Consumption or leisure ? The welfare impact of migration on family left behind : Theory and evidence from rural Mexico

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Abstract

The literature has traditionally focused on the impact of migration on the consumption of non-migrants left behind, generally supporting the view that migration and remittances alleviate poverty. Another separate strand of research has yet provided evidence that those left behind bear a larger work burden to compensate for the loss of migrant's earnings, thereby raising the concern of a negative effect on non-income dimensions of well-being, and in particular on leisure time. This paper aims at integrating these two approaches into one unified framework to account for the welfare impact of migration in both dimensions, i.e. in terms of both consumption *and* leisure time. Building on an agricultural household model, I derive a set of testable predictions necessary implied by migration decisions taken to maximize the family utility and driven by earnings' differentials. Drawing on household panel data from rural Mexico and using fixed-effects instrumental variable estimation, I find evidence of both an income and a substitution effect which are both welfare-improving. Non-migrants both reduce their participation in off-farm jobs and increase their work in the household farm (and in self-employment in general). This reallocation of labor is consistent with a raise in the productivity of agricultural labor caused by the out-migration of a farmer (substitution effect). In line with a positive income effect, I find that non-migrants do not completely offset the loss of migrant's farm labor, which causes a decline in the total income derived from local activities at origin. Results further suggest that remittances sent by the migrant exceed his initial net contribution to the household income, thereby relaxing the budget constraint of non-migrants who increase their consumption.

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1 Introduction

International migration is now on the development agenda. The issue of whether migration improves the welfare of families left behind in sources countries and helps the development process has gained substantial attention among both policymakers and academics (Clemens, Ozden, and Rapoport, 2014). The literature has traditionally focused on the impact of migration on the total income or consumption of rural households. Evidence from various country-case studies has supported the optimistic view that international migration and remittances reduce poverty among families of migrants remaining at origin – for a review Schiff(2008) and Bertoli and Marchetta (2014).

Another recent strand of research has yet emphasized the importance of non-income dimensions of well-being for the population left behind. As reviewed by Adams (2011) and Antman (2013), changes in other indicators – such as education , health, time use – has yielded mixed conclusions about the welfare impact of migration. Specifically, a series of studies has explored how migration affects the time allocation of non-migrants staying behind in rural areas of origin. Among other, Binzel and Assaad (2011) in Egypt, Mu and van de Walle (2011) and Chang et.al (2011) in China , Mendola and Carletto(2012) in Albania, show evidence that migration causes members left behind, especially women, to increase their time spent in the farm and in unpaid family work. This result has raised the concern that left-behinds bear a larger work burden possibly because of the need to compensate for the loss of migrant's labor and forgone local earnings. This converging empirical evidence has challenged the view that migration has a positive welfare impact by reducing poverty exclusively. Reduction in time out of work has certainly important implications in terms of well-being, beyond the direct disutility in terms of leisure. It leaves less time for domestic tasks (such as care for children and elderly) which provide goods and service for the family, and less time for personal care and socialization, which may in turn negatively impacts health status ; in the case of young people, additional work time may also negatively affect their ability to attend school and study.

These two separate approaches of the migration impact, one in terms of consumption, the other in terms of time allocation have however their own limitations. The former neglects the disutility of work and the latter ignores the utility of consumption. My paper aims at integrating both approaches into one unified framework to account for the welfare effect of migration in both dimensions, i.e. consumption and leisure (understood as time out of work).

Migration is commonly viewed as raising the consumption (or total income) of non-migrants through remittances sent back by the migrant. However, the absence of a household member and the inflow of remittances also affect labor supply decisions of left-behinds, which modify the income they derive from local activities. Consequently, the observed changes in non-migrants' consumption/income due to migration partly reflect changes in labor supply behaviors. A welfare analysis requires determining whether migration relaxes the budget constraint of non-migrants, holding constant their labor supply. Migration entails a positive income effect if (and only if) remittances send by the migrant exceed his initial net contribution to the household income, defined as the difference between his local earnings and his consumption before departure. In this case, migration is associated with an increase in the unearned income accruing to left-behinds who can then both consume more and work less. Examining the impact

only in terms of consumption might however underestimate the welfare gain of migration since non-migrants may purchase time out of work, thereby substituting consumption with more leisure. In the opposite case of a negative income effect, the purely monetary approach might underestimate the welfare loss caused by migration because non-migrants may work more to compensate for the migrant's forgone local earnings. Typically, if the main breadwinner of the family (household head) migrates without sending back remittances, dependent members (spouse and children) are worse-off and may need to begin working to maintain consumption level.

Previous studies examining the migration impact only in terms of time allocation have usually overlooked the fact that migration also affects the shadow wage of farm work, and more generally the productivity of self-employed activities. Because migrants and non-migrants are probably close substitute in the farm production that exhibits diminishing marginal productivity, the out-migration of a farmer is likely to raise the productivity of agricultural labor for remaining members. This immediate increase in the shadow wage of farm work is per se welfare-improving for non-migrants, independently of the income effect trough remittances [1]. From the evidence that left-behind work more in the farm (or in the family business) , previous studies conclude that they may suffer from overwork, fatigue, stress and other health problem related to the reduction in leisure time caused by the out-migration of a productive working-age household member. Another, maybe more natural interpretation is the following. Given that off-farm local wages remain unchanged by the marginal out-migration of one family member, left-behinds should efficiently reallocate their labor away from off-farm wage work to on-farm self-employed work. In fact, many empirical studies find that left-behinds simultaneously increase their farm work and reduce their off-farm wage work. Moreover, since the opportunity cost of leisure (in terms of consumption) has increased, non-migrants might even increase their farm work more than they reduce their off-farm work, thereby increasing their overall labor supply. The fact that non-migrants may prefer working more in order to consume more goods or services might not be surprising in rural developing economies where household's income are low and desire to escape poverty is strong.

In this paper, I provide a theoretical framework to account for both the income effect of migration – through remittances – and the substitution effect – through an increase in the shadow wage of farm work. Building on an agricultural household model (Sadoulet, De Janvry and Benjamin, 1998), I assume migration to be a collective decision maximizing the utility of the family and driven by earnings differential between the local and the foreign labor market. The model allows deriving a set of testable necessary conditions for migration to improve the welfare of family left behind.

First, migration should increase the unearned income accruing to non-migrants because remittances should exceed the initial migrant's net contribution to the household income. Since off-farm wages remain unchanged, this positive income effect should cause non-migrants to reduce their labor supply in the non-agricultural labor market. Second, the substitution effect depends on which tasks the migrant performed before departure. If the migrant cultivated the land, left-behinds may possibly spend more time in the farm in response to the raise in farm labor's productivity triggered by the absence of a farmer. If the migrant did not farm before departure, the shadow wage of farm work remains constant

1. As Winters, de Janvry and Sadoulet (2011) pointed it out, household size is positively related to the decision to out-migrate likely because there are decreasing returns to family labor in agriculture in rural Mexico. The opportunity cost to the family of sending a migrant is lower for larger household (for a given landholding size).

and left-behinds should not increase their farm labor. Finally, even if non-migrants may work more in the farm, the model predicts that, due to the income effect, they should not completely offset the loss of the migrant's farm labor. Consequently, the total labor input in the farm and the agricultural production should decline. A key necessary implication of a positive welfare impact of migration is thus as follows. We should observe both a decline in the labor income derived by the household (migrant included) from local activities at origin and an increase in the non-migrant's consumption.

One can argue that a theoretical model is not needed to assess the welfare effect of migration because remittances sent by the migrant can be directly observed. However, as pointed out by Schiff(2008), the direct observation of remittances needs not to be informative about the effect of migration on the budget constraint of non-migrants. Only the amount of remittances *relative* to the initial net contribution of the migrant to the household income is informative. If a net "giver" to the family, say the main breadwinner, migrates, he must remit an amount higher than his forgone local earnings in order to leave the rest of the family better-off. If a net "taker" migrates, say a dependent member, his absence alone relieves the remaining member of tacking charge of his subsistence. Having fewer mouth to feed, left-behinds are better-off. Therefore, in addition to remittances, a correct welfare analysis requires determining the migrant's individual local earnings and consumption at origin in the case he would stayed home instead of migrating. These are counterfactual outcome after all, not observable by definition. Moreover, the notion of individual contribution to the household is not clearly defined when migrants and non-migrants work together in a joint production in which the marginal product of labor is nonlinear and family member's labor input are partially substitutable .

To test the theoretical predictions, I draw on an original panel data from the Mexican Family Life Survey (Rubalcava and Teruel, 2006,2008). This survey was conducted for the first time in 2002 and interviewed the same households three years later in 2005. Using the rural sample, I examine how the non-migrants' participation and hours in off-farm jobs, self-employment, and farm work are affected by the migration of a household member between the two rounds. I also explore the migration impacts on the total labor input in the farm (or business), on the the family production, on the total labor income, as well as on transfers and consumption of the household. Although migration to the United States is my primary interest, I also investigate the effects of internal migration within Mexico.

Only very few studies use longitudinal data to evaluate the effects of migration on families staying behind [1]. Exploiting the longitudinal structure of the survey, I estimate fixed-effects models to control for time-invariant unobserved characteristics. To address the concern of confounding factors varying over time – such as labor demand shocks [2] – I instrument current U.S. migration with historical emigration rates to the U.S. in the household's municipality of residence [3] . In addition , I control for initial household characteristics as well as for changes over time in municipal employment rates and other municipal labor market indicators.

1. Only 5 out of 50 migration studies according to Adam (2011)'s review, one of the exception being Mu and van de Walle (2011)

2. Local labor demand shocks may provoke involuntary unemployment in wage-earning jobs and force some members of the family to out-migrate to find jobs elsewhere. The migration of one household member may also reflect joint decisions with family 's labor allocation : women' s participation in agricultural work may help finance men 's out-migration.

3. Data from the 2000 Mexican census

To briefly preview the results, I find converging evidence of a positive impact of U.S. migration on the welfare of families left-behind in rural Mexico. Results suggest that non-migrants are better-off, once both the utility of consumption *and* the disutility of work are accounted for.

I find members left behind, and especially women, reallocate their labor by reducing their participation (and hours) in off-farm jobs and increasing their work in rural self-employed activities , and particularly in the farm. Estimates further suggest that the increase in self-employed family work is significantly more pronounced when a self-employed worker leaves the family production, providing further evidence in favor of the substitution effect highlighted by the model. Results also show that U.S. migration is associated with a substantial decline in the total labor input in the family production , as well as in the total labor income derived from local activities at origin. Finally, I find an increase in the unearned income accruing to the non-migrant members, as well as in consumption per capita .

2 Theoretical model

2.1 Framework

Drawing on the New Economics of Labor Migration (Stark, 1991 ; Lucas, 1997 ; Lucas and Stark, 1988), I consider individual migration as an household livehood strategy resulting from an implicit mutually beneficial contract between the migrant and the rest of the family.

I consider a two-persons household which derives income either from farm production or from off-farm wage-earning activities in the labor market. Each family member i allocates his time endowment T_i between on-farm work L_i^F , off-farm wage work L_i^O and leisure l_i. Family members' labor are remunerated at different (exogenous) wage rates w_1 and w_2 in the local labor market [1]. Family members' labor are perfect substitutes in the farm production F which exhibits diminishing marginal productivity of labor ($F'(L) > 0, F''(L) < 0$). Other inputs such as land or capital are supposed to be fixed. The household does not hire in non family workers on the farm [2]. Those assumptions result in the violation of the well-know separation property of household consumption and production decisions. The family maximizes a Bergson-Samuelson social welfare function $\theta U^2(c_2, l_2) + (1-\theta)U^1(c_1, l_1)$, with $\theta \in [0,1]$ being the Pareto weight and c_i the member i's consumption. Individual preferences U^i are concave and leisure and consumption are complements in the utility ($U^i_{c_i l_i} \geq 0$).

Only member 1 can migrate and earn a wage rate w_1^* abroad. In this static model, monetary costs of migration (travel, set up upon arrival..) are modeled as deductions from the foreign wage w_1^* . The separation of families certainly entails utility (psychological) costs for both the migrant and the members left behind that I suppose to be additive. Once he has migrated, member 1 cannot work simultaneously on the foreign labor market and on the family production (because of too high commuting costs for instance). In the first "time" period, the household compares his utilities with and without migration, and decides whether member 1 migrates or not. Migration occurs only if w_1^* is sufficiently higher than the local wage w_1. In the second "time" period, the migrant observes the realized labor market outcomes and the household decides about its optimal labor allocation. The household optimization process can

1. I exclude general equilibrium effects of migration on local wages
2. This assumption is relaxed in a extended version of the model (see Appendix)

be expressed as a utility maximization in two regimes, with and without migration :

$$STAY \begin{cases} \text{Member 1 stays home} & \\ \max_{c1,c2,L_1^F,L_1^O,L_2^F,L_2^O} & \theta U^2(c_2, T_2 - L_2^F - L_2^O) + (1-\theta)U^1(c_1, T_1 - L_1^F - L_1^O) \\ \text{subject to} & c_1 + c_2 = F(L_1^F + L_2^F) + w_1 L_1^O + w_2 L_2^O + y \\ & \forall i = 1,2 : 0 \leq L_i^F \ , 0 \leq L_i^O \ , L_i^F + L_i^O \leq T_i \end{cases}$$

$$MIG \begin{cases} \text{Member 1 migrates} & \\ \max_{c1,c2,L_1^O,L_2^F,L_2^O} & \theta \left[U^2(c_2, T_2 - L_2^F - L_2^O) - \delta_2\right] + (1-\theta)\left[U^1(c_1, T_1 - L_1^O) - \delta_1\right] \\ \text{subject to} & c_1 + c_2 = F(L_2^F) + w_1^* L_1^O + w_2 L_2^O + y \\ & 0 \leq L_2^F \ , 0 \leq L_i^O \ \forall i \ , L_2^F + L_2^0 \leq T_2 \ , L_1^0 \leq T_1 \end{cases}$$

δ_i (> 0) is member i' s psychological costs and y is the non labor income of the family. For the remainder of the paper, I assume that family members supply at least one unit of labor either on the farm or in the labor market.

2.2 Income effect through remittances

For simplicity, suppose first the household has no land and derives income only from wage earnings ($F = 0$ and $L_1^F = L_2^F = 0$). Since the marginal product of labor is constant and the family utility is separable in (c_1, l_1) and (c_2, l_2) the maximization of family utility can be attained by a two-stage budgeting (second welfare theorem) : in the first stage, household full-time income is allocated between members, in the second stage, each individual independently maximizes his utility with respect to his own budget constraint. Let $R = w_1 L_1 - c_1$ denote the net transfer of member 1 to member 2. It can be shown that this transfer R increases with the wage rate of member 1's labor w_1 [1]. In this altruistic model of the family,member 1 's gain in his personal earnings is immediately shared with the other member (which is a corollary of the property of income pooling in unitary models). In the migration regime, where necessarily $w_1^* > w_1$, the migrant remits at least his initial net contribution to the household income. Consequently, remittances constitute an additional nonlabor income accruing to the non-migrants, raising their reservation wages. Since off-farm wages remain unaffected by migration, non-migrants left behind reduce their wage work in the labor market . This result holds even if the household produces in

1. The non migration regime can be written as :

$$\begin{cases} \max \theta U^2(c_2, T_2 - L_2) + (1-\theta)U^1(c_1, T_1 - L_1) \\ \text{subject to } c_1 + c_2 = w_1 L_1 + w_2 L_2 + y \end{cases} \Longleftrightarrow \begin{cases} \max U^1(c_1, T_1 - L_1) & \max U^2(c_2, T_2 - L_2) \\ \text{subject to } c_1 = w_1 L_1 - R & \text{subject to } c_2 = w_2 L_2 + R + y \\ \text{R such that } \theta U_{c_2}^2(R, w_2, y) = (1-\theta)U_{c_1}^1(R, w_1) \end{cases}$$

Differentiating the last equation gives : $\dfrac{\partial R}{\partial w_1} = \dfrac{(1-\theta)\frac{\partial U_{c_1}^1}{\partial w_1}}{\theta \frac{\partial U_{c_2}^2}{\partial R} - (1-\theta)\frac{\partial U_{c_1}^1}{\partial R}}$ Because the utilities are concave and leisure and consumption are complementary, it can be shown that $\dfrac{\partial U_{c_1}^1}{\partial w_1} < 0$ and $\dfrac{\partial U_{c_1}^1}{\partial R} > 0$ and $\dfrac{\partial U_{c_2}^2}{\partial R} < 0$.As a result, $\dfrac{\partial R}{\partial w_1} > 0$.

the farm [1]. Derivations of the proofs are provided in the online appendix [2].

2.3 Substitution effect and total labor input in the farm

To fix ideas, let suppose that $w_1 > w_2$. By symmetry, similar reasoning applies if $w_2 > w_1$. Assuming that the farm always demands a positive amount of labor ($F'(0) = \infty$) and excluding corner solutions $L_i^F + L_i^O = 0$, it follows that member 2 always devotes some time in farming activities. Family members being substitutes on the farm but member 1's labor having higher returns on the labor market, efficiency requires that member 2 specializes in farming ($L_1^F > 0 \Longrightarrow L_2^O = 0$) – unless off-farm wages are so high that both members work off-farm .

As illustrated in Figure 1 , when w_1 is lower than the marginal productivity of the farm Ω [3], member 1 does not work off-farm and total farm family labor satisfies $F'(L) = \Omega(y, T_1, T_2)$. As soon as $w_1 > \Omega$, member 1 participates in the labor market and the household equalizes the return of farm work and off-farm wage work, i.e. $F'(L) = w_1$. A marginal increase in w_1 triggers a strict decline in total family time in the farm because it is more efficient to reallocate labor to off-farm work and because the income effect is pooled within the family. Similar reasoning applies in the migration regime . Member 1 leaves the farm only if the foreign wage w_1^* is higher than the threshold $\overline{w_1}$ which is the fixed point of Ω_2, the shadow wage of farm labor when member 2 is the only cultivator to work in the farm . Otherwise member 1 would return to work on farm [4]. The substitution effect arises because the immediate decrease in farm labor resulting from the out-migration of member 1 raises the productivity of farm work for the remaining member 2. The income effect occurs because, the gain in member 1's earnings due to migration is shared within the family ($w_1^* > \overline{w_1} > w_1$). Therefore member 2 benefits from a higher unearned income relative to the non-migration regime. Due to this income effect, member 2 does not completely compensate the loss of migrant's farm labor. As a result, the total labor input in the farm declines with migration ($\Omega_2(w_1^*) > \Omega_2(\overline{w_1}) = \overline{w_1} > \max(w_1, \Omega) \geq F'$) [5].

When member 1 does not work on farm before departure ($w_1 > \overline{w_1}$), migration does not entail any substitution effect . Since member 1 migrates only if $w_1^* > w_1$, migration has only an income effect on the non-migrant's farm labor which must therefore decrease ($\Omega_2(w_1^*) > \Omega_2(w_1)$). However, if member 2 works both on and off farm initially ($w_2 > \Omega_2(w_1)$) , his farm labor may remain unchanged . This can happen because for member 2 every infra-marginal unit of farm labor is more valuable than wage labor ($F'(L_2^F) = w_2$ and F' is decreasing). Due the income effect of migration, member 2 first reduces

1. In the morning after migration, the return of farm labor is always higher than the wage rate on the market for the member left behind. Having more unearned income, member 2 starts by reducing the type of work whose marginal productivity is the lowest, that is wage work.

2. www.parisschoolofeconomics.eu/docs/murard-elie/online_appendix.pdf

3. When the household in self-sufficient in labor, the optimal marginal productivity of the farm Ω is a function of y, T_1, T_2

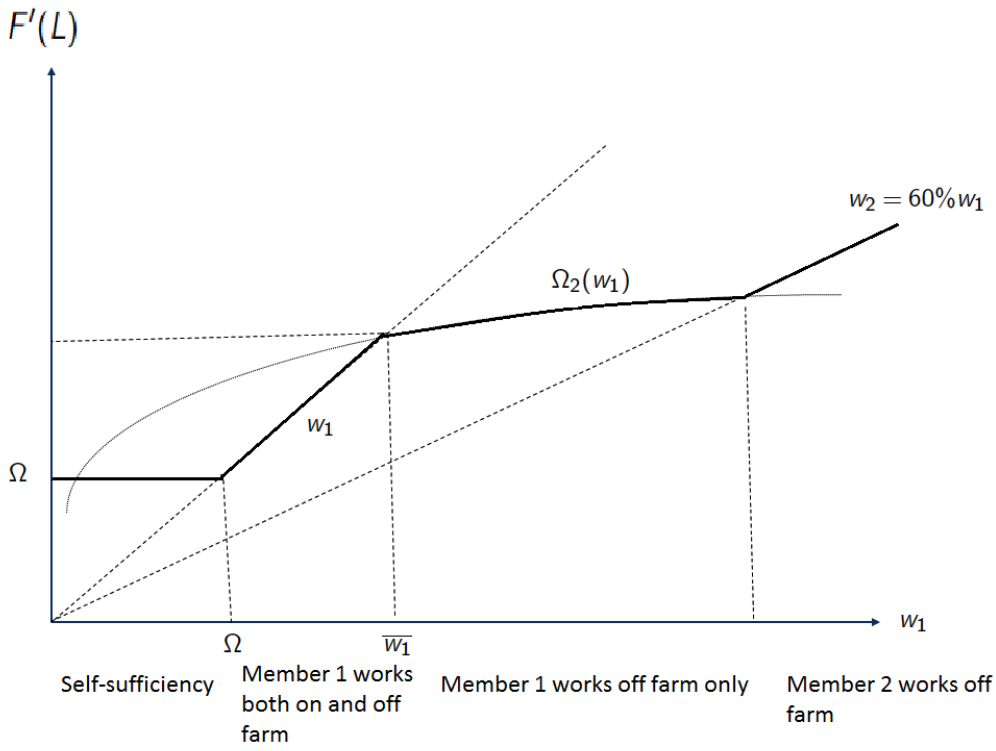
4. $\overline{w_1}$ is the fixed point of the function Ω_2 , the marginal product of member 2's farm labor when he is the only farmer and member 1 works only off-farm. Since Ω_2 has a unique fixed point (the reverse will lead to economic absurdities) and is increasing with w_1 (member 2's farm labor decreases with w_1) , $\Omega_2(w_1) - w_1$ has constant and opposite signs over the interval $[0, \overline{w_1}]$ and $[\overline{w_1}, +\infty[$. If $\Omega_2(w_1)$ were lower than w_1 over $[0, \overline{w_1}]$ and higher than w_1 over $[\overline{w_1}, +\infty[$, this would imply that member 1 leaves the farm to exclusively work in the labor market when his wage drops from $\overline{w_1} + \varepsilon$ to $\overline{w_1} - \varepsilon$, (with $\varepsilon > 0$). This is economically absurd and this is reason why Ω_2 is above the 45 degree line for $w_1 < \overline{w_1}$ and below for $w_1 > \overline{w_1}$. See online appendix for details.

5. A necessary condition for migration is that w_1^* exceeds the marginal productivity of the farm either equal to Ω or to w_1 if $w_1 > \Omega$. Since Ω_2 is above the above the 45 degree line for $w_1 < \overline{w_1}$, $\Omega_2(w_1^*) > \max(\Omega, w_1)$. Hence, the total input of farm labor decreases.

the type of labor whose marginal product is the lowest ,that is wage labor. If the income effect is not high enough (i.e. if $w1^*$ is not high enough : $\Omega_2(w_1^*) < w_2$), the non-migrant only reduces his off-farm work and holds constant his farm labor.

By symmetry of argument, it can be show that if $w_2 > w_1$ the total input of farm labor decreases with migration, or remains unchanged [1].

FIGURE 1 – Marginal productivity of farm labor and member 1's wage ($w_1 > w_2$)



2.4 Consumption and welfare

The model predicts that the total consumption of the household $c_1 + c_2$ increases with migration. For "standard" utility and production functions , simulations show that this increase in total consumption is shared between the migrant and the non-migrant. The model supposes migration to be welfare-improving for the entire family. Simulations further show this welfare gain should be shared between the migrant and the non migrant. Therefore non-migrant's consumption and utility should both increase with migration of a household member. Of course , the important assumption of this model is that migration does not affect the Pareto weight θ reflecting the intra-household bargaining power.

In summary, the theoretical model predicts that following necessary implications for migration to be

1. Member 1 migrates only if $w_1^* > w_2$. If no one works off farm initially ($w_2 \leq \Omega$), migration is associated with a decline in the input of farm labor ($\Omega_2(w_1^*) > \Omega$). If member 2 works initially off farm ($w_2 > \Omega$), the marginal product of farm labor is either equal, or lower than w_2 .As member 1 migrates and leaves member 2 alone on the farm, the marginal product of member 2's farm labor will always exceed or be equal to w_2 (otherwise member 2 would reduce his farm labor to equalize marginal returns). The marginal product of farm labor is thus higher (or equal) after migration than before : the total input of labor decreases or remains unchanged with migration.

welfare-improving :

- **Members left behind should reduce their labor in off-farm wage-earning activities**
- **Due the combination of the income and substitution effect, the impact of migration on non-migrants' farm labor remains theoretically undetermined. However, the effect of migration should be more pronounced (either more positive or less negative) when the migrant initially worked in the farm than when he did not.**
- **The total labor input in the farm cannot increase, neither the production output [1]. Consequently, total labor income derived from local activities at origin should decline**
- **Non-migrant's consumption should increase**

The model assumes that non-labor farm inputs are fixed and not affected by migration. The NELM theory yet argues that migration is a family strategy to alleviate liquidity constraints and finance productivity-enhancing investment in the farm through remittances (Stark, 1991 ; Mendola, 2008 ; Woodruff and Zenteno, 2007 ; Taylor and Lopez-Feldman, 2010). The model provides a empirical test of the NELM hypothesis. If the total input of farm labor, or the production output, were found to increase with migration, this would be in contradiction with the model's prediction and would validate the NELM theory.

3 Data

3.1 The Mexican Family Life Survey

The Mexican Family Life Survey is a longitudinal household survey representative at the national, urban, rural and regional level. The baseline survey was conducted from April to July 2002 and collected information from a sample of approximately 8,400 households in 16 Mexican States. I use the rural sample covering about 3,300 households (14,000 individuals) residing in 75 rural communities with less than 2,500 inhabitants. The second round of the survey was begun in mid-2005 and completed in 2006, with a 90 percent re-contact rate at the household level [2]. If an individual who was enumerated in the previous round is not found in the same household of origin, resident members of the household are asked about the location and date of departure of this individual. Hence, even if they could not be individually recontacted, all migrants can be identified from the household roster. Kaestner and Malamud (2010) is the first study using the MxFLS to examine the selection of Mexican migrants to the U.S. As the authors underline, the MxFS is ideally suited to analyze migration. Not only it allows identifing all migrants, including those who have moved permanently to the U.S, but it also provides very rich information prior to migration for both migrants and non-migrants.

The MxFLS also asks the family left behind to provide the absentee's reason for moving out, either employment motives or non-economic motives such as marriage, schooling or family reunification. Migrants who leave to seek better employment opportunities are young/middle-aged males and females respectively less than 43 and 35 years old. Older men and women do not move out for economic rea-

1. If the non-migrants worked only on the farm before migration, the total input of farm labor strictly decreases, along with the production output. If non-migrants worked off farm initially, the total input of farm labor may remain unchanged.

2. Individuals changing residence between the two waves are tracked even in states that do not make-up the original baseline sample

sons [1]. Eventually, I differentiate three types of movements : migration to the United States, internal migration between Mexican municipalities, and other domestic movements motivated by non-economic reasons (non-migration absence). Among the rural adult population (12-64), 4% of individuals engage in international migration and 2% in internal migration between 2002 and 2005 (4% are non-economic absentee). Among rural households, 9% of households send at least one international migrant and 5% at least one internal migrant. Descriptive statistics for U.S. migrant-sending households and the rest of sample are provided in the online appendix.

The MxFLS collects detailed information on household demographics, education, housing characteristics and asset ownership, as well as on nonlabor incomes (pensions, social transfers such as Progresa or Procampo, and financial returns...). Employment-related questions refer to the main job in the last week preceding the interview. The survey records the number of weekly hours individuals spent in various occupations : non agricultural salary work (obrero), agricultural wage-earning work (jornalero) and self-employed work. The latter category comprises peasants farming their plot, self-employed running a household owned business, and family workers without remuneration. Additionally, in a different section of the questionnaire, the MxFLS collects time use data. Specifically, adult members are asked how many hours they spent per week in agricultural tasks (like weeding hoe, sowing, raising livestock) performed mainly in the family farm or garden, therefore referring primarily to unpaid family work and not to "jornalero" work. With respect to individual labor income , the MxFLS collects profits of self-employed workers and earnings of wage-earner during the month and the year prior the survey. Finally, the survey includes a extensive consumption questionnaire where the family head reports the food and non-food consumption (goods and services) of the household.

3.2 Employment and time use patterns in rural Mexico

Table 1 presents labor force participation across age and gender in rural areas. As emphasized by de Janvry and Sadoulet(2001) , Mexican rural households appear to rely importantly on non-agricultural jobs to complement their income – one third of the male labor force being employed in off-farm jobs. In addition, as extensively documented by Katz and Correia(2001), due to labor market discrimination and social norms, the rural Mexican labor force is characterized by a low participation of females relative to males. This gendered division of labor seems to reflect a female-inside/male-outside dichotomy in which appropriates roles for women is to perform most of the domestic work and take care of the children and elderly (20 +10 hours a week in average). The gender gap appears particularly marked concerning "jornalero" jobs (agricultural wage work) almost exclusively performed by men. An intergenerational division of labor also exists, with older member working more in self-employed activities and less in the labor market , especially less in non-agricultural jobs, relative to younger members below 35. Finally, young women appear to cross the U.S. border twice less often than young men (5% versus 10% out-migration rate).

Because non-migrant members have different wages or shadows wage and different (marginal) disutility of work, the effect of migration are expected to vary by gender and age. Migration should theo-

1. Those age group do not indicate the age at departure time but rather the age in 2002. Migration can happen in the next three years.

retically cause the family left behind to reduce their off-farm wage work and possibly to increase their self-employed farm work. Because off-farm wages are likely higher for men than women, an optimal re-allocation of labor triggered by migration should be more pronounced among women than among men . Moreover, since women are much less engaged in the labor force than men, they offer a larger reservoir of time that can be devoted to farm work. The marginal disutility of an extra burden of farm work is therefore certainly lower for women than men. More generally, the welfare gain of migration has to distributed among non-migrant members who have certainly different marginal utility of leisure. Relative to younger member, older member might for instance benefit more from a given increase in leisure. The income effect of migration may thus allow old people left behind to reduce their work burden more than young people. If the substitution effect dominates the income effect, younger member may increase their farm work more than older member reduce it.

Finally, off-farm jobs' constraints in terms of fixed costs (commuting) or working schedules may oblige household members to specialize in their own occupation. It might be too costly for family members to individually switch occupations. In consequence, they may adjust their working time in their own occupation in such a way that total family labor is optimally re-allocated at the household level.

4 Empirical strategy

I examine two separate questions. First, at the individual level, how the migration of a household member affects the labor supply decisions of the members left behind. Second, at the household level, how migration impacts the total labor input in the business/farm , the labor income and the consumption of the household

4.1 Difference-in-differences estimates

To answer the first question, I estimate a regression across all non-migrant individuals (both in migrant-sending and non-migrant-sending households) of the outcome L_{iht} for individual i in household h at time t. L_{iht} is either a binary variable indicating whether the individual participates in different occupations or the number of working hours spent in those occupations. To answer the second question, I estimate a regression across all households of the outcome L_{ht} for household h at time t. In both regressions, I use the longitudinal structure of the data to apply first-differences to wipe out unobservable omitted variables that are time-invariant. Since the MxFLS provides only two survey rounds, in 2002 and 2005, the specification boils down to a simple difference-in-differences regression :

$$L_{iht} - L_{iht-3} = \beta_{US} M_{ht}^{US} + \beta_I M_{ht}^I + \beta_o M_{ht}^o + X_{it-3}\alpha_1 + H_{ht-3}\alpha_2 + D_{ht-3} + \varepsilon_{iht} \quad (1)$$

$$L_{ht} - L_{ht-3} = \gamma_{US} M_{ht}^{US} + \gamma_I M_{ht}^I + \gamma_o M_{ht}^o + H_{ht-3}\lambda_2 + + D_{ht-3} + v_{ht} \quad (2)$$

M_{ht}^{US} is a binary variable equal to 1 if household h has at least one member who migrates in the U.S. between the the two survey rounds, i.e between $t-3$ and t. M_{ht}^I and M_{ht}^o respectively stands for Mexican inter-municipality migration and other internal domestic movements for non economic motives. X_{it-3} and H_{ht-3} are vectors of initial (pre-migration) value of individual and household characteristics that may affect labor supply decisions over time, for example through preferences or ability to work on or

off the farm.. The vector X_{it-3} includes individual i's age, sex, educational attainment and marital status. Included in H_{ht-3} are households' demographic composition, the level of education in the famil , as well as a wealth index and social transfers received (pensions, subsidies and governmental aid). Moreover, I added self-reported shocks suffered by the household between 2000 and 2005 to the controls : illness or death of one family member, house, business or crop losses due to natural disaster, robbery or other adverse events. Similarly, a vector D_{ht-3} of state dummy variables controls for state-specific macroeconomic shocks. In estimating Eq. (1) I take account of the potential correlations of the error terms ε_{iht} within the same household h. For this purpose I calculate robust standard errors clustered at the household level.

My primary interest is to consistently evaluate the effects of U.S. and Mexican migrations (β_{US} , γ_{US} and β_I , γ_I). Self-selection of households into migration does not threaten the consistency of the estimates unless it is driven by time varying unobserved factors. The identifying assumption needed is a common trend between migrant and non migrant households conditional on the controls. Admittedly, omitted time-variant variables between 2002 and 2005 may affect both migration decisions and labor outcomes though. For example, unobserved local labor demand shocks (collective layoff or agricultural shocks) may provoke involuntary unemployment and constraint households 's participation in salary work. Out-migration may then precisely constitute an ex-post coping strategy to find better employment conditions elsewhere. Consequently, a decline in the family's participation in wage labor would cause migration rather than the reverse. Another concern with the earlier specification is simultaneity bias - the fact that the migration of one household member may reflect joint decisions with family 's labor allocation. For example, women' s participation in agricultural work may help finance a member's out-migration.

4.2 IV estimates

To address these concerns about the endogeneity of migration, I instrument for household migration in the U.S.. As instrument, I use the percentage of out-migration in the U.S. from 1995 to 2000 in the household's municipality of residence. I rely on the 2000 Mexican Census which records every household member's international migration during the 5 years prior the interview in the enumerated household (no matter whether the migrant has returned or not). Using also the municipal population data in 1995 (provided by the 1995 Census), I calculate 1995-2000 U.S. out-migration rates by municipality. This instrument is meant to proxy for the extent of village level migration networks which likely provide information to potential migrants and reduce travel costs (smugglers), initial setup and job search costs at destination [1]. Since migration rates capture geographical and historical determinants of migration tied to places, I do not include the vector D_{ht} of state dummies in the controls of the instrumented regression (redundant with the instrument). The exclusion restriction is violated if past U.S. migration rates in the municipality have independent impacts on current changes in the household' s labor outcomes between the two survey waves. One possible threat is that the instrument captures long term impacts of migration (on labor market dynamics, growth...) or unobserved (time-variant) community characteristics affecting

1. Similar instruments, such as historical migration rates by state, have been extensively used in the literature, notably in the US-Mexico migration literature (Woodruff and Zenteno, 2007 ; McKenzie and Rapoport, 2007 and 2011)

household labor decisions. For example, communities with high U.S. migration prevalence may be particularly prone to recurrent weather shocks (droughts) which might have spurred migration in the past and which disrupt agricultural work in the present.

To account for these statistical concerns, I control for relevant municipality-level variables measuring both initial level (in 2002) and changes(from 2002 to 2005) in local labor market conditions. Using road distance data [1], I match every MxFLS rural community (under 2,500 inhabitants) with the closest Mexican town, defined as a municipality with more than 100,000 inhabitants (2000 Census). Using then the Mexican Labor Force Survey (ENE) which covers almost every large urban municipality on a quarterly basis, I calculate initial levels and changes in the yearly averages of the municipal population, of the male employment rate and of the percentage of high-wage earners (above 3 times regional minimum wages) among salary workers [2]. In addition, I include the minimum road distance to the closest town in the controls, the MxFLS rural community median income in 2000 (provided by the 2000 Census) and the GDP growth rate of the state between 2000 and 2006.

Throughout, IV-estimates are obtained using a linear probability model at the first-stage and clustered-standard errors at the municipality level. Admittedly, internal Mexican migration should also be instrumented. To mitigate the concern that the endogeneity of internal migration may confound the estimation of the U.S. migration effect, I test the robustness of the results to the exclusion of Mexican migration from the controls.

5 Results

5.1 First-stage : prediction of U.S. migration

Table 2 presents results of first-stage regressions predicting the family's participation into U.S. migration, either in the sample of non-migrant individuals (Equation (1)), or in the household sample (Equation (2)). The instrument is strongly and significantly correlated with U.S. migration : a standard-deviation increase in the past municipal migration rate (about 3 %) increases by 6% the probability to send a household member in the U.S. This effect is sizable since the average probability of U.S migration is about 9% in the sample. I obtain F-statistics adjusted for clustering at the municipality level of respectively 24 and 17 in the household sample and in the individual sample [3].

Migrant-sending families are also larger, with relatively more young males (14-35) and middle-aged women (36-54), and relatively less middle-aged men and elderly people (older than 55) [4]. Additionally, migrant household appear to have intermediate educational attainment as measured by the highest grade completed in the family. Estimates also reveal a hump-shaped relationship between international out-

1. Provided by a GIS model of the National Road Network in Mexico (NRN) based on Topographic Digital Dataset (TDD) developed by Duran-Fernandez (2007)

2. If the second or third closest town is within a 20km radius from the first closest town, I consider it as part of the same urban cluster. Then I calculate population, employment rate and share of high-wage earners at the agglomeration level rather than at the municipal level

3. If non clustered, F-stats are 256 and 107 in the individual and household sample

4. The presence of middle-aged women increase the probability of migration of a younger family member, likely because they relieve the would-be migrants of taking care of the various "household chores" (including child care), thereby easing his departure.

migration and wealth in rural Mexican areas, echoing the results of McKenzie and Rapoport (2007) and Fernandez-Huertas Moraga (2013) [1].

5.2 Labor supply response of non-migrants

Non instrumented estimates

Turning first to Difference-in-differences regressions on the sample of non migrant individuals (Equation (1)), I present in Table 3 non instrumented estimation results. Given space constraints, coefficients of Mexican migration and non-economic absence are not reported because they are almost always non-significant. Controlling for initial levels of household and individual characteristics, I find that non-migrants increase their work in self-employed activities and in the family farm in response to the migration of a household member to the U.S. ($> +2$ hours a week) .THis increase is particularly pronounced among 36-54 women and 15-35 men who both increase their overall labor supply, and therefore reduce their time out of work. Younger 15-35 females increase their farm work too but they simultaneously reduce their participation and hours spent in off-farm non-agricultural jobs. Estimates suggest that young females reduce their off-farm work by a larger amount than they increase their farm work, resulting in a (statistically non-significant) decline in working time (-2.7 hours, t-stat of -1.54) . These counteracting effects within migrant households seem to lead to an almost zero effect on left-behinds' overall labor supply.

Instrumented estimates

When I instrument for migration status of the household, I find similar effects of U.S. migration. Table 4 shows that U.S. migration increases left-behinds' farm work only among 36-54 women and 15-35 women (participation increases by more than 20% and weekly hours by 5). IV estimates further indicate that 15-35 women both increase their self-employed work and reduce their off-farm non-agricultural work by almost the same amount (about 11 hours a week). In summary, non-IV and IV results provide converging evidence of a re-allocation of labor away from local off-farm jobs to self-employed production in general and to family farm work in particular.

These results are in line with previous empirical studies. Most studies present evidence of a negative effect of migration on labor supply, especially among non-migrant women [2]. In rural areas of Mexico, Amuedo- Dorantes and Pozo (2006) find that women use remittances to purchase time away from informal work. Hanson (2007) finds also that women born in Mexican high-migration states are less likely to work outside the home relative to women born in low migration states. Mendola and Carletto (2012), Binzel and Assaad (2011) and Mu and van de Walle (2011) find in different context that women left behind not only reduce their wage labor but also increase their time in unpaid family work (either in the farm or in the household business)

1. Following the methodology of Filmer and Pritchett (2001) and McKenzie (2005), I construct a wealth index using principal component analysis with data on household assets (such as livestock, land, equipment), household durable goods, dwelling conditions and access to public utilities.

2. in the Philippines (Rodriguez and Tiongson, 2001), in El Salvador (Acosta, 2006), in Jamaica (Kim, 2007) and in in Nepal (Lokshin and Glinskaya, 2008). The study by Cox-Edwards and Rodriguez-Oreggia (2009) come to different conclusions. Using a national labor force survey from Mexico, the authors find that regular international remittances have no significant effect on the labor force participation of non-migrants.

We next refine the model to allow migration impacts to differ according tho initial occupation of the migrant before departure.

5.3 Direct evidence of substitution effect

In Panel A of table 5 , I estimate heterogeneous impacts of migration depending on whether the migrant worked in self-employed activities before departure. However, comparing households in which the migrant is initially self-employed with other migrant-sending households is likely to introduce bias. Relative to individuals living in the latter, individuals living in the former household are mechanically more likely to participate in the family production together with the migrant. Therefore the initial participation self-employment is not balanced at baseline between the two groups – because of differences in in land/capital endowment and entry costs in farm/business production. To address this issue, I restrict the sample to families who were already involved in self-employed activities in 2002 [1].

Panel A in table 5 shows that the effect of migration on non-migrants' self-employed labor is more positive when the migrant worked in family production before departure than when he did not [2] . When the migrant helped in the business/farm , non-migrants are 11% more likely to participate in self-employment relative to when the migrant did not. This effect is especially pronounced among adult 15-54 males who increase their hours in in the household production relatively more. Panel B replicates the same analysis but examines the differential impact according to whether the migrant worked in the farm or family garden. I find that when a cultivator leaves the farm, remaining members are 19% more likely to engage in agricultural tasks in the family farm relative to when a non-farmer migrates. Adult 15-54 males also increase their self-employed hours relatively more . I find no significant effect on hours spend in the farm/garden specifically.

When migrants did not initially work in the family farm or business, more than 60% of them were employed in off-farm jobs. It is therefore not the case that when the migrant did not help in the production, she/he was not contributing to the household income. Evidence of differential impact of migration cannot be simply explained by a greater need to replace migrant's forgone income contribution.

5.4 Household outcomes : farm labor input, labor income, transfers and consumption

Non instrumented estimates

Panel A1 of table 6 shows the non instrumented impacts of migration on non-migrant's labor supply, aggregated at the household level, i.e. summing individual's hours(or participation) of non-migrant members living in the same household. I find the same re-allocation effect as previously, i.e. a decline in family labor supplied in off-farm wage work and a increase in self-employed work and in farm work (although less significant). Turning to Panel A2, I examine the total labor supply of the family, including both migrant and non-migrant's labor. As expected, total labor in off-farm work decreases. More interestingly, I find that the total family labor input in self-employed production, and in particular in the farm decreases with the migration of a household member. These results suggest that although non-migrant

1. where at least one household member worked in self-employment
2. Due to lack of statistical power, I do not differentiate between the six previous demographic groups

increase their work in the household production, they do not increase it enough to completely offset the loss of migrant's labor.

Non-instrumented estimates of panel B in table 6 further indicate that U.S. migration triggers a sizable decline in total labor income (earnings + profits) derived from local activities at origin, and particularly in wage earnings [1]. This loss of about 1800 pesos a month corresponds to the loss of the migrant's earnings, this amount being close to the median wage in rural areas (agricultural and non-agricultural jobs put together). Surprisingly I do not find significant decrease in the profits of the household, which should match the decline in self-employed labor. This might be due the typical measurement errors plaguing self-reported profits in family enterprises (de Mel et al. , 2009). Using various households sales instead in table 10 in appendix, I do not any significant effects neither.

Turning to panel C of table 6 , I explore how U.S. migration affects unearned income. Unfortunately the MxFLS survey does not allow distinguishing remittances from other transfers received by the family (either private or public). I define the unearned income of the family as the residual of the difference between total consumption and total labor income derived from local activities in Mexico (per month). I find that U.S. migration is associated with a substantial increase in the unearned income of the family (+ 1900 pesos a month), most likely because the migrant send significant remittances from abroad. However, this result is not per se informative about the welfare impact of migration. Non-migrants are better-off only if the migrant's transfer exceeds his initial contribution to the household income. I further examine consumption per capita . Household consumption per capita is a good proxy for non-migrant's consumption provided that the intra-household distribution of resources is not too uneven before migration (between the future migrant and the non-migrants). Panel C of table 6 shows that consumption per capita significantly increase in both food and non-food items, by a total amount of more than 200 pesos a month. This represents an increase by one third of the consumption median (600 pesos a month).

Instrumented estimates

When I instrument for U.S. migration , the impacts on non-migrants 's labor supply and total family labor become non-significant. The effects on total earnings and labor income remain very significant and become even more negative. IV estimates further confirm that U.S. is causally associated with an increase in unearned income accruing to the family. With respect to household consumption per capita, IV estimates indicate a significant positive effect on non-food consumption (at 10% level) . As a robustness check, IV estimates in table 9 in appendix show that non-migrants left behind by a U.S. migrant are less likely to report suffering from malnutrition (by 20%) .

These results are consistent with previous evidence in Mexico, and notably with Taylor et al. (2005) and de la Fuente (2010) who find that international migration and remittances alleviate poverty and reduce vulnerability in rural areas.

5.5 Direct evidence of income effect

I examine how U.S. migration affects the intra-household transfer from the migrant to the non-migrants. An important problem is that individual contribution to the household is conceptually indefi-

1. All 2005 nominal values have been converted in 2002 nominal values (taking a 15% inflation rate over the period)

nite when family members participate together in joint production. To circumvent this problem, I restrict the analysis to the sample of households who are initially not engaged in any sort of self-employed activity at baseline in 2002. Since individuals derive income only from wages, this allows defining individual contribution to the household income as the residual of the difference between individual earnings and consumption – assuming consumption is entirely private. Let member 1 denote the (future) migrant(s) and member 2 the non-migrant(s), and W_i and c_i the individual earnings and consumption. The initial intra-household transfers from member 1 to member 2 is simply $c_2(2002) - W_2(2002)$, i.e. the additional amount member 2 can consume thanks to the net contribution of member 1 [1]. I explore how this transfer changes over time with the migration of member 1 by estimation regression with the dependent variable $intra\,transfer = c_2(2005) - W_2(2005) - (c_2(2002) - W_2(2002))$. This transfer is distinct from the family unearned income I examined previously which equals to $Unearned\ income = c_2(2005) - W_2(2005) - (c_1(2002) + c_2(2002) - W_1(2002) - W_2(2002))$.

Because only the aggregate consumption of the household $C(2002)$ is observed, additional assumptions are needed to estimate the initial individual consumption $c_2(2002)$. [2] . I suppose that total consumption is evenly distributed before migration, and I approximate $c_2(2002) = \frac{n_2}{n_1+n_2} * C(2002)$, with n_1 and n_2 the number of migrants and of non-migrants. As a robustness check, I further derive a upper bound of the pre-migration intra-household transfer, assuming that non-migrant members consume all the resources of the household, i.e. $c_2(2002) = C(2002)$. This corresponds to a conservative estimate of the welfare gain of migration since it exaggerates initial non-migrant's welfare before migration.

To build the counterfactual outcomes of non-migrant members left behind by a U.S. migrant, I rely on the following identification assumptions. As previously, I assume that, in the absence of migration, the variation over time in the earnings (and consumption) of left-behinds would have been the same as the one of non-migrants living in households who do not send migrants. In the latter non-migrant households , one cannot observe which member would have potentially migrated (member 1) and which members would have stayed behind (member 2). Consequently, in order to identity the causal migration effect, on needs to further suppose that migrants are not selected within the family, i.e. that variation in earnings (and consumption) of potential migrant members and of potential left-behind members are the same. The causal estimation of the migration impact in presence of intra-household selection of migrants is beyond the scope of this paper. This problem is addressed in a follow-up paper Murard (2015) in which I show that even IV-estimates instrumenting for the decision to send or not a migrant might suffer from substantial bias if they ignore this intra-household selection.

The first two rows in table 8 show that on average migrants earn around 1300 pesos a month before departure and that their net contribution to the household (earnings minus consumption) is positive. The following columns in table 8 show that U.S. migration is associated with a significant increase in the intra-household transfers received by the non-migrants, even when the conservative estimate of the income gain accruing to non-migrants is examined (third column, "upper bound transfer"') . Both IV and non-IV estimates point to the same conclusion : remittances send by the migrant seem to exceed his initial net contribution to the household, thereby relaxing the budget constraint for the members left behind. The next coefficients suggest that non-migrants use this additional unearned income to both

1. budget constraint being $c_1 + c_2 = W_1 + W_2$
2. After migration, since the household has split , local consumption $c_2(2005) = C(2005)$by definition

consume more goods/services *and* purchase more time out of work – although IV-estimates are non-significant with respect to consumption [1] .

5.6 Are remittances invested in productivity-enhancing farm inputs ?

The fact that members left behind increase their work in the farm (or in the business) can be either due to (i) a pure substitution effect as underlined by the model (ii) or productivity-enhancing investments in farm inputs as claimed by the NELM's theory. To disentangle the two explanations, I look at direct evidence of whether migration increases agricultural investments between the two survey rounds. Using data on annual farmers' expenditures on land inputs, as well as on household livestock assets, I provide in Panel C of table 10 in appendix estimates of migration impacts on four different inputs : draft animals (horses, mules, donkeys), production animals (cows, pigs, goats or poultry whose meat and byproducts can be sold), soil/seeds inputs (fertilizer, pesticides, improved seeds...) and other inputs such as tractor, yoke, irrigation, or fuels. I find no signs that migration modifies either the acquisition of these inputs or the yearly expenditures made on them [2].

6 Conclusion

This paper reveals that migration of a household member to the U.S. increases the welfare of the rest of the family left behind in Mexico. Non migrants are better-off, once both the utility of consumption and the disutility of work are accounted for. I find converging evidence of both an income and a substitution effect, very much consistent with a set of predictions necessary implied by migration decisions taken to increase the family utility and to exploit earnings' differentials.

Due to the substitution effect, non-migrants are better-off because they can efficiently reallocate their labor to farm work whose productivity has immediately increased after the out-migration of a cultivator. Left-behinds do not yet increase their overall working time, but rather reduce their work in off-farm non-agricultural jobs by about the same amount they increase their farm work , consistently with a positive income effect of migration. Due the income effect, non-migrants do not completely offset the loss of migrant's farm labor, which causes a decline in the total income derived from local activities at origin. I further find indirect evidence that remittances sent by the migrant exceed his initial net contribution to the household income, thereby relaxing the budget constraint of non-migrants. In line with this, results indicate a significant increase in the consumption of non-migrants.

The main finding of this paper points to a welfare gain for the family left behind taken as a whole. However, results also suggest that migration modifies the intra-household division of labor along gender lines. The increased time of young and older women (15-35 and 36-54) in farm work, both in absolute terms and relative to men, is indicative of a changing division of labor which results from a differential

1. Note that the sum of the coefficients of non-migrants' consumption and total earnings is by construction equal to the coefficient of intra-household transfer.

2. An exception is the (IV-estimated) significant effect of U.S. migration on the ownership of production animals. However, the purchase of such animals can serve other purposes than increasing the farm production. Mexican households may use livestock as a form of precautionary savings.

adjustment to the out-migration of a household member – likely due to gendered labor market discrimination and off-farm wage gap, differential constraints and social norms. Some argue that left behind women's welfare have risen in Mexico as a consequence of an increased autonomy and new decision-making power as household heads (Antman ,2011). However, women may be more empowered at the expense of being overworked in the farm, with direct implications for their health. As IV-estimates strikingly suggest in table 9 (see appendix), 15-35 and 36-54 females are precisely the family members who, due to U.S. migration, are more likely to report lower health status and for whom the number of medical symptoms (flu,nausea,headache..) [1] has increased. Of course, further research is required to examine whether the potential gain in decision-making power that women left behind could benefit from within the household could be sufficient to balance out the negative effects in terms of reduction of leisure time.

More generally, other indicators than consumption and leisure need to be investigated to get a broader insight into the welfare effect of migration. The absence of a parent (or a child) certainly entails psychological cots for the children (or the parents) left behind. As table 9 in appendix shows, young women and elderly seem to suffer from greater level of depression and greater emotional distress due to the absence of a relative [2].These issues require further investigation to formulate appropriate policy responses . One of which could be the reduction of restrictions on return migration to facilitate circular movements which could lower the physical and mental health costs caused by prolonged extra work on the farm and prolonged separation of families.

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2. Data from mental health module on 21 depressive symptoms. These questions capture various elements of distress, including sadness, loneliness, and fear and feelings of pessimism, uselessness, and a wish to die. Together, the symptoms are combined into a scale from 0 to 60 that has been validated against other mental health inventories in Mexico (Calderon 1997)

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Tables

TABLE 1 – Participation and hours in different activities in rural areas at baseline in 2002

	Male			Female		
	15-35	36-54	55+	15-35	36-54	55+
Labor force						
Work last week	0.77	0.92	0.67	0.28	0.27	0.16
Agricultural wage work	0.25	0.28	0.14	0.04	0.05	0.01
Non agricultural wage work	0.37	0.29	0.12	0.20	0.11	0.03
Self-employed work	0.20	0.39	0.45	0.09	0.17	0.12
Time use data						
Family farm work	0.21	0.28	0.32	0.07	0.10	0.08
Time out of work						
Household chores (weekly hours)	4.09	4.45	3.82	21.31	28.47	21.61
Caring for children/elderly (weekly hours)	2.54	1.83	0.58	16.82	11.94	5.13
School attendance	0.18	0.01	0.00	0.16	0.00	0.00
Migration						
US migrant	0.10	0.02	0.00	0.05	0.00	0.00
Mexico migrant	0.04	0.00	0.00	0.04	0.00	0.00
Observations	1683	976	455	1988	1008	449

TABLE 2 – First-stage results - Prediction of U.S. migration (linear regression)

	(1) Sample of non-migrant individual (working-age)		(2) Sample of households	
Instrument :				
1995-2000 U.S. migration rate in the municipality	0.024***	(0.006)	0.026***	(0.005)
F-stat clustered at the municipality level	17		24	
F-stat non clustered	256		107	
Municipal level variables				
1995 population(log)	-0.002	(0.011)	-0.013	(0.012)
2000 median income(log)	-0.083***	(0.029)	-0.062**	(0.027)
distance to closest town (log)	-0.002	(0.004)	-0.004	(0.004)
Closest town characteristics :				
2002 population (log)	-0.017	(0.014)	-0.013	(0.014)

Continued on next page...

Continuation of table 2

	(1) Sample of non-migrant individual (working-age)		(2) Sample of households	
2002 men employment rate	0.002	(0.003)	0.003	(0.003)
2002 share of high wage-earners	0.002**	(0.001)	0.001*	(0.001)
2005-2002 variation in population (log)	-0.004	(0.024)	-0.011	(0.025)
2005-2002 variation in men employment rate	0.002	(0.002)	0.003	(0.002)
2005-2002 variation in share of high wage-earners	-0.001	(0.002)	-0.002	(0.002)
state gdp growth 2000-2006	0.002	(0.002)	0.001	(0.003)
Individual characteristics				
sex female	-0.061	(0.066)		
AGE	-0.005**	(0.003)		
sq age /100	0.011***	(0.004)		
female*AGE	0.009***	(0.003)		
female*sq age /100	-0.014***	(0.004)		
years of education	0.002	(0.002)		
single	0.032	(0.021)		
female*single	-0.017	(0.018)		
female*years of education	-0.002	(0.002)		
Household characteristics				
household size	0.013**	(0.007)	0.012**	(0.006)
number of males 14-35	0.019*	(0.011)	0.026**	(0.012)
number of females 14-35	0.014	(0.011)	0.021	(0.013)
number of males 36-54	-0.015	(0.017)	-0.016	(0.014)
number of females 36-54	0.015	(0.015)	0.056***	(0.016)
number of elderly 55+	-0.026**	(0.012)	-0.009	(0.010)
Highest educ level in hh : secondary	0.014	(0.019)	0.024	(0.018)
Highest educ level in hh : post-secondary	-0.045*	(0.023)	-0.045**	(0.019)
Wealth index from PCA	0.002	(0.006)	-0.001	(0.005)
sq wealth index /100	-0.275	(0.178)	-0.375**	(0.178)
log hh social transfers	-0.003	(0.002)	-0.003	(0.002)
Household Shocks				
death of a household member 2000-2002	-0.005	(0.066)	-0.017	(0.050)
illness of a household member 2000-2002	0.004	(0.027)	0.013	(0.028)
Business failure 2000-2002	0.007	(0.035)	0.002	(0.031)
House,crop, asset losses 2000-2002	0.008	(0.030)	0.004	(0.030)
death of a household member 2002-2005	-0.029	(0.048)	-0.071	(0.044)
Business failure 2002-2005	0.027	(0.036)	0.007	(0.031)
House,crop, asset losses 2002-2005	0.058*	(0.030)	0.051*	(0.026)
Observations	5526		2029	
R2	0.195		0.200	

Significance levels : $*$ = 10% ; $**$ = 5% ; $***$ = 1%. Standard errors in parenthesis.

TABLE 3 – Effect of U.S. migration. NON-IV estimates (Diff-in-diff 2005-2002)

	Any work		Non-agricultural wage work		Agricultural wage work		Self-employed work		Family farm work	
Participation										
US mig	0.05*		-0.03		-0.00		0.07***		0.05*	
	(1.86)		(-1.36)		(-0.11)		(2.95)		(1.87)	
US mig * 55+ male		0.16**		0.01		-0.01		0.16**		0.01
		(2.16)		(0.18)		(-0.23)		(2.02)		(0.13)
US mig * 55+ fem		0.08		0.04		0.03		0.01		-0.05
		(1.00)		(1.52)		(1.01)		(0.09)		(-0.76)
US mig * 36-54 fem		0.10**		-0.00		-0.00		0.10**		0.07*
		(2.07)		(-0.16)		(-0.30)		(2.34)		(1.92)
US mig * 36-54 male		-0.00		0.03		-0.02		-0.02		-0.06
		(-0.06)		(0.53)		(-0.34)		(-0.23)		(-0.73)
US mig * 15-35 fem		-0.04		-0.10***		0.00		0.05		0.06*
		(-1.02)		(-2.88)		(0.12)		(1.47)		(1.82)
US mig * 15-35 male		0.11*		-0.05		0.01		0.14*		0.25**
		(1.84)		(-0.70)		(0.08)		(1.86)		(2.39)
Hours per week										
US mig	1.58		-1.26		0.25		2.62**		2.38***	
	(1.28)		(-1.32)		(0.37)		(2.32)		(2.90)	
US mig * 55+ male		6.13		0.52		0.40		5.23		2.80
		(1.35)		(0.22)		(0.15)		(1.18)		(0.68)
US mig * 55+ fem		0.77		0.99		1.07		-1.27		1.56
		(0.35)		(1.31)		(1.13)		(-0.63)		(0.92)
US mig * 36-54 fem		4.10**		1.42		-0.35		3.04*		2.78***
		(2.25)		(1.47)		(-0.60)		(1.93)		(3.29)
US mig * 36-54 male		-1.10		-0.19		-0.93		0.04		0.46
		(-0.34)		(-0.06)		(-0.37)		(0.01)		(0.13)
US mig * 15-35 fem		-2.74		-4.16**		0.19		1.26		1.54***
		(-1.54)		(-2.46)		(0.44)		(1.00)		(3.27)
US mig * 15-35 male		6.95*		-3.90		2.12		8.78**		6.28**
		(1.74)		(-1.18)		(0.65)		(2.18)		(2.51)
Observations	5517	5517	5502	5502	5502	5502	5502	5502	4632	4632

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

. Standard errors clustered at the household level

Controls of the regressions are : individual age, sex, educational attainment and marital status, household size and demographic composition,highest level of education in the family, education of the household head , quadratic form of household wealth index, social transfers received, reported household shocks between 2000 and 2005 . Municipal level variables include 2000 municipal median income and distance to closest town, initial levels and changes in the yearly averages of the municipal population, of the male employment rate and of the percentage of high-wage earners. State dummies are included.

TABLE 4 – Effect of U.S. migration . IV estimates (Municipal migration rate as instrument)

	Any work		Non-agri wage work		Agricultural wage work		Self-employed work		Family farm work	
Participation										
US mig	0.11		-0.14		0.06		0.19		0.14	
	(0.95)		(-1.38)		(0.69)		(1.63)		(1.02)	
US mig * 55+ male		0.05		0.03		0.09		-0.07		-0.26
		(0.24)		(0.25)		(0.53)		(-0.26)		(-0.76)
US mig * 55+ fem		0.06		-0.03		-0.05		0.15		-0.18
		(0.30)		(-0.26)		(-0.61)		(0.65)		(-0.75)
US mig * 36-54 fem		0.31**		0.14		0.01		0.17		0.24**
		(2.07)		(1.47)		(0.09)		(1.30)		(2.12)
US mig * 36-54 male		0.12		-0.40		0.10		0.43		0.07
		(0.61)		(-1.54)		(0.40)		(1.25)		(0.19)
US mig * 15-35 fem		-0.03		-0.26*		-0.06		0.29**		0.34**
		(-0.14)		(-1.72)		(-0.91)		(1.96)		(2.48)
US mig * 15-35 male		0.11		-0.48		0.57		0.02		0.02
		(0.29)		(-1.07)		(1.41)		(0.05)		(0.04)
Hours per week										
US mig	3.70		-4.21		3.40		4.65		-0.83	
	(0.65)		(-0.89)		(0.92)		(0.92)		(-0.21)	
US mig * 55+ male		-8.87		6.84		2.86		-18.50		-20.85*
		(-0.74)		(1.02)		(0.41)		(-1.48)		(-1.66)
US mig * 55+ fem		-1.33		0.93		0.51		-2.72		0.85
		(-0.17)		(0.22)		(0.18)		(-0.37)		(0.17)
US mig * 36-54 fem		12.57**		6.90		1.28		4.47		4.38*
		(2.12)		(1.63)		(0.58)		(0.98)		(1.74)
US mig * 36-54 male		12.73		-12.70		7.40		18.19		-0.94
		(0.76)		(-0.90)		(0.56)		(0.96)		(-0.07)
US mig * 15-35 fem		-0.28		-11.11*		-1.15		12.06**		5.06*
		(-0.04)		(-1.66)		(-0.43)		(2.21)		(1.88)
US mig * 15-35 male		4.47		-23.52		23.57		5.06		-13.61
		(0.22)		(-1.09)		(1.26)		(0.27)		(-0.76)
Observations	5517	5517	5502	5502	5502	5502	5502	5502	4632	4632

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Standard errors in parenthesis and clustered at the municipal level

Controls of the regressions are : individual age, sex, educational attainment and marital status, household size and demographic composition,highest level of education in the family, education of the household head , quadratic form of household wealth index, social transfers received, household shocks between 2000 and 2005. Municipal level variables include 2000 municipal median income and distance to closest town, initial levels and changes in the yearly averages of the municipal population, of the male employment rate and of the percentage of high-wage earners. State dummies not included.

TABLE 5 – Heterogeneous effect of U.S. migration depending on initial migrant's occupation. Non-IV estimates

	Self-employed work				Family farm work			
	Participation		Weekly hours		Participation		Weekly hours	
Panel A : sample of households engaged in self-employment								
US mig	0.04		1.71		0.08*		2.43*	
	(1.00)		(0.79)		(1.72)		(1.67)	
US mig* Self-emp. worker mig	0.11*		3.36		-0.01		1.80	
	(1.65)		(1.09)		(-0.14)		(0.77)	
US mig * 55+		0.02		2.57		0.08		-0.49
		(0.22)		(0.48)		(0.58)		(-0.09)
US mig *15-54fem		0.04		0.56		0.10**		3.07***
		(0.88)		(0.28)		(2.23)		(3.03)
US mig *15-54 male		0.05		3.24		0.06		2.56
		(0.60)		(0.67)		(0.53)		(0.76)
US mig*Self-emp. worker mig * 55+		0.14		-3.89		-0.12		-0.08
		(0.94)		(-0.51)		(-0.70)		(-0.01)
US mig*Self-emp. worker mig*15-54 fem		0.04		2.33		-0.05		0.81
		(0.48)		(0.74)		(-0.70)		(0.52)
US mig*Self-emp. worker mig*15-54 male		0.24**		15.67**		0.19		7.38
		(2.05)		(2.09)		(0.98)		(1.02)
Observations	2621	2621	2467	2467	2182	2182	2169	2169
Panel B : sample of households engaged in farming								
US mig	0.06		2.22		-0.04		4.71**	
	(1.26)		(1.03)		(-0.77)		(2.51)	
US mig*Farmer mig	0.10*		3.25		0.19**		-0.59	
	(1.66)		(1.01)		(2.39)		(-0.22)	
US mig *55+		0.12		7.59		-0.13		9.22
		(1.14)		(1.48)		(-0.85)		(1.51)
US mig *15-54 fem		0.06		1.22		0.05		4.52***
		(1.01)		(0.56)		(0.77)		(3.04)
US mig *15-54 male		0.01		0.61		-0.16		2.51
		(0.17)		(0.14)		(-1.31)		(0.60)
US mig*Farmer mig * 55+		-0.02		-9.28		0.26		-8.69
		(-0.10)		(-1.13)		(1.13)		(-0.89)
US mig*Farmer mig *15-54 fem		0.10		3.41		0.12		1.27
		(1.26)		(1.09)		(1.50)		(0.71)
US mig* Farmer mig * 15-54 male		0.20*		17.71***		0.25		-0.18
		(1.90)		(2.67)		(1.12)		(-0.02)
Observations	2162	2162	2047	2047	1810	1810	1798	1798

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE 6 – Effect of U.S. migration on household outcomes - Non-IV estimates

Panel A :Labor supply

	Non-agricultural wage work	Agricultural wage work	Self-employment	Family farm work
Panel A1 : Total non-migrant's labor in local activities				
Number of worker				
U.S. migration	-0.14**	-0.02	0.13**	0.00
	(-2.30)	(-0.43)	(2.12)	(0.00)
Number of weekly hours				
U.S. migration	-6.19**	0.05	3.99	3.90*
	(-2.14)	(0.02)	(1.37)	(1.81)
Panel A2 : Total family labor (migrant + non-migrant) in local activities				
Number of worker				
U.S. migration	-0.49***	-0.17***	-0.09	-0.28***
	(-7.32)	(-3.17)	(-1.37)	(-2.89)
Number of weekly hours				
U.S. migration	-21.09***	-5.78**	-6.50**	-2.61
	(-6.41)	(-2.34)	(-2.12)	(-1.04)
Observations	2070	2070	2070	1289

Panel B :Total labor income (migrant + non-migrant) in local activities

	Monthly wage earnings	Monthly profits	Monthly labor income	Yearly labor income
U.S. migration	-1770.80***	-152.99	-1845.14***	-16488.53***
	(-7.53)	(-0.99)	(-6.75)	(-6.41)
Observations	2026	2046	2016	2025

Panel C :Household unearned income and consumption per month

	Unearned income	Food consumption per capita	Non-Food consumption per capita	Total Consumption per capita
U.S. migration	1925.57***	123.95***	51.46***	233.74***
	(6.06)	(4.19)	(3.00)	(5.32)
Observations	1929	1940	1972	1961

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE 7 – Effect of U.S. migration on household outcomes - IV estimates s

Panel A :Labor supply

	Non-agricultural wage work	Agricultural wage work	Self-employment	Family farm work
Panel A1 : Total non-migrant's labor in local activities				
Number of worker				
U.S. migration	-0.34	0.26	0.42	0.66
	(-1.35)	(1.19)	(1.55)	(1.63)
Number of weekly hours				
U.S. migration	-13.71	10.72	5.73	6.86
	(-1.12)	(1.10)	(0.46)	(0.68)
Panel A2 : Total family labor (migrant + non-migrant) in local activities				
Number of worker				
U.S. migration	-0.56**	0.01	0.18	0.40
	(-1.98)	(0.05)	(0.62)	(0.85)
Number of weekly hours				
U.S. migration	-20.00	3.29	-6.33	-0.81
	(-1.43)	(0.31)	(-0.48)	(-0.07)
Observations	2070	2070	2070	1289

Panel B :Total labor income (migrant + non-migrant) in local activities

	Monthly wage earnings	Monthly profits	Monthly labor income	Yearly labor income
U.S. migration	-4367.23***	602.63	-4619.08***	-39893.63***
	(-4.03)	(0.90)	(-3.76)	(-3.53)
Observations	2026	2046	2016	2025

Panel C :Household unearned income and consumption per month

	Unearned income	Food consumption per capita	Non-Food consumption per capita	Total Consumption per capita
U.S. migration	3942.23***	14.30	127.31*	174.78
	(2.83)	(0.11)	(1.67)	(0.91)
Observations	1929	1940	1972	1961

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE 8 – Evidence of income effect of U.S. migration

Sample of households no engaged in self-employment at baseline (deriving income from wages only)

U.S. migrants'	average	standard error
initial local earnings W_1	1348.45	(116.81)
initial net contribution $W_1 - c_1$	709.19	(124.38)

Regression estimates

	Family Unearned income [a]	intra-household transfer [b]	Upper bound intra transfer [c]
Non-IV estimates			
U.S. migration	2795.96***	2392.33***	1786.25***
	(4.64)	(3.91)	(2.88)
IV estimates			
U.S. migration	7309.02**	7837.96**	6651.48**
	(2.34)	(2.56)	(2.25)
Observations	1094	1095	1104

	Non-migrants' consumption [d]	Non-migrants' total earnings [e]	Non-migrants' working hours
Non-IV estimates			
U.S. migration	642.96***	-1802.61***	-9.45**
	(3.02)	(-3.11)	(-1.97)
IV estimates			
U.S. migration	635.83	-6858.66**	-9.33
	(0.62)	(-2.45)	(-0.42)
Observations	1075	1098	1092

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

[a] : $c_2(2005) - W_2(2005) - (c_1(2002) + c_2(2002) - W_1(2002) - W_2(2002))$

[b] : $c_2(2005) - W_2(2005) - (c_2(2002) - W_2(2002))$ with $c_2(2002) = \frac{n_2}{n_1+n_2} * C(2002)$

[c] : $c_2(2005) - W_2(2005) - (c_1(2002) + c_2(2002) - W_2(2002))$

[d] : $c_2(2005) - c_2(2002)$ with $c_2(2002) = \frac{n_2}{n_1+n_2} * C(2002)$

[e] : $W_2(2005) - W_2(2002)$

Appendix

TABLE 9 – Effect of U.S. migration on health - IV estimates (Municipal migration rate as instrument)

	Bad nutrition		Bad self health		Nb symptom		calderon_depression	
US mig	-0.20*		0.19**		1.83*		6.44**	
	(-1.85)		(2.05)		(1.82)		(2.15)	
US mig * 55+ male		-0.23		0.40		1.32		13.50**
		(-1.00)		(1.56)		(0.76)		(2.15)
US mig * 55+ fem		-0.39		0.16		-0.40		8.05
		(-1.41)		(0.54)		(-0.19)		(1.59)
US mig * 36-54 fem		0.10		0.29**		2.31*		0.56
		(0.82)		(2.13)		(1.86)		(0.14)
US mig * 36-54 male		-0.13		0.16		2.04		5.39
		(-0.57)		(0.88)		(1.03)		(0.83)
US mig * 15-35 fem		-0.28**		0.11		2.29*		9.57**
		(-2.31)		(1.17)		(1.73)		(2.23)
US mig * 15-35 male		-0.63*		0.01		1.59		4.64
		(-1.90)		(0.04)		(0.58)		(0.56)
Observations	4285	4285	4609	4609	4614	4614	3405	3405

t statistics in parentheses

* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

TABLE 10 – Household production

	Non-IV estimates			IV estimates			
	U.S. migration	Mexican migration	Non-mig. absence	U.S. migration	Mexican migration	Non-mig. absence	Obs
Panel A : Annual household sales							
Participation in :							
Crops grown on land	0.05*	-0.02	-0.04	-0.04	-0.02	-0.06	2027
	(0.03)	(0.04)	(0.03)	(0.16)	(0.05)	(0.05)	
Livestock byproducts	0.02	0.01	-0.01	-0.25	-0.04	-0.06	2043
	(0.02)	(0.03)	(0.03)	(0.17)	(0.05)	(0.05)	
Various handicrafts	0.03	-0.01	0.03	0.13	0.01	0.05	2041
	(0.02)	(0.03)	(0.02)	(0.15)	(0.03)	(0.04)	
Micro business sales	0.02	-0.07**	0.05*	-0.19	-0.10***	-0.00	2044
	(0.02)	(0.03)	(0.03)	(0.13)	(0.04)	(0.04)	
Values of the sales :							

Continued on next page...

Continuation of table 10

	Non-IV estimates			IV estimates			
	U.S. migration	Mexican migration	Non-mig. absence	U.S. migration	Mexican migration	Non-mig. absence	Obs
Crops grown on land	667.54	-231.88	359.35	3646.14	309.54	982.59	2027
	(644.20)	(798.54)	(697.12)	(2830.22)	(1337.28)	(741.48)	
Livestock byproducts	-471.07	-220.49	-196.76	-3646.08	-776.08*	-772.72	2043
	(365.51)	(454.45)	(396.40)	(2310.42)	(446.15)	(548.36)	
Various handicrafts	140.18	388.93*	189.29	1067.73	583.49	378.74	2041
	(177.22)	(221.60)	(193.43)	(1287.11)	(475.67)	(343.62)	
Micro business sales	-774.41	-2060.14*	536.44	982.16	-1725.12	856.24	2044
	(947.67)	(1179.81)	(1031.58)	(3433.37)	(1292.18)	(1228.74)	
Panel B : Farm inputs							
Ownership of :							
Draft animals	0.07**	0.03	0.01	-0.06	0.02	-0.02	2049
	(0.03)	(0.04)	(0.03)	(0.16)	(0.05)	(0.05)	
Production animals	0.05	0.07	-0.07	0.76***	0.20***	0.08	2049
	(0.04)	(0.05)	(0.05)	(0.26)	(0.07)	(0.08)	
Seed/soil inputs	-0.01	-0.01	0.01	0.12	0.03	0.03	2049
	(0.04)	(0.04)	(0.04)	(0.19)	(0.05)	(0.06)	
Other Harvest inputs	0.04	0.05	-0.01	-0.01	0.06	-0.02	2049
	(0.03)	(0.04)	(0.03)	(0.20)	(0.05)	(0.07)	
Expenditures on :							
Draft animal 05-02	491.23***	177.11	164.75	-315.48	88.80	22.45	2020
	(120.85)	(150.63)	(130.14)	(612.01)	(153.26)	(187.85)	
Production animals	-114.33	391.41	-336.07	-501.11	342.93	-391.60	1996
	(431.41)	(524.97)	(457.63)	(1731.79)	(632.98)	(532.84)	
Seed/soil related inputs	63.06	92.07	249.69	1973.37	489.01*	664.95*	2021
	(188.12)	(236.74)	(204.40)	(1335.37)	(292.69)	(349.07)	
Other Harvest inputs	197.61	114.36	53.90	519.26	171.01	103.22	2032
	(142.99)	(178.55)	(154.59)	(1023.71)	(231.39)	(317.53)	

Each row corresponds to a regression on a different dependent variable in the entire sample of Mexican households.
Significance levels : Significance levels : $*$ = 10% ; $**$ = 5% ; $***$ = 1%. Standard errors in parenthesis and clustered at the municipal level for IV estima
Controls of the regressions are : household size and demographic composition,highest level of education in the family, education of the household head ,
quadratic form of household wealth index, social transfers received, private transfers, reported household shocks between 2000 and 2005. Municipal level var
changes in the yearly averages of the municipal population, of the male employment rate and of the percentage of high-wage earners. State dummies
not included for IV estimates . State dummies included for NON IV estimates.