	0.015	0.004	external2002	0.025	0.963	0.251	0.012	-0.013	
govt2000	0.010	0.969	0.267	0.006	-0.004	govt2002	0.034	0.824	0.079	0.004	-0.030	
family2000	0.927	0.476	0.969	0.968	0.041	family2002	0.909	0.572	0.964	0.978	0.070	
total income		0.441				total income		0.512				
Center												
internal2000	0.084	0.921	0.439	0.069	-0.015	internal2002	0.072	0.910	0.291	0.041	-0.031	
external2000	0.060	0.960	0.613	0.072	0.012	external2002	0.023	0.975	0.423	0.020	-0.003	
govt2000	0.005	0.968	0.304	0.003	-0.002	govt2002	0.053	0.743	-0.028	-0.002	-0.055	
family2000	0.851	0.546	0.907	0.856	0.006	family2002	0.853	0.559	0.926	0.942	0.089	
total income		0.492				total income		0.468				
Northeast												
internal2000	0.040	0.944	0.297	0.021	-0.019	internal2002	0.042	0.954	0.394	0.032	-0.009	
external2000	0.038	0.932	0.209	0.014	-0.024	external2002	0.068	0.948	0.562	0.075	0.007	
govt2000	0.051	0.974	0.756	0.072	0.020	govt2002	0.082	0.833	0.484	0.068	-0.014	
family2000	0.871	0.579	0.939	0.893	0.023	family2002	0.808	0.542	0.909	0.824	0.016	
total income		0.529				total income		0.484				
West Center												
internal2000	0.038	0.947	0.212	0.016	-0.022	internal2002	0.031	0.947	0.322	0.018	-0.013	
external2000	0.081	0.909	0.429	0.066	-0.015	external2002	0.099	0.902	0.503	0.087	-0.012	
govt2000	0.014	0.961	0.305	0.009	-0.005	govt2002	0.058	0.771	0.224	0.019	-0.039	
family2000	0.867	0.547	0.920	0.910	0.043	family2002	0.812	0.610	0.917	0.876	0.064	
total income		0.480				total income		0.518				
South-Southeast												
internal2000	0.136	0.974	0.803	0.174	0.038	internal2002	0.058	0.927	0.461	0.050	-0.008	
external2000	0.024	0.980	0.649	0.025	0.001	external2002	0.048	0.972	0.680	0.065	0.016	
govt2000	0.017	0.907	0.176	0.005	-0.013	govt2002	0.101	0.618	0.079	0.010	-0.091	
family2000	0.823	0.616	0.964	0.797	-0.026	family2002	0.793	0.591	0.920	0.875	0.082	
total income		0.613				total income		0.493				

Notes:

Percent Change = the impact that a 1 percent change in the respective income source will have on inequality
Share = the share of each income source in total inequality, **S_k** = the share of each income source in total income
G_k = the source gini, **R_k** = the gini correlation of income from source k with the distribution of total income

Appendix Table 2: Gini Decomposition by Income Source (Rural households by region) [CONT.]

Source	S_k	G_k	R_k	Share	% Change	Source	S_k	G_k	R_k	Share	% Change
2004						2005					
Northwest						Northwest					
internal2004	0.023	0.937	0.141	0.005	-0.018	internal2005	0.028	0.947	0.226	0.011	-0.017
external2004	0.010	0.975	0.094	0.002	-0.009	external2005	0.012	0.983	0.474	0.010	-0.002
govt2004	0.011	0.899	-0.002	0.000	-0.012	govt2005	0.013	0.891	0.033	0.001	-0.013
family2004	0.956	0.645	0.984	0.994	0.038	family2005	0.947	0.588	0.980	0.979	0.032
total income		0.610				total income		0.558			
Center						Center					
internal2004	0.044	0.942	0.404	0.032	-0.012	internal2005	0.040	0.931	0.321	0.022	-0.017
external2004	0.034	0.970	0.510	0.032	-0.002	external2005	0.051	0.953	0.499	0.045	-0.006
govt2004	0.027	0.801	-0.209	-0.009	-0.036	govt2005	0.040	0.766	-0.022	-0.001	-0.041
family2004	0.895	0.581	0.952	0.945	0.050	family2005	0.870	0.607	0.944	0.934	0.064
total income		0.524				total income		0.534			
Northeast						Northeast					
internal2004	0.039	0.945	0.390	0.028	-0.011	internal2005	0.033	0.924	0.249	0.014	-0.019
external2004	0.043	0.959	0.475	0.038	-0.005	external2005	0.040	0.961	0.443	0.031	-0.008
govt2004	0.057	0.863	0.343	0.033	-0.024	govt2005	0.091	0.858	0.517	0.075	-0.016
family2004	0.861	0.573	0.933	0.901	0.040	family2005	0.836	0.606	0.938	0.880	0.044
total income		0.511				total income		0.540			
West Center						West Center					
internal2004	0.021	0.949	0.270	0.009	-0.012	internal2005	0.028	0.954	0.441	0.019	-0.009
external2004	0.058	0.924	0.472	0.042	-0.015	external2005	0.062	0.921	0.443	0.041	-0.021
govt2004	0.040	0.794	0.186	0.010	-0.030	govt2005	0.035	0.772	0.086	0.004	-0.031
family2004	0.882	0.656	0.961	0.939	0.057	family2005	0.875	0.686	0.957	0.936	0.061
total income		0.592				total income		0.614			
South-Southeast						South-Southeast					
internal2004	0.038	0.943	0.441	0.028	-0.011	internal2005	0.038	0.940	0.368	0.023	-0.015
external2004	0.045	0.970	0.630	0.048	0.003	external2005	0.038	0.966	0.540	0.035	-0.003
govt2004	0.087	0.672	0.206	0.021	-0.066	govt2005	0.070	0.670	0.045	0.004	-0.066
family2004	0.830	0.664	0.951	0.904	0.074	family2005	0.854	0.657	0.954	0.939	0.085
total income		0.579				total income		0.570			

Notes:

Percent Change = the impact that a 1 percent change in the respective income source will have on inequality

Share = the share of each income source in total inequality, S_k = the share of each income source in total income

G_k = the source gini, R_k = the gini correlation of income from source k with the distribution of total income

Column 2 in Appendix Table 2 reports the shares of income from each income source.⁸ Naturally, family income, which includes wages, agricultural and business income, has the largest share in total income for all regions and years. The share of both internal and external remittances in total income is less than 10%. This is likely an understatement of the share of remittances in total income due to the special nature of our data set. An important point to notice is that relative share of external remittances in income increased over time compared to internal remittances.

Column 3 shows that both internal and external remittances are unequally distributed across rural households for the entire period. The source Gini's for internal and external remittances are around or above 90% for all regions and years.

Above, during the methodological discussion, we underlined the fact that contribution of an income source to the total income might be larger than its contribution to the inequality as long as it has a small Gini correlation with the distribution of total income. Column 4 presents these correlations. One should notice that internal remittances have a smaller Gini correlation with total income compared with external remittances.

Finally, Column 6 represents the impact of a 1 percent change in the remittances income source on inequality. Note that there is not a particular difference in these impacts over time by region.

In Appendix Table 3, we repeat the same imputation exercise as in Table 1 with a regional break down. Appendix Table 3 shows the estimates of the Gini coefficient using reported and imputed non remittances income for the remittance-receiving households for 5 regions in Mexico over time. It also reports the Gini coefficients for after remittances income.

Note that our results from the regional break down are similar to the results obtained for rural Mexico as a whole. There are two striking findings of this exercise. First, in 1992, remittances have an even more equalizing effect in comparison to what we estimated using just the reported non remittances income data for all regions except South-South

⁸In our analysis, we separated sources of household income into 4 distinct group: external remittances, internal remittances, government transfers from programs such as PROCAMPO and PROGRESA and family income. Last category, family income, includes all income from wages, family businesses, interest earnings, etc.

Appendix Table 3: Remittances and inequality under a counter-factual scenario (by region)

	West Center		North West		Center		North East		South-South East	
	Non remittances income	Reported Imputed	Non remittances income	Reported Imputed	Non remittances income	Reported Imputed	Non remittances income	Reported Imputed	Non remittances income	Reported Imputed
1992										
Before	0.55	0.57	0.47	0.51	0.47	0.51	0.57	0.58	0.69	0.56
After	0.52	0.52	0.46	0.46	0.50	0.50	0.53	0.53	0.61	0.61
1994										
Before	0.52	0.51	0.56	0.53	0.48	0.53	0.53	0.55	0.56	0.55
After	0.52	0.52	0.51	0.51	0.55	0.55	0.52	0.52	0.52	0.52
1996										
Before	0.51	0.45	0.53	0.51	0.54	0.49	0.55	0.50	0.51	0.50
After	0.47	0.47	0.58	0.58	0.54	0.54	0.52	0.52	0.53	0.53
1998										
Before	0.55	0.47	0.51	0.59	0.52	0.55	0.50	0.39	0.49	0.47
After	0.51	0.51	0.61	0.61	0.51	0.51	0.43	0.43	0.49	0.49
2000										
Before	0.51	0.40	0.43	0.36	0.47	0.35	0.57	0.46	0.57	0.53
After	0.48	0.48	0.44	0.44	0.49	0.49	0.50	0.50	0.65	0.65
2002										
Before	0.54	0.49	0.61	0.48	0.50	0.39	0.50	0.38	0.50	0.46
After	0.53	0.53	0.53	0.53	0.45	0.45	0.51	0.51	0.49	0.49

Notes:

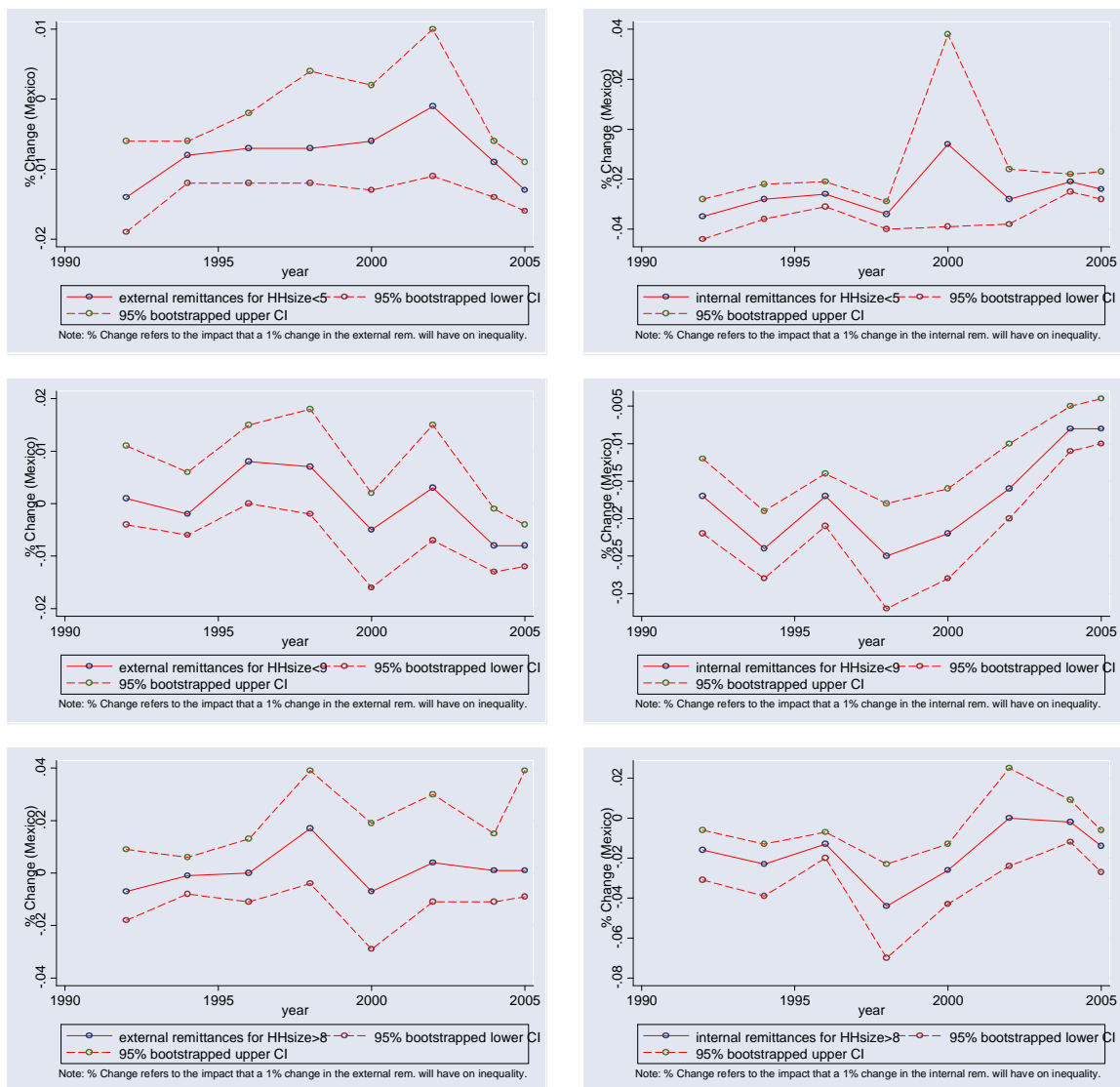
Before = Before remittances, After = After remittances

East region. Second, for the later years we find a contradictory result. That is for instance for year 2002, even though we found an equalizing impact of remittances for all regions using reported income variable, after imputation we show that remittances indeed had been quite unequalizing.

APPENDIX B: IMPACT OF FAMILY SIZE

One might also wonder whether remittances have a differential impact on households with different sizes.

Appendix Figure 1: Impact of a 1% change in remittances



Appendix Figure 1 breaks down the impact estimates of a 1% change in remittances on income inequality by household size. Categories we created are: less than 5 people, between 5 and 8 people and more than 8 people in the household. Appendix Figure 1 shows that internal remittances have an increasingly unequalizing impact over time for larger households.

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