Mexico-to-U.S. Migration and the Time Use of Left-Behind Family Members*

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Abstract

Migration for economic opportunity may both benefit and burden left-behind family members. Time-use data from the Mexican Family Life Survey are used to analyze the effect of Mexico-to-U.S. migration of a family's father, adult son, or adult daughter on the activities of left-behind mothers and children. In particular, we examine how migration affects the mother-child and brother-sister distributions of time in market work, agricultural work, home production, caregiving, and leisure, as well as the boy-girl allocation of formal education time. Controlling for unobserved heterogeneity and endogenous migration, we find robust evidence of strong shifts in the allocations of time spent in formal education across similarly aged boy-girl pairs and in housework between mothers and daughters in association with migration. The findings may help policymakers to evaluate the benefit and burden of international migration along the time use dimension that has been relatively understudied.

Key words: Migration, Time Allocation, Children, Education, Mexico

JEL classification: I24, I38, J11, J61, O15

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1 Introduction

Recurrent migration of Mexican workers to the U.S. for economic opportunity is an important and much-studied phenomenon. Hanson (2006) reviews the large literature on the motives and attributes of migrants and the recent U.S-Mexico migration record. Migration's impact on the welfare of Mexican communities and left-behind families has received attention (e.g., see Woodruff and Zenteno, 2007; Garip, 2012; Acosta et al., 2008; Taylor, 1987; and Antman, 2013b), but little research has comprehensively studied how the migration of a family member affects everyday household routines and responsibilities. This aspect of migration is extremely important. At the most general level, the allocation of time use may be no less consequential to individual development and happiness than the allocation of goods. This paper is also motivated by another important reason: Since the perceived substitutability of a left-behind family member for the migrant depends upon the characteristics of both the migrant and the family member, migration's impacts on time use may differ considerably according to sex. These differences in impact may increase sex-based inequality, mitigating policy efforts to promote equality (Pitt and Rosenzweig, 1990).

Migration is predicted to affect time use through several channels. In the near term, migration is a major expense that may necessitate increased paid work by left-behind household members. Ultimately, remittances from a successful migrant expand opportunities for human capital investment and leisure, reducing maternal and child paid labor and increasing children's educational attainment. Time-use preferences of the mother may also dominate when the father is absent due to noncooperative behavior. Mothers are often posited to value education more than fathers, for example. Finally, because the migrant is both a demander and supplier of activities in the household, re-optimization inevitably leads to adjustments by the left-behind in the migrant's absence.

We estimate the re-allocation of activities between household members in the wake of the U.S. migration of a household member using data from the Mexican Family Life Survey (MxFLS). We emphasize the role of sex-based inequities in adjustment patterns. Following Pitt and Rosenzweig (1990), we estimate the shift in activities between left-behind mothers and boys, mothers and girls, and opposite-sex siblings of similar age.

This work makes several new contributions to the literature. This is the first work of which we are aware to examine the allocation of time use across household members in a comprehensive fashion, encompassing hours of time in market work, home production, agricultural work, learning, and leisure for the same households. This work is also unique in the migration literature in focusing on migration's effect on the distribution of time use among family members, rather than estimating each family member's experience in isolation. While Chen (2013) also examines intra-household shifts in responsibilities, her time use data have important limitations, and the activities of each household member are estimated without reference to other members' time use.

Along with Acosta (2011), this paper forms a nascent body of evidence on sex-biased migration effects. Finally, this work makes a broad contribution to the migration literature by demonstrating that the effects of migration often depend importantly on the migrant's former household role.

There are multiple challenges to estimating the impact of migration on time use. The chief issues are the simultaneity of time use across all activities and household members, the endogeneity of the migration choice with the time use of all members across all activities, and unobserved community, family, and individual-level heterogeneity. Migration and household time allocations are endogenous because families that would be more inconvenienced by migration are less inclined to send a migrant.[1] In a reduced-form approach, it is desirable to include a host of explanators that help control such factors (e.g., a detailed household roster). However, if migrant-sending households have systematically less need to make major adjustments in time use in response to migration due to unobserved factors, the naive estimate understates the causal effect of migration on time allocations. It may also be the case that family tastes for certain activities are correlated with migration. Correlated unobserved family preferences for both time-use *allocations* and migration could also contribute to estimation bias (e.g., households in communities where child labor is less stigmatized may also view adult migration as a less attractive option). The directions of such 'taste' biases are unpredictable in general.

Our approach, in light of these problems and with the data limitations we face, is as follows. First, we follow the existing literature in employing migration to explain the dependent variable of interest. In the specific instance of time use, the lack of person-specific prices in actual household data is a serious obstacle to implementing a more structural approach, as Pitt and colleagues discuss at length (Pitt, 1997; Pitt and Rosenzweig, 1990; Pitt and Khandker, 1998; and Pitt et al., 2003). We follow the approach of Pitt and Rosenzweig (1990) in chiefly examining time-use differences across family member pairs. Under specific assumptions, this aids identification of the relevant effects, and controls for community and family-level heterogeneity in activity levels that could bias the migration coefficient. Although our data do not permit implementation of a true fixed-effects approach, we control for potential biases due to heterogeneity in families' taste for pairwise allocations (which is problematic when the heterogeneity is correlated with migration and other variables) by including the relevant lagged time allocation from the pre-migration period. Finally, the prior literature proposes several instrumental variables strategies to address endogenous migration. However, in our data, all of these approaches produced estimates of which we were deeply skeptical. These attempts are also described below.[2]

To preview the findings, we find robust evidence of strong shifts in the allocations of time

[1] This is consistent with large households being more likely to send migrants; they have ample workers on hand to cover the absent member's responsibilities.

[2] Arguably the more similar the individuals being compared, the less likely the estimates are to suffer from endogeneity bias, because the implicit adjustment costs of reallocating time use are low. That is, 'costless' adjustments should not inhibit migration. Specifically for our context, families may perceive time readjustments across children and adults as more costly than readjustments between similarly-aged children.

spent in formal education across similarly aged boy-girl sibling pairs and in housework between mothers and daughters in association with migration. The education findings indicate large shifts favoring girls when an adult son migrates, and large shifts favoring boys when an adult daughter migrates. Supplementary analyses suggest that these shifts are driven by the girl or boy taking on the former responsibilities of their departing elder sister or brother, respectively, crowding out education time. In the case of housework, there is a relative shift of time onto girls, but not boys, that is associated with migration. Findings for other categories (agricultural work, market work, and caregiving) are less significant or less robust, but with some evidence that boys are relatively more affected. There is virtually no evidence of migration effects on the allocation of leisure time.

The paper proceeds as follows. Section 2 briefly overviews the relevant literature. Section 3 discusses the predictions of a standard economic model of household allocation in light of migration choice and discusses how sex biases in reallocations may originate. Section 4 details our estimation strategy. Section 5 describes the construction of the samples and variables. Findings are presented in Section 6. Section 7 concludes with a discussion of the findings and directions for future research.

2 Prior Literature

Interest in the well-being of left-behind family members has motivated detailed studies of migration's impact on women's labor force participation, child labor, health, formal educational attainment, entrepreneurship, and intra-family bargaining power. This discussion focuses on prior studies that examine the effects of migration on the market work, domestic work, and education of left-behind family members.[3]

Chang et al. (2011) use the China Health and Nutrition Survey to examine the impacts of domestic, rural-to-urban migration on left-behind elders' and children's time in market work, agricultural work, and housework. Internal migration increases agricultural work and housework for all left-behind members, with the largest effects on females. Migration status is indicated by the number of household members who are away from home looking for a job, while the prevalence of migrants in the origin community serves as an instrument for migration. Chen (2013) uses the same data to study paternal migration's impact on maternal and child time allocations. Fixed-effect estimates indicate decreased maternal time in both housework and income-generating work, with the housework burden shifted onto children. Acosta (2011) examines households in El Salvador using an IV strategy based on migration networks and local return migration rates. He finds that children in remittance-receiving households spend more time in "unpaid work" at home (unfortunately, Acosta does not provide a definition of unpaid work at home; some authors use unpaid work to refer to production of items for sale outside the household, while others also

[3] For a broad overview of migrations' impacts on the left-behind, see Antman (2013b).

incorporate housework in this term).

Research findings for Pakistan, El Salvador, and some Latin American countries provide evidence of reduced child labor and increased school retention in the wake of migration (Alcaraz et al., 2012). Acosta (2011) finds El Salvadoran girls in remittance-receiving families have better school attendance, although middle-school attendance may be reduced. Overall, Acosta's (2011) evidence suggests that girls reduce paid work and shift into schooling, while boys also reduce paid work but shift into unpaid work at home. Deb and Seck (2009) study the effects of within-Mexico migration on children using the MxFLS, applying distance and rainfall measures as migration instruments.[4] Internal migration increases the probability of a child being in the expected grade-for-age, adversely affects health, and increases housework time. Antman (2011a), using the Mexican National Urban Labor Force Survey finds that left-behind children, especially boys, study less and work for pay more when a father migrates to the U.S. Antman's (2011a) estimation incorporates individual fixed effects and an instrumental variable based on U.S. unemployment rates in immigrant-hiring industries at U.S. destinations.

Taken as a whole, the findings from the literature on the effects of migration on left-behind Mexican children's educational attainment are inconclusive and often differ by the sex of the child affected (Alcaraz et al., 2012). Hanson and Woodruff (2003), instrumenting migration with the interaction between historical state migration patterns and household characteristics, find that 10-15-year old children, particularly daughters of less-educated parents, complete significantly more years of schooling when a household member is in the U.S. Antman (2011b) uses the Mexican Migration Project to estimate a family-fixed-effect model relating sibling differences in years of schooling to children's differential experience of parental U.S. migration prior to age 20. She finds that migration has a positive effect on girls' educational attainment. McKenzie and Rapoport (2011) use the 1997 National Survey of Demographic Dynamics and historical migration rate instruments to estimate migration's impact on educational attainment in rural Mexico. Parental migration reduces the chance that boys and girls complete high school and that boys complete middle school.[5]

Several papers have studied left-behind women's paid work. Hanson (2007) finds lower women's labor force participation rates in higher-migration areas of Mexico. Recent studies for other countries generally concur that left-behind women reduce their time in paid labor in association with migration (see Binzel and Assaad [2011] for Egypt, and Chang et al. [2011] and Mu and Walle [2011] for China). These studies also tend to find increased women's time in unpaid household and agricultural work.

[4] Rainfall instruments are arguably invalid in this context.

[5] Nobles (2011) presents OLS estimates from the MxFLS of a positive association between the absent father's financial contribution (reported ordinally) and educational attainment and college aspirations.

3 Predicted Effects of Migration

A standard model of household production, child investment, and labor market choice generates predictions about how activities are allocated among a household's adults and children. Consider a family consisting of two parents and their children of various sexes and ages. Typical assumptions are that the father has a comparative advantage in market work, that families desire both purchased and home-produced goods, and that parents value child quality, which can be raised through education investment. Educational investment requires the child's time (while financial resources may also be required, this is ignored here to simplify the discussion, and because the opportunity cost of time is usually the primary costly input when schools are publicly subsidized).

Such models generate a hierarchy of assignment to market work within the family. The first member assigned to market work is the father, with perhaps all of his non-leisure time devoted to the market. If the marginal value of additional purchased goods is sufficiently great once his time is exhausted, the mother will devote time to work. The downside of devoting maternal time to market work is that children may need to make up some of the home production that the mother is no longer able to provide, which reduces their learning time. In the worst-case scenario, family financial resources may still be so low that a child has to work in the market. In general, the first child into the market will be the one with the strongest comparative advantage in market work, or alternatively, the weakest comparative advantage in learning (and/or housework).

Family-member migration affects resources available to the left-behind, changes the household roster, alters the net demand for various activities and purchased consumption goods, and changes the degree of control of the left-behind parent. Each of these channels induces alterations in the optimal allocation of activities across family members. Due to varying perceived and actual relative productivities of boys and girls in various activities, biases about the 'suitability' of boys and girls for various activities, and biases in parental preferences, the migration effects may have uneven impacts on boys and girls in the same family.

The left-behind family may experience a net increase in financial resources due to remittances. In this case, mothers are predicted to shift away from market work into housework, which allows children to shift out of market work or housework and into learning. If there is a bias for girls to substitute for mothers in housework, then girls may disproportionately benefit from remittances. However, if the family was so formerly so poor that it had a child worker, this worker was more likely a boy. Therefore, sex-biased effects of remittances on some activities, such as learning, are ambiguous.

It has been asserted that migration is often associated with near-term financial hardship (McKenzie and Rapoport, 2011; Antman, 2011a) because the journey and establishment in the destination labor market may be costly. As a result, shorter- and longer-term impacts of migration may differ.

Mothers may face pressure to earn more in the near term, with consequent increases in children's housework time. In this 'short-term scarcity' scenario, housework time increases at the expense of learning to a greater degree for children who are at a comparative disadvantage in formal education compared with their siblings, as girls may be perceived to be. Older children, especially boys, could also be pushed into the labor market in the short run.[6] In this case, the effect on the relative time spent in learning of boys and girls is ambiguous.

Absence of the migrant household member also affects the time use and purchased goods demands of the household. If the migrant is a net 'taker' of household production, his absence creates a housework windfall. The mother could use this time-resource gain to increase work for pay (if the marginal utility of wealth remains high despite migration) or take more leisure, and children could spend more time in learning. If boys and girls do not share this gain equally, presumably it is because of differences in the comparative advantage in learning versus housework by sex, or because of biases in parental preferences that favor one sex.

In contrast, the migrant may be a net 'giver' of household production. For example, a father or adult son in a rural community may do important agricultural work or chores (carrying water, chopping wood) for the family, or an adult daughter may be a net provider of housekeeping to the family. In these cases, the absence opens up a net gap in some aspect of household production that must be filled by others. If boys and girls are viewed as more substitutable for some activities than others, then the differential impact of migration on left-behind children according to their sex may depend importantly on the sex of the migrant, with boys being relatively disadvantaged in learning when a father or brother migrates, and girls being relatively disadvantaged when an older sister migrates.

If the absence of the household member induces a decline in the overall demand for purchased goods, then this is very similar to the case of increased remittances. Mothers shift away from market work, allowing children to shift out of housework and into learning. If there is a bias for girls to substitute for mothers in housework, then girls disproportionately benefit from the reduced demand for purchased goods. However, if the family was so formerly so poor that it had a child worker, it is likely that this worker was a boy. Again, sex-bias effects on some activities, such as learning, may be ambiguous.

Finally, Chen (2013) extrapolates this model to one in which parents bargain over the allocation of resources under imperfect monitoring by the migrant. When the father migrates, the mother may exploit this situation to assert her preferences over the left-behind household. Typically, it is assumed that mothers value child investment, especially in education, more than fathers

[6] Empirical evidence on dynamics is lacking. The wave 2 U.S. migrant group in the MxFLS is a mix of the newly migrated and cyclical/return migrants. Restricting attention to prime-age adults with children at home likely increases the share of newly migrated in our samples; not only are parents of children younger than the adult population, but adult children may be better migration candidates than parents when there are still young children in the household. Further, families may expect lower, or even no, remittances from sibling migrants compared with a paternal migrant.

(e.g., see Akresh, deWalque and Kazianga, 2012). Therefore, it may be that the mother alters the distribution of time and material resources to promote learning by her children. In this case, whether boys and girls benefit differentially will depend on maternal preferences.

However, an important strand of the household bargaining literature suggests that a mother might use her new position to establish a measure of economic autonomy by working for pay (e.g., Antman [2013a], which also uses the MxFLS, finds working mothers are more involved in household decision-making). In this case, children's learning time could be reduced as a consequence of greater maternal power following migration. If girls are more likely to substitute for maternal work at home, girls may lose learning time relative to boys in this scenario.

4 Estimation Strategy

We analyze the allocation of time in major activities among left-behind mothers and minor children. Very young children and left-behind adult sons and daughters are not analyzed because, respectively, children under age 6 rarely attend school or participate in home production, the dominant activity of adult males remaining in Mexico is work outside the home, and the sample of older left-behind adult daughters is quite small.

We estimate the difference in hours spent in a given activity between two household members, denoted i and j. The difference in their time in hours per week spent on activity y is specified

$$y_i - y_j = \alpha_0 + \alpha_1(a_i - a_j) + \alpha_2(h_i - h_j) + \gamma_3 M + X\beta + \varepsilon. \tag{1}$$

The pairwise time difference is measured subsequent to the opportunity for out-migration to occur (i.e., at wave 2). The second and third terms are person i's comparative advantage in learning and housework activities, respectively, M indicates that a former household member has migrated, and X is a vector of individual, household, and community characteristics.

We use Raven's test scores as ability indicators, a (Raven et al., 1998).[7] If parents perceive that the productivity of additional schooling is increasing (decreasing) in attainment, children with higher attainment will attract more (respectively, less) schooling investment. We employ detailed age-sex categorical variables as proxies for perceived relative housework productivity. We do not have hypothetical market wages for children, so these variables also help to capture their potential value in the market.

M indicates whether a father, adult son, or adult daughter residing in the household in wave 1 has moved to the U.S. from Mexico between the survey waves. X contains additional controls, including household wealth, family composition (indicators of the presence and numbers of fam-

[7] While age-for-grade might also be usefully included, missing values overly constrained the samples.

ily members of various sexes and ages), and rural location, which may indicate both a taste for and differential cost of home-produced goods. Maternal education controls for maternal labor market opportunities, her preferences for educational investment in children, and her taste for purchased versus home-produced goods. Since the key role of maternal preferences justifies the inclusion of maternal education in the child-to-child specifications also, we estimate the same specification for boy-girl and mother-child pairings. The specification always includes a full set of interview-month dummies to control for seasonality in activities.

While differencing activity levels between family members controls for family-member-invariant tastes in time use (e.g., a fastidious household demands more housework from all members), families may also have time-invariant, heterogeneous tastes over time allocations as (e.g., a family systematically allocates more housework to female children than the mother). This is problematic for our estimates if these tastes are correlated with the migration choice. To address this, we use the pre-migration wave of the MxFLS to construct an alternative dependent variable that incorporates the intra-family time allocation observed prior to the migration occurrence, or $(y_i - y_j) - (y_i' - y_j')$, where a prime denotes the initial period. A complication is that the initial migration status of the household is not known. That is, the wave 1 household could already be 'treated' by U.S. migration, unbeknownst to the researcher. In that case, the inclusion of the lagged time use difference already incorporates adjustments in response to migration, leading to an understated estimate of the migration effect. Therefore, the estimates from this specification are likely conservative ones.

5 Sample and Variable Construction

The Mexican Family Life Survey (MxFLS) is a nationally representative, two-wave, longitudinal study of the Mexican population. The base-line survey, conducted during 2002, consisted of over 35,000 individuals originating from 8,440 households in 150 communities (Rubalcava and Teruel, 2006). The second wave, conducted during 2005 and 2006, achieved a 90 percent household re-contact rate (Rubalcava and Teruel, 2008).

5.1 Derivation of the Estimation Subsamples

We began with MxFLS households residing in Mexico during both interview rounds. To restrict attention to families with similar migration choice sets, pairs were drawn from two-parent families in which there was at least one minor child as well as a child who was potentially eligible to migrate to the U.S. as an 'adult.' Children were defined as persons in the household who were not yet 18 years old in wave 2. Our initial assumption was that persons reaching age 13 by wave 2 could migrate to the U.S. in an adult role (i.e., with the aim of paid work). Therefore, households lacking a member of the 6-17-year age group in wave 2 and households lacking a child aged at

least 13 in wave 2 were deleted from the sample. A handful of households where a mother was the U.S. migrant were dropped.

The resultant sample of nearly 2,500 mothers and 5,400 children was rearranged into three estimation subsamples. The mother-boy and mother-girl subsamples consisted of 2,657 and 2,725 pairs, respectively. For the boy-girl subsample, we controlled strong age trends in children's time use by restricting attention to opposite-sex siblings sharing the age categories 6-9, 10-12, and 13-17. There were 813 suitable boy-girl pairs.

5.2 Time Use Variables

The Appendix summarizes time use information in the MxFLS. This information was recoded into the six primary dependent variables investigated – market work, agricultural work, housework, caregiving, formal education, and leisure.

Individuals older than 14 reported the number of hours worked on their primary and secondary jobs in the week preceding the interview. Average weekly employment hours in the past year were reported for 3-14-year-olds. Employment was not analyzed for persons younger than 13, since just 2 percent of this group were employed. The sample was restricted to rural households in this case of agricultural activities, since these activities were unlikely to occur elsewhere.

Total hours spent in housework in the past week was constructed from responses about time spent cooking and preparing food, washing clothes and cleaning house, carrying firewood, and carrying water. Caregiving time combined hours reported taking care of children, elders, or the sick with hours helping another household member study.

Respondents aged 15 and older were asked to report a specific number of hours in school during the last week. Respondents for younger children were asked about the average hours per day and average days per week the child spent at school during the academic year 2004-2005.[8] Time in formal education was constructed as the product of average hours at school per day times average days at school per week plus hours of out-of-school study for those under 15. Those over 14 simply reported hours spent in school and studying out of school in the past week. Leisure activities included entertainment outside the home, playing, watching TV, using the Internet, and reading. Sleep time was excluded from leisure in order to better identify discretionary activities.

5.3 Construction of Explanatory Variables

The wave 2 survey module "Migrants U.S." contained information on wave 1 sample members living in the U.S. at the wave 2 interview date. Wave 1 relationship status determined the migrant's

[8] In the wave 1 survey, average hours were asked for the academic year 2001-2002.

family role. Migration dummies were constructed as any (adult) migrant, father migrant, adult son migrant, adult daughter migrant and male migrant (father or son).

The ability to perform various activities differs by age. Following Kimmel and Connelly (2006), we grouped children into five age cohorts, 0-2, 3-5, 6-9, 10-12 and 13-17. This categorization fit the Mexican children's time-use data well. Children did not enroll in school in meaningful numbers until age 6; thereafter, they typically spent much of the day in school. The presence of 0-2 and 3-5-year olds was predicted to greatly increase a household's net demand for home production. Age and sex indicated how close a substitute a child was for other family members. We employed a full set of sex-and-age-category dummy variables in all analyses.

Cognitive ability was measured with Raven's progressive matrices instrument. The share of correct answers was transformed into a z-score by age and wave. There were a large number of missing wave 2 Raven's test scores, especially for mothers. To conserve observations, we replaced mothers' missing values with wave 1 scores as available.[9] Since the identical test instrument was implemented in both waves, the imputation was likely quite accurate for adults. To preserve sample size, we imputed a z-score of 1 to mothers without reported scores.

Other explanators appeared in all specifications. Household assets are likely correlated with both migration and activities. We followed Kaestner and Malamud (2010) in defining household assets as the total peso value of housing and land, bicycles and motor vehicles, electronic and kitchen appliances, savings and financial assets, farming equipment, and livestock. Dummy variables indicated the sample quintile membership of each household in the asset distribution of sample households. Following Rubalcava and Teruel (2006), we classified communities as rural (less than 2,500 persons), small urban (2,500-100,000), or large urban (100,000). A dummy variable for the presence of extended family was included in all regressions. Finally, maternal education was characterized as ever attending elementary, secondary, high school, or college.

5.4 Descriptive Statistics

Table 1 provides an overview of household members' activities prior to possible family-member migration to the U.S. There are strong patterns of activity specialization by age and sex. Mothers and adult daughters dominate homemaking activities (housework and caregiving), with substantial support from older daughters. While mothers average 29.4 hours per week of housework, fathers average just 3.4 hours. More than 90 percent of mothers engage in housework, while participation of other females strongly increases with age. Girls' housework starts at low levels, reaches 9.7 hours per week at ages 13-17, and climbs further if they remain in the household as an adult. In contrast, males do little housework at any age. Boys' housework peaks at just 4.1 hours

[9] Nearly one-half of mother's sample observations were affected. In 15 percent of missing cases, both the mother and child's score was missing. In another 15 percent, only the child's score was missing. In the remaining 70 percent of cases, the mother's score alone was missing.

per week at ages 13-17 and declines to 3 hours for males remaining in the household after age 17.

Caregiving is also a largely female responsibility. Weekly hours average 21.5 for mothers and 5.3 for both adult daughters and 13-17-year old girls. Corresponding figures for males are just 3.9 hours (fathers), 1.2 hours (adult sons), and 2.4 hours (13-17-year-old boys). Disaggregated information (not reported in the table) indicates that much of the housework and caregiving time of mothers and adult daughters is spent cleaning, washing clothes, preparing food, cooking, caring for other family members, and helping other household members to study. In contrast, fathers' and adult sons' housework mostly consists of carrying water and firewood. These extreme patterns in household production by age and sex supported our decision not to analyze the time use of left-behind fathers and adult sons.

Adult males dominate paid work. 95 percent of fathers and 75 percent of adult sons report employment, with weekly hours averaging 45.4 and 31.8, respectively. About 33 percent of mothers and 46 percent of adult daughters are employed, with average work hours of 11.1 and 18.3, respectively. Sex differences in labor force participation emerge at ages 13-17, with boys' employment hours (13.8) more than double girls'. Males are the dominant breadwinners (male earnings account for 80 percent of family income; not reported in a table). Adult males and older boys are also the main providers of agricultural work.

Nearly all boys and girls are in school at ages 6-12. Hours in education markedly peak at an average of 31 hours per week for both boys and girls at ages 10-12. While hours fall considerably by ages 13-17, average declines are similar for boys and girls.

Leisure time is highest at ages 6-9 (at 30 hours or more for boys and girls) and strictly decreases with age. Girls' leisure time declines in age as housework and caregiving hours grow. Adult females report slightly more leisure time than adult males.

Table 2 provides descriptive statistics for the three estimation samples. Comparing mothers with boys at least 13 years of age, mothers average just 1.7 more hours of market work, but 22 hours more housework, and 11 hours more caregiving. Boys' hours in agricultural work are slightly higher than mothers' (by 1 hour) and boys' leisure exceeds mothers' by 15 hours. Girls exhibit greater similarity to their mothers. Except for market work, the absolute value of the mother-girl difference is less than the corresponding mother-boy difference for all activities. Boys average 3 hours more market work per week, 2 hours more agricultural work, and 1 hour more formal education than their similarly-aged sisters, while boys' and girls' leisure hours are similar. Girls contribute 4 hours more housework and 2 hours more caregiving per week than boys.

Table 2 indicates migration status. Approximately 7 percent of observation-pairs experience any migration. Migration is overwhelmingly by a male, usually an adult son. From 1.5-1.9 percent of observation-pairs experience migration of an adult daughter.

Shares of children in the defined age groups are similar across the two mother-child samples,

and other family structure variables are also stable. Households average 0.1 infant-toddlers, 0.2 3-5-year-olds, 1.5 male adults, and 0.8 adult offspring. The distribution of children is skewed older in the boy-girl sample due to the selection criteria.

While children have significantly higher Raven's test z-scores than their mothers, possibly reflecting intergenerational improvements in cognitive ability, it should be noted that child and adult versions of the test differ. Average maternal education is quite low; half attended elementary school (as the highest grade) and only 25 percent attended secondary school. Only 8 percent of mothers attended high school and just 5 percent attended college.

Asset distributions in the subsamples are roughly representative of the population. Selection on having more children (as in the boy-girl subsample) skews the distribution somewhat poorer. From 47-51 percent of sample observation-pairs are located in rural areas and from 29-31 percent are in large urban areas. There are no important differences in characteristics across the three estimation samples other than those arising from the selection criteria.

6 Findings

The basic findings on hours spent on various activities are presented in tables 3-8. Three estimates are presented for each migration coefficient. The first applies OLS to equation (1) (denoted FD) and the last applies OLS to the baseline-adjusted dependent variables (denoted DFD). The middle estimate is the FD estimate applied to the restricted sample required by the DFD estimate (note that this restriction makes the sample children older, since a lagged activity difference must be available). Errors are always clustered at the household level.

In each of tables 3-8, the first row contains the estimated coefficients and standard deviations from a specification with *Any migrant* as the only right-hand-side migration variable. The second row reports the coefficient on *Male migrant* for a specification with *Male migrant* and *Adult daughter migrant* as the migration variables. The last three rows list estimates for a specification with *Father migrant*, *Adult son migrant*, and *Adult daughter migrant* as the migration variables.

Before proceeding to the main findings, we briefly discuss the estimated effects of other explanators.[10] With the exception of market work estimates, the child's own age is the most important driver of mother-boy time allocations. Boys' burden of housework, caregiving, and agricultural work relative to mothers increases with age, while relative leisure decreases with age. Family structure is also important. The presence of children under 6 and of at least one female sibling (younger or older), increases mothers' caregiving relative to boys'. The presence of male siblings increases the leisure of boys relative to mothers, consistent with a fixed amount of non-leisure activities being spread over more boys. More educated mothers take on more paid and agricul-

[10] A complete set of FD coefficient estimates is provided in the Electronic Appendix.

tural work relative to their sons. Boys from asset-poorer families do more housework and take less leisure relative to their mothers. In rural areas, relatively more paid work is allocated to boys than mothers.

Findings for non-migration variables are qualitatively similar in mother-boy and mother-girl specifications, with the following exceptions. While cognitive ability does not affect mother-boy allocations, girls with higher Raven's test scores are allocated less housework and caregiving relative to their mothers. Also in contrast to mother-boy estimates, the presence of male or female siblings of any age at home does not markedly change mother-girl activity allocations of any type.

Boy-girl activity differences sharpen with age, as expected, with boys increasingly shifting into market work and girls increasingly into housework. Boys with higher Raven's test scores do less agricultural work than their similar-age sisters. Girls' leisure decreases relative to boys' in the presence of a very young sibling, while boys' leisure benefits from the presence of both male and female siblings. The presence of male siblings reduces boys' agricultural work relative to girls, while the presence of female siblings increases boys' relative leisure. In contrast, girls benefit somewhat, but less than boys, from the presence of a female sibling, through relative reductions in housework. Boys with more educated mothers enjoy increased leisure over their their similar-age sisters.

6.1 Market and Agricultural Work Allocations

Estimated effects of migration on the allocation of market and agricultural work to left-behind family members are presented in Tables 3 and 4. The FD coefficient estimates indicate large shifts of market work hours from boys to mothers when there is a migrant. However, DFD findings for mothers and boys are all estimated to be insignificant. Although some individual point estimates are large in absolute magnitude, none of the estimates of migration's effect on mother-girl and boy-girl allocations of market work differ significantly from zero at standard confidence levels.

In the case of agricultural work (Table 4), the FD and DFD coefficient estimates indicate shifts from boys to mothers in agricultural work when a male household member or an adult daughter migrates, although these are only significant at the 90% level. A (marginally) positive shift in agricultural work time from girls to mothers is not robust to controlling for the pre-migration allocation. All boy-girl estimates are insignificant.

6.2 Housework and Caregiving Allocations

Estimated effects of migration on the allocation of housework and caregiving to left-behind family members are presented in Tables 5 and 6, respectively. FD estimates indicate a shift of 3.5 hours of housework from mothers to girls corresponding to any migration, with a marginally

significant shift of over 5 hours to girls from mothers when the migrant is an adult daughter. FD estimates also indicate a shift in housework hours from girls to boys, apparently due to the migration of an adult son.

Table 6 presents caregiving findings. The DFD estimate is of a large shift of over 11 hours from mothers to boys when a father migrates. In the case of mothers and girls, the FD estimate is of a caregiving shift to girls when an adult son migrates. There is some evidence of a caregiving shift from girls to mothers when an adult son migrates, but this estimate is not robust with respect to controlling for the pre-migration allocation. In boy-girl comparisons, the DFD estimate is of a (marginally significant) shift in caregiving from boys to girls of more than 4 hours per week when an adult son migrates.

6.3 Allocations of Time in Formal Education

Very large shifts in formal education time between similarly-aged, opposite-sex siblings are estimated with both the FD and DFD approaches (Table 7). The first three columns present findings for the base sample. Whether the girl or boy in a similarly-aged pair is relatively advantaged by migration depends crucially on the migrant's identity. When an adult son is the migrant, the DFD estimate indicates a gain of nearly 19 hours per week in formal education time for girls over their brothers. In contrast, when an adult daughter migrates, boys gain 24 hours of formal education time over girls.

Such large hours estimates are consistent with school-leaving behavior, so we present some supplemental estimates that aid further understanding of the origins of the hours effects. First, it is unlikely, given the sample statistics suggesting high average enrollments and hours, that younger children are driving the findings. The last three columns in Table 7 confirm this by presenting the findings for sibling pairs in the 13-17-year age group only. Because of prior sample restrictions, the sample change little when a lagged time allocation is required (i.e., DFD). In the case of the FD specification sample, the significant findings are driven by the oldest group of children. Since this older group has the option to leave school, the findings are compatible with school-leaving behavior.

To further explore what is driving the education findings, we present some supplementary level estimates of formal education hours. In the case of education, it turns out that the level estimates are similar to the sibling difference estimates; that is, the differences in the two level estimates of migration in table 8 are generally similar in magnitude to the estimates of the net effect presented in table 7. This suggests that family heterogeneity in education (at least, conditional on having a boy and a girl in the same age group) is not systematically correlated with the migration variables. The first estimate presented for both boys and girls is the impact of migration on weekly hours. The average decline in boys' hours when an adult son departs is marginally negative and

slightly less than a one-third reduction in average hours, while the departure of an older sister is associated with an increase in hours of almost 60% above the average. For girls, the change in average hours when an older brother departs amounts to a nearly 50% increase. While the decline in girls' hours when an older sister departs is not estimated to differ significantly from zero, it is large in magnitude, at over 40% of average hours.

The main purpose of presenting level estimates is to provide school participation effects. The next three columns explore the impact of migration on the probability of reporting either no or very low school attendance. The share of boys reporting spending positive hours on formal learning increases by nearly one-third when their older sister departs. When their older brother departs, the incidence of boys reporting very low but nonzero enrollment hours falls by more than 20 percentage-points. For girls, the pattern of impacts on attendance is somewhat different. The departure of an older brother reduces the share of girls who report spending more than 10 hours per week on education by more than one-third. Similarly, the greatest impact of an older sister departing (a decline of over 40 percentage points) is on the likelihood of reporting low but positive education hours. While estimated impacts on enrollment at more than 5 hours per week are fairly large in absolute magnitude, they are imprecisely estimated for girls. These findings can be explained by a combination of factors. First, it is possible that girls are more likely to continue to maintain a marginal connection to formal education than boys, rather than definitively dropping out. This would explain why the major findings for girls occur at the 10-hour-per week cutoff. Second, the formal learning variable is constructed differently for children above age 14. For those above, learning is "hours last week;" for younger children, average hours refer to the prior school year. Therefore, if younger children are observed in the process of dropping out over a longer period, the effects of migration also reflect the age composition of those 'treated' by migration. Due to small sample sizes and low incidence of migration, it's not possible to meaningfully explore this issue further.

6.4 Leisure Allocations

Effects on the allocation of leisure to left-behind family members are presented in Table 9. With a single exception (a DFD estimate that mothers gain leisure over boys when the father migrates), the estimated effects of migration do not differ significantly from zero. Many coefficients are also quite small in absolute magnitude.

6.5 Robustness of the Findings[11]

We conducted robustness checks on the sensitivities of all the findings to the exact sample and variable specifications, including adjusting for differences in the age compositions of the three

[11] A complete set of robustness findings are available upon request.

subsamples and altering our assumption about the minimum age of potential adult migrants. We were also concerned about correctly capturing the alternatives facing rural families.

6.5.1 Increasing the Similarity of the Three Samples' Membership

We have presented estimates for families containing at least one minor child and at least one child older than age 12 in wave 2 in the paper. These families contain a diversity of children's age-sex compositions. To make the three samples more similar, we further restricted attention to families containing both a boy and girl in the 13-17-year-old age category. With this modification, all pairs examined also faced the same activity choice set (i.e., including market work). This restriction substantially reduced mother-child sample sizes-by 70 to 85 percent, depending on activity-while the boy-girl subsamples were reduced by as much as one-third.

With this age restriction, all mother-girl estimates of the effect of migration were estimated to be insignificant, with the exception that migration of an adult daughter marginally increased the agricultural work of girls according to the FD estimate (the DFD estimate of this effect was similar in magnitude but imprecise). This overall pattern of findings is not surprising. As evidenced by the descriptive statistics, older girls engage in a pattern of activities very similar to their mothers. Thus, there is little scope for further adjustment of mother-girl responsibilities in the wake of migration. There were some positive mother-boy shifts for the FD specification of market work in the cases of adult son and adult daughter migration, but DFD estimates were insignificant, as before. For boy-girl comparisons, market work, housework, caregiving, education and leisure findings were quite similar to those for the unrestricted sample, but the FD and DFD estimates indicated a (marginal) shift in agricultural work from boys to girls in response to the migration of an adult daughter.

6.5.2 Increasing the Minimum Age of Adult Migration

To ensure that the migrant family member was engaged in activities expected of an adult and that the goals of migrating fathers and adult children were fairly similar (i.e., to work in the U.S.), we raised the minimum age of sons and daughters considered as candidates for migration from 13 to 18 (in wave 2),[12] in an attempt to eliminate children who simply accompanied an adult to the U.S. from being classified as migrants. This change decreased the incidence of sibling migration by 20 percent in the sample of all families with both a minor child and a child at least age 13. Sample size was reduced by about one-half from the base specifications for each subsample.

Several FD and DFD estimates changed considerably with this heightened age restriction. Overall, there was evidence of more potentially adverse effects of migration of adult daughters

[12] These estimates are available in the Electronic Appendix.

on girls. Specifically, when an adult daughter migrated, market work shifted to girls from mothers and agricultural work shifted to girls from boys. Findings on leisure also differed. When the father migrated, boys gained leisure over both their mothers and sisters according to the FD estimates. The DFD estimates indicated that mothers gained leisure from both boys and girls when an adult daughter migrated.

There were also some notable differences in the case of formal education time. The adverse effect of adult daughter migration on girls' education was 40 percent as large in absolute magnitude and was insignificant in both FD and DFD specifications, while the favorable effect of adult son migration on girls' relative education persisted. Differences in the findings according to the classification of 'adult' migrant may arise for various reasons. For example, the older the migrant, the more likely they may be to remit resources from the U.S., which would explain how younger sisters are able to remain in school.

6.5.3 Families in Rural Areas

We re-estimated all specifications for rural households, roughly halving the three analysis subsamples. Mother-boy findings were similar to those estimated from the entire sample across all choices. Findings for mother-girl allocations were similar to prior findings, except for market work. FD estimates indicated shifts in market work to girls from mothers due to any migration. In boy-girl comparisons, FD estimates indicated a shift in market work to boys when the father migrated and to girls when the adult daughter migrated. These latter findings are consistent with market work being systematically re-allocated to boys and girls according to the sex of the migrating family member.

In the case of education, potentially adverse effects of migration on girls were more pronounced in rural families. The estimated adverse effect of an adult daughter's migration on girls' relative time in education was 50 percent larger in absolute magnitude in the rural subsample. In contrast, the adverse effect of an adult son's migration on boys was little altered by this sample restriction.

6.6 IV Strategies

In theory, migration and time use are endogenously determined. As a remedy, we attempted to implement many of the standard approaches in the literature, using arguably exogenous variables as migration instruments. The variables were constructed using the community level information of MxFLS, geographic information provided by other authors, and results from other work. The variables exploited included historical factors, community culture, distance, and natural and economic shocks. However, we were not satisfied that any of the typical IV estimators used in the

literature solved the endogeneity problems for our sample. Here, we briefly describe the IV strategies that were pursued.

It is a historical fact that certain areas of Mexico became advantaged in migration earlier than others, and prior work found that contemporary patterns of migration still strongly mimic these earlier patterns. The use of historical migration strategies is widespread in the literature (see the large number of studies employing historical migration rate strategies cited in McKenzie and Rapoport [2011]). We followed McKenzie and Rapoport (2007), Woodruff and Zenteno (2007), McKenzie and Rapoport (2011) and Hildebrandt et al. (2005) in using a historical 1950s migration rate for the household's state of residence as an instrument for migration. In boy-girl samples, first stage F-statistics were never strong enough to merit proceeding to implement the IV. In general, migration is relatively rare and more idiosyncratic for families with children, and that is an issue with all of our analysis samples. While first-stage F-statistics indicated a reasonably strong correlation between the historical and current migration patterns for mother-child samples, the resultant IV estimates were typically very large and imprecisely estimated.[13] Other studies interact migration rates with household characteristics (e.g., Hanson and Woodruff, 2003). However, the first stage of the characteristic-interacted IVs is likely weak and proved so in our data.

We followed the similarly motivated strategy of Woodruff and Zenteno (2007), which used the distances from the capital of the household's state of residence to the nearest railroad station in place by the turn of the 20th century. In this case, we often found that the distances, when significant in the first-stage specifications, had signs contrary to that expected if the instrument shifted migration as hypothesized, with closer locations to railroads indicating a lower cost to migration. These first-stage findings cast doubt on the validity of this strategy.

In order to exploit an exogenous variable that influences cotemporary migration shocks without affecting other outcomes in Mexico, we also followed the approach in Munshi (2003) and Antman (2011a), matching the most popular destinations in the U.S. with the a migrant's state of residence in Mexico. Research indicates that Mexican immigrants establish a tight spatial concentration within a limited number of destination zones in the U.S. (Munshi, 2003), suggesting that economic conditions in the destination areas (unemployment rates and hourly wages for popular industries for migrants – chiefly construction and service) might be determinants of U.S. migration that are orthogonal to conditions in the sending community. Unfortunately, in our samples the correlations between destination economic conditions and migration patterns were weak.

We also used community-level information on out-migration computed within-sample as well as contact of local residents with migration clubs as migration instruments. These variables are valid IVs when the aggregated migration pattern in a community does not influence household outcomes other than migration. This method is widely used in the prior literature (e.g., Chang

[13] It is possible that the exogeneity assumption of historical migration rates does not hold when examining the impact of contemporary migration in receiving areas (McKenzie and Sasin, 2007).

et al, 2011). Unfortunately, in none of our samples were these variables significant predictors of migration, leading again to indefensibly weak first stages.

Finally, some other work, including Munshi (2003), Deb and Seck (2009) and Yang (2008) has applied natural and economic shocks as migration instruments. In a similar vein, it is possible to create between-wave crop and unemployment shock variables in the MxFLS. However, it is extremely unlikely that such shocks do not also independently influence allocations of time to activities, including market work, by household members, and therefore such variables fail the validity standard for an IV.

In summary, migration proved too idiosyncratic to be reliably predicted in our samples of households with children. This often led to insupportably weak first stage estimates across a wide variety of IV approaches (We note that many of the studies cited did not report first-stage F-statistics).

Other approaches, which may have been more promising in the first stage, were clearly invalid in the context of our study.

7 Conclusion

We estimated the impact of family-member migration on the time use of left-behind household members with approaches that controlled for family heterogeneity in the level as well as allocation of time use.

Our strongest findings, in terms of significance and robustness, were for the allocations of housework time between mothers and daughters and formal education time between boys and girls. Housework time tended to shift from mothers to girls in the presence of any migrant, with some weak evidence that girls were stepping into the housework chores of an older sister. There was some evidence that housework shifted relatively onto boys from girls when a male migrated, which is also plausible, given some of the strongly 'male' chores embedded in the housework variable. Boys were greatly advantaged in education time when an older sister was the migrant and girls were strongly advantaged in education time when an older brother was the migrant. In addition, there was some evidence that market work and agricultural work shifted from boys to mothers when a male migrated. There was very little evidence that migration affected the allocation of leisure time.

7.1 Discussion

Comparisons of similarly-aged, opposite-sex siblings provide the most direct evidence on whether time allocations are sex-biased. There is weak evidence of inequities in caregiving (girls

take on more caregiving than boys when an adult son migrates) and also that housework is shifted relatively less onto girls than boys when an adult son migrates. With the exception of caregiving and education time, DFD estimates of migration did not differ significantly from zero for most boy-girl activity allocations. Strong migration effects on education vary with both the sex of the child and the identity of the migrant and are robust to controlling for the pre-migration time allocation of education.[14] Supplemental findings support the interpretation that boys and girls leave school to take over the household role of their departing older brother or sister, respectively.

Comparing findings across mother-boy and mother-girl pairings also provides evidence of sex-based inequities. FD estimates indicate that market work is shifted from boys to mothers but not from girls to mothers. The likely result is to make the market work allocations of boys and girls within the household more equitable, since the sample statistics indicate boys work more in the marketplace than girls to begin with. In the case of housework, there is evidence of shifts of housework duties from mothers to girls when an adult daughter migrates. We note that some of the strongest findings for mother-boys are in the traditionally 'male' activities market work and agricultural work, while the strongest findings for mother-girls are for housework.

Differences in the pattern of effects according to the identity of the migrant and sex of the child could also be interpreted as evidence of sex bias in the perceived substitutability of family members for the migrant. Nearly every significant effect on mother-boy allocations is associated with the migration of a male from the household, while in the case of girls, mother-girl effects are driven by both male and female migration. This is consistent with the reallocation of duties across mothers and boys representing a more internally "costly" change for the household than mother-girl reallocations. Therefore, significant mother-boy reallocations are only made in response to situations in which traditionally "male work" has been affected.

Finally, we note that a basic theory of household production with migration predicts that when migration increases family income, housework shifts to mothers from children. To the contrary, we find that mothers pass housework on to children, especially girls, as a result of migration. A possible explanation is that migration episodes entail a period of scarcity, so that our migration variable is not highly correlated with remittance receipt. Chen (2013) also finds that changes in maternal-child time in housework in the wake of paternal migration with remittances do not comport with theoretical predictions, even with the addition of husband-wife bargaining to the model. Since we lack remittance data, the only conclusion at this time is that our findings are similar to Chen's (2013).

[14]Examination of mother-child estimates for the other time-use variables suggests caution in making conclusions about education; in most cases the FD and DFD estimates were usually not similar to either IV estimate. Arguably, however, estimates based on comparisons across similarly-aged siblings may suffer less endogeneity bias than estimates based on mother-child comparisons. E.g., families may perceive time readjustments across children and adults as more costly than time readjustments between similarly-aged children.

7.2 Comparisons with the Prior Literature on Mexico

Prior work on migration and time use has estimated its impact on time *levels*, whereas we have focused largely on time *differences* among household members. Nonetheless, our findings shed further light on prior contributions. Given the differences in cultural norms, family sizes, resources, and other factors across countries, we focus the discussion on prior work on Mexico.

Prior evidence on the education effects of Mexico-to-U.S. migration is mixed. In principle, our evidence could be consistent with Deb and Seck (2009)'s finding of an overall improvement in education by both sexes, as measured by age-for-grade, because we estimate the relative distribution of education time between boys and girls. That is, education time may increase for both siblings, but more for one than the other. However, the supplementary analysis shows that school drop-out plays a key role in the findings, contradicting this scenario. Antman (2011b) finds a positive effect of parental migration to the U.S. on attainment while Hanson and Woodruff (2003) find a positive effect of any household migrant in the U.S. In contrast, our education findings differ with both the sex of the child and the sex and family role of the migrant.

Our education findings are, however, entirely consistent with findings of Hanson and Woodruff (2003) and Antman (2011b) that gains in children's school enrollment as a consequence of 'any migration' are largely restricted to girls. Since the migration variables used in these other studies entirely or largely exclude female migrants, these analyses may have missed the possible (relative) benefits to boys (equivalently, that girls may be harmed) that we found in the case of adult daughter migration.

Deb and Seck (2009), also using the MxFLS, find evidence that Mexico-U.S. migration increases children's – especially girls' – housework load relative to mothers.' Deb and Seck's (2009) 'housework' measure also incorporates agricultural chores. Our findings on housework are consistent with Deb and Seck (2009), although we find weak evidence of mothers taking on more agricultural work from both boys and girls. While Antman (2011a) finds that boys work for pay more when a father migrates to the U.S., we find no evidence of reallocations of paid work between boys and mothers, or between similarly-aged, opposite-sex siblings, in response to any type of migration. Indeed, our strongest evidence on this point is of mothers' market work allocations increasing relative to boys. This finding also contrasts with Hanson (2007)'s evidence of lower female labor force participation rates in higher-migration areas of Mexico.

7.3 Directions for Further Research

The findings underline the need for future research that carefully delineates migration according to the family role of the migrant. Many societies still hew to sex-based divisions of labor. Sex is associated with both changes in net demands for activities in the wake of the departure

of the migrating member, as well as the perceived suitability of a left-behind household member to meet these changes. As Pitt and Rosenzweig (1990) note, in the presence of such differentials in treatment and expectations, all kinds of shocks families confront can influence human capital investment, broadly considered, in ways that may substantially exacerbate sex-based inequality over time.

Two major themes related to this work would benefit from additional research effort. There are now many studies on the net effect of a migration episode on left-behind family member outcomes that indicate well-being. A richer, more specific understanding of the mechanisms underlying these findings-e.g., remittances, bargaining power, and household re-optimization-is lacking. Second, there is emerging evidence of substantial feedback among a person's entire set of skills and experiences (e.g., Behrman, et al., 2008; Cunha and Heckman, 2008), underlining the need to learn more about how family time use relates to both the cognitive and non-cognitive skills instilled in children.[15]

[15]There are few studies of children's time allocation in response to events other than migration. Vuri (2010) finds that improved school access reduces children's time in both housework and paid work in Ghana. Attanasio et al. (2010) find a conditional cash transfer program in Colombia increased children's time in school, decreased time in housework, and had little impact on time in paid work.

Appendix 1. Theoretical Model

Consider a simple model of time allocation. A household is defined as a collection of related children and adults sharing living quarters. Each household member is endowed with total time T. For simplicity, assume children have two possible activities, housework (denoted m) and schoolwork. A child's housework output is $G_i = h_i m_i$ with productivity parameter h. The level of educational attainment generated by time investments is $S_i = a_i(T - m_i)$, where a is the productivity parameter. The family selects either one or no members to send to the U.S. Relocation of the entire family is not analyzed.

There are three types of adults. Mothers engage in housework and market work, producing $G_M = h_M m_M$ at home and earning $Y_M = w_M(T - m_M)$ in the local labor market at wage w_M. Mothers are assumed to face a zero wage in the U.S. (maternal migration is never optimal). The second type of adult, fathers/brothers, works for pay in Mexico or the U.S. and never engages in housework in Mexico. A father/brother's earnings are $Y_D = T w_D$ in Mexico and $Y_D = T\tilde{w}_D$ in the U.S. Adult sisters engage in market work in either Mexico or the U.S. Unlike fathers/brothers, sisters may also provide housework in Mexico. Adult sisters' earnings are $Y_S = w_S(T - m_S)$ in Mexico and $Y_S = \tilde{w}_S(T - m_S)$ in the U.S. If a sister stays in Mexico, her home production is $G_S = h_S m_S$.

A composite parental decision maker with unitary preferences and passive children maximizes utility by allocating consumption, home production, and educational attainment to family members. That is, $U(\vec{C}, \vec{G}, \vec{S})$ is maximized by purchasing a consumption good (C), producing a household good (G), and investing time in minor children to attain achievement level (S). The household utility function depends on the total amounts of the purchased consumption good and home production, but the family may care about the distribution of school attainment. Under these assumptions, utility is specified $U(C, G, \vec{S})$.

Consider a household consisting of two children, a mother, and a father. The father is the only potential migrant. Denote the children by the subscripts 1 and 2, the mother by the subscript M and the father by the subscript D and normalize the price of the purchased good to 1. The variable $t_M (= T - m_M)$ indicates maternal labor market hours. It follows from the assumptions that the father's time, whether in Mexico or the U.S., is always exhausted on labor. $M = 1$ indicates that the father has migrated (otherwise $M = 0$). Substituting for C, G, S_1 and S_2 in the utility function, the household chooses M, m_1, m_2 and m_M to maximize

$$U\left(w_M(T - m_M) + MT\tilde{w}_D + (1 - M)Tw_D, h_1 m_1 + h_2 m_2 + m_M h_M, a_1(T - m_1), a_2(T - m_2)\right)$$

The first order conditions of this problem with respect to m_i indicate optimal tradeoffs between children's time allocations. The optimal allocation is governed by child 1's comparative advantage in schoolwork, moderated by parental preferences over the equality of schooling outcomes. If child 1 has a comparative advantage in school, parents allocate more time to child 1's school-

ing and assign more housework to child 2. Parents' willingness to make productivity tradeoffs between children may be tempered by a concern for equitable educational attainments.

The first-order condition with respect to m_M indicates that mothers work more in the labor market as families have a greater taste for purchased consumption, ceteris paribus, and that mothers work more if they are relatively more productive in the labor market than at home, cet. par. Combining the first order conditions with respect to m_i and m_M yields an expression indicating the extent to which each child's housework substitutes for its mother's, for the purpose of freeing maternal time for market work. The desirability of trading off child-mother time in this way depends on the marginal rate of substitution between a child's schooling and purchased goods, as well as on the relative productivities of child and mother in their respective domains – housework and schooling for the former; housework and market work for the latter.

Because the father/brother allocates all his time to the labor market, there are no optimizing tradeoffs between paternal and other family members' time.

A Meaningful Role for Migration

Migration is an opportunity to increase family income. When migration is costless, sending a migrant is optimal if the wage abroad is higher than at home. We make the migration choice non-trivial by incorporating more realistic assumptions about migration's effects on household production and utility.

Suppose that father/adult son's presence at home increases the housework burden. Concretely, $M = 1$ increases the marginal utility of G as follows (where $\delta > 1$):

$$\begin{aligned} U\left(w_M(T-m_M)+M\tilde{w}_D T+(1-M)w_D T,(1-M)(h_1m_1+h_2m_2+m_Mh_M)\right. \\ \left.+\delta M(h_1m_1+h_2m_2+m_Mh_M),a_1(T-m_1),a_2(T-m_2)\right). \end{aligned}$$

That is, the same utility level in the absence of migration can be obtained at a lower level of housework with migration. We can also include M as an argument in the utility function, allowing the absence of the migrant to directly affect household well-being, or $U(C,G,\tilde{S},M)$.

For intuition's sake, consider the case where M is continuous (i.e., a propensity to migrate). The first-order condition for optimal migration is

$$\frac{\partial U}{\partial C}T(\tilde{w}_D-w_D)+\frac{\partial U}{\partial G}(\delta-1)(h_1m_1+h_2m_2+m_Mh_M)+\frac{\partial U}{\partial M}=0.$$

This equation indicates that migration's benefits arise from increased income that can be applied to purchase goods and from a reduced housework burden, while the cost of migration is decreased happiness due to the father's absence.

Solution when an Adult Sister is the Potential Migrant

Adult sisters, unlike fathers and adult brothers, can provide housework if they remain in Mexico. Consider the case where a father is present in the household, but his low prospective U.S. earnings make the adult daughter the better migration candidate. The problem is to choose M (where $M = 1$ now represents migration of the adult daughter), and, conditional on M, m_M, m_S, m_1, and m_2 to maximize

$$U\left(w_M(T-m_M)+M\tilde{w}_S T+w_D T+(1-M)w_S(T-m_S),\right.$$
$$\left.h_1 m_1+h_2 m_2+m_M h_M+(1-M)h_S m_S, a_1(T-m_1), a_2(T-m_2), M\right).$$

The motivation for migration of adult daughters in the context of household production is readily demonstrated under the simplifying assumption that M is continuous. The first order condition for adult daughter migration is

$$\frac{\partial U}{\partial C}(\tilde{w}_S T-w_S t_S)-\frac{\partial U}{\partial G}h_S m_S+\frac{\partial U}{\partial M}=0.$$

The benefit is an income gain, and the costs are the loss of the adult daughter's housework contribution and the disutility of her absence. If she does not migrate, her role in the model is identical to her mother's, and the tradeoffs governing her allocations are the same as those discussed above. She contributes more housework to the extent that her younger siblings are relatively more talented at school than housework, to the extent that she is relatively more productive at home than in the market, and to the extent that the family prefers home-produced to purchased goods.

Appendix 2. Explanation of Time-Use Variables

Variable		Age universe
Housework	During the last week (Mon-Sun), how many hours did the child/you	
a.	Do domestic housework e.g. sweeping, washing dishes, dusting, washing clothes, etc.	3 to 14
b.	Cook/prepare food	15 and above
c.	Wash clothes and/or clean your house	15 and above
d.	Carry firewood	3 and above
e.	Carry water	3 and above
Home care	During the last week, (how many hours) did the child/you	
a.	Take care of elderly or sick people, and/or children	3 and above
b.	Help a household member with studies or homework	5 and above
Leisure	During the last week, (how many hours) did the child/you	
a.	Participate in a sport, cultural, or entertainment activities out of the household	3 and above
b.	Watch TV	3 and above
c.	Play inside or outside the house	3 to 14
d.	Read	5 and above
e.	Use internet	5 and above
Agricultural work	During the last week, (how many hours) did the child/you …	
a.	Participate in any agricultural activities like weeding, cleaning, sowing, shucking, or taking care of animals.	3 and above
Employment		
a.	During the past 12 months, on average, how many hours did the child work from Monday to Friday?	4-14
b.	During the past 12 months, on average, how many hours did the child work on weekends?	4-14
c.	What was the total number of hours that you worked in the main and secondary jobs in the past week?	15 and above
d.	Normally, how many hours do you work in the main and secondary jobs per week?	15 and above
Formal education		
a.	How many hours a day does/did the child spend in school during the current academic year?	5-14
b.	How many days a week does/did the child spend in school during the current academic year?	5-14
c.	How many hours a week does/did the child spend studying and doing homework somewhere other than school during the current academic year (including labor days and weekends)?	5-14
d.	Last week, from Monday through Sunday, how many hours did you study in school or elsewhere?	15 and above

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Table 1: Participation and Time in Activities by Family Member Role

	Father			Mother			Adult son			Adult daughter		
	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs
Any activity												
Housework	0.348	0.476	2,440	0.918[a]	0.275	2,446	0.364	0.482	637	0.736[a]	0.441	530
Caregiving	0.386	0.487	1,951	0.749[a]	0.434	2,272	0.200	0.400	485	0.437[a]	0.497	439
Market work	0.947	0.225	1,947	0.328[a]	0.470	2,272	0.754	0.431	484	0.459[a]	0.499	440
Agricultural work	0.274	0.446	931	0.101[a]	0.302	1,059	0.184	0.389	228	0.079[a]	0.271	189
Formal education	0.009	0.094	1,777	0.012	0.108	2,022	0.280	0.449	479	0.333[c]	0.472	438
Leisure	0.870	0.337	1,951	0.886[c]	0.317	2,272	0.953	0.213	485	0.950	0.218	439
Hours of activity												
Housework	3.37	7.14	1,951	29.40[a]	15.71	2,272	3.05	5.93	485	11.37[a]	11.69	439
Caregiving	3.92	9.42	1,951	21.47[a]	24.59	2,272	1.20	4.33	485	5.31[a]	11.55	439
Market work	45.38	21.11	1,951	11.12[a]	19.61	2,272	31.78	23.84	485	18.32[a]	23.38	440
Agricultural work	7.69	16.83	931	0.881[a]	4.97	1,059	3.83	11.11	228	0.529[a]	2.43	189
Formal education	0.120	1.97	1,777	0.101	1.17	2,022	3.08	6.87	479	4.16[b]	8.93	438
Leisure	12.09	10.60	1,947	12.24	10.83	2,270	16.61	12.87	485	17.18	13.65	437

Notes: Unweighted summary statistics calculated in wave 1, prior to migration. Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. Hours statistics include zeros. (a,b,c) indicate significance at (1% , 5%, 10%) levels for a t-test of no difference between males and females in the same family role ('parent' or 'child').

Table 1 (continued): Participation and Time in Activities by Family Member Role

	13-17-year old son			13-17-year old daughter			10-12-year old son			10-12-year old daughter		
	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs
Any activity												
Housework	0.511	0.500	1,199	0.839[a]	0.368	1,169	0.570	0.495	958	0.768[a]	0.422	992
Caregiving	0.345	0.475	1,085	0.484[a]	0.500	1,077	0.316	0.465	909	0.442[a]	0.497	938
Market work	0.364	0.481	803	0.165[a]	0.371	772	–	–	–	–	–	–
Agricultural work	0.194	0.396	551	0.078[a]	0.269	524	0.132	0.339	425	0.060[a]	0.237	470
Formal education	0.767	0.423	1,072	0.763	0.425	1,063	0.988	0.110	901	0.985	0.122	934
Leisure	0.941	0.236	1,085	0.948	0.222	1,077	0.941	0.237	909	0.939	0.239	938
Hours of activity												
Housework	4.13	7.53	1,085	9.65[a]	9.86	1,077	3.58	5.61	909	6.25[a]	6.39	938
Caregiving	2.44	5.83	1,084	5.31[a]	9.96	1,075	2.57	6.62	906	3.87[a]	7.25	935
Market work	13.75	22.88	803	6.47[a]	17.13	772	–	–	–	–	–	–
Agricultural work	3.10	9.42	551	0.597[a]	3.44	524	1.24	4.80	425	0.347[a]	1.84	470
Formal education	19.42	17.99	1,072	19.91	18.47	1,063	31.44	7.42	901	31.40	8.15	934
Leisure	22.45	15.94	1,084	21.21[c]	15.86	1,074	30.12	17.40	906	26.77[a]	16.68	935

Notes: Unweighted summary statistics calculated in wave 1, prior to migration. Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. Hours statistics include zeros. (a,b,c) indicate significance at (1% , 5%, 10%) levels for a t-test of no difference between males and females in the same family role (parent or child) and age group.

Table 1 (continued): Participation and Time in Activities by Family Member Role

	6-9-year old son			6-9-year old daughter		
	Mean	SD	Obs	Mean	SD	Obs
Any activity						
Housework	0.368	0.483	850	0.532[a]	0.499	855
Caregiving	0.148	0.355	785	0.187[b]	0.390	779
Market work	–	–	–	–	–	–
Agricultural work	0.064	0.245	406	0.020[a]	0.141	394
Formal education	0.991	0.095	662	0.994	0.080	625
Leisure	0.912	0.283	785	0.910	0.286	779
Hours of activity						
Housework	1.91	3.70	785	3.20[a]	4.77	779
Caregiving	1.04	3.65	784	1.55[b]	4.63	777
Market work	–	–	–	–	–	–
Agricultural work	0.468	2.74	406	0.109[b]	0.952	394
Formal education	29.92	6.50	662	29.99	6.67	625
Leisure	32.41	17.58	784	29.72[a]	16.99	777

Notes: Unweighted summary statistics calculated in wave 1, prior to migration. Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. Hours statistics include zeros. (a,b,c) indicate significance at (1% , 5%, 10%) levels for a t-test of no difference between males and females in the same family role (parent or child) and age group.

Table 2: Descriptive Statistics

	Mother-boy			Mother-girl			Boy-girl		
	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs
Time difference									
Market work	1.73	27.11	1,173	7.09[a]	24.10	1,222	3.00[*]	22.20	430
Agricultural work	-1.00	7.50	1,029	0.726[a]	5.79	1,079	2.19	9.18	340
Housework	22.40	15.67	2159	18.3[a]	16.63	2219	-4.48[*]	9.25	650
Caregiving	11.39	19.78	2,157	10.12[b]	21.34	2219	-1.82 [*]	8.36	650
Formal Education	-	-	-	-	-	-	1.03	22.77	583
Leisure	-15.02	18.96	2,157	-12.7 [a]	17.18	2,218	0.651	19.30	650
Migrant identity									
Any	0.072	0.259	2,657	0.073	0.261	2,725	0.068	0.251	813
Male	0.060	0.238	2,657	0.059	0.237	2,725	0.055	0.229	813
Paternal	0.021	0.145	2,657	0.023	0.149	2,725	0.020	0.139	813
Adult son	0.043	0.202	2,657	0.042	0.200	2,725	0.042	0.200	813
Adult daughter	0.017	0.128	2,657	0.019	0.136	2,725	0.015	0.121	813
Other explanators: Individual									
Age 6-9	0.189	0.392	2,657	0.195	0.396	2,725	0.169	0.375	813
Age 10-12	0.241	0.428	2,657	0.228	0.420	2,725	0.129	0.336	813
Age 13-17	0.570	0.495	2,657	0.577	0.494	2,725	0.702	0.458	813
Other boy 6-9	0.180	0.384	2,657	0.177	0.381	2,725	0.146	0.354	813
Other boy 10-12	0.199	0.399	2,657	0.183	0.387	2,725	0.208	0.406	813
Other boy 13-17	0.355	0.479	2,657	0.374	0.484	2,725	0.395	0.489	813
Adult male (18+)	0.285	0.451	2,657	0.295	0.456	2,725	0.245	0.430	813
Other girl 6-9	0.173	0.378	2,657	0.179	0.384	2,725	0.165	0.371	813
Other girl 10-12	0.195	0.397	2,657	0.198	0.398	2,725	0.216	0.412	813
Other girl 13-17	0.385	0.487	2,657	0.371	0.483	2,725	0.263	0.441	813
Adult female (18+)	0.279	0.449	2,657	0.281	0.450	2,725	0.257	0.437	813
Raven's score	-0.190	1.188	2,657	-0.180	1.19	2,725	-0.052	1.11	813

Notes: Unweighted summary statistics measured in wave 2. All samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. (a, b) indicates significance at the (1%, 5%) level for a t-test of no difference in means between mother-boy and mother-girls samples. [*]Significantly different from zero at the 95% confidence level.

Table 2: Descriptive Statistics (continued)

	Mother-boy			Mother-girl			Boy-girl		
	Mean	SD	Obs	Mean	SD	Obs	Mean	SD	Obs
Other explanators: Maternal education (highest level attended)									
Elementary	0.493	0.500	2,471	0.498	0.500	2,522	0.124	0.329	769
Secondary	0.245	0.430	2,471	0.248	0.432	2,522	0.518	0.500	769
High school	0.079	0.269	2,471	0.060	0.237	2,522	0.233	0.423	769
College	0.046	0.210	2,471	0.048	0.213	2,522	0.055	0.227	769
Other explanators: Household									
Extended family	0.174	0.379	2,657	0.177	0.381	2,725	0.207	0.405	813
Children 0-2 (#)	0.080	0.289	2,657	0.089	0.306	2,725	0.082	0.284	813
Children 3-5 (#)	0.200	0.449	2,657	0.208	0.462	2,725	0.237	0.490	813
Adult males (#)	1.47	0.991	2,657	1.47	0.961	2,725	1.48	1.00	813
Adult children (#)	0.814	1.07	2,657	0.843	1.11	2,725	0.760	1.13	813
Male children (#)	1.90	1.16	2,657	0.997	1.05	2,725	1.95	1.16	813
Female children (#)	0.995	1.03	2,657	1.89	1.15	2,725	1.82	1.12	813
Asset Q2	0.226	0.419	2,425	0.228	0.420	2,466	0.239	0.427	758
Asset Q3	0.213	0.410	2,425	0.199	0.399	2,466	0.194	0.396	758
Asset Q4	0.199	0.399	2,425	0.182	0.386	2,466	0.168	0.374	758
Asset Q5	0.181	0.385	2,425	0.201	0.401	2,466	0.198	0.399	758
Rural	0.469	0.499	2,471	0.467	0.499	2,522	0.512	0.500	769
Large urban	0.305	0.461	2,471	0.310	0.462	2,522	0.286	0.452	769

Notes: Unweighted summary statistics measured in wave 2. All samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas.

Table 3: Estimated Effects of Mexico-to-U.S. Migration on the Allocation of Market Work between Left-Behind Family Members

	Mother-Boy			Mother-Girl			Boy-Girl		
	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]
Any[e]	9.87**	9.85**	5.32	-1.38	-1.57	2.44	-2.89	-1.10	4.64
	(3.22)	(3.21)	(4.11)	(3.09)	(3.11)	(2.83)	(5.06)	(4.94)	(6.01)
Any male[f]	8.03*	7.94*	2.97	0.228	-0.127	3.19	1.51	2.36	6.73
	(3.41)	(3.39)	(4.35)	(3.23)	(3.24)	(2.92)	(5.37)	(5.45)	(6.06)
Father[g]	7.09	7.16	4.28	0.996	1.32	2.63	11.27	11.25	9.56
	(5.78)	(5.69)	(6.84)	(3.92)	(3.94)	(3.37)	(8.92)	(9.04)	(9.87)
Adult son[g]	6.66+	6.48+	0.829	0.182	-0.349	3.19	-3.97	-2.73	3.47
	(3.93)	(3.93)	(5.18)	(4.27)	(4.29)	(3.80)	(5.59)	(5.58)	(6.35)
Adult daughter[g]	7.87	8.22	4.52	-2.39	-1.90	-2.30	-13.29	-9.95	-2.44
	(8.24)	(8.29)	(11.45)	(6.33)	(6.25)	(6.07)	(10.10)	(10.00)	(12.01)
Observations	1,167	1,117	1,117	1,217	1,149	1,149	427	408	408

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[a]Family difference specification estimated with OLS.

[b]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with OLS.

[e]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[f]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators.

Table 4: Estimated Effects of Mexico-to-U.S. Migration on the Allocations of Agricultural Work between Left-Behind Family Members

	Mother-Boy			Mother-Girl			Boy-Girl		
	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]
Any[e]	1.21	1.26	2.22*	1.61	1.51	1.29	-1.12	-0.714	-2.42
	(0.82)	(0.81)	(1.05)	(1.20)	(1.21)	(1.24)	(1.57)	(1.47)	(1.92)
Any male[f]	1.38+	1.42+	1.77+	2.22+	2.03+	1.53	-0.463	0.379	-1.49
	(0.77)	(0.77)	(1.02)	(1.20)	(1.17)	(1.19)	(1.46)	(1.38)	(1.93)
Father[g]	1.22	1.16	0.916	4.59	4.66	4.66	0.369	0.683	2.06
	(1.38)	(1.40)	(1.36)	(3.24)	(3.21)	(3.09)	(1.59)	(1.68)	(1.73)
Adult son[g]	1.11	1.15	2.21	-0.664	-1.01	-1.56	-1.36	-0.484	-3.98
	(0.96)	(0.95)	(1.36)	(1.30)	(1.29)	(1.23)	(1.90)	(1.85)	(2.73)
Adult daughter[g]	2.54	2.65	5.51+	2.74	3.05	3.71	-3.17	-5.45	-5.37
	(2.84)	(2.99)	(3.22)	(4.42)	(4.49)	(4.38)	(4.20)	(4.16)	(4.23)
Observations	1,027	999	999	1,074	1,038	1,038	339	319	319

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[a]Family difference specification estimated with OLS.

[b]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with OLS.

[e]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[f]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators.

Table 5: Estimated Effects of Mexico-to-U.S. Migration on the Allocation of Housework between Left-Behind Family Members

	Mother-Boy			Mother-Girl			Boy-Girl		
	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]
Any[e]	-2.25	-1.58	0.789	-3.50*	-3.50*	-3.50*	4.21**	4.21**	2.70
	(1.69)	(1.69)	(2.64)	(1.69)	(1.72)	(1.72)	(1.45)	(1.48)	(2.08)
Any male[f]	-2.98	-2.88	-1.06	-2.57	-2.54	-2.54	4.15*	4.09*	0.965
	(1.84)	(1.86)	(2.90)	(1.87)	(1.90)	(1.90)	(1.74)	(1.76)	(2.23)
Father[g]	-2.07	-2.25	-1.03	2.09	2.30	2.30	-1.04	-1.10	-2.09
	(2.30)	(1.97)	(4.59)	(2.84)	(2.87)	(2.87)	(2.06)	(2.09)	(2.34)
Adult son[g]	-2.21	-1.97	0.175	-3.12	-3.22	-3.22	6.56***	6.47**	2.42
	(2.47)	(2.48)	(3.46)	(2.36)	(2.40)	(2.40)	(1.94)	(1.98)	(2.86)
Adult daughter[g]	-0.053	2.25	3.71	-5.20+	-5.36+	-5.36+	1.96	1.94	5.67
	(3.05)	(2.73)	(5.08)	(3.11)	(3.18)	(3.18)	(2.50)	(2.91)	(4.48)
Observations	2,151	2,028	2,028	2,210	2,065	2,065	647	604	604

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[a]Family difference specification estimated with OLS.

[b]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with OLS.

[e]Family difference specification estimated with IV.

[f]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with IV.

[g]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[g]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators.

Table 6: Estimated Effects of Mexico-to-U.S. Migration on the Allocation of Caregiving between Left-Behind Family Members

	Mother-Boy			Mother-Girl			Boy-Girl		
	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]
Any[e]	-1.13	-1.14	0.738	-1.73	-1.29	-1.12	-1.32	-0.738	-2.32
	(2.17)	(1.96)	(3.25)	(2.19)	(2.35)	(2.85)	(1.31)	(1.29)	(1.83)
Any male[f]	-1.63	-2.33	-2.71	-1.77	-1.78	0.200	-1.18	-0.786	-3.65^{+}
	(2.46)	(2.22)	(3.57)	(2.57)	(2.74)	(3.10)	(1.46)	(1.41)	(1.90)
Father[g]	-2.56	-5.73*	-11.28*	4.93	5.63	6.01	0.272	0.230	-0.836
	(3.62)	(2.71)	(5.30)	(4.83)	(5.07)	(5.46)	(2.32)	(1.62)	(2.56)
Adult son[g]	-1.55	-0.764	1.33	-6.63**	-7.15**	-4.77	-1.45	-2.32	-4.37^{+}
	(2.91)	(2.74)	(4.21)	(2.34)	(2.47)	(3.14)	(1.77)	(1.90)	(2.31)
Adult daughter[g]	2.00	5.07	8.57	0.041	2.00	-7.95	-3.55	-3.34	-0.818
	(3.42)	(3.19)	(5.67)	(3.43)	(3.65)	(6.26)	(2.81)	(3.28)	(4.25)
Observations	2,149	1,835	1,835	2,210	1,872	1,872	647	524	524

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[a]Family difference specification estimated with OLS.

[b]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with OLS.

[e]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[f]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators.

Table 7: Estimated Effects of Mexico-to-U.S. Migration on the Allocation of Formal Education between Similar-age, Opposite-sex siblings

	Base sample			13-17-Year Olds		
	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]
Any[e]	-2.30	-4.36	-7.28	-7.30	-7.80	-10.23
	(5.15)	(5.81)	(6.59)	(5.81)	(5.94)	(7.01)
Any male[f]	-8.63	-11.80+	-15.59*	-16.46**	-16.78**	-19.95**
	(5.44)	(6.21)	(7.00)	(5.80)	(6.05)	(7.35)
Father[g]	5.05	5.64	-4.13	2.95	4.89	-5.32
	(6.64)	(8.10)	(9.50)	(9.32)	(9.17)	(11.08)
Adult son[g]	-15.86*	-18.33**	-18.81*	-21.52*	-22.88**	-22.35**
	(6.23)	(6.59)	(7.99)	(5.47)	(5.71)	(7.90)
Adult daughter[g]	19.92**	20.12**	23.55*	21.08**	20.35*	23.80*
	(7.35)	(7.67)	(9.12)	(8.31)	(7.67)	(9.96)
Observations	580	473	473	425	404	404

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[a]Family difference specification estimated with OLS.

[b]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with OLS.

[e]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[f]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators.

Table 8: Estimated (Level) Effects of Mexico-to-U.S. Migration on Education of Left-Behind Boys and Girls

	Boys				Girls			
	Weekly hours	Enrollment = hours>0	Enrollment = hours>5	Enrollment = hours>10	Weekly hours	Enrollment = hours>0	Enrollment = hours>5	Enrollment = hours>10
Any [e]	0.464	0.033	-0.013	-0.004	2.763	0.073	0.041	0.120
	(2.93)	(0.088)	(0.090)	(0.085)	(3.673)	(0.082)	(0.100)	(0.108)
Any male [f]	-3.68	-0.059	-0.125	-0.127	4.94	0.033	0.084	0.251*
	(3.27)	(0.104)	(0.104)	(0.092)	(3.92)	(0.096)	(0.101)	(0.107)
Father [g]	4.56	0.135	0.198	0.160	-0.484	-0.020	-0.039	0.069
	(5.62)	(0.137)	(0.171)	(0.151)	(5.78)	(0.152)	(0.152)	(0.150)
Adult son [g]	-6.20+	-0.113	-0.214+	-0.234*	9.67*	0.095	0.184	0.370**
	(3.43)	(0.126)	(0.112)	(0.093)	(4.57)	(0.113)	(0.115)	(0.119)
Adult daughter [g]	11.54*	0.321**	0.267+	0.315+	-8.38	0.104	-0.221	-0.421*
	(5.01)	(0.099)	(0.153)	(0.167)	(6.62)	(0.144)	(0.221)	(0.187)
Observations	580	580	580	580	580	580	580	580

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[e]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[f]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators.

Table 9: Estimated Effects of Migration on the Allocation of Leisure between Left-Behind Family Members

	Mother-Boy			Mother-Girl			Boy-Girl		
	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]	FD[a]	FD[a]	DFD[b]
Any[e]	-0.719	-1.19	2.94	0.183	0.094	1.29	-1.76	-3.39	-5.87
	(1.34)	(1.40)	(2.35)	(1.31)	(1.38)	(2.01)	(3.48)	(4.03)	(6.18)
Any male[f]	-0.682	-1.03	2.54	0.144	0.022	1.48	-1.47	-4.85	-6.93
	(1.49)	(1.55)	(2.62)	(1.43)	(1.50)	(2.26)	(4.19)	(4.70)	(7.23)
Father[g]	-0.457	-1.35	10.39*	-1.11	-1.47	-0.697	0.164	-2.23	-6.99
	(2.25)	(2.28)	(4.60)	(2.67)	(2.75)	(3.33)	(7.35)	(9.34)	(12.14)
Adult son[g]	-1.78	-1.75	-2.95	1.13	1.15	2.33	-0.812	-3.36	-3.19
	(1.77)	(1.86)	(2.54)	(1.58)	(1.67)	(2.79)	(4.69)	(4.87)	(8.73)
Adult daughter[g]	-2.43	-2.91	3.46	2.03	2.12	4.08	0.430	4.86	0.239
	(2.50)	(2.46)	(4.02)	(2.81)	(3.23)	(3.66)	(5.39)	(5.86)	(7.48)
Observations	2,149	1,834	1,834	2,209	1,869	1,869	647	524	524

Notes: Samples restricted to members of two-parent families with at least one 13-17-year old child and another minor child in wave 2. Agricultural work samples restricted to rural areas. All specifications contain other explanators, as described in the narrative. Standard errors are clustered at the household level. + p<0.10, * p<0.05, ** p<0.01, *** p<0.001.

[a]Family difference specification estimated with OLS.

[b]Family difference specification, dependent variable incorporates wave 1 time-use information, estimated with OLS.

[e]Row contains estimated coefficients and standard deviations for a specification where *Any migrant* is the only migration explanator.

[f]Row contains the estimated coefficients and standard deviations from *Any male migrant* for a specification with migration explanators *Any male migrant* and *Adult daughter migrant*.

[g]Row contains the estimated coefficients and standard deviations from *Father migrant, Adult son migrant, and Adult daughter migrant* from a single regression with these three migration explanators