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THE IMPACT OF MIGRATION AND REMITTANCES ON DISTRIBUTION AND SOURCES INCOME: THE MEXICAN RURAL CASE*

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*The view expressed in the paper do not imply the expression of any opinion on the part of the United Nations Secretariat.

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A. INTRODUCTION

With the aim of testing a set of hypothesis as outlined by the NELM, this study will use data about migration in rural Mexico in order to address the following questions: i) When migrants leave the household, does the reduction in the labor force cause a decrease in household revenues in the short run? ii) What are the effects of remittances on rural household income sources? iii) What happens to the income distribution in the labor force ejector communities? In other words, does it increase or decrease the income inequality in the rural households of Mexico? iv) Is migration an investment strategy of the households?

In order to accomplish these objectives, the paper is organized as follows. First, an analysis of the

test this hypothesis it is necessary to measure the income source Gini decomposition at regional or community level but that left for future study.

2. Income Source Gini Decomposition

In order to identifying the impacts of migrant remittances on rural income distribution, it is first necessary to select an inequality index. Of the various indexes that satisfy the five basic properties mentioned by Ray (1998), the Gini coefficient is probably the most intuitive with its neat correspondence to the Lorenz curve and easy-to-interpret decompositions of income effects. This is the measure used in the present study.

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

$$G = \sum_{k=1}^{K} R_k G_k S_k \qquad (1)$$

where S_k represents the share of component k in total income, G_k is the source Gini, corresponding to the distribution of income from source k, and R_k is the Gini correlation of income from source k with the distribution of total income.

Using equation (1) it is possible to decompose the influence of any income component, in this case migrant remittances, upon total income inequality, as the product of three easily interpreted terms:

a) how important the income source is with respect to total income (S_k)
b) how equally or unequally distributed the income source is (G_k)
c) whether or not the income source is correlated with total income (R_k).

For example, if an income source represents a large share of total income, it may potentially have a large impact on inequality. However, if that income is perfectly and equally distributed ($G_k = 0$), it cannot influence inequality even if the magnitude is large. If this income from a source is large and unequally distributed (S_k and G_k are large), it may either increase or decrease inequality, depending upon which households, at which points in the income distribution, receive it. If remittances are unequally distributed and flows disproportionately towards households at the top of the income distribution (R_k is positive and

3. Remittances, Market Restrictions and the New Economics of Labor Migration

The increasingly important migration phenomenon has induced development theoreticians to study migration from different perspectives. A wide range of migration studies already has certain bases to describe the observed population movement patterns in order to study the main migration determinants (Massey et al., 1993, 1994). However, several of these studies tend to research the phenomenon by itself and sometimes its total impact in the economy, neglecting the impacts that the migratory phenomenon has on the migrants' origin communities (some studies that consider this impact are, among other, Adams, 1989 and 1991; Barham and Boucher, 1998; Stark et al, 86, 88).

One of the most important differences between the neoclassical models of migration and those of the NELM is the analysis unit. On one hand, the neoclassical models (e.g. Todaro, 1969; and Harris and Todaro, 1970) consider the migration decisions from an individual perspective, ignoring one of the main motivations -sharing part of the migrants' revenues with their origin households. These types of models consider the individual as the fundamental unit of analysis and they ignore the family relationships that exist between the migrants and the households left behind.

On the other hand, the NELM considers that migration decisions are taken in the household context that involves family decisions. The NELM takes into account different individuals with different interests and different income accesses. This theory outlines that individuals act in a collective way at the household level with the objective to maximize their revenues, minimize the risks and diminish the restrictions created by diverse market failures (e.g. lack of access to capital, absence of a well developed labor market, etc.).

If it is assumed that the curve PP'(see figure I) represents the production possibility frontier (PPF), where its slope is determined by -μ, then at the range of relative prices such that, $|\mu| > |p_2/p_1|$, the household will specialize in the activity with higher returns, then product will be, $Q^* = f(\overline{T}, Z_h)$, and income $Y^* = g(Q^*)$.

Q* and Y* would be the result if the household does not face any kind of restrictions in the markets. However, if the household faces market restrictions when it is trying to invest in the higher revenues activity the following outcome is possible. Considering, $c(\cdot) = T_1$, where $c(\cdot)$ denotes one or more barriers that limit the investment of the household fixed resources to only T_1 ($T_1 < \overline{T}$). For example, in the case of a restriction of liquidity or credit, $c(\cdot)$ can denote a barrier that keeps the household from getting loans for the purpose of investing more in the higher returns activity. Consequently, the restriction prevents the production of more Q_2 due to the lack of access to the formal credit market. In this example, T_1 represents the portion of the household fixed resources that at that moment are used for the activity of highest returns. Although the household would prefer to produce more Q_2

Figure 1. Potential Migration Effects on rural households´production

Because the relative magnitudes of the derivatives $dc/dR > 0$ and $dc/dM < 0$ are unknown, the net migration effect on the households' total income is ambiguous. However, when the credit and/or

restricted income sources will depend on M and R, as well other vectors of individual, household, and community level characteristics ($\mathbf{Z}_k$). Through production, the migration and remittances can have diverse effects on different income sources. This paper distinguishes between the effects of internal and international migration, as well as considering the effects of the remittances coming from these two main destinations.

Considering income sources such as agricultural income (Y_a)(including the production of basic, cash crops, and plantations); livestock income (Y_l), wage income (Y_w), government transfers (Y_t), and other incomes (Y_o)(including the income from commercial activities and services); and dividing the concept of remittances into national, R_n, and international, R_u, the sum of the two sources of remittances and the five sources of net revenues are equal to the total net income.

The central equation of the model that explains the net income generated by the household from each one of the sources is determined by:

$$\overline{Y}_k = \gamma_{0k} + \gamma_{1k} M_n + \gamma_{2k} M_u + \gamma_{3k} R_n + \gamma_{4k} R_u + \gamma_{5k} Z_k + \varepsilon_k ; \quad k = a, l, w, t, o \qquad (4)$$

The null hypothesis associated with the NELM is: Neither the remittances, R, nor the migration, M, affect the different income sources. In other words: $\gamma_{1k}, \gamma_{2k}, \gamma_{3k}, \gamma_{4k} = 0 \quad \forall \quad k$.

Although is well known that remittances are produced by the households' members allocated to labor migration, M, not all of households receive them. Given the migration, remittances are affected by the characteristics of households' human capital, $\mathbf{Z}_R$, which in turn influence the migrant's success and disposition to send remittances.

$$R_i = \alpha_{0i} + \alpha_{1i} M_i + \alpha_{2i} Z_{Ri} + \varepsilon_{Ri} \qquad i = n, u \qquad (5)$$

Migration is also a function of the characteristics at the individual, household, and community level, $\mathbf{Z}_M$; this function can generally be represented by

$$M_j = g_j(\beta; Z_M) + \varepsilon_M \qquad j = n, u \qquad (6)$$

In order to estimate consistently the system of equations (4) to (6), a functional form must be chosen for the equation (6). This functional form in (6) has to consider that the number of migrants is never a negative number. However, some aspects that complicate the estimate, according with the NELM, are that migration and remittances are endogenously determined with the other income sources. In order to control the endogeneity problems, instruments are needed to identify both remittances and migration. The selectivity bias also represents a problem, since not all the households sending migrants receive remittances and not all the households participate in the different income activities. Finally, the remittances and other income sources may suffer the same types of shocks, which would cause contemporary correlations among the equations.

In the migration equation certain factors beyond the non negativity should be taken into account. It shall be considered that an significant number of households do not send out migrants. For instance, in the West-Center region, 45% of the households did not report household members living in the United States, or any Mexican destinations. Meanwhile, a significant portion of the households which allocated migrants sent more than one individual. In this region, 37% of households reported more than one migrant either going to the interior of the country or toward the United States.

Considering the above, a functional form will be used, which counts the probable number of individuals migrants. This functional form for equation (4) is $g(\beta; Z_M) = \exp(\beta_0 + \beta_1 Z_M) + \varepsilon_M$. The count regression has several advantages over other possible estimators. For instance it takes into account the

households in 14 states. INEGI, Mexico's national information and census office, designed the sampling

alternatives to migration. The frequency of transport index averages 8.24 but ranges from 0 to 24. Fourteen percent of villages lack access during weather shocks, and one in four has a non agricultural enterprise.

Table 2 shows the distribution in years of schooling of the sample, suggesting a relatively symmetrical distribution centered in the range from 4 to 6 years. A quantity near 11% represents individuals do not have any schooling. Only 3% have 12 or more years of schooling. More than a third of the sample reported between 4 and 6 years of schooling.

Table 3 presents migration characteristics of rural Mexico by region. For the total sample, 16% of the households had at least one member living in the United States at the beginning of 2002, and 26% of the households had members living in other parts of Mexico. The average number of migrants per household to the United States is 0.35 individuals, while the average of migrants to the interior of the country is 0.71. This makes a total of 1.06 migrants on average per household. The number of migrants to U.S. per household ranged from 0 to 9, while the number of internal migrants ranged from 0 to 10. The graph II displays the tendency of internal migration and migration toward the United States in this sample.

There are sharp differences in migration experience among the five rural regions of Mexico. The West-Center region traditionally has had the highest propensity to send migrants to the United States. It currently has the highest participation rates in international migration and the most international migration experience. Nearly 28% of all households in this region have at least one family member in the United States, and the average household has 0.62 U.S. migrants. By contrast, 7.5% of households in the South-Southwest have U.S. migrants, with an average of 0.10 U.S. migrants per household[iv].

b. Level and Composition of the Net Rural Incomes

Detailed data on household-farm production, wage work, and migration make it possible to estimate total income for each household in the ENHRUM sample. In this paper, net incomes from livestock, agriculture, government transfers, internal and international remittances, wages and net incomes from other sources including commerce, services, and natural resources are calculated. This list of income sources is exhaustive; the sum of income from the seven sources equals household total net income.

There are various methods to estimate net income from rural household production activities. To impute values of family inputs such as labor, land and capital were not used, because it is not obviousp4(T)-6atpuselic

income (mostly from the United States). Agricultural net income represents more than 12%, and the highest household's income source is wages, which are more than 50% of the total net income.

Summary statistics reveal that migrant remittances potentially have significant impacts on rural income inequality and on rural income sources. It is possible to see some of these economic impacts in the empirical findings.

2. Empirical Findings of Income-Source Gini Decomposition

Table 6 summarizes the contributions of diverse income sources to total income and income inequality in rural Mexico during 2002. The first column, S_k

D. CONCLUSIONS

This work has endeavored to determine the relationships between migration, remittances and the different income sources of Mexican rural households. First of all, decomposing the households' net income into its different sources is possible note that international remittances have a negative impact in the income distribution. That the individuals who migrate do not come from the poorest households, because international migration has a higher risk and cost, may explain this impact. This assertion is backed up with the econometric results from the equation used to model migration. There it is possible to see that the wealth index variable has a positive and significant effect. Meanwhile, the same variable squared has a negative and significant effect, suggesting an inverted-U relationship between migrants and their level of wealth. In other words, households who allocate international migrants are within the middle and middle upper income of the income distribution spectrum.

The national remittances impact is a decrease in the Mexican rural households' inequality level. The lesser risks and costs of internal migration explain this effect. Hence, a higher number of households can engage in this activity, without regard to which part of the income distribution they belong. Furthermore, as the results from the migration function suggest, these households are the less wealthy, causing a decrease in the distribution gap.

The econometric results indicate that the principal migration motivators, as the literature predicts, are the household size and the existence of migratory networks. In this manner, the remittances effects on the different income sources are not null. Migratory phenomena represent cost for households that allocate

Table 3. Migration Summary Statistics for Rural M

Region	*Variable*
South-South East	Households with US migrants (%)
	US Migrants per Household
	Households with Internal migrants (%)
	Internal Migrants per Household
	Household Sample Size
Center	Households with US migrants (%)
	US Migrants per Household
	Households with Internal migrants (%)
	Internal Migrants per Household
	Household Sample Size
Center-West	Households with US migrants (%)
	US Migrants per Household
	Households with Internal migrants (%)
	Internal Migrants per Household
	Household Sample Size
Northwest	Households with US migrants (%)
	US Migrants per Household
	Households with Internal migrants (%)
	Internal Migrants per Household
	Household Sample Size
Northeast	Households with US migrants (%)
	US Migrants per Household
	Households with Internal migrants (%)
	Internal Migrants per Household
	Household Sample Size
Total	Households with US migrants (%)
	US Migrants per Household
	Households with Internal migrants (%)
	Internal Migrants per Household
	Household Sample Size

Table 4. Descriptive Statistics for Households which Receive Internal and U.S. Remittances and for Households that do not

Variable	*Households with U.S. Remittances*	*Households with Internal Remittances*	*Household without remittances*
	(n=295)	(n=236)	(n=1294)

Table 5. Composition of Net Income, by Source

Variable	*Mean*	*Participation*
Livestock Income	1983.38	3.71%
Agricultural Income	6627.15	12.40%
Government Transfers	2326.39	4.35%
Internal Remittances	897.71	1.68%
U.S. Remittances	5888.42	11.01%
Wages	28949.05	54.15%
Other Incomes	6793.2	12.71%
Total	53465.31	100.00%

Source: ENHRUM, 2003.

Table 6. Gini Decomposition by Income Source

Income Source	*Share in Total Income (S_k)*	*Gini Coefficient for Income Source (G_k)*	*Gini Correlation with Total Income Rankings (Rk)*	*Contribution to Gini Coefficient of Total Income* ($S_kG_kR_k$)	*Percent Share in Gini of Total Income*	*Effect of a 10% Increase on Total Income Gini Percent Change*
Livestock	0.04	1.70	0.55	0.04	0.06	0.22%
Agricultural	0.12	1.13	0.77	0.11	0.18	0.57%
Government Transfers	0.04	0.76	0.23	0.01	0.01	-0.31%
Internal Remittances	0.02	0.95	0.25	0.00	0.01	-0.10%
US Remittances	0.11	0.94	0.69	0.07	0.12	0.10%
Wages	0.54	0.69	0.81	0.30	0.51	-0.36%
Others	0.13	0.86	0.63	0.07	0.12	-0.12%
Total Income	1.00	0.60	1.00	0.60	1.00	

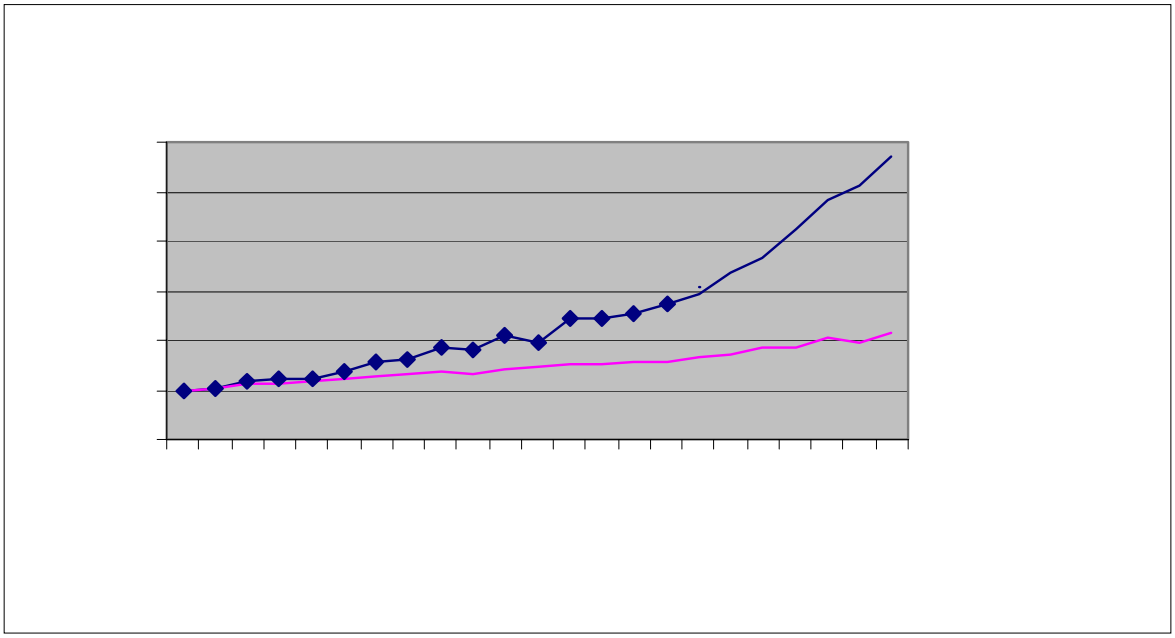
Table 7. Impacts of Household Characteristics and Migration Networks on Migration

Independent Variable	*Specification*			
	FAMUS (1990)	*FAMEX (1990)*	*HHFUS*	*HHFMEX*
	(a)	*(b)*	*(c)*	*(d)*
Household Size	0.18503	0.20662	0.18621	0.20738
	(13.93)***	(23.94)***	(14.38)***	(24.23)***
Schooling of household head	-0.01736	0.0208	-0.01934	0.02127
	(-1.10)	(1.77)*	(-1.21)	(1.82)*
Household Head Experience	0.14282	0.11716	0.14904	0.11824
	(7.95)***	(9.99)***	(8.32)***	(10.06)***
Experience Squared	-0.00136	-0.00075	-0.00134	-0.00075
	(-7.75)***	(-7.75)***	(-7.81)***	(-7.23)***
Wealth Index	0.28259	-0.05813	0.31706	-0.06651
	(9.14)***	(-3.30)***	(10.40)***	(-3.80)***
Index Squared	-0.03333	-0.02383	-0.02724	-0.02409
	(-2.60)***	(-3.31)***	(-2.13)**	(-3.35)***
Landholdings	-0.00247	-0.00005	-0.00337	-0.00001
	(-1.40)	(-0.03)	(-2.02)**	0
Livestock	0.00727	-0.00722	0.00804	-0.00674
	(3.55)***	(-2.11)**	(4.00)***	(-2.04)**
Tractors	0.27596	0.18164	0.28958	0.15411
	(2.24)**	-1.57	(2.38)**	-1.33
Frequency of Transport	-0.01002	0.01928	-0.00468	0.02187

Table 8. Impacts of Migration and Remittances on Income Sources

Independent Variable	*Remittances*		*Livestock*	*Agricultural Income*	*Government Transfers*	*Wage Income*	*Other Income*
	International	*Internal*					
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
Number of International Migrants, Predicted	7673.133	---	2526.403	9345.644	-86.15833	-35.6147	1666.384

Figure 1. Trends in Internal and International Migration, 1980-2002



ENDNOTES

[i] This money is quantified only in formal mechanisms of reception, for example banks.
[ii] In the study international migration is defined as migration mainly to the United States, as well as internal migration.
[iii] The percentage of the population of Mexico that lives in hamlets of less than 500 people is no more than 20% in 2000, INEGI, population Census 2000.
[iv] For descriptive statistics of households which receive internal and international remittances and those that do not see table 4
[v] These source Ginis are high in part because they include zero remittances for some households.
[vi] PROCAMPO was instituted in the context of a phase-out of price guarantees to basic grain producers. It represented a shift

_____(1994). An Evaluation of International Migration Theory: The North American Case. *Population and Development Review*, 20(4): 699-751.

Oberai, A.S. and H.K.M. Singh (1980). Migration, Remittances and Rural Development: Findings of a Case Study in the Indian Punjab. *International Labor Review*,119:229-41.

Portes, Alejandro and Rubén G. Rumbaut (1990). Immigrant America: A Portrait (University of California Press, Berkeley and Los Angeles).

Ray, Debraj (1998). *Development Economics*. Princeton University. Princeton, NJ.

Rozelle, S., J.E. Taylor, and A. De Brauw (1999). Migration, remittances, and agricultural productivity in China. *The American Economic Review*, 89:287-291.

Singh, I., L. Squire and J. Stauss, eds. (1986). *Agricultural Household Models: Extensions, Applications, and Policy*