International Migration and Schooling as Alternative Means to Social Mobility: the Mexican Case.

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Abstract

Using data from the National Survey of Rural Households in Mexico (Spanish initials: ENHRUM), covering 80 communities with less than 2,500 inhabitants, this study explores the relationship between migration and cash remittances back to back to Mexico on the one hand and, on the other hand, attendance at school by children and youths from rural communities between 11 and 19 years old. The analysis takes stock of the migratory culture that springs up in homes and communities, and also of the effect that the Mexican Government's *Oportunidades* (i.e. "Opportunities") program may have on educational variables. Positing a set of simultaneous equations between migration and remittances, our results suggest that migratory experience, both in the home and in the community, has a negative effect on the junior- and senior-high-school education of young males and females in the Mexican rural sector. Cash transfers via the *Oportunidades* (i.e. "Opportunities") and *Procampo* (i.e. "Pro-countryside") programs seems to correlate positively with the two schooling variables, though the *Oportunidades* program would seem to promote more schooling among girls, once the effects of migration and remittances have been factored out. The results show that community economic activity leads to more schooling among males between 16 and 19 years of age, while more schooling of mothers and more family income seem to lead to more schooling in their children, which is in line with the existing literature on educational economy.

Key words: Migration, Education, Mexico.
Classification JEL: O15, J61, D31.

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1.- Introduction

Though the human-capital theory acknowledges various types of mechanisms whereby a person may obtain greater returns from his/her social and demographic features, meritocratic societies reward education and job experience over other human-capital investments in areas such as physical health.

Migration is deemed to be a human-capital investment to the extent that the return of a person's social and demographic features increases when s/he moves to another place. A person may increase his/her earnings simply by moving to a place where the demand for his/her features is higher. Hence, education and migration may come to be seen as interchangeable under certain conditions, leading migrant families to spend less on education than families who have not witnessed a migratory experience up close.

At present there is a debate among economists about the effect that migration can have on families' investment in education. Since there are diametrically opposed findings in this regard, it is necessary to approach this by no means trivial problem empirically in terms of economic development. If, as is known, migration alleviates the economic limitations of families in developing countries, it is logical that remittances should be associated with greater investment in education, bringing about circumstances that allow such families to eventually shake off poverty. If, on the other hand, it changes the returns expected from schooling and leads families to opt for migration, then people will invest less in education, bringing about tendencies that do not favor the family unit in the medium and

long term. However, migration is not the only thing that can affect the anticipated results of schooling. The absence of a family member due to migration can result in disruption of the home, affecting children's emotional state and causing them to drop out of school. Moreover, the lack of a family member may make it necessary for children to leave school to help shoulder the additional chores that the remaining members of the family have to perform, creating greater cash problems in the short term that in turn lead to more absenteeism from school.

The increased flow of migrants from Mexico to the United States that has been seen in recent years has generated a great deal of interest in this trend's negative and positive effects on future economic development. There is no denying the positive effects of remittances on family welfare in the short term. Hildebrandt y McKenzie (2005), for example, find that children in homes with migrants have lower infant-mortality rates and are less likely to be ill-nourished than ones in homes which have not experienced migration. Furthermore, according to Mora (2006), poverty has decreased in Mexican rural families in proportion to the increase in their income stemming from international remittances, which suggests that international migration has played a positive role in the struggle to end poverty. The same author analyzes the effect of remittances from the United States on income distribution in communities with respectively high and low traditional migration rates, concluding that migration and remittances correlate positively with inequality in the latter. In other words, he finds that, at the onset of migratory trends in a given place, inequality indicators initially rise, but that, as the inhabitants' tendency to migrate becomes more widespread, income-distribution indicators improve significantly, with the result that communities with well established migratory trends have lower poverty

levels than ones whose inhabitants are less likely to migrate to other countries[2]. Other studies, such as the one published by Woodruff and Zenteno (2001), suggest that remittances stimulate entrepreneurial activity in families that have experienced migration by their members, while a study carried out by Lucas (1987) concludes that, though migration has a negative influence on agricultural production in the short term, in the long term the arrival of remittances more than makes up for this initial loss, since it encourages business investment. Finally, the exit of workers from the country due to migration means that less new jobs need to be generated, which benefits those who stay behind. However, we do not know whether the migratory culture that is being generated in Mexico, along with the high levels of illegal immigration by Mexicans to the United States, is having a negative effect on the affected families' investment in human capital, and, hence, creating greater long-term dependence on remittances[3].

The present paper sets out to analyze the effects of migration and the reception of remittances on various aspects of schooling in Mexican rural families. This topic has been tackled in the past by various authors [See Hanson and Woodruff (2003), McKenzie and Rapoport (2006), López-Cordoba (2006) and Borraz (2005), among others], and hence our own research contributes new data and reviews a growing -and controversial- body of work. Primarily, our analysis primarily focuses on communities with less than 2,500 inhabitants, with the direst poverty levels in Mexico. Secondly, unlike other studies, this one very directly takes stock of the migratory culture that arises in both the families and communities analyzed. Thirdly, in our estimates we endeavor to isolate the effect that

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[2] Although the two studies use different databases, the results obtained by Mora (2006) coincide with those of McKenzie and Rapoport (2005), which makes them all the more noteworthy.
[3] Since illegal workers in the United States generally do jobs that don't need much schooling, people expecting to migrate in the future are less motivated to invest in education.

Mexican social policies have had on rural families' decisions about schooling, and we specifically include, in the regressions, a variable pertaining to the help that each family has received from the *Oportunidades* program. Our study's findings can be attributed to the richness of the database used, which comes from the National Survey of Mexican Rural Households (Spanish initials: ENHRUM) that was carried out in early 2003 and the results of which are available on the Internet.[4]

The subject tackled in this project poses various econometric challenges. The first of these is that of identifying schooling equations, given that many of the features that affect families' schooling results also affect decisions about migration and the likelihood of receiving money transfers, making it difficult to identify endogenous and exogenous variables in the models. Another problem is that a person's schooling depends both on past family decisions and also on present conditions, many of which cannot be observed directly by the analyst, thus giving rise to possible bias due to the omission of variables from the equations. Finally, not all the members of certain age groups attend school, and attendance is probably not randomly defined. This means that the self-selection biases implicit in the definition of schooling variables should be taken into consideration. These problems, and the techniques used to try to solve them, are amply discussed in this paper.

The paper is organized as follows: In Ch. 1, we present a review of the existing literature -both theoretical and empirical- on the effects that migration from a developing to a developed country can have on investment in human-capital. In the third section, we present the data and list the main characteristics of rural homes and communities with

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[4] At http://precesam.colmex.mx/ENHRUM/

migrants and ones without them. In Ch. 4, we present the results of various econometric endeavors, and in Ch. 5. we set out our conclusions.

2.- Migration and Education: A Review of the Literature.

According to neoclassical economic theory, geographic population mobility mainly depends on differences in income and opportunity between one region and another. However, though the developmental differences between Mexico and the United States largely explain the flow of migrants from the former to the latter, such an explanation does not take stock of all the problems associated with the decision to migrate from a developing to a developed country.

The new economic theory of migration, also referred to as "the new economics of labor migration" (NELM) and attributed to Oded Stark and David E. Bloom (1985), argues that the decision to migrate from one community to another, whether within a developing country or from it, is not taken at the individual level, as neoclassical economic theory holds, but, rather, at the family or household level[5]. According to this theory, both social and family factors intervene in the decision to migrate, which is aimed at strategically tackling two impediments to a family's social mobility – i.e. difficulties in gaining access to credit and a dearth of risk-coverage resources. This theory holds that migration facilitates and enhances the transformation of family production (and hence consumption) due to the double role that it plays in the accumulation of capital, both generating income in the form of remittances and spreading risk by diversifying income sources.

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[5] According to the new economic theory of migration, the decision-taking entity is the household, and it is assumed that, just like the individual, the latter seeks to optimize a profit-making function. In the case of families, the profit-making function is the aggregate one, and the profit-making capacity of each individual is weighted differently. Moreover, since there are long-term benefits implicit in the decision to migrate, the optimizing function includes time-related factors.

Graph 1 illustrates the central ideas of the new economic theory of labor migration. On the one hand, it analyzes the role played by money remittances to migrant's families in their home communities, while, on the other hand, it allows us to include an analysis of the costs to the family associated with the loss of an economically active member.

Let us suppose that a family from a developing country can produce either a traditional commodity (T), as measured on the horizontal axis of Graph 1, or a domestically manufactured commodity (M), as measured on the vertical axis of the graph, so that the M^0T^0 line depicts the domestic-production-possibility frontier (DPPF). The horizontal R^0 line depicts a restriction on resources, and the initial M and T production combination is represented by point e_1. Now let us imagine that resource limitations are alleviated by the inflow of new domestic income deriving from remittances, so that R^0 changes to R^1 [See Taylor, et al. (2003) and Stark (2005)]. Now, the optimal M and T production combination passes, across the original Production-possibility Frontier, to point e_2, where M^0T^0 intersects with R^1 (N.B. with the restriction of resources and any PPF, an optimal-production point is reached in a corner solution, given that the amount of the two commodities will be produced, regardless of the prevailing price ratio). However, the expansion of domestic resources has the effect not only of moving the resource-restriction borderline, but also of enabling the production of T to increase by displacing the original PPF towards the right, so that the new optimal-production point is e_3, where both the traditional commodity, T, and the manufactured commodity, M, increase in relation to the original point e_1. Now the relevant PPF is that depicted by the M´T´ line. According to Stark (2005), the inflow of remittances to the home allows the members of the family to use a more advanced production technology, investment in which, without the inflow of money transfers, would have been deemed very risky. This technological change displaces the PPF

even further, leading to a greater increase in the production of T and moving the family to production point e_4, where it is possible to invest in areas that may not previously have been key to its survival, such as human capital.

The essential tenet of the above theory is that the migration of one of its members allows a family in a developing country to increase production not only of the commodity that it traditionally produced, but also of an additional commodity, thanks to the technological change brought about by the decision to migrate. Now, if we take into account the cost to the family, in terms of lost human capital, of the decision to migrate, we might think that the final PPF does not end up being M"T", but, rather, reverts to M´T´, so that the end production of the two commodities, while not so high, is indeed higher than the original production.

This calculation shows that the decision to send a family member from a developing country to another more developed one is perfectly rational, being aimed at increasing the aggregate profits of the whole family.

Now a family decides to invest in human capital in order to thereby maximize returns [Becker (1993)]. A family will choose schooling level, s*, for each of its members, i, so that:

$$s_i^* = \max_{s \in (0,1,2....N)} \sum_{j=1}^{s} (r_{ij} - c_{ij} - k_{ij}) \quad s.\,a. \quad \sum_{j=1}^{s} c_{ij} <= A_i \quad ....(2)$$

where r_{is} is present value subtracted from the return obtained by the individual, i, upon completing an additional year of schooling, s. Finally, k_{is} is the additional non-financial cost of completion of an additional year's schooling by family member, i, which cost might be

displeasure at the person's educational endeavor or at the consequent loss of wages. The costs are incurred at the present time, while the return is produced in the future. Clearly, both the expected returns on the schooling and the direct and indirect costs vary with each individual, even within the same household. However, the relevant restriction is that the sum of all the financial costs associated with an additional year of schooling must be less than the total amount of resources, A_i, that the household needs in order to subsist. To sum up, the household's decision regarding schooling is to choose $s \in \{0,1,2,....,N\}$ in order to maximize education minus present net value, subject to the stated restriction.

After McKenzie and Rapoport (2006), the optimal schooling level for individual i may be called s_i^U, which would be reached if there were no monetary restrictions within the family. We expect an increase in optimal schooling when mother's schooling or the household's resources rise. Let us suppose that the mother's schooling causes the displeasure at the corresponding educational endeavor to decrease, while the increase in the household's income causes higher levels of return to education due to the peer effect – i.e. to access to valuable social networks. If the highest possible number of years of schooling for individual, i, is called s_i^P, then, given the family's economic restrictions, we can assume that s_i*, the maximum level of schooling achieved for individual, i, will be:

$$s_i* = \min (s_i^U, s_i^P) \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots..(3)$$

We depict s_i^U and s_i^P in Graph 2, assuming that $s_i^U > s_i^P$ - i.e. that financial and cash-flow restrictions prevent the family from reaching s^U for individual, i. In that case, given expression 3, we know that individual, i, will follow the schooling path denoted by s_i^P, since this is what the family can afford.

If the family of individual, i, resorts to migration to ameliorate some of its financial and cash-flow restrictions, s_i^P might move upward as shown in Graph 3, passing from s_i^P (1) to s_i^P (2), which would cause the schooling of individual, i, to increase in certain phases of the family's financial development, while, in other phases, it would remain below what the family might afford, depending on household preferences. In this specific case, the schooling profile of individual, i, vis-à-vis the family's financial level, would be as represented by the thick black line in Graph 4. However, it should be stressed that this example might change in such a way that the schooling path changes in accordance with the cost of education, with family preferences, and with changes in the restrictions inherent in migration and remittances [See McKenzie and Rapoport (2006)][6].

So far, both the theory and the evidence presented suggest that migration and the sending of remittances back home could be good means of promoting a country's development, since they encourage investment in human capital and in technology at the household level as well as helping to alleviate poverty and to increase income distribution to higher aggregate levels. If this were the case, then national social policies should include a program facilitating the temporary migration of chosen groups of people, who should be selected based on studies that show which types of people are more likely to send remittances back home, to invest in capital (both physical and human), and to return to their home country after a given period abroad.

However, we still lack sufficient data about the possible negative effects of migration to make suitable recommendations regarding appropriate social and migratory policies. One possible effect of international migration is that it replaces education as a

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[6] One suggestion made by Hanson and Woodruff (2003) is that migration might also change returns to education in both the country of origin and the host country, which would encourage further investment in human capital.

suitable means of achieving social mobility. If migration does, indeed, change the schooling aspirations of young people and their families, then Graph 4 would change, so that the ideal schooling profile vis-à-vis families' prosperity would move downward, as shown in Graph 5. In this case, since neither cash remittances nor social programs promoting conditioned transfer would succeed in keeping people rooted in their home communities, local economic activity might diminish over time and migration increase, to the point where wage differentials between host communities and home communities might disappear[7]. This could result in lower economic growth in both host countries and home countries, since immigration would lead to less investment in human capital, and hence to lower rates of technological change, factors which are both widely acknowledged to encourage economic investment[8].

So as to make issues clearer, below we present a review of the most relevant studies of the empirical effects of migration on schooling in Mexico.

One of the first studies to tackle the migration-remittance-education phenomenon in a quantitative manner was that of Hanson and Woodruff (2003), who attempted to determine whether Mexican children living in homes with migrants tend to have more schooling than children from homes from which nobody has migrated. The authors of the study acknowledge that, since migration is a means of increasing family income, then, assuming educational normality, it should lead to higher levels of schooling in the younger members of the family. On the other hand, the authors themselves point out that migration results in family disruption and labor shortages, which might have a negative effect on

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[7] This result is based on rather unrealistic premises, such as perfect competition in both communities' job markets and the free flow of workers between the communities.
[8] Assuming that perfect competition and the free flow of workers did indeed exist, then certainly stagnant conditions of low development would come about in both countries, with lower wages and a glut of jobs requiring relatively unqualified workers.

family decisions about schooling. One of the study's weaknesses is that it analyzes family migratory experience in terms of interactions between the past migration rates of the state in question and some household features, an approach that seems inadequate when one considers that the same state includes communities with both high and low migration levels and that, even in places with high migration rates, not all households have necessarily experienced migration. Based on a cross-sectional econometric analysis that uses data from a sub-sample of the 2000 Census, the authors conclude that migration helps girls between the ages of 10 and 15 in the poorest families to achieve higher levels of schooling, though results are not conclusive for boys within the same age range.

In a similar study, McKenzie and Rapoport (2006) examine the impact of migration on young people's educational achievement in rural areas of Mexico. The authors use data from the 1997 National Survey of Population Dynamics (Spanish initials: ENADID) and analyze both school attendance and levels of schooling in boys and girls between 12 and 15 years old and 16 and 18 years old respectively. One criticism made by the authors about the study carried out by Hanson and Woodruff (2003) is that it analyzes an age group that must complete the obligatory basic education cycle, which, in Mexico, extends to the third year of secondary school or ninth grade (i.e. up to approximately 15 years old). McKenzie and Rapoport (2006) point out that variations in the schooling of children between 10 and 15 years old don't require econometric correction for self-selection, and acknowledge that a study of this age group cannot produce revealing results about the effects of migration on families' decisions about schooling.

To tackle the problems of endogeneity that arise when the effects of migration on family-level schooling are analyzed, McKenzie and Rapoport (2006) examine the migratory experience of those families within the state that have a record of migration, an

approach which is again open to question for the reasons mentioned above. The authors find that migration has a negative effect on the school attendance of boys between 12 and 15 years old and girls between 16 and 18 years old. Using census-based regressions to elude the problem caused by obligatory basic education, the authors note that migratory experience tends to decrease the likelihood of boys finishing secondary education, and of both boys and girls finishing senior-high-school education. One interesting result of this analysis is the conclusion that boys between 16 and 18 in families with migratory experience are more likely to migrate themselves, while girls in such families belonging to the same age group are more likely to end up working as servants.

Using cross-sectional data pertaining to Mexican municipalities and tackling the econometric problems of endogeneity between migration and development in the same way that the above-mentioned studies do, López-Cordova (2006) finds that the reception of remittances has positive effects on both health and literacy levels in children between 6 and 14. This author also finds that migration and remittances help to diminish poverty at the municipal level, resulting in higher living standards for inhabitants. One problem arising in this study is that the unit of analysis is the municipality rather than the household, and results might vary if the family were the focus.

Finally, like Hanson and Woodruff (2003), Borraz (2005), using data from a 2000-census sub-sample, finds that migration and cash remittances correlate positively with schooling in boys and girls between 10 and 13 years old, but only in communities with less than 15,000 inhabitants. The author finds that the results are not conclusive for larger communities, However, since his study also fails to tackle the problem of including in his survey those variables inherent in the obligatory nature of basic education in Mexico, his results might be questioned on the grounds that they derive from a sample containing age

groups that can and must complete the basic schooling that is mandated by the Mexican State.

One important omission from all the aforementioned studies is that the possible effects of the "*Oportunidades*" conditioned-cash-transfer program, are not considered in the schooling equations. This program has been especially aimed at the poorest rural communities and has a gender component that encourages more schooling among girls. Various evaluations of the program bear witness to its positive effects on school attendance and average schooling levels [See Parker and Skouffias (2001) and Levy (2006), among others]. For this reason, omitting this variable from the schooling equations might result in a corresponding bias in the regressions, causing erroneous conclusions to be reached about the effects of migration and remittances on investment in human capital.

Below, we describe the database used in our study and present some statistics that will help to elucidate the apparent relationship between migration and remittances on the one hand and schooling in the Mexican rural sector on the other hand.

3.- Description of the Basic Data and Statistics.

In order both to design the models for this study and also to create the basic statistics for it, we have used data from the National Survey of Rural Households in Mexico (Spanish initials: ENHRUM), complementing some of the community-level variables with data from the 2000 Census of General Population and Dwellings and the 2005 Population Tally (Conteo).

Divided into two stages, the first of which included a Community Survey and the second of which included a Household Survey, ENHRUM, which covers settlements nation-wide with between 500 and 2,499 inhabitants, was carried out in 80 rural locations

in 14 Mexican states, based on a division of the country into the following 5 regions: South-Southwest (Oaxaca, Veracruz and Yucatán), Center (the State of Mexico and the State of Puebla), Center-West (Guanajuato, Nayarit and Zacatecas), Northwest (Baja California, Sonora and Sinaloa) and Northeast (Chihuahua, Durango and Tamaulipas), choosing 16 locations in each region.

The Community Survey was carried out between August and October of 2002, in order to get the information that was needed to adjust the household questionnaire that was to be used in each of the locations chosen. The local authorities from each community were asked to respond to the community questionnaire, providing information about the relationship between each community and its environment (trade, work, migration, etc.), local statistics (e.g. total population or number of schools), the socio-economic infrastructure, the main money-earning activities, the type of land ownership, access to and use of natural resources, and corn markets.

The household survey was carried out between early January and mid March of 2003, obtaining socio-demographic and economic information about the homes covered, such as the sex and schooling background of the members of the household, their jobs and migratory histories, and the costs of, and income deriving from, their productive activities and consumption. The data obtained included non-pecuniary activities such as the family's use of labor and production, as well as who it made purchases from and who it sold to. Most of the data pertain to 2002.

For the purposes of this study, we created a database in which we included data at four levels – individual, household, district of residence and municipality. The individual variables come directly from the household databases, while the household variables were calculated based on the community survey, being added to the individual database using the

household identifier as a linkage variable. Finally, the variables that we have used at the municipal level come from the National Statistics, Geography and Computer-science Institute (Spanish initials: INEGI).

It should be stressed that, in order to keep the sample representative at the national-rural-sector level, we have used the weightings provided by the ENHRUM survey itself in all our calculations. Below, we comment on the structure of the data.

3.1.- Data.

The expanded ENHRUM sample is representative of a population of around 17 million people – i.e. the total rural population in Mexico. The average age of the total population is 31.6 years and its schooling average 5.32 levels satisfactorily passed. This is lower than the national schooling average, but it should not be forgotten that it pertains to the country's rural population, 28% of which, if one includes those with less than full proficiency, speaks a native-Mexican language. Slightly more than half of the simple population (54%) said that it was either married or cohabiting with a partner. The average household size was higher than the national average, at 5.51, with a school-attendance participation of 25%.

Regarding the break-down of the population according to the type of household to which subjects belong, it can be seen that 13.4% of the respondents live in single-parent homes, 12% of which are headed by women. It is noteworthy that 30% of rural households have, at some point, had one of their members migrate, and 4% of households have had one of their members participate in the Bracero Program. More than 20% of the population lives in a household from which somebody migrated to the United States in 2002.

Since monetary income is not a good indicator of the livings standards of members of the rural population, we used the number-of-rooms-in-the-home variable to gauge each household's living standards. The average number of rooms per household for the population comprising the sample is 2.7.

Participation in the *Oportunidades* program is important for the purposes of this research, since the program has a direct effect on young people's schooling. The basic data from the survey indicate that 47% of the rural population lives in households receiving support from the *Oportunidades* program.

Comparing households from which someone has migrated in the past with ones from which nobody has ever migrated (Table 1), we find that "migrant homes" show some signs of better educational performance, whether it be in terms of years of schooling of members of nuclear families (5.19 vs. 5.64), of average grades (8.14 vs. 8.05), or of lower failure rates (15.3% vs. 17.6%). On the other hand, it should be stressed that there is a significantly lower percentage of indigenous households with migrants in the population (6% vs. 38%).

Some outstanding differences can be seen, in Table 2, between households with migrants and ones without them. In the first place, it should be stressed that migrant homes tend to have more rooms, suggesting better living standards. Moreover, migration seems to bring about family changes that result in more migrant households with non-nuclear families. In many cases, this might be because households break up as a result of migration, with grandparents and aunts and uncles moving in to live with the family[9]. On the other hand, it seems that both migrant and non-migrant households are equally likely to be headed by women. Though we would have expected to find more migrant households

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[9] For a review of the effects of migration on family set-ups in Mexico, see Rubalcava and Teruel (2005)

headed by women, given the higher proclivity of males to migrate, this is not borne out by the figures, probably because women in charge of migrant families continue to see their absent husband as the head of the household [Polanco (2007)]. One important trait shown in this Table is the much lower proportion of indigenous households with migrants (7% vs. 39%). We also find that members of migrant households tend to have more years of schooling than those of non-migrant ones (5.67 years vs. 5.04 years).

We find that the average length of time during which the communities have experienced migration is 20.9 years, and that, on average, 18% of the members of the communities in which the surveyed population lives are in the United States (according to the information provided by the community-survey informants). We also find that the average per-capita income in the migrant communities is almost $5,000 pesos a month – significantly higher than the average per-capita income of $531 pesos a month in the non-migrant communities, which suggests that the former have important non-wage income such as remittances and government money transfers.

Regarding the economic features of the communities inhabited by the surveyed population, we find that 32% of the population lives in communities where there is some sort of dressmaking workshop or industrial enterprise, while 91% lives in communities with irrigated land, which, on average, constitute 50% of the total land belonging to the communities. Of the surveyed population, 78% lives in a community where there is a tract of communally owned farmland (*ejido*), while only 14% come from communities that offer hotel and restaurant services.

The average number of students per classroom in the communities whose inhabitants were analyzed is 24 at the primary level and 22 at the secondary level, and the average number of students per teacher is 23 and 18.5 at the two respective levels. The

average grade handed out in the communities' schools is 3.5[10], which reflects how difficult it is for the young people there to continue their education beyond secondary school.

Average school attendance by children between 6 and 11 years old in the places surveyed is 97.4%, while children between 6 and 14 years old have an average attendance rate of 94.4%. On average, there is less than 1 computer per primary school, and 2.89 computers per secondary school, while only 10% of the schools have Internet access. The average amount of schooling in the places studied is 5.6 years.

On further breaking down the above statistics in order to compare communities with a tradition of migration and ones with no such tradition (Table 3), we find that total income level per capita is more than twenty times higher in the communities with a tradition of migrating, which leads one to suspect that cash remittances assume substantially raise community income levels. One also sees a positive effect, though much smaller, on wage-based income, which might mean that migration has a positive affect on economic growth at the community level.

In general, scholastic performance is better in the communities with a history of migration, since, in these places, the percentage of students in the aforesaid two age groups is larger than in the rest of the country's communities. Likewise, educational-quality indices -i.e. those pertaining to the number of students per classroom and per teacher- are better in the communities. However, we did not find, as we had expected to do, that schools in communities with a tradition of migration used more electronic learning resources than those in the communities without such a tradition.

3.2.- Educational Performance of Communities and Households Depending on the Presence or Absence of Migration.

In this section, we analyze the educational performance of the school-age population from the ENHRUM sample, in terms of two basic indicators – school attendance and school levels passed.

Graph 6 shows that attendance peaks at the age of 10. However, no difference can be seen in this regard between households with migrants and ones without them.

An analysis of the decrease in school attendance shows that, while this slowly begins to drop off from the age of eleven on, the decline speeds up from the age of 13 on, and is steeper in communities with a history of migration (Graph 11), reverting to the same levels in migrant and non-migrant communities from the age of sixteen on.

Now, if we analyze average schooling levels in homes with and without migrants (Graph 8), we can see that this factor does not seem to have any effect on the number of years of schooling that prevails in the population. However, upon comparing average years of schooling per age level in communities with and without a migratory tradition (Graph 9), we can see that belonging to a community with a tradition of migration seems to positively affect the cumulative schooling index.

The overview presented in this chapter suggests that, though attendance does drop off in communities with a history of migration, this does not translate into lower overall levels of schooling. On the contrary, it would seem that the population of young people living in communities with a history of migration has a slight advantage, when it comes to years of schooling, over the population in communities without such a history. One possible explanation for this apparent paradox is that, while school attendance drops in communities with migrants, scholastic performance is better in such places and students there manage to accumulate more years of schooling.

In the following chapter, we consider a number of econometric models that will allow us to get a clearer understanding of the relationship between the schooling and migratory variables that we have sketched out in the present chapter. In these models, the effects of migration can be confirmed or verified by introducing variables enabling us to control for other factors that affect schooling.

4.- Analyses and Results.

If families belonging to the Mexican rural sector who opt to send one of their members abroad find their financial and cash-flow limitations alleviated due to the reception of remittances, and this affects decisions about schooling, then we should estimateH education equations, at the individual level, that take into account the effects of both remittances and migration on the chosen educational variables. However, since the reception of remittances depends on someone from the household migrating, we need to come up with an econometric model that that takes stock of the causative relationship between remittances and migration, so as to ensure that the statistics reflect this reality.

Since our central hypothesis holds that migratory experience at both the household and the community level influences families' preferences regarding their children's education, we include, as regressors, migration variables at both the household and community levels.

Hence, our characterization of the schooling decision of child, i, from home j, in region g, may be summed up, in reduced form, in the following formula:

$$S_{ijg} = \alpha + \beta\, \mathbf{M}_{jg} + \phi\, R_j + \theta\, \mathbf{X}_i + \delta\, \mathbf{Z}_j + \gamma\, \mathbf{Y}_g + \varepsilon_{ijg} \ldots \ldots \ldots \ldots \ldots (4)$$

where $\mathbf{M}_{jg}$ is the migration-variables vector at the household and community level, R_j indicates whether the household receives remittances or not, $\mathbf{X}_i$ is an individual-features vector, $\mathbf{Z}_j$ is a household features vector, $\mathbf{Y}_g$ is a community-features vector, and ε_{ijg} is an error term. Since schooling equations are usually formulated only for the children of the head of the household aged between 11 and 19, all other young males who live in the households pertaining to the sample and have a different kinship link to the head of the household are excluded.

Now, given that migration household-level migration and remittances correlate, and that education equations should be formulated in reduced form, the econometric calculations for equation 4 are as follows:

$$S_{ijg} = \alpha + \beta\, M_g + \phi\, [R_j/M_j] + \theta\, \mathbf{X}_i + \delta\, \mathbf{Z}_j + \gamma\, \mathbf{Y}_g + \varepsilon_{ijg}.\dots\dots\dots\dots(4')$$

where M_g is a community-level migration variable, R_j indicates whether or not the household receives remittances, M_j indicates that someone from the household has migrated, $\mathbf{X}_i$ is an individual-features vector, $\mathbf{Z}_j$ is a household-features vector; $\mathbf{Y}_g$ is a community-features vector, and ε_{ijg} is the error term.

Our study's null hypothesis is that both β and ϕ in equation $(4')$ are equal to zero; i.e. that neither migration at the community level nor remittances at the household level affect the schooling decisions of children in Mexican rural households. Now, given the probability that the household features affecting schooling decisions also affect decisions

regarding migration and remittances, we must estimate the chances of remittances being received, as a result of migration, using the following equation:

$$[R_j / M_j] = \lambda + \xi\, \mathbf{Z}_j + \psi\, \mathbf{Y}_g + \mu_{jg}\ldots\ldots\ldots\ldots\ldots(5)$$

where, as previously stated, R_j indicates whether the household receives remittances, M_j is a| household-level migration variable, $\mathbf{Z}_j$ is a household-features vector, $\mathbf{Y}_g$ is a community-features vector, and y μ_{jg} is the error term. Given equation 5, the remittance equation is formulated based on someone from the household having migrated. However, since the remittance equation must be presented in its reduced form, the migration variable should be approached by means of an instrumental variable. To make this approach, the household-level migration variable is linked to the probability of someone from the home having migrated, which is worked out via the following equation:

$$M_j = \varphi + \pi\, \mathbf{Z}_j + \rho\, \mathbf{Y}_g + \eta_{jg}\ldots\ldots\ldots\ldots\ldots(6)$$

where, once more, M_j is the household-level variable , $\mathbf{Z}_j$ is the household-features vector, $\mathbf{Y}_g$ is the community-features vector, and y η_{jg} is the error term.

Via the system comprising equations (4´) to (6), we tackle the problem of endogeneity that arises because some of the household features, both observable and unobservable, that influence schooling decisions also affect both the likelihood that the household will receive remittances and the probability that one or more family members will be sent to work abroad. However, this endogeneity is not the only measurement problem. We need to find variables that help to identify the equations – i.e. to include, in the regressions, variables that affect each of the endogenous variables without affecting the

other ones. Finally, we must take the nature of each of the endogenous variables into account and adapt the econometric methods to suit them.

4.1.- Results.

In the following three sections of our study, we present the econometric results of the econometric estimations carried out using the (4´)-(6) equations system. In the first section we present the migration equation (6), in the second section the equation pertaining to the link between the possibility of receiving remittances and someone from the household having migrated (5), and in the third section the results of the schooling equations (4´). In the present study, we analyze two aspects of the schooling of children and youths between 11 and 19 years old in Mexican rural communities: their school attendance and their highest schooling level.

4.1.1 Analysis of the Migration Equation.

Various studies of the relationship between migration and education acknowledge the problem of endogeneity that arises when attempts are made to measure the effect of one of these variables on the other. As is only logical, certain features of the household that influence its children's education may also influence the decision to migrate, making it difficult to gauge the true relationship between these two phenomena. In order to get round this econometric problem, various studies have approached household migratory experience via the interaction of household variables with the migratory history of the state where the household is located [See Hanson and Woodruff (2003), López-Cordova (2006), and McKenzie and Rapoport (2006), among others]. In our opinion, the problem with this

estimation of household migratory experience is that it does not correlate very much with the migratory experience of the family of individual, i. In those Mexican states whose inhabitants typically migrate (Jalisco, Michoacán, Zacatecas and Guanajuato), there are communities with a tradition of migration and ones without it, and hence the state's migratory tradition may or may not correlate with the migratory tradition of individual i's home community; moreover, not all the households in the communities that traditionally send out migrants have migrants in them. In the present study, in order to tackle the phenomenon of household migratory experience, we have estimated each household's likelihood of sending one of its members to work abroad, using this probability as a household-migration proxy in the remittance equation. In order to gauge community migratory tradition (which appears as a regressor in the equations pertaining to household-migration, remittances and schooling), we have used the number of years during which the particular community has been sending migrants to the United States.

We present the results of the migration equation, used by us to calculate the likelihood of each of the households in the sample sending one of its members abroad, in Table 4. The data suggest that households whose heads have less education and are younger -i.e. ones with less human capital- are more likely to resort to migration as a means of subsistence. Household size seems to correlate positively with migration, as does the number of young children in household. On the other hand, indigenous households seem less likely to resort to migration as a means of generating income. One interesting result is that the receipt of support from the *Oportunidades* program seems to correlate negatively with household migratory propensity. Likewise, Table 4 suggests that household and community migratory tradition, determined by the presence or absence of braceros in the household and by the number of years of community migratory experience, are factors

encouraging further migration, which seems to accord with the theory of cumulative-causation of migration [Massey (1990)]. Finally, the most prosperous, but financially inequitable, communities seem to encourage more migration, while the presence of basic establishments such as restaurants and hotels (which require workers, but not qualified ones) seems to keep populations from leaving their home communities.

This first analysis suggests that migration and schooling correlate negatively. On the one hand, households with less human capital seem more likely to use migration as a means of social mobility, and the community's prosperity, which can lead to more education, also seems to lead to more migration.

In the following section, we present the remittance equation, which is worked out using a self-choice correction in which the variable defining the household-level self-selection is precisely the variable denoting the existence of a migrant.

4.1.2 Analysis of the Remittance Equation.

A household's reception of remittances clearly depends on its having sent a migrant abroad, but not all households with migrants receive remittances. The fact that we assume that both migration and the reception of remittances by a household have an impact on the household's schooling decisions obliges us to use these two variables as regressors in the education equations. However, given the above-mentioned econometric problem of endogeneity, we need to include, as a regressor, an instrumental remittance variable that takes stock of the close relationship between remittances and household immigration. This variable is the likelihood of each household in the sample receiving remittances, given the probability of having a migrant.

The results of the remittance equation are presented in Table 5, which is divided into two charts, the top one of which shows the results of the analysis of the likelihood of receiving remittances, while the bottom one contains the results of the selection equation.[10]

Both households with young heads and larger ones seem more likely to receive remittances, while households that receive government payments via the *Oportunidades* program also seem more likely to receive remittances. This result might point to the selection of the poorest households in the Mexican rural sector, and a consequently greater need to obtain income by sending a family member to work abroad. The homes in the richer communities seem to have a chance of receiving remittances, just like the homes in the more economically active communities.

With regard to the results of the selection equation (lower chart), since we can say that they are fully consistent with the results of the migration equation reported above, we limit ourselves to reporting that, in view of the results of the remittance equation, the homes in the Mexican rural area that receive remittances seem not to constitute a random group.

4.1.3 Analysis of the Education Equations

In order to analyze the relationship between migration and remittances using two different education indicators –school attendance and years of schooling- we split the sample containing children of heads of households into the following four groups, according to their age and gender: boys from 11 to 15 years old, girls from 11 to 15 years old, teenage boys from 16 to 19 years old, and teenage girls from 16 to 19 years old. School

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[10] The selection equation gauges the probability of the household's having a migrant, given certain features both of the household itself and of the community. This estimate is made by correcting the selection bias mentioned above.

attendance was measured with a dummy variable of 1 if individual, i, was attending school at the time of the survey, and of 0 if s/he was not attending. Years of schooling were measured using a variable ranging from 1 to 15, indicating the maximum years of schooling completed by individual, i, at the time of the survey. The results for each of the aforesaid groups are presented in the following four sections of the study. It should be stressed that the 8 schooling equations used in this research are formulated without making use of the ENHRUM weightings, given that these were not created to make the sample of young people between 11 and 19 years old representative of the whole rural population belonging to this age group. This enables us to make the calculation of the regression coefficients more credible, but not the calculation of standard deviations. To permit more effective calculation of the standard deviations of the education regressions, a bootstrap[11] correction is applied to the schooling equations in this study, lending more robustness to our estimates of the z statistics and the p-values.

a) Education Regressions for Boys from 11 to 15 Years Old.

The results of the two schooling regressions for the group of boys from 11 to 15 years old are presented in table 6. Each of the education variables included in the chart -i.e. attendance and years of schooling- is offset by migration and remittance variables both at the household and community level, and also by a series of control variables commonly found in publications about education.

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[11] The "bootstrapping" process corrects the biases created when the sample used for calculating the coefficient is a small one and the distribution of the dependent variable is not easy to determine. In such cases, "bootstrap" correction replicates the original sample n times, until the distribution of the dependent variable is identifiable.

The first school-attendance regression indicates that experience at both the household and community levels correlates negatively and significantly with the school attendance of this group of people. This result is quite robust, holding true for different specifications of the regression. It suggests that migration is seen as an alternative to education as way of achieving social mobility in Mexican rural communities, at least for the group of boys between 11 and 15 years old, which might lead to future poverty traps for the subjects in question in the host country. With regard to the education-linked regressors at both the household and the community levels, we note that higher levels of schooling in mothers are likely to result in more school attendance by their children, though we find that higher average levels of schooling at the community level do not significantly influence the parents' decision to send individual, i, to school. Additionally, the results suggest that the more schooling offered in the community -in terms of levels- the more parents are motivated to send their children to school, and also that the richer the household (measured in terms of the number of rooms in the house), the more likely it will send its males between 11 and 15 years old to school.

Concerning the second regression, the results suggest that household migratory experience correlates negatively with the number of years of schooling, thus confirming the conclusion that migration and education are substitutes for each other in the Mexican rural sector, at least for boys between 11 and 15 years old. At both the household and community levels, neither the education variables at the community or the household level nor the *Oportunidades* program seem to have any effect on the average level of schooling in boys. The average schooling level of young boys between 11 and 15 years old seems to increase in inverse ratio to the child's age, and average schooling tends to drop if the boy in question fails a school level. Female headed households seem to promote higher average schooling

levels in this group, just as do higher levels of prosperity measured in terms of rooms per house.

b) Education Regressions for Girls between 11 and 15 Years Old.

The results of the two schooling regressions for the group of girls between 11 and 15 years old are presented in table 7. As in the previous case, the education variables included in the model are attendance and years of schooling, and these variables are regressed against migration and remittances at the household and community levels, as wll as a series of control variables.

The first regression robustly indicates that community migratory experience correlates negatively with the school attendance of this population group. This suggests that a migratory culture at the community level promotes less middle-level education among girls between 11 and 15 years old. However, this does not seem to be the case with household migratory experience, which might reflect the gender-bias that still prevails in migration from the Mexican rural sector to the United States. In this case, the average school level offered in the community seems to encourage parents to keep their daughters in school, a tendency that appears to be reinforced by the financial support that the family obtains from the *Oportunidades* program. Finally, as is to be expected, richer households (measured in terms of the number of rooms) seem to attach more value to their daughters' school attendance, which is consistent with the literature on education.

The results of the second regression suggest that household migratory experience and a community-level migratory culture do not affect decisions about the middle-school education of girls from the Mexican rural sector. Once again, this result may stem from the

gender bias whereby most of the younger Mexicans migrating to other countries are male. Both the mother's schooling and household wealth measured in terms of the number of rooms in the house seem to lead to girls receiving more schooling. Finally, it seems that failing a school year discourages girls between 11 and 15 from continuing their schooling.

c) Education Regressions for Teenage Boys between 16 and 19 Years Old.

The results of the two schooling regressions for the group of males between 16 and 19 years old are presented in Table 8. As in the previous cases, each of the two education variables included in the model -i.e. school attendance and years of schooling- are regressed against migration and remittances at both the household and community levels, and also against a series of control variables commonly found in educational studies.

The first regression indicates that community-level migratory experience or migratory culture significantly inhibit the school attendance of young males, though this is not so in the case of household-level migratory experience. This suggests that thel migratory culture plays a bigger role in inhibiting schooling than migratory experience at the household level, which is consistent with Massey's theory of cumulative causation of migration. In this group, higher levels of schooling in mothers seem to result in better school attendance their sons, while female household heads, non-nuclear families, and the existence of money-earning service activities in the community seem to lead to more school attendance by males between 16 and 19 years old.

The results of the second regression suggest that both household and community migratory experience result in lower average levels of schooling among young males in the Mexican rural sector. This seems to be a very robust result, and hence we would argue that

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there is no evidence that migration and education complement each other, at least in the Mexican countryside. This regression also indicates that more schooling in the mother leads to higher average levels of schooling in males between 16 and 19 years old, and that the average schooling level of the population is a factor that also correlates positively with the average schooling level of males in this age group. In thois group, average schooling level grows at a decresing rate in relation to age , and the existence of a dynamic service sector in the community would seem to inhibit young people from pursuing more schooling.

d) Education Regressions for Females between 16 and 19 Years Old.

The results of the two schooling regressions for the group of females between 16 and 19 years old are presented in table 9. As in the previous cases, each of the two education variables included in the chart -i.e. attendance and years of schooling- are regressed against the migration and remittance variables, and also against a series of control variables.

The first regression indicates that household migratory experience, measured in terms of the likelihood of receiving remittances due to someone having migrated from the household, correlates negatively with school attendance in this group of subjects. This suggests, once more, that, for young females, household migration replaces schooling as a means of social mobility, though this is not true for community migratory experience, measured in terms of the length of time the females from the community have been going abroad. With regard to the education-related regressors, at both the household and community levels we see, once again, that both higher levels of schooling in mothers and higher community schooling levels have a positive effect on school attendance by girls. Regarding the effects of the *Oportunidades* program on female school attendance between

16 and 19, the results indicate that households are positively affected by participation in the program, which is not the case with the male sample. This result indicates that there is a gender component in the program, as has been concluded in other studies [See Rubalcava and Teruel, 2005]. Regarding the coefficient of the variable pertaining to household wealth -i.e. the number of rooms in the house- the results show that children from homes with more income are more likely to attend school. A significant final result is that, once again, grade repetition seems to have a negative effect on school attendance.

The results of the second regression do not show any significant effect of migration and remittances on the average schooling levels of females between 16 and 19 years old. Though this is a striking result, it does not change the conclusion that proximity to migratory experience, at both the community and household level, would appear to lead to lower levels of schooling in young Mexican rural males. At both the household and community levels, the education variables again seem to have positive effects on the schooling of this group, which is consistent with the conclusions of the previous regressions. Once again, the *Oportunidades* program would seem to have a positive effect on the number of years of schooling in women, which is consistent with the published literature on this topic. Household wealth -measured in terms of the number of rooms in the house- seems to correlate positively with the average schooling level of young females, while, yet again, grade repetition would appear to have a negative effect on schooling.

5.- Conclusions.

Mexico now sends large amounts of its population abroad and though there is a tendency to consider the short-term effects of this trend positive, it is necessary to carefully study the long-term repercussions in order to begin to formulate policies that will help to reap the benefits of this situation and, as far as possible, avoid its prejudicial effects. Published studies of this phenomenon have insisted that migration promotes more long-term investment in productive activities, better health in the people who are closely involved in the migration process, and even more schooling. There are studies showing that migration correlates with less poverty, and that migrant communities tend to have a better income spread. However, since there are no published studies suggesting that migration be used as a means of fomenting development, there seems to be a contradiction between empirical research on the topic and economic-development theory.

The aim of this study is to examine the relationship between migration and the reception of remittances on the one hand and, on the other hand, two key aspects of schooling in rural Mexican families. Analyzing two educational variables -school attendance and years of schooling- our study focuses on communities with less than 2,500 inhabitants, with the direst poverty levels in the country, and it very directly takes into account the migratory culture produced in the families and communities analyzed. In our study, we used data from the National Survey of Mexican Rural Households (ENHRUM), carried out in early 2003, in communities with less than 2,500 inhabitants, complemented by information gathered at the municipal level by the National Institute of Statistics, Geography and Information Processing (INEGI).

To tackle various econometric problems that arise when examining the link between migration and education, in this study we present a system of equations that takes stock of the effects of migration on the reception of remittances, and the effects both of the

reception of remittances and of household migratory experience on families' decisions about schooling. This partially solves the problem of endogeneity that stems from the fact that some of the features of the household -both observable and non-observable- that influence schooling decisions also affect the likelihood of the household's receiving remittances and of its sending one or more members to work abroad. However, this endogeneity is not the only analytical problem. We also had to find variables to identify the equations – i.e. to include, in the regressions, variables affecting each of the endogenous variables, but not the other ones. Additionally, we had to take the nature of each of the endogenous variables into account and adapt the econometric methods to suit it.

The most important results of our study are as follows. First, it is evident that household migratory experience can have a negative effect on the schooling of both males and females, which is a danger signal for the country's educational authorities. Apparently both young females and young males from households with migratory experience are less likely to undertake schooling, a tendency that may stem from various factors. For example, the absence of one of the members of a household would appear to lead to a labor shortage that is made up for by one of the children leaving school. Moreover, it may be that the family disruption associated with migration affects the emotional state of the children, leading them to lose interest in school. The alleged positive effects of remittances on income seem to be more than offset by the negative effects of migration on schooling, which is worrying in a country from which more and more people are migrating. With regard to community migratory tradition, the results are at all times consistent and suggest that this also has a negative effect on the schooling variables, both for males and for females, which is worrying when one considers that, in communities, migration sets in motion a process that leads to yet more migration (Massey's theory of cumulative

causation). If this is so, the inhabitants of communities that send out migrants will have lower and lower schooling levels, which may set in motion processes that prevent families and communities from escaping from their poverty, both in their home communities and in the ones where they settle.

One result of our study that is worth stressing again pertains to the *Oportunidades* program, which provides the poorest households in Mexico with an additional income on condition that their young members under 21 attend school. More aid is given to help young females to attend school than to help young males to do so, a policy whose purpose is to reduce the education gap between Mexican males and females. The effects of this program on our schooling variables is at all times positive for girls, but no so for boys, which results from the strong gender component of the program which, in the long term, might lead to schooling imbalances in favor of females in Mexican communities that send immigrants abroad. Another interesting result is the one suggesting that service activities result in less schooling among young males, which leads one to conclude that there is a growing demand for less educated people in the Mexican rural sector, manifesting itself in the service sector rather than the industrial one. Lastly, we find that mother´s schooling, and income level of the household, measured by the number of rooms in the house, have a positive effect on young people's schooling in the Mexican rural sector, which is consistent with the educational literature and lends credibility to the results pertaining to migration and remittances.

Our analysis leads us to formulate various policy recommendations. Firstly, the *Oportunidades* program should grant equal funding to families for the schooling of both males and females, since it is likely that an educational imbalance in favor of girls is beginning to present itself in the communities with the highest migration levels. Secondly,

the temporary migration of one of the members of Mexico's poorest families should be encouraged, but only after the person in question has reached a given schooling level, and with the application of incentives that encourage this person to return home after a given period of time. Families should be able to maintain close contact with their migrant members so as to offset the negative effects of separation on the emotional health of those remaining behind. Finally, local economic activity should match the population's socio-demographic features, so as to help keep the members of the population in their home communities and thus prevent the local migratory trend from increasing, with apparently negative effects on education in Mexico. Additionally, in order to promote positive linkages between education and the job market in migrant sending communities, local economic activity that requires people with more schooling should be encouraged,

Bibliography

Becker, Gary S., (1993) "Human Capital: A Theoretical and Empirical Analysis, with Special Reference to Education." National Bureau of Economic Research

Borraz, Fernando, (2005) "Assessing the Impact of Remittances on Schooling: the Mexican Experience." Global Economy Journal, Vol. 5, Issue 1, Article 9, pp. 1-30
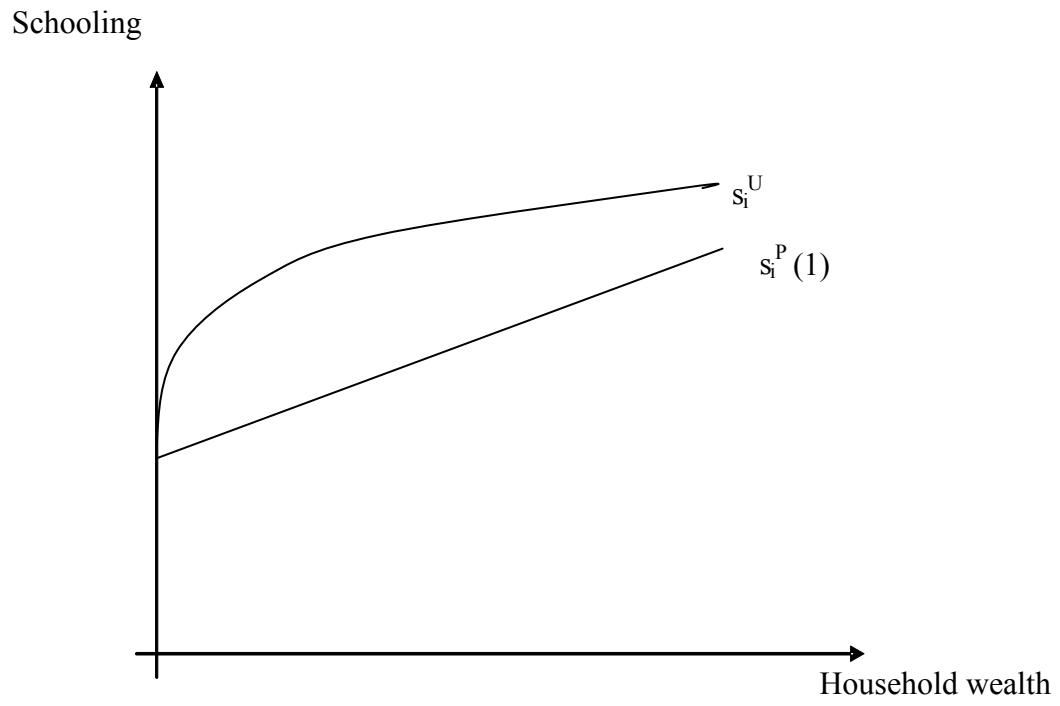
Card, David y Krueger, Alan B. (1996) "School Resources and Student Outcomes: An Overview of the Literature and New Evidence from North and South Carolina." The Journal of Economic Perspectives, Vol. 10, No. 4, pp. 31-50

Greenwood, Michael J. (1975) "Research on Internal Migration in the United States: A Survey." Journal of Economic Literature, June, pp. 397-433

Hanson, Gordon H. and Woodruff, Christopher, (2003) "Emigration and Educational Attainment in Mexico." National Bureau of Economic Research. April, pp. 1-38

Hildebrandt, Nicole y McKenzie, David J. (2005) "The Effects of Migration on Child Health in Mexico." World Bank Policy Research, Working Paper 3573, April, pp. 1-35

Levy, Santiago, (2006) "Sustaining Mexico's Progresa-Oportunidades Program." Progress Against Poverty, Brookings Institution Press

López-Cordoba, Ernesto, (2006) "Globalization, Migration and Development: The Role of Mexican Migrant Remittances." Inter-American Development Bank, INTAL-ITD, Working Paper 20, August, pp. 1-43

Lucas, Robert E. B. (1987) "Emigration to South Africa's Mines." The American Economic Review, Vol. 77, No. 3, June, pp. 313-330

Massey, Douglas S. (1990) "Social Structure, Household Strategy, and the Cumulative Causation of Migration." Population Index, Vol. 56, pp. 3-26

McKenzie, David and Papoport, Hillel, (2005) "Migration and Education Inequality in Rural Mexico." Stanford Center for International Development, Working Paper No. 2587, September, pp. 1-24

McKenzie, David y Rapoport, Hillel, (2006) "Can Migration reduce Educational Attainments? Depressing Evidence from Mexico." Stanford Center for International Development, Working Paper No. 274, March, pp. 1-29

Miller, Edward. (1973) "Is Out-Migration Affected by Economic Conditions?" Southern Economic Journal, January, pp. 396-405

Mora, Jose J. (2006) "Essays on Migration and Development in Rural Mexico." Doctoral thesis, El Colegio de México

Parker, Susan and Carla Pederzini (2001) "Gender Differences by Education in Mexico", 2001, *The Economics of Gender in Mexico: Work, Family, State, and Market*. The World Bank, Washington, DC

Polanco, Graciela, (2007) "La Vulnerabilidad Femenina al Fenómeno Migratorio desde su Dos Visiones." Mimeo. Universidad Iberoamericana

Ritchey, P. Neal, (1976) "Explanations of Migration." Annual Review of Sociology, Vol. 2, pp. 363-404

Rubalcava, Luis, and Graciela Teruel, (2005) "El Efecto de Oportunidades sobre la Dinámica Demográfica de los Hogares Beneficiaries y las Desiciones de Migración de sus Integrantes, en Localidades Rurales." In "Evaluación Externa de Impacto del Programa Oportunidades 2004: Aspectos Económicos y Sociales", edited by Bernardo Hernández Prado and Mauricio Hernández Ávila, Instituto Nacional de Salud Pública, Vol. 4, Ch. 4

Skoufias, Emmanuel and Parker, Susan W. (2001) "Conditional Remittancesand Their Impact on Child Work and Schooling: Evidence from the PROGRESA Program in Mexico." Journal of the Latin American and Caribbean Economic Association, Vol. 2, No. 1, pp. 45-151

Stark, Oded y Bloom, David E. (1985) "The New Economics of Labor Migration." The American Economic Review, Vol. 75, No. 2. Papers and Proceedings of the Ninety-Seventh Annual Meeting of the American Economic Association. May, pp. 173-178

Stark, Oded, (2005) Comment on "Migration and Incomes in Source communities: A New Economics of Migration Perspective from China." Economic Development and Cultural Change, Vol. 53, pp. 983–986

Taylor, J. Edward, Rozelle, Scott and De Brau, Alan, (2003) "Migration and Incomes in Source communities: A New Economics-of-Migration Perspective from China." Economic Development and Cultural Change, Vol. 52, pp. 75–101

Woodruff, Christopher M. and Zenteno, Rene, (2001) "Remittances and Microenterprises in Mexico." UCSD, Graduate School of International Relations and Pacific Studies Working Paper, August.

Graph 1

Graph 2

Schooling

s_i^U

$s_i^P(1)$

Household wealth

Graph 3

Schooling

$s_i^P(2)$

s_i^U

$s_i^P(1)$

Household wealth

Graph 4

Graph 5

Schooling

s_i^U (1)

s_i^P

s_i^U (2)

Household wealth
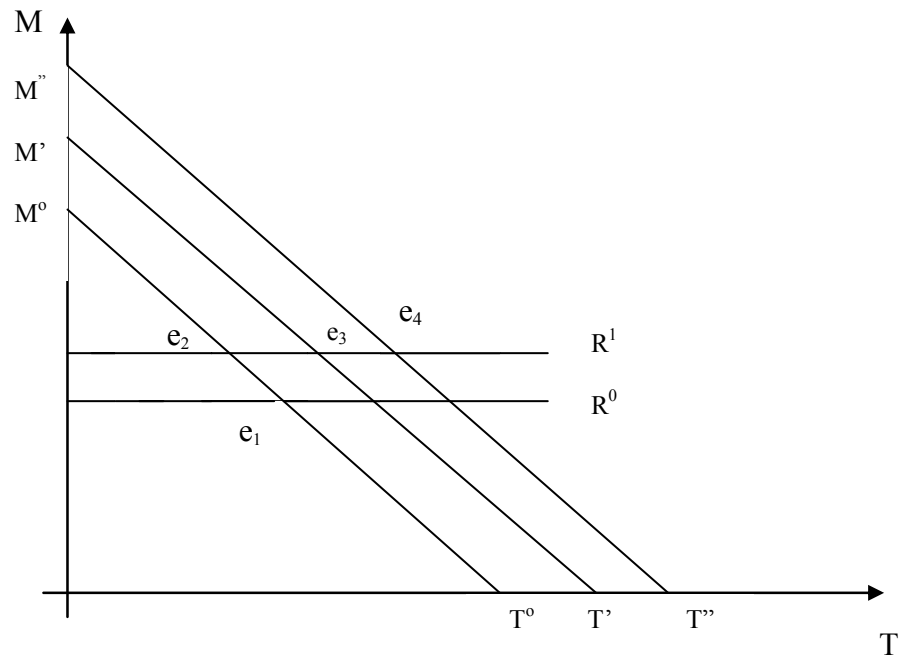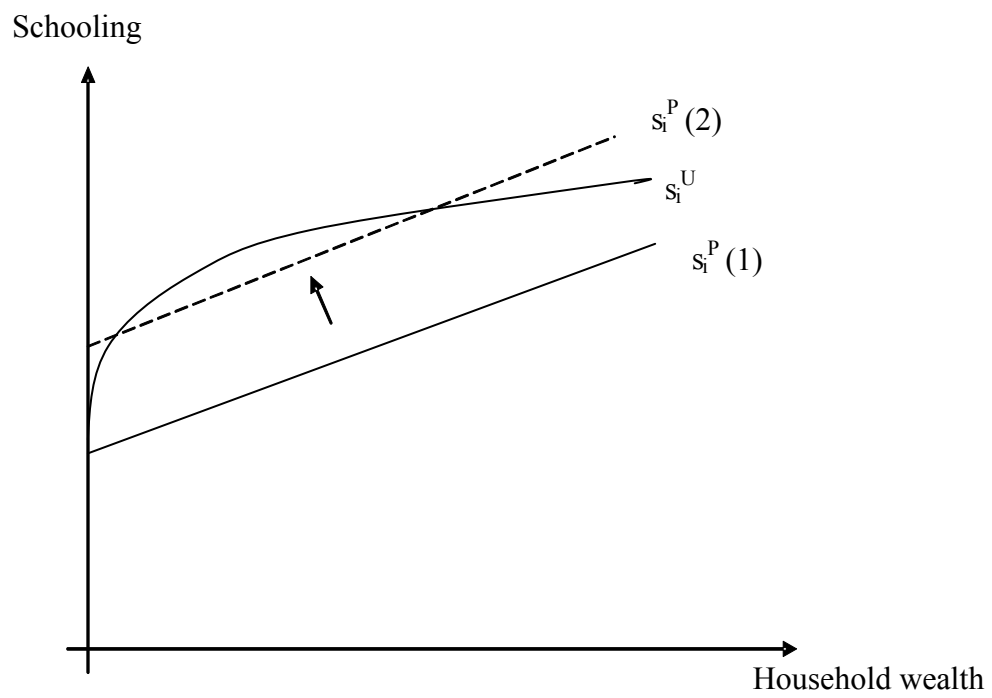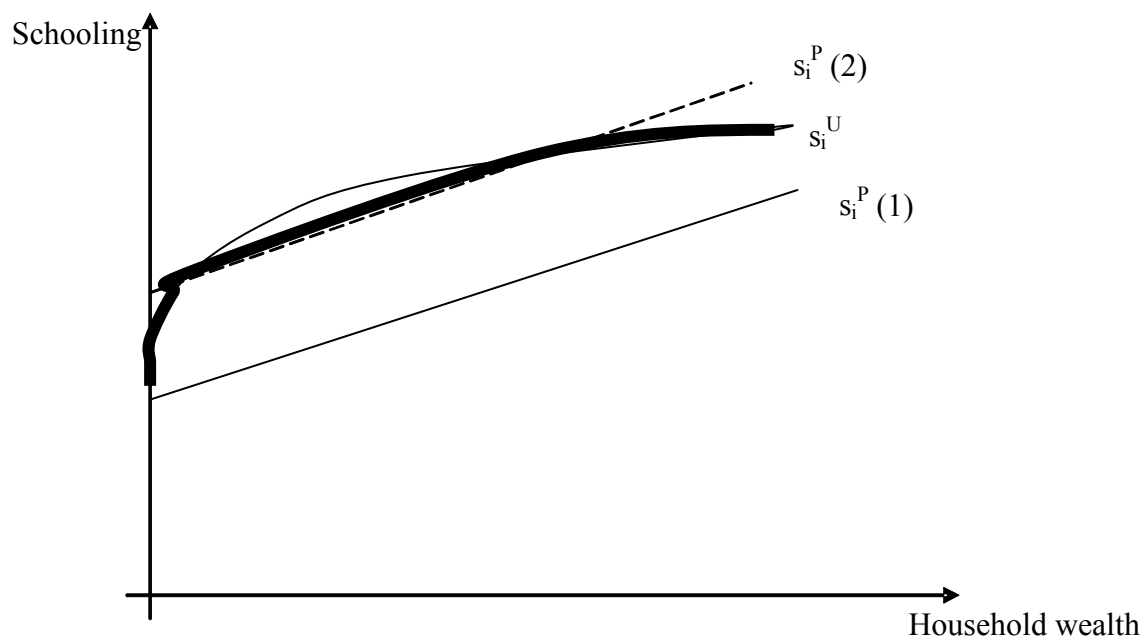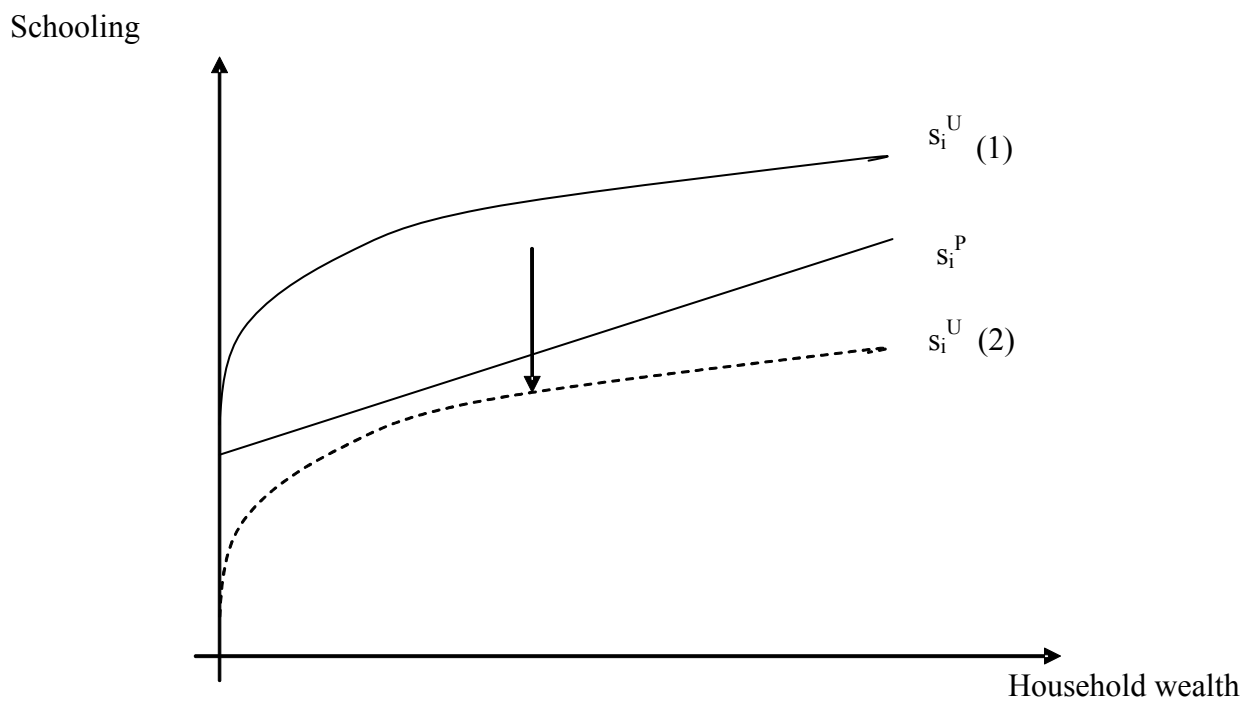
Graph 6

Percentage of the population attending school, according to age and household migratory situation

Legend: Without migrants · With migrants
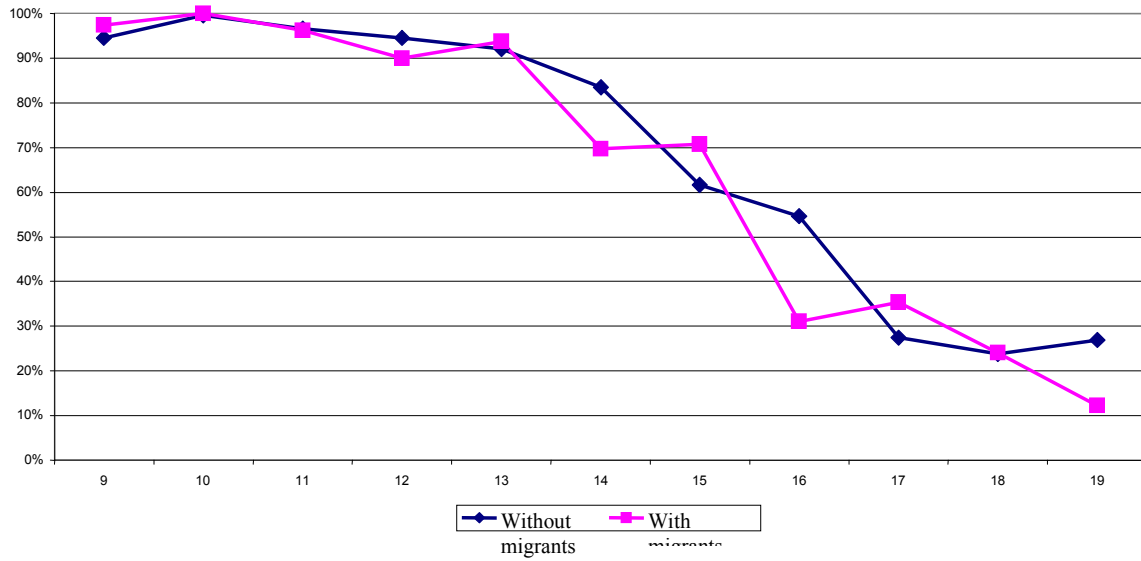
Graph 7

Percentage of the population attending school, according to age and household migratory situation

Legend: Without tradition · With tradition

Source: Self-generated, based on ENHRUM

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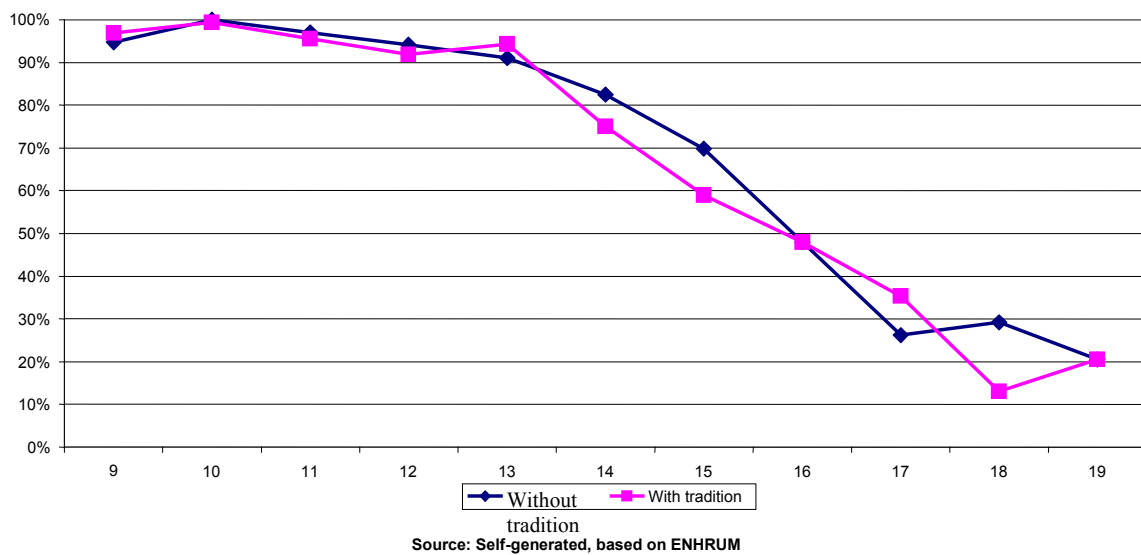
Graph 8

Average years of schooling according to age and household migratory situation
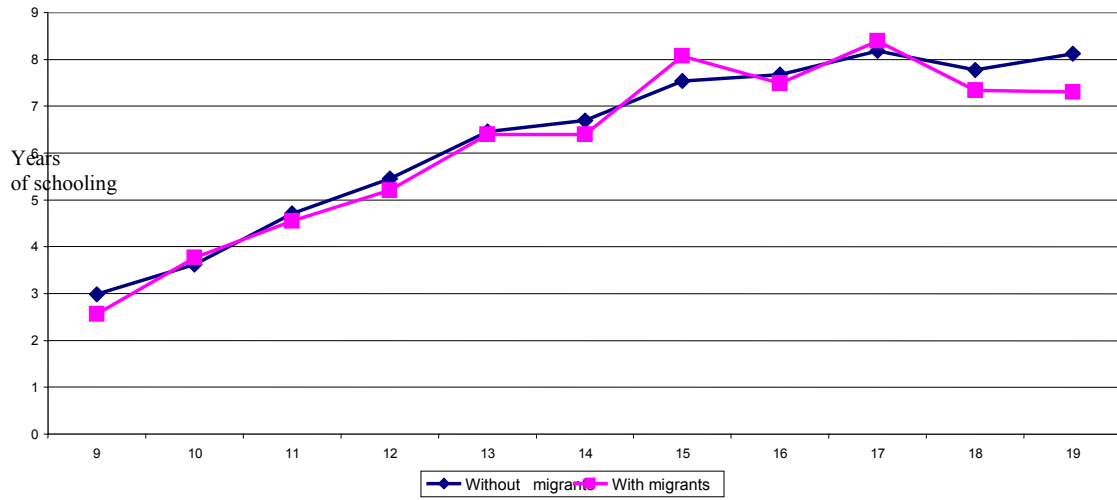
Source: Self-generated, based on ENHRUM

Graph 9

Average years of schooling according to age and community migratory tradition (Gini)

Source: Self-generated, based on ENHRUM

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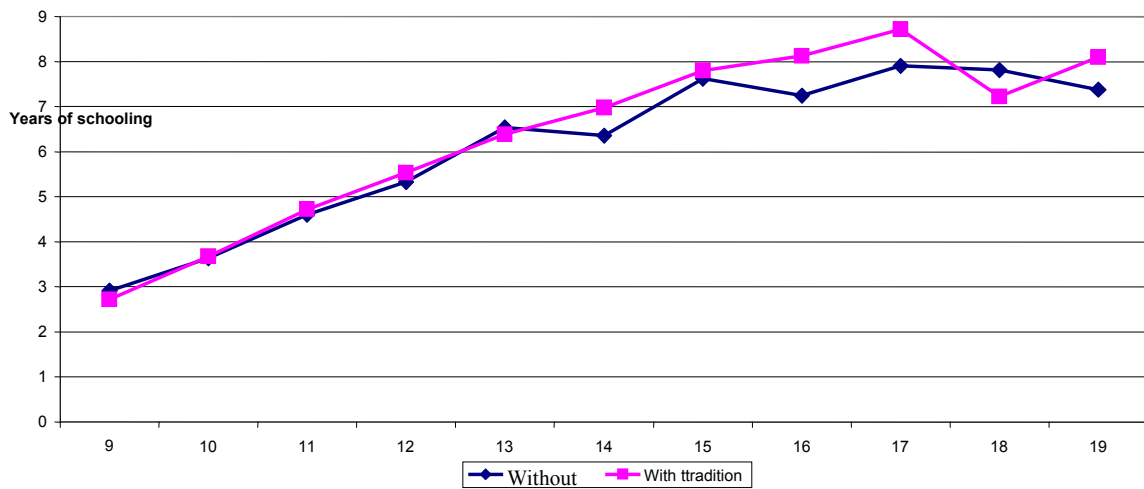
Table 1

Basic individual statistics by household condition

Variables	Non-migrant household		Migrant Household	
	Average	Standard deviation	Average	Standard deviation
Women	0.50	0.50	0.50	0.50
Age	31.45	19.34	32.07	18.96
Child of HH	0.48	0.50	**0.56**	**0.50**
School attendance	0.26	0.44	**0.22**	**0.42**
Years of schooling	5.19	3.58	**5.64**	**3.63**
School achievement	8.05	1.00	**8.14**	**1.04**
Repeated year	0.18	0.38	0.15	0.36
Older sibling	0.51	0.50	0.52	0.50
Good health (self-reported)	0.65	0.48	0.61	0.49
Indigenous language	0.38	0.49	0.06	0.23
Married or with couple	0.53	0.50	**0.56**	**0.50**

Source: Own calculations based on ENHRUM

Table 2

Basic household statistics by household condition

Variables	Non-migrant household		Migrant Household	
	Average	Standard deviation	Average	Standard deviation
Size of household	5.27	2.38	**6.09**	**2.29**
Number of rooms	2.47	1.29	**3.26**	**1.49**
Age of head of household	48.67	15.35	52.29	15.12
Schooling of father	1.16	1.26	1.16	1.26
Schooling of mother	1.26	1.99	0.99	1.19
Non-nuclear household	0.25	0.43	0.29	0.45
English speaking household	0.01	0.07	0.02	0.14
Indigenous household	0.39	0.49	**0.06**	**0.24**
Oportunidades	0.50	0.50	0.41	0.49
Migrant	0.00	0.00	1.00	0.00
Migrant in 2002	0.02	0.13	0.62	0.48
Bracero member	0.00	0.06	**0.12**	**0.33**
Single headed household	0.14	0.35	0.13	0.33
Female headed household	0.13	0.33	0.11	0.31

Source: Own calculations based on ENHRUM

Table 3
Basic statistics of 9-19 aged population by community migration condition

Variables	Non-migration tradition communities		Migration tradition communities	
	Average	Standard deviation	Average	Standard deviation
Years of migration experience	9.20	6.20	**41.66**	**14.85**
Percentage of population in the US	7.47	9.39	**23.15**	**24.32**
Feminity Index	105.02	8.06	106.88	13.44
Gini of of per-capita total income */	0.56	0.08	0.55	0.09
Gini of of head of household schooling */	0.31	0.04	0.29	0.03
Industries and workshops in the community **/	0.35	0.48	0.30	0.46
Percentage of irrigated land in the community **/	53.85	35.57	43.65	27.67
Hotels and restaurants in the community	0.19	0.39	**0.07**	**0.26**
Elementary school students per classroom	26.28	11.79	20.95	8.00
Secondary school students per classroom	23.35	9.26	21.65	9.55
Elementary school students per teacher	25.30	7.58	21.30	7.55
Secondary school students per teacher	20.91	9.67	15.98	6.51
Maximum schooling at the community	3.41	1.07	3.59	0.82
School attendance of 6-11 population	96.82	2.53	98.00	2.09
School attendance of 6-14 population	93.41	4.55	**95.77**	**2.76**
Average computers in secondary	3.15	5.53	2.63	4.97
Average computers in primary	0.42	1.20	0.86	2.39
Internet connectivity in schools	0.17	0.38	0.05	0.22
Average schooling	5.32	1.24	6.03	1.03

*/ Variables calculated at a municipal level based on the 2000 census.

**/ Dummy variables(1,0)

***/ Variables from the 2005 Conteo de Población y Vivienda, INEGI.

Source: Own calculations based on ENHRUM.

Table 4
Migration equation ((Probit) Dependent variable: migrant in household)

Variable	Coefficient	
Schooling of HH	-0.028	***
	(-5.93)	
Age of HH	-0.005	***
	(-4.20)	
Household size (individuals)	0.106	***
	(15.15)	
Children under 6 in household	0.490	***
	(4.54)	
Indigenous household (Indigenous language spoken)	-0.942	***
	(-16.42)	
Number of roomas in dwelling	0.132	***
	(12.37)	
Oportunidades (household)	-0.138	***
	(-3.94)	
Procampo (household)	0.113	***
	(3.05)	
Bracero (household level)	1.706	***
	(17.10)	
Years migrating (community)	0.023	***
	(23.25)	
Total per capita income of community	0.000	***
	(3.58)	
Income inequality in community (Gini)	1.669	***
	(9.45)	
Schooling inequality in community (Gini)	5.330	***
	(10.39)	
Industries and workshops in community	0.300	***
	(8.29)	
Restaurants and hotels in community	-0.231	***
	(-4.97)	
Constant	-4.073	***
	(-18.75)	

Z stadistic in brackets
log likelihood = -4511.47
***/ Significant at 99%

Table 5
Remittance equation (likelihood of receiving remittances)

Variable	Coefficient	
Age of household head	-0.005	***
	(-2.81)	
Schooling of household head	-0.006	
	(-0.87)	
Oportunidades suport	0.122	**
	(2.45)	
Procampo support	0.367	***
	(7.24)	
Size of household	0.072	***
	(6.80)	
Total per-capita income of the community	0.000	***
	(-4.63)	
Industries and workshops in the community	-0.145	**
	(-2.91)	
Restaurants and hotels in the community	-0.297	***
	(-3.68)	
Constant	-0.110	*
	(-0.77)	

Selection equation (likelihood of having an immigrant household member

Variable	Coefficient	
Schooling of household head	-0.028	***
	(-6.12)	
Age of household head	-0.005	***
	(-4.04)	
Size of household (number of people)	0.105	***
	(14.86)	
Children under 6 years old in household	0.459	***
	(4.54)	
Indigenous household (indigenous language spoken)	-0.942	***
	(-16.42)	
Rooms in household	0.135	***
	(4.22)	
Oportunidades	-0.138	***
	(-3.90)	
Procampo	0.115	***
	(3.11)	
Bracero	1.644	***
	(16.16)	
Years migrating (of the community)	0.023	***
	(23.54)	
Total per-capita income of community	0.000	***
	(3.70)	
income distribution (Gini)	1.797	***
	(10.13)	
Educational distribution levels in the community (Gini)	5.517	***
	(10.82)	
Industries and workshops in the community	0.310	***
	(8.58)	
Restaurants and hotels in the community	-0.228	***
	(-4.89)	
Constant	-4.216	***
	(-19.37)	

Númbers in parentheses z statistic

log likelihood = -7194.95

***/ Significant up to 99%

**/ Significant up to 95%

*/ Significant up to 90%

Table. 6
Schooling Equation. Males (11 to 15)

Variables	School Attendance Probit	Years of schooling Negative Binomial Regression
Remmittances 1/	-2.701 ***	-0.317 ***
	(-2.48)	(-1.81)
Years of migration experience (community)	-0.200 ***	0.000
	(-28.57)	(0.20)
Mother´s schooling	0.082 ***	0.007
	(2.16)	(1.40)
Average schooling years (community)	-0.051	0.028
	(-0.47)	(1.56)
Age	1.268	0.577 ***
	(0.84)	(2.57)
Squared Age	-0.057	-0.017 ***
	(-0.98)	(-2.13)
Repeated	0.222	-0.158 ***
	(0.98)	(-4.79)
Female headed household	-0.165	0.111 *
	(-0.37)	(1.76)
Oportunidades	0.109	0.055
	(0.47)	(1.45)
Non nuclear household	0.082	-0.047
	(0.30)	(-0.99)
Number of rooms in dwelling	0.351 ***	0.025 ***
	(3.69)	(2.50)
Industires and workshosps (community)	-0.136	-0.033
	(-0.61)	(-1.00)
Restaurants and hotels in community	-0.416	0.016
	(-1.10)	(0.34)
Maximum level of schooling level in community	0.242 ***	-0.008
	(1.97)	(-0.50)
Number of observations	377	375
Log likelihood	-130.02654	-775.82683

Z stadistic in brackets, standard deviations for the coefficientes were corrected with a bootstrap method

 ***/ Significant at 99%; */ Significant at 90%

Table 7
Schooling Equation. Females (11 to 15)

Variable	School Attendance	Years of schooling
	Probit	**Negative Binomial Regression**
Remmittances 1/	-0.495	0.002
	(-0.36)	(0.01)
Years of migration experience (community)	-0.017	-0.001
	(-2.43) ***	(-1.00)
Mother´s schooling	0.072	0.015
	(1.29)	(2.50) ***
Average schooling years (community)	0.388	0.017
	(1.68) *	(1.21)
Age	1.070	0.293
	(0.37)	(1.59)
Squared Age	-0.058	-0.007
	(-0.56)	(-1.00)
Repeated Schooling year	-0.076	-0.153
	(-0.24)	(-3.64) ***
Female headed household	-0.079	-0.023
	(-0.16)	(-0.35)
Oportunidades	0.746	0.029
	(2.87) ***	(0.88)
Non nuclear household	0.101	-0.025
	(0.33)	(-0.68)
Number of rooms in dwelling	0.247	0.027
	(2.25) **	(2.45) ***
Industires and workshosps (community)	0.110	0.026
	(0.32)	(0.96)
Restaurants and hotels in community	-0.263	0.018
	(-0.55)	(0.43)
Maximum level of schooling level in community	0.171	0.005
	(1.33)	(0.42)
Number of observations	390	389
Log likelihood	-98.488147	-794.88199

Z stadistic in brackets, standard deviations for the coefficientes were corrected with a bootstrap method
 ***/ Significant at 99%; **/ Significant at 95%*/ Significant at 90%

Table 8
Schooling Equation. Males (16 to 19)

Variable	School Attendance Probit	Years of schooling Tobit	
Remmittances 1/	-1.945	-4.606	***
	(-1.59)	(-2.08)	
Years of migration experience (community)	-0.012	-0.017	***
	(-2.40)	(-2.13)	
Mother´s schooling	0.103	0.184	***
	(3.12)	(2.97)	
Average schooling years (community)	0.074	0.469	***
	(0.86)	(2.78)	
Age	-3.138	14.131	***
	(-0.95)	(2.51)	
Squared Age	0.082	-0.398	***
	(0.86)	(-2.47)	
Repeated	0.245	-0.115	***
	(1.01)	(-0.28)	
Married or with couple	-0.043	0.410	***
	(-0.10)	(0.71)	
Female headed household	-1.081	0.647	***
	(-2.74)	(0.70)	
Oportunidades	-0.147	0.549	***
	(-0.62)	(1.21)	
Non nuclear household	-0.449	-0.522	
	(-1.70)	(-1.17)	
Number of rooms in dwelling	0.056	0.105	***
	(0.79)	(0.93)	
Industires and workshosps (community)	-0.054	-0.268	***
	(-0.28)	(-0.79)	
Restaurants and hotels in community	-0.573	-1.716	***
	(-1.69)	(-2.45)	
Maximum level of schooling level in community	-0.028	0.251	***
	(-0.28)	(1.29)	
Number of observations	308	308	
Log likelihood	-164.5599	-730.80473	

Z stadistic in brackets, standard deviations for the coefficientes were corrected with a bootstrap method
***/ Significant at 99%; **/ Significant at 95%*/ Significant at 90%

Table 9
Schooling Equation. Females (16 to 19)

Variable	School Attendance		Years of schooling	
	Probit		**Negative Binomial Regression**	
	(–1.89)		(0.08)	
Years of migration experience (community)	-0.008		-0.001	
	(–1.33)		(–1.00)	
Mother´s schooling	0.085	***	0.019	***
	(2.66)		(3.80)	
Average schooling years (community)	0.217	***	0.060	***
	(2.33)		(4.62)	
Age	-3.756		0.675	***
	(–1.16)		(3.65)	
Squared Age	0.103		-0.019	***
	(1.12)		(–2.71)	
Repeated	0.469	**	-0.113	***
	(1.96)		(–2.69)	
Married or with couple	-0.765		-0.050	
	(–1.52)		(–0.12)	
Has children	0.021		-0.172	
	(0.04)		(–0.39)	
Female headed household	-0.375		0.054	
	(–0.80)		(0.82)	
Oportunidades	0.427	***	0.097	***
	(1.74)		(3.13)	
Non nuclear household	0.143		0.018	
	(0.58)		(0.50)	
Number of rooms in dwelling	0.135	**	0.052	***
	(1.67)		(5.20)	
Industires and workshosps (community)	-0.303		0.001	
	(–1.28)		(0.04)	
Restaurants and hotels in community	-0.272		0.039	
	(–0.87)		(0.93)	
Maximum level of schooling level in community	0.118		0.019	
	(1.24)		(1.58)	
Number of observations	295		292	
Log likelihood	-151.3901		-725.54135	

Z stadistic in brackets, standard deviations for the coefficientes were corrected with a bootstrap method
 ***/ Significant at 99%; **/ Significant at 95%*/ Significant at 90%