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Who Cares for the Elderly? Intrafamily Resource Allocation and Migration in Mexico

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Who Cares for the Elderly? Intrafamily Resource Allocation and Migration in Mexico *

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Abstract

Children are sometimes viewed as a method of insuring against disability and providing income after retirement, especially in developing countries with limited markets for credit and insurance. But how do children decide on how much care to provide to their parents in old age, particularly in families with many children? This paper takes a non-cooperative view of family decision-making and estimates best response functions for individual physical and financial contributions as a function of siblings' contributions. I account for the endogeneity of siblings' contributions by using siblings' characteristics as instrumental variables. By estimating these decisions as part of a two-stage game that includes a migration decision, I also consider the impact of migration on elderly care. I find evidence that children's financial contributions function as strategic complements while their time contributions operate as strategic substitutes, suggesting that giving may be based on both strategic bequest and public good motivations. Despite these findings, evidence from a simulation generating an exogenous switch in child's migrant status shows a likely decrease in time and financial contributions for most elderly parents.

JEL classification: O15, J14, D13, C72
Keywords: elderly care; intrafamily allocation; migration.

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1 Introduction

Children are sometimes viewed as a method of insuring against disability and providing income after retirement, especially in developing countries with limited markets for credit and insurance. By the time parents have reached an age where they require assistance, however, it is their children that must decide on the distribution of responsibility of caring for their elderly parents. How do children decide on how much care to provide to their parents in old age, particularly in families with many children? The country of focus is Mexico, where the lure of international migration to the U.S. is strong given the possibility of earning a higher income and thus potentially contributing more financially to the elderly parent. At the same time, in most cases the decision to migrate substantially limits the migrant's ability to visit his family in Mexico and thus prohibits him from acting as personal care-giver for the elderly parent. While some papers have addressed the issue of migrant remittances to parents in the home country,[1] none has addressed this switch from physical to financial care.

This paper treats elderly care contributions in terms of time and money as the outcome of a non-cooperative game among children. The game is made up of two stages where agents decide whether or not to migrate in the first stage and make contributions to elderly parents in terms of time and money in the second. From this perspective, I estimate best response functions for physical and financial care conditional on migration as functions of contributions made by other siblings. This analysis allows us to determine whether siblings' contributions function as strategic substitutes, implying a negative relationship between siblings' contributions, or strategic complements, in which an increase in one child's contribution is met with an increase in that of his sibling.

Estimating the best response functions is particularly interesting because it sheds light on both theoretical and policy questions. First, it is valuable because

[1] One example is Lucas and Stark (1985) who find that migrants with wealthier parents contribute relatively more to their parents relative to migrants with poorer parents. This is suggestive of the possibility of intervivos transfers between migrants and parents and/or a bequest motive.

it allows us to asses the impact of children's migration on the care of parents remaining in Mexico. If siblings' time contributions are strategic substitutes, then the migration of one child and the reduction in time contribution that it necessarily induces would be offset by siblings in the home country who would compensate for the absent sibling by increasing their own time contributions. On the other hand, if siblings' contributions are strategic complements, one child's move abroad would result not only in the reduction in time contribution of the absent sibling, but also a reduction in time contributions by other siblings. As one child in the family migrates, he may also increase his financial contribution to the elderly parent via remittances. If siblings' financial contributions are strategic substitutes, then his siblings' money contributions in the home country would fall as a result. However, if siblings' financial contributions are strategic complements, then siblings would raise their financial contributions to the parents in response.

Thus, if both financial and time contributions are strategic substitutes, the effects of one child's migration on the financial and physical care of an elderly parent would tend to be dampened by the strategic responses of his siblings. If instead both financial and time contributions are strategic complements, the effects of migration would tend to be amplified. In the event the results are mixed–for example, if financial contributions are strategic complements and time contributions are strategic substitutes–then the results for elderly contributions will depend on the relative magnitudes of the parameter estimates describing individual time and financial contributions. In this paper, I present an exercise to determine the overall effects of migration on elderly time and financial contributions by simulating the equilibrium contributions to the elderly parent when all children are non-migrants as well as the counterfactual when one child exogenously migrates to the U.S.

The best response functions are also of particular interest in light of their theoretical implications pointing to competing models of family interaction. While the economics literature is largely silent about the intrafamily allocation of resources toward elderly parents specifically, it does provide a theoretical jumpingoff point to analyze the problem within the context of the public goods literature in the tradition of Bergstrom, Blume and Varian (1986). If a child cannot be excluded from benefiting from her parent's well-being and such a good is not diminished by the consumption of her siblings, then the parent's well-being can be thought of as a public good.[2] If parental well-being is a pure public good, then we would expect the best response functions to indicate that siblings' contributions are strategic substitutes. If, however, children's only motivation to contribute is through some preference for personally caring for their parents, referred to as a "warm-glow" in Andreoni (1990), then there would be no relationship between siblings' contributions as there is essentially no public good channel on which to free ride. Finally, if siblings are competing for their parent's attention, perhaps due to affection or in anticipation of a bequest that may function as a form of payment for services from the child as with Bernheim, Shleifer, and Summers' (1985) strategic bequest motive, we would expect to find siblings' contributions operating as strategic complements. Thus, the estimation of the best response functions, by indicating whether siblings' contributions are strategic complements, substitutes, or neither, can illuminate which model of family interaction is most appropriate.

Despite the recent focus on reforming elderly care provision programs such as Social Security and Medicare, little attention has been paid to how siblings distribute responsibility of caring for their elderly parents. In the economics literature, research on this subject largely concerns siblings' choice of co-residence with elderly parents. For instance, Wakabayashi and Horioka (2006) examine the factors determining why eldest sons are more likely to co-reside with their parents in Japan and find evidence of a strategic bequest motive. Pezzin, et al. (2006) consider a two-stage game where co-residence is determined in the first stage and transfers are determined in the second stage. They find that co-residence of one sibling reduces her bargaining power vis-a-vis her other siblings,

[2] The good could be considered as the knowledge that the parents are being cared for physically and financially and thus does not require children to spend time with their parents to consume it.

so the outcome may not be Pareto efficient if efficiency involves co-residence. Checkovich and Stern (2002) examine the shared care-giving responsibility for physical care-giving among siblings in the U.S. While they do not estimate best response functions directly, they do find evidence that physical care decisions are not independent across siblings.

This paper provides insight into the allocation of resources within families by estimating best response functions for individual physical and financial contributions as a function of siblings' contributions. By estimating these decisions conditional on a migration decision, I also consider the impact of migration on elderly care. Treating siblings' contributions as the outcome of a non-cooperative two-stage game, I account for the endogeneity of siblings' contributions by using siblings' characteristics as instrumental variables. I check the robustness of the instrumental variables results by comparing with results from a model including intrafamily averages as proxies for family fixed effects. I also consider the possibility of selection into migration by considering the results with a Heckman selection term. To assess the impact of migration on elderly contributions, I perform a simulation based on the empirical results and ask whether the parent would be better or worse off as a consequence of one child's exogenous migration. I find that individuals (1) increase their financial contributions in response to an increase in their siblings' financial contributions, (2) decrease their time contributions in response to an increase in their siblings' time contributions, (3) decrease their time contributions in response to an increase in their siblings' financial contributions, and (4) decrease their financial contributions in response to an increase in their siblings' time contributions.

These results suggest that children's financial contributions function as strategic complements while their time contributions operate as strategic substitutes, a distinction that could indicate children's expectation that parents will mainly consider financial contributions when they are making bequest decisions at the ends of their lives. Nonetheless, due to the high variance in financial contributions from non-migrants relative to migrants, the results from simulating an exogenous switch in migrant status show a likely decrease in time and financial contributions for the majority of elderly parents who experience a change in contributions. Consequently, policies that promote migration may have a negative impact on the overall well-being of elderly parents. The paper proceeds as follows: Section 2 illustrates the theoretical model, Section 3 describes the data set, Section 4 establishes the empirical strategy, Section 5 presents the results, Section 6 checks for robustness, Section 7 discusses the simulation, and Section 8 concludes.

2 Theoretical model

There are two main approaches to the analysis of intrafamily allocations: one that takes the view that the family maximizes a joint utility function and another that focuses on individuals as units of analysis and views family decision-making as a non-cooperative game. This paper takes the latter approach which, it can be argued, is more appropriate for analyzing the relationship between older parents and their adult siblings that are largely independent. Given the high levels of remittances and the importance of networks in the context of migration, some might find it more appealing to position the family as unitary decision-maker rather than the individual. In light of the number of studies rejecting the unitary model of intrahousehold decision-making, however, it seems reasonable that this class of models would be even less appropriate for describing decision-making by family members who do not co-reside.[3] Another possibility is that siblings take a cooperative approach where they first decide on the amount of care that parents should receive and subsequently decide on a division of responsibilities among siblings. Nevertheless, any behavior that is not incentive compatible at the individual level is not likely to persist, so any model of cooperation must include some self-enforcing mechanism. Also note that the non-cooperative approach does not entirely preclude cooperation among siblings, as children may need to choose between multiple equilibria. This is particularly

[3] See for example, Thomas (1990) who rejects the income-pooling hypothesis of the neoclassical model.

important when equilibria are Pareto-ranked.

I begin by specifying a two-stage game in which individuals make decisions about migration, $m_i \in \{0,1\}$ in the first stage, and subsequently decide on the amount of (private) consumption, c_i, and their contributions to their parents in terms of time, t_i, and material goods, g_i, with the objective of maximizing utility less some cost of migration, $C_i(m_i, M_{-i})$. $C_i(m_i, M_{-i})$ is a decreasing function of the number of migrant siblings in the family, $M_{-i} = (m_1, ..., m_{i-1}, m_{i+1}, .., m_n)$, and is equal to zero if the individual does not migrate.[4] Thus, the individual maximizes a net utility function:

$$U_i(m_i, c_i, g_i, G_{-i}, t_i, T_{-i}|Z_i) - C_i(m_i, M_{-i}),$$

subject to a binding resource constraint and the restriction that his time contribution must equal zero if he migrates, $t_i = 0$ if $m_i = 1$. Note the inclusion of other siblings' goods contributions, $G_{-i} = (g_1, ..., g_{i-1}, g_{i+1}, .., g_n)$, and their time contributions, $T_{-i} = (t_1, ..., t_{i-1}, t_{i+1}, .., t_n)$, as well as the individual contributions, t_i and g_i in the utility function. This allows for the possibility that children care for the well-being of their parents in terms of how much they are cared for by all of their siblings as well as how much they personally provide to their parents. Also note that the utility function depends on some individual characteristics, Z_i, which include observable and unobservable components, (X_i, ε_i). As a simplification, we can substitute out for the consumption good using the budget constraint and rewrite the individual's utility as a function of his own time and goods contributions as well as of his siblings' contributions: $\tilde{U}_i(m_i, g_i, G_{-i}, t_i, T_{-i}|Z_i)$.

Using backward recursion, we begin with an examination of the second stage in which M, the vector of migration decisions made by all siblings in the first stage, has been fixed.[5] The individual then solves:

[4] The costs of migration are likely to be decreasing in the number of migrant siblings since migrant siblings can potentially steer the individual toward cost-saving alternatives, for instance in the areas of transportation, residence, and job search.

[5] Every vector M defines a proper subgame.

$$\max_{\{g_i,t_i\}} \tilde{U}_i(m_i, g_i, G_{-i}, t_i, T_{-i}|Z_i) - C_i(m_i, M_{-i})$$

$$\text{subject to } t_i = 0 \text{ if } m_i = 1,$$

$$g_i \geq 0, t_i \geq 0$$

This maximization problem yields the following best response functions for g_i and t_i which are conditional on the migration decision:

$$g_i = \gamma(G_{-i}, T_{-i}|m_i, Z_i) \tag{1}$$

$$t_i = \{ \begin{matrix} \tau(G_{-i}, T_{-i}|Z_i) \text{ if } m_i = 0 \\ 0 \text{ if } m_i = 1 \end{matrix} \tag{2}$$

Solving these equations simultaneously for all siblings determines the continuation equilibrium, the vectors describing each child's contributions in terms of goods and money as functions of the migration profile in the first stage and the vectors of characteristics for all siblings, $Z = (Z_1, ..., Z_n)$:

$$G^*(M, Z), T^*(M, Z).$$

Note that estimation of the best response functions will yield inconsistent estimates because of the simultaneity inherent in the problem, i.e. sibling i's contribution is a function of sibling j's contribution which in turn is a function of sibling i's contribution. Thus, other siblings' total contributions, G_{-i}, T_{-i}, will be endogenous in equations 1 and 2. Nevertheless, the nature of the continuation equilibrium points to an econometric solution in the form of exogenous variables that only affect individual i's contributions through their effect on G_{-i}, T_{-i}. These potential instruments are simply the other siblings' characteristics, $Z_{-i} = (Z_1, ..., Z_{i-1}, Z_{i+1}, .., Z_n)$, which do not enter into the best response function directly. Empirically, the econometrician can thus take the observable component of the characteristics of other siblings and aggregate them to produce instruments for the contributions of these siblings: $W(X_1, ..., X_{i-1}, X_{i+1}, ..., X_n)$.

Moving to the first stage of the game, individual i will choose to migrate if his net utility is higher as a migrant than as a non-migrant. That is, he chooses m_i to solve

$$\max_{m_i \in \{0,1\}} V_i^*(M, Z) = \tilde{U}_i(m_i, G^*(M, Z)T^*(M, Z)|Z_i) - C_i(m_i, M_{-i})$$

This yields the following best response function for migration:

$$m_i = \mu_i(M_{-i}, Z). \tag{3}$$

Solving for the fixed point among all siblings in the family yields the vector $M^*(Z)$ which maps characteristics of all siblings into migration outcomes. While it would be instructive to estimate the best response function in equation 3, we would not be able to identify the parameters as we again have an endogeneity problem because of simultaneity, i.e. sibling i's migration is a function of sibling j's migration which in turn is a function of sibling i's migration. Unfortunately, in this case, all siblings' characteristics enter directly into the best response function and therefore cannot be excluded from the equation to be used as instruments. Nevertheless, we may still estimate the equilibrium mapping

$$m_i^* = m_i^*(Z), \tag{4}$$

which is a function of all of the siblings' characteristics. This estimation will prove useful in the robustness section below where I address the concerns arising from selection into migration.

3 Data

3.1 Description

The data set used in this paper is the Mexican Health and Aging Study (MHAS) for the years 2001 and 2003, the results of a joint project between Mexico's statistical agency, INEGI, and researchers at the Universities of Pennsylvania and Maryland. The MHAS is a nationally representative panel data set of Mexicans born before 1950 that began interviewing respondents in 2001 and returned to collect data from the same respondents in 2003.[6] Respondents are asked a range of typical household survey questions regarding their expenditures, income, assets, and labor supply, as well as detailed questions on the health conditions of the sampled person. Basic information is also collected about the children of the sampled person, including those that live in and outside of the elderly parent's home. In addition, the MHAS also has data on the migration history of the respondent and whether his children are currently in the U.S.

For purposes of the analysis presented here, the data set contains detailed information about financial transfers between the respondent and his children.[7] Information is also provided on the time children spend helping their parents, but these responses are conditional on the respondent's reporting difficulty with "Activities of Daily Living" (abbreviated as ADLs) which are divided into basic ADLs and higher level "Instrumental Activities of Daily Living" (IADLs).[8] The basic ADLs involve getting in and out of bed, bathing oneself, using the toilet, eating, and walking across a room. The IADLs involve preparing a hot meal, shopping for groceries, taking medications if needed, and managing money. Since these are the only measures of hourly time contributions in the study, I limit my sample to families where the parent reported difficulty with at least one ADL or IADL. If respondents report that they simply can not or do not

[6] An effort was made to follow respondents that had moved residences and collect information on respondents that died in the intervening period.

[7] Unfortunately, no data is collected on any transfers between the children themselves.

[8] The question specifies that any difficulty performing this task is due to a health reason.

do one of the basic ADLs, I also include them in the sample since these tasks are fundamental to everyday life. If respondents report that they cannot or do not perform one of the IADLs, which may be by choice, I only include them in the sample if they answer yes to a follow-up question that asks whether this difficulty is due to a health reason.

Since my sample is conditional on difficulties with ADLs or IADLs, and respondents are asked to list the amount of time individuals spend helping them with these tasks, the time contributions made by children in this analysis can be thought of as a measure of critical hourly help. While cutting the sample on this dimension greatly limits the number of observations, focusing on this restricted sample is arguably more appropriate as families with parents with these difficulties are likely to differ considerably from families where the parent is more independent.[9] Thus, the restricted sample can be thought of as a more flexible specification where I have allowed all effects to vary based on the fact that the parent has difficulties with one or more activities of daily living. I take the five indicators of difficulty with the basic ADLs as particularly important indicators of the parent's basic ability to provide for himself and also include them as controls in the regression analysis below.[10]

The two main variables of interest provide data on time and financial contributions by children to parents. The financial variable is the result of a series of questions about how much money the child has contributed to the elderly parent over the past 2 years.[11] Most participants that respond make reference to a monthly allotment and for those who do not, I convert the answer into a monthly average.[12] In addition, some participants were not sure of the amount and were allowed to respond with a pre-specified range of values. Using the

[9] Only about 10% of the usable sample report having difficulties with at least one of these specific activities.

[10] I do not include indicators of the IADLs as controls as they are not entirely necessary for independent living.

[11] I convert financial data to 2002 Mexican pesos using the national Consumer Price Index.

[12] For instance, if a parent indicated that the child gave him 1200 pesos per year, the monthly average would be 100 pesos.

continuous data as the empirical distribution, I converted these responses to the mean of the range specified. The time contribution variable is the result of asking how many days in the last month and how many hours per day the child spent helping the parent with any ADLs or IADLs. In addition, if a non-resident child's spouse or children helped the elderly respondent, the survey records this time contribution as deriving from the child of the elderly parent, so the time contributions can be viewed more broadly as hourly help flowing from the households of the respondent's children.[13]

3.2 Descriptive statistics

Table 1 illustrates the summary statistics for the children who form the units of analysis in this paper. Since the estimation of best response functions requires more than one agent, I restrict my sample to families where there are at least two siblings whose sampled parent has difficulty with at least one basic or instrumental activity of daily life. This leaves a total number of observations of 5,505 children from 928 family-year observations.[14] Since the data for the entire family are collected from the elderly parents, I do not have detailed information on earnings for their children. Neither do I have data on any transfers that may have occurred between siblings. I do, however, have basic information on a child's education, marital status, current migration status, and the number of his children.

In Panel 1A we see that the average age of a child in the sample is close to 40 and her average years of schooling are close to eight years. Almost 80% of the child sample is married and the average number of children (who would be grandchildren to the old-age sample) is 2.8. The three main variables of interest: financial contribution, time contribution, and migration status are

[13] This caveat actually makes the time contribution more consistent with the financial contribution which certainly stems from the child's entire household.

[14] Of these, 737 families are observed in 2001 and only 191 are observed in 2003, making for a particularly high attrition rate of close to 75%, which I take to be exogenous to the sibling allocation problem.

listed at the bottom of Panel 1A. While the mean of financial help is about 165 pesos per month (the equivalent of about US$17), only a small fraction of children contribute–about 18%. A similar story is true for the hourly help variable with a mean of about 15.5 hours per month, but only 12% of children give any time at all. Since there are so many zeros in the sample, the averages go up substantially once we condition on help being provided. The average financial help climbs to 923 pesos per month conditioning on any financial help provided and the monthly hours goes to 130 hours per month given any hourly help is offered. These results suggest that responsibility for caring for the elderly parent falls on relatively few children. At the same time, the fraction of children who are currently in the US is around 10.7%.[15]

Panel 1B describes the sample of parents. The average age of parents is about 70 and the average education of the parent is only 3.2 years. This is substantially less than the 8 year average among their children, a fact that reflects Mexico's rapid increases in educational attainment over that generation. About 47% of the parents are married. The average number of children which will serve as the siblings in my analysis is close to six. The average number of children who are reported to contribute financially to the parent is close to 1, while the average number of children who give help in terms of time is about 0.7. The rest of Panel 1B describes the health of the parent sample. Close to 30% report difficulty bathing themselves, 18% have trouble eating, 45% report difficulties getting in and out of bed, 31% have difficulty using the toilet, and 44% have trouble walking across a room. Around 73% report difficulties with at least one of the basic activities of daily life including bathing, eating, walking across the room or using the toilet.

It is also useful to examine the differences in means of characteristics by gender. Table 2 shows that on average sons give a higher amount of money to their parents relative to daughters (196 pesos per month relative to 134) and this difference is statistically significant at the 10% level. At the same time,

[15] Remarkably, this is the same fraction of current US migrants in the larger sample which is not conditioned on difficulty with at least one ADL or IADL.

on average women give more time to their parents relative to men (22.4 hours per month versus about 8.7); this difference is statistically significant at the 1% level. As expected, men are more likely to be U.S. migrants with 13% of men currently in the U.S. whereas only 8% of women are currently in the U.S. Men are also slightly more educated than women, slightly more likely to be married, and have fewer children on average than their sisters, a fact that points to earlier timing of fertility in women. The fact that daughters are more likely to provide physical care and sons more likely to provide financial care illustrate the importance of gender-specific roles within the family. This is particularly striking given that money and time given by the child's entire family (including husband, wife, and children) are all included in the data corresponding to sons and daughters.[16]

Given the potential gains and drawbacks of migration, we might also ask whether parents of migrant children are better off than parents of non-migrant children. Table 3 shows that parents of migrants appear to receive more financial help from their children compared with parents of non-migrants (on average, about 1200 pesos per month versus about 890), although the high variance in contributions does not allow for a finding of a statistically significant difference. The number of siblings per family, however, is significantly larger for families where at least one child is a migrant (on average, 7 siblings versus 5.5.) In terms of hours of help, parents of non-migrant children appear to receive more from their kids than their counterparts with children in the U.S., although the total number of hours is not statistically significant. After taking into account the difference in the number of siblings, however, the result is significantly significant, with parents of non-migrant children receiving an average of 20.6 hours of monthly care from each child relative to 12.5 hours for parents of migrant children.

These descriptive statistics point to significant differences between parental

[16] One possibility is that women control fewer financial resources in their own household and thus can not so easily direct it toward their own parents. Personal time, however, is more likely to be controlled at the individual level.

contributions among siblings based on gender and migrant status.[17] I now turn to controlling for the observed characteristics discussed here and focusing on the question of how children's contributions respond to those made by their siblings.

4 Empirical strategy

I begin by considering the appropriate estimation of the best response functions as derived in section 2, where I interpret the goods contribution to be in the form of money, i.e. the financial contribution. The form of the best response functions derived in equations 1 and 2 suggests that the empirical estimation should be conditional on migration status, both because (i) constraining the time contribution to be zero for migrants may affect the optimized value of financial contributions and (ii) opportunities and trade-offs are likely to be different for migrants and non-migrants. This can also be thought of as allowing for a more flexible functional form for the financial contribution to vary with migration status. Thus, I estimate the linearized versions of the best response functions, where I assume that the contributions of other siblings enter as a sum:

$$g_{ij} = G_{-i,j}\alpha_1^1 + T_{-i,j}\alpha_2^1 + X_{ij}\beta_1^1 + u_{ij} \text{ given } m_{ij} = 1 \tag{5}$$

$$g_{ij} = G_{-i,j}\alpha_1^0 + T_{-i,j}\alpha_2^0 + X_{ij}\beta_1^0 + \xi_{ij} \text{ given } m_{ij} = 0 \tag{6}$$

$$t_{ij} = G_{-i,j}\gamma_1 + T_{-i,j}\gamma_2 + X_{ij}\beta_2 + e_{ij} \text{ given } m_{ij} = 0, \tag{7}$$

where i is the individual subscript and j denotes the family. The main empirical problem is that siblings' contributions are determined simultaneously, and thus are necessarily endogenous. It is straightforward to show that $G_{-i,j}$ will be correlated with u_{ij} since $G_{-i,j}$ is also a function of g_{ij}. The analog is true for all the variables comprising siblings' financial contributions as well as time contributions, $T_{-i,j}$. As a result, least squares estimation of equations 5 through

[17] While it would be instructive to estimate the best response functions separately by gender, I estimate only on the pooled sample of men and women due to the small sample size.

7 violates the classical assumptions and will lead to bias and inconsistency. For now, I will treat migration status as predetermined, ignoring any possible selection into migration, and consider potential selection issues in the robustness section.

4.1 Instrumental variables

To address this endogeneity problem, I propose a set of instruments that are excluded from equations 5 through 7 but that help to predict the endogenous variables $G_{-i,j}$ and $T_{-i,j}$. These are simply the sibling's characteristics, X_{-ij}, since they help to predict $G_{-i,j}$ and $T_{-i,j}$ but are not included directly in the equations determining g_{ij}, t_{ij}. The identification assumption is that siblings' characteristics only affect individual i's contributions and migration decision through $G_{-i,j}$ and $T_{-i,j}$.[18] In the simple 2-sibling family, it is easy to see that these are just the personal characteristics of the other sibling. In a many-sibling family it would be some aggregate function of the other siblings' characteristics. In particular, I use the sum of siblings' characteristics which can be motivated through some reduced-form algebra.

Consider a 3-sibling household with one public good. Substituting $G_{-1,j} = g_{2,j} + g_{3,j}$, $G_{-2,j} = g_{1,j} + g_{3,j}$, and $G_{-3,j} = g_{1,j} + g_{2,j}$ yields:

$$g_{1j} = X_{1j}\beta_1 + \alpha_1(g_{2,j} + g_{3,j}) + u_{1j} \quad (8)$$

$$g_{2j} = X_{2j}\beta_1 + \alpha_1(g_{1,j} + g_{3,j}) + u_{2j} \quad (9)$$

$$g_{3j} = X_{3j}\beta_1 + \alpha_1(g_{1,j} + g_{2,j}) + u_{3j} \quad (10)$$

Solving the system of equations for g_{3j} as a function of exogenous variables leaves us with the following reduced form equation for g_{3jk}:

$$g_{3j} = \Upsilon[X_{3j}\beta_1 + \frac{\alpha_1\beta_1}{1-\alpha_1}(X_{1,j} + X_{2,j}) + \frac{\alpha_1}{1-\alpha_1}(u_{1j} + u_{2j}) + u_{3j}] \quad (11)$$

where $\Upsilon = [1-(2\alpha_1^2/1-\alpha_1)]^{-1}$. Equation 11 is the first stage equation where the instrumental variables $X_{1,j} + X_{2,j}$ are used to predict g_{3j}. The instrumental

[18] A similar strategy is used by Sandler and Murdoch (1990) to estimate the effect of NATO allies' defense expenditure on individual countries' military spending during the Cold War.

variables I use are the analogues of all variables included as covariates, but as they relate to the other siblings. They are: (1) number of sisters, (2) number of siblings in each of four education categories, (3) sum of ages of siblings (and sum of squared ages), (4) sum of children of other siblings, (5) number of married siblings, (7) total number of siblings and (8) sum of birth orders of other siblings.

The estimation strategy thus amounts to estimation of equations 5 through 7 where I account for the endogeneity of siblings' contributions by estimating:

$$T_{-i,j} = Z_{ij}a_1 + \epsilon_{ij} \quad (12)$$

$$G_{-i,j} = Z_{ij}a_2 + \varsigma_{ij} \quad (13)$$

4.2 Estimation

Due to a high fraction of zeros in both time and financial contributions, a tobit specification would be most appropriate for estimating equations 5 through 7. The standard maximum likelihood estimation, however, is computationally difficult due to the inclusion of multiple endogenous variables. Instead, I use two-step estimation inspired by Rivers and Vuong (1988) and Blundell and Smith (1986), as detailed in Wooldridge (2002). The first step amounts to estimation of equations 12 through 13 via OLS and then inserting estimated residuals from those regressions into tobit estimation of equations 5 through 7. I bootstrap the standard errors, clustering at the family level, using 500 replications. From these estimates, I compute the average partial effects of interest evaluated at the mean values of the covariates, which, for continuous variable x_{ij}^k in equation 5 take the form:

$$\frac{\partial E(g_{ij}|X_{ij}, G_{-i,j}, T_{-i,j})}{\partial x_{ij}^k} = \Phi\left(\frac{G_{-i,j}\widehat{\alpha}_1^1 + T_{-i,j}\widehat{\alpha}_2^1 + X_{ij}\widehat{\beta}_1^1}{(\widehat{\theta}_1^2\widehat{\tau}_1^2 + \widehat{\theta}_2^2\widehat{\tau}_2^2 + \widehat{\tau}_3^2)^{1/2}}\right) * \widehat{\beta}^k, \quad (14)$$

where $\widehat{\theta}_1^2, \widehat{\theta}_2^2$ are the estimated second-stage coefficients on the residuals from the first-stage regression and $\widehat{\tau}_3^2$ is the estimated error variance from the second-stage regression. The procedure for estimating equations 6 and 7 and finding the resulting average partial effects is analogous.

5 Results

5.1 Under the assumption of no endogeneity

Before presenting the results from the instrumental variables estimation, it is instructive to examine the results from a regression that neglects to account for the endogeneity of siblings' contributions. The results from a tobit estimation of the best response functions are shown in Table 4 with each column representing equations 5 through 7. The first column shows that an increase in siblings' financial contributions of 100 pesos is associated with a rise in about 24 pesos at the individual level for migrants. In addition, an increase in one hour of siblings' time contributions is associated with a decrease in the individual's financial contribution of about 1.6 pesos for the migrant group. For non-migrants, the individual financial response to an increase in siblings' financial contributions is also positive, with an increase of 19 pesos for every 100 peso increase in siblings' contributions. The effect of an increase in siblings' time contributions however, is positive, with an increase of one hour of siblings' time contribution associated with an increase in .91 pesos on behalf of the individual. In the final column estimating the hourly contribution equation, neither time nor financial contributions of siblings are statistically significant at the 10% level, with coefficients measuring -3.71E-4 on the financial contributions of siblings and .019 on the time contributions of siblings. These results suggest that not accounting for the endogeneity of siblings' contributions would lead us to believe that siblings' financial contributions are strategic complements, but give mixed results for the relationship between hours and financial contributions of siblings depending on the migration status of the individual.

5.2 Best response functions

While the endogeneity problem casts doubt on a causal interpretation of the results in table 4, the IV strategy I propose relies critically on the validity of the instruments used. To address this, I present first-stage results in table 5 where the dependent variables are the sums of the siblings' contributions and the regressors are the sums of the siblings' characteristics presented in the empirical section above. As expected, the number of sisters is negatively related to the sum of siblings' contributions, but is positively related to the total hours siblings spend helping parents. A higher number of younger siblings is also negatively associated with the siblings' financial contribution, a finding that is also as expected. In addition, the number of siblings in the highest education group has a positive effect on financial contributions while the number of siblings in the lower education group has a positive effect on siblings' hourly contributions. Marriage has an appreciable negative impact on financial contributions, consistent with the notion that married people shift their financial focus to their own immediate families and away from their parents. Nevertheless, the number of children is a positive predictor of financial contributions and a negative predictor of hourly help, perhaps because the care of children requires people to shift time away from caring for their parents, a shift which they may compensate for with increased financial contributions.[19] Most of these coefficient estimates are significant at the 1% level, reflecting the predictive power of the instrumental variables individually. In addition, the F stat on the excluded instruments, a commonly used diagnostic for detecting weak instruments, is above 10 in all regressions, indicating the strength of the set of instrumental variables.

Table 6 shows the average partial effects from estimating the best response functions with the two-step tobit estimator described above.[20] Column (1)

[19] In the MHAS data set, time or money provided by someone within the immediate family of a child, e.g. a daughter-in-law or grandson of the sampled elderly person, is coded as coming from the family of the son or daughter to whom they are related.

[20] I follow Wooldridge (2002) in estimating the average partial effects, $\partial E(y)/\partial x$, for the two-step IVtobit.

shows that a 100 peso increase in siblings' contributions leads to a 10 peso increase in the financial contribution of the individual migrant child. In addition, an increase in one hour of siblings' total time contribution leads to a decrease of 1.365 pesos at the individual level. The direction of this effect is the same for non-migrant children, shown in column (2), who display a somewhat smaller increase in financial contribution of 1.7 pesos for every 100 peso rise in siblings' contribution. While an increase in siblings' time contribution also has a negative effect on the contributions of non-migrant siblings, the magnitude of the effect is larger. For them, an increase in one hour of siblings' total time contribution leads to a decrease of 4.4 pesos in the individual non-migrant contribution. Column (3) shows that an increase in one hour of siblings' total time care results in a decrease of .58 hours at the individual level while an increase in siblings' contributions by 100 pesos yields a fall in hourly help of 2.6 hours. These results suggest that siblings' financial contributions are indeed strategic complements for both migrants and non-migrants while time contributions appear to be strategic substitutes. In addition, the cross-effect of siblings' financial contributions on individual time contributions points to substitution across siblings as does the effect of siblings' time contributions on individual financial contributions. The distinction between the complementarity of financial contributions across siblings and the substitutability of time contributions could point to the possibility that children expect their parents will mainly consider financial contributions when they make bequest decisions at the ends of their lives.

6 Robustness

6.1 Intrafamily correlation

One concern about the instrumental variables strategy employed here is the possibility that since the instruments are based on siblings' characteristics, they may in fact be capturing some heterogeneity at the family level that is correlated with the disturbance term in the equation determining individual i's contribution. For example, the education of individual i's siblings may be correlated with some unobserved family effect, perhaps warm and loving parents, that could be correlated with i's contribution. One solution to this problem in the linear framework would be to include family fixed effects, thereby ensuring that the error term is purged of any such family-level component which might be correlated across siblings and with siblings' contributions. Since there are so many zeros in this analysis, however, the use of non-linear estimation is key to accounting for the clustering at zero and thus effectively prohibits the use of family-level fixed effects. Instead, I include the averages of the instrumental variables across all siblings in the family (including individual i) as controls in the estimation. For example, in addition to the number of children of individual i that is included directly in the best response function and the sum of his siblings's children which are used as instrumental variables, I now include the average number of children per sibling directly in the best response function.[21] With this strategy, the siblings' characteristics used as instruments will only help predict siblings' total contributions insofar as they offer some predictive power beyond that of the family mean.

The results from the best response functions including the within-family averages are presented in table 7, which shows a pattern of results similar to the estimation without the family-level averages. Column (1) shows the results for migrants: An increase of 100 pesos in siblings' contributions results in an increase of about 20 pesos at the individual level while an increase of one hour in siblings' time contributions leads to a decrease in .40 pesos at the individual level. For non-migrants in column (2), the signs of these coefficient estimates are the same, but the magnitudes are much larger: an increase of 100 pesos in siblings' financial contribution leads to a 45 peso increase in the individual contribution while an increase in siblings' time contribution leads to a decline

[21] Of course, some averages of the instrumental variables will not be estimable because of collinearity, such as the average number of i's siblings, which will be constant equal to $\frac{n-1}{n}$, where n is the number of siblings.

in the individual's financial contribution of 2.73 pesos. Column (3) shows a negative effect of siblings' financial contributions on time contributions so that an increase in 100 pesos by siblings would result in a decrease of .5 hours at the individual level. The effect of siblings' hours contributions on individual hourly help is not statistically distinguishable from zero, but the sign is still negative as in the previous results (point estimate equal to -.003.) Overall, these results show that the findings that financial contributions are strategic complements across siblings while time contributions are strategic substitutes are robust to the critique that the instrumental variables are simply capturing family-level heterogeneity.

6.2 Selection into migration

6.2.1 Econometric model with selection

Thus far, I have been operating under the assumption that migration is predetermined and ignoring any possible selection issues. However, if migration status and the unobservable component of contributions were somehow correlated, dividing the sample by migration status would introduce a selection term into the best response functions. For instance, we might be concerned that migrants emerge from a group of people who are not close to their families, so they are more likely to migrate and give less to their parents.

Estimation of the best response functions must therefore address the omitted selection term. In the case of the time contribution equation, which is only observed when the individual is a non-migrant, we actually observe[22]

$$t_{ij} = G_{-i,j}\gamma_1 + T_{-i,j}\gamma_2 + X_{ij}\beta_2 + q(X_{ij}, G_{-i,j}, T_{-i,j}, m_{ij}) + \varrho_{ij}, \qquad (15)$$

where I have defined

$$q(X_{ij}, G_{-i,j}, T_{-i,j}, m_{ij}) = E(e_{ij}|X_{ij}, G_{-i,j}, T_{-i,j}, m_{ij})$$

[22] This section is adapted from Wooldridge (2002) which considers the case of one endogenous regressor and sample selection.

and

$$\varrho_{ij} = e_{ij} - E(e_{ij}|X_{ij}, G_{-i,j}, T_{-i,j}, m_{i,j}).$$

Note that by definition, $E(\varrho_{ij}|X_{ij}, G_{-i,j}, T_{-i,j}, m_{i,j}) = 0$. As with the Heckman two-step procedure, we can find an estimator for $q(X_{ij}, G_{-i,j}, T_{-i,j}, m_{ij})$ by noting that $E(e_{ij}|X_{ij}, G_{-i,j}, T_{-i,j}, m_{ij} = 0) = \gamma_3 \widehat{\lambda}^0_{ij}$, where $\widehat{\lambda}^0_{ij}$ is the estimated inverse Mills' ratio predicting non-migration from probit estimation on m_{ij}. From the theoretical section above, a suitable equation predicting migration is the equilibrium mapping in equation 4 , $m^*_i = m^*_i(Z)$, where migration status is a function of all siblings' characteristics. Thus, the inverse Mills ratios are derived from the migration equation estimated via probit:

$$m_{ij} = \mathbf{1}(Z\delta + \varepsilon_{ij} > 0) \tag{16}$$

where $\mathbf{1}$ is the indicator function.

While migration does not affect the observability of financial contributions, estimating equations 5 and 6 separately for migrants and non-migrants also requires the inclusion of a selection term to account for the split sample. Thus, to address the possibility of a correlation between selection into migration and child's contribution, I include the selection term for migration or non-migration into each best response function as appropriate. Because of the non-linear tobit estimation, the most appropriate way to account for selection into migration would be via maximum likelihood. The selection problem coupled with the multiple endogenous variables, however, makes maximum likelihood estimation intractable. Instead, I present the results with the selection term from the IV linear regressions of best response functions which amount to:

$$g_{ij} = G_{-i,j}\alpha^1_1 + T_{-i,j}\alpha^1_2 + \alpha^1_3\widehat{\lambda}^1_{ij} + X_{ij}\beta^1_1 + u_{ij} \text{ given } m_{ij} = 1 \tag{17}$$

$$g_{ij} = G_{-i,j}\alpha^0_1 + T_{-i,j}\alpha^0_2 + \alpha^0_3\widehat{\lambda}^0_{ij} + X_{ij}\beta^0_1 + \xi_{ij} \text{ given } m_{ij} = 0 \tag{18}$$

$$t_{ij} = G_{-i,j}\gamma_1 + T_{-i,j}\gamma_2 + \gamma_3\widehat{\lambda}^0_{ij} + X_{ij}\beta_2 + e_{ij} \text{ given } m_{ij} = 0 \tag{19}$$

where $\widehat{\lambda}_{ij}^{1} = \frac{\phi(Z)}{\Phi(Z)}$ and $\widehat{\lambda}_{ij}^{0} = \frac{\phi(Z)}{1-\Phi(Z)}$ are the estimated inverse Mills' ratio terms associated with migration and non-migration, respectively, from probit estimation of equation 16.

6.2.2 Results accounting for selection

The results from probit estimation of equation 16 can be found in Table 8. Overall, it appears that both individual and siblings' characteristics play a role in determining the probability of migration. From the theoretical model, this makes sense since the individual characteristics are partially accounting for the continuation values of financial and time contributions across siblings. One important characteristic predicting migration appears to be the number of sisters, which decreases the probability of migrating, perhaps because there are fewer migrant siblings in the family as a result raising the relative cost of migration. Another significant variable is the birth order of siblings which is negatively related to migration meaning the more younger siblings and individual has, the less likely he is to migrate. In addition, the number of siblings has a positive effect on migration, as expected, since migrants are more likely to come from larger families. The predictive power of the individual and siblings' variables lends credibility to the use of this model to estimate the inverse Mills' ratios instrumental to accounting for selection into migration.

The results from the IV linear regressions accounting for selection and endogeneity of contributions can be found in table 9. While the magnitudes of the results are somewhat different from the previous results, the signs of the coefficient estimates are consistent with previous findings of strategic complements for siblings' financial contributions. To get a better sense for the effect of including the selection term, I also include estimates from the IV linear regressions without the selection term.[23] Comparing these sets of linear results, we see very little change in the magnitude of the estimates after including the

[23] Overidentification tests on the instrumental variables in these linear regressions suggest that we fail to reject the hypothesis that the instrumental variables are uncorrelated with the error term and correctly excluded from the linear best response functions at the 5% level.

selection term. With the selection term, an increase in siblings' total financial contribution of 100 pesos results in an increase of about 6.5 pesos for migrants and about 12.5 pesos for non-migrants. An increase in one hour of siblings' total time contribution leads to a .99 peso decline in the financial contributions of non-migrants. Despite the fact that statistically significant results are not obtainable for the effects of siblings' hourly contributions on individual financial contributions for migrants, the negative sign of the estimated coefficients is the same as without the selection term (point estimate of -.12.) As for responses in terms of hourly contributions, the signs are also consistent with previous findings and both coefficients are statistically significant at the 1% level. Column (6) implies that an increase of 100 pesos in siblings' financial contributions results in a decrease in individual time contribution of about .7 hours while an increase in one hour of siblings' time contribution results in a decrease of about .11 hours at the individual level. Despite the statistically significant selection term, the magnitudes of these estimates are identical to two decimal places with those from column (5) which does not include the selection term.

Despite the problematic consistency implications, I present the tobit results including the selection term in Table 10. Overall, the results are very close in sign, magnitude, and statistical significance to the results without the selection term. For migrants, a 100 peso increase in siblings' contributions results in a 9 peso increase in the individual contribution, while an increase in one hour in siblings' time leads to a reduction in 3.2 pesos in the individual contribution. For non-migrants, a 100 peso increase in siblings' financial contribution yields a 1.8 peso increase in personal financial contribution and an increase in one hour in siblings' time contributions results in a decrease in 4.4 pesos at the individual level. An increase in 100 pesos leads to a reduction of 2.6 hours in individual time contribution while an increase in one hour of siblings' time contribution leads to a reduction of .59 hours in individual hourly help. The similarity of these results with the non-selection results is particularly noteworthy in light of the importance of the inverse Mills' ratio, which is significant at the 1% level. These results provide suggestive evidence that while selection into migration may exist, it is of second-order importance and does not affect the findings of strategic complements for siblings' monetary contributions and substitutes for siblings' time and financial contributions.

7 Do parents receive more contributions as a result of a child's migration?

7.1 Simulation

The question remains whether parents will receive more or less contributions as a result of a child's migration. Having estimated best response functions for migrants and non-migrants separately allows me to solve the best response functions simultaneously and obtain the equilibrium contributions which represent the fixed point. To do this, I begin by considering a two-sibling family where the eldest sibling is a potential migrant. Taking the median characteristics for the two siblings and drawing an error term for each, the policy question is whether the estimated best response functions predict a higher total time contribution for the elderly parent when one sibling migrates or when both stay home. An analogous policy question concerns whether the elderly parent receives a higher total financial contribution from his children when one migrates or when both stay home.

The simulation works as follows. After establishing the median characteristics for the two children in the family, I draw a sample of 500 errors from a normal distribution with mean 0 and variance equal to that found in the sample populations based on the estimated standard deviations from the three best response functions. For each draw, I compute the equilibrium total contribution to the elderly parent under two assumptions about the migration patterns of the siblings: (i) where both children are non-migrants and (ii) where the eldest son is a migrant. I then compare the equilibrium contributions toward elderly parents under the two scenarios across the 500 simulated observations to see whether, on average, the parent received more under case (i) or (ii).

To find the fixed point, I first make a guess for the initial values, the contribution of the younger sibling in terms of time and money, as a function of whether or not his sibling migrates. Given the younger sibling's contribution, I then use the estimated coefficients, median values from the sample of 2-sibling families, and the randomly drawn error terms to predict the elder sibling's contribution in the case where he migrates and the case where he does not. From the older sibling's predicted contribution, I then evaluate what the model predicts for the younger sibling's contribution based on his sibling's contributions, the median values for 2-sibling families and the randomly drawn error terms. If these predicted values match the initial guesses, then I have arrived at the equilibrium contribution; if they have not, I revise my guess for the value of the younger sibling's contribution accordingly and repeat the exercise with the new guess.[24] Just as there are many zeros in the contributions of time and money in the data set, there are also a considerable number of zeros in contributions in the simulation. Thus, in most cases, I focus on families that saw a change in contributions as a result of switching the migration status of one sibling.

7.2 Simulation Results

Table 11 presents the results from the simulation for a family of two brothers as well as a family of one sister and one brother. Panel A shows that of the 500 hypothetical families in the simulation, the average difference in financial contributions received by the parent as a result of migration is about -261, meaning that, on average, the parent receives more when both his children are in Mexico than when one child migrates.[25] In addition, we can reject the null hypothesis that the average difference in contributions is zero. Nevertheless,

[24] In practice, I define convergence to be achieved if the predicted value of the younger sibling's contribution is within 1 peso of the guess for his financial contribution and within 0.1 hour of his time contribution. The revised guess is defined to be half of the difference between the guess and the predicted value.

[25] The difference is calculated as the total contribution received by the parent when one child migrates less the total contribution received by the parent when neither child migrates.

looking more closely at the sample, only 188 observations see a shift in the financial contribution received by the parent. This lack of movement is due to the fact that many potential migrants give nothing while in the home country as well as nothing when shifted abroad, and thus, there is no change in the contribution received by the parent as a result of migration. Of those two-brother families who do see a change, about 48% receive a higher total financial contribution when one child is a migrant. Taking the standard deviation into account, we cannot rule out the possibility that the true proportion is 50%, indicating that parents may be just as likely to see financial contributions rise as they are to see them fall as a result of migration. In terms of hourly help, the average difference in time contributions as a result of migration is -15.5, indicating that the parent of two non-migrants receives more time help relative to what he would receive if one child migrates. Only 71 families see a change in the hourly contributions as a result of the migration switch, however, and of these, just 7% of parents receive more time contributions as a result of the child's migration. Since we can reject the null hypothesis that the true fraction is 50%, it appears that parents are definitively more likely to receive less time contributions as a result of migration.

The results for the families of one sister and one brother presented in Panel B, show the same pattern of results. For this sample, about 51% of parents receive more in terms of financial contributions from their children when one child migrates while approximately 12% of parents receive more in terms of time when one child migrates. As with the sample of two brothers, we can reject the hypotheses that the average contributions are the same for migrants as for non-migrants in terms of both time and money. The average differences are -138.5 for financial contributions and -13.5 for time contributions, suggesting that on average, parents receive more when children stay home. Nonetheless, we cannot reject the hypothesis that the true fraction of parents who would receive more money under the migration scenario is actually 50%.

Table 12 shows that these pattern of results are maintained when the simulation is performed using the estimates from the model accounting for selection. The average difference in contributions between the migration and non-migration scenarios is -244 for the case of two brothers, and -322 for the case of one brother and one sister. The difference in time contributions on average is -14.3 for the two brothers and -13.9 for the brother and sister. In both cases, we can reject the null that the average difference in contributions is zero. As for the fractions of household that see an increase in financial contributions as a result of the migration switch, about 41% of observations see an increase in financial contributions in the two brother case and 37% see an increase in the brother/sister case. The main difference between these estimates and the estimates without selection is that in this case, we can reject the null hypothesis that the true proportion of parents to see an increase in financial contributions is 50%, i.e. where the elderly parent is just as likely to receive more as a parent of a migrant than as a parent of a non-migrant. The remaining results show that about 14% of parents receive more time contributions as migrants in the two-brother family while 17% of parents receive more time contributions in the brother-sister family. In both of these cases, we can reject the null that the true fraction is 50%, that is, that the parent is just as likely to receive more as he is to receive less as a result of his child's migration.

It may seem surprising that financial contributions are not unilaterally higher when the child migrates. Given the results from the best response functions that show financial contributions to function as strategic complements across siblings, we might expect to see a higher contribution to the elderly parent in terms of money. Predicted financial contributions are consistent with this reasoning: financial contributions using only observable variables are predicted to be higher when one child migrates. Nevertheless, the importance of the error term cannot be understated as the variance of the error distribution is larger for non-migrants than for migrants.[26] Since contributions are constrained to be greater than or equal to zero, the larger variance in the distribution of the error term for non-

[26] For example, the standard deviation of the error term for non-migrants in the financial contribution equation from the non-selection model is 3,549 and the standard deviation of the error term for migrants is 2,059.

migrants implies a higher value of financial contributions when children are non-migrants. One explanation for the higher variance for non-migrants relative to migrants is that parents in the home country may more readily lean on children that are present when they face a temporary health shock. In contrast, children who are out of the country may be more likely to send constant amounts to their parents, and as a result we see a smaller variance in the error distribution for migrants. Consequently, we see that despite the relationship between siblings' financial and time contributions, parents of migrants are likely to receive less in terms of both time and money as a result of one child's migration than they would have if both children stayed in the home country.

8 Conclusion

The results from estimating the best response functions for children's contributions toward their elderly parents show that (1) individuals increase their financial contributions in response to an increase in their siblings' financial contributions, (2) individuals decrease their time contributions in response to an increase in their siblings' time contributions, (3) individuals decrease their time contributions in response to an increase in their siblings' financial contributions, and (4) individuals decrease their financial contributions in response to an increase in their siblings' time contributions. These results suggest that children's financial contributions function as strategic complements while their time contributions operate as strategic substitutes. They also provide evidence that children substitute for their siblings' time contributions with their own financial contributions and vice versa. This mixture of results provides a blended picture of the model which best describes family interaction. The finding of strategic complementarity in financial contributions is consistent with a strategic bequest motive in which children compete with their siblings for a potential transfer from their parent. At the same time, the finding of strategic substitution in time contributions points to a public good channel in which children can free-ride off of the time contributions of their siblings. This distinction could indicate that children expect parents to focus mainly on financial contributions when making bequest decisions. Nevertheless, due to the high variance in financial contributions from non-migrants relative to migrants, evidence from a simulation generating an exogenous switch in migrant status shows a decrease in both time and financial contributions for the majority of elderly parents who experience a change in contributions. As a result, these findings cast doubt on the popular view that families of migrants remaining in Mexico unilaterally benefit from migration and suggest that governments in sending communities should be concerned about the detrimental consequences of migration for their own elderly populations.

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Table 1: Descriptive Statistics

Panel 1A: Sons and Daughters

	Mean	SD
Female	0.499	0.500
Age	39.955	11.527
Years of Schooling	7.975	4.420
Married	0.793	0.405
Number of Children	2.795	2.284
Monthly Financial Help to Parent	164.871	1334.043
Gives Financial Help=0/1	0.179	0.383
Financial Help Given Financial Help>0	923.311	3045.302
Monthly Hours Help to Parent	15.528	72.977
Gives Hourly Help=0/1	0.120	0.325
Hours Help Given Hourly Help>0	129.710	172.381
Currently U.S. Migrant	0.107	0.309
Number of Observations	5505	

Panel 1B: Parents

	Mean	SD
Female	0.691	0.462
Age	69.861	11.075
Years of Schooling	3.245	3.581
Married	0.470	0.499
Assets	69507.430	274762.100
Monthly Income	2162.836	7060.492
Number of Children	5.932	2.747
Number of Children Living at Home	0.873	1.098
Parent with At Least 1 Child At Home	0.543	0.498
Total Monthly Financial Help from Children	978.033	4542.589
No. of Children Who Help Financially	1.059	1.612
Receive financial help from at least one child	0.416	0.493
Total Monthly Hourly Help From Children	92.111	196.574
No. of Children Who Give Hourly Help	0.710	1.014
Receive hourly help from at least one child	0.489	0.500
Difficulties with Basic Activities of Daily Life (ADLs):		
Bathing	0.304	0.460
Eating	0.177	0.382
Getting In and Out of Bed	0.445	0.497
Using the Toilet	0.313	0.464
Walking Across Room	0.440	0.497
Sum(Basic ADL difficulties)	1.675	1.602
Needs Help with Any Basic ADL	0.732	0.443
Number of Observations	928	

Table 2: Descriptive Statistics by Gender

	Sons	Daughters	
Years of Schooling	8.223	7.725	***
	(4.526)	(4.298)	
Age	39.914	39.996	
	(11.721)	(11.330)	
Married	0.804	0.782	*
	(0.397)	(0.413)	
No. Kids	2.675	2.917	***
	(2.317)	(2.244)	
Financial Help to Parent	195.864	133.731	*
	(950.717)	(1630.441)	
Gives Financial Help=0/1	0.216	0.141	***
	(0.411)	(0.348)	
Financial Help Given Financial Help>0	908.216	946.458	
	(1883.789)	(4252.582)	
Monthly Hours Help to Parent	8.709	22.379	***
	(50.696)	(89.458)	
Gives Hourly Help=0/1	0.082	0.158	***
	(0.274)	(0.365)	
Hours Help Given Hourly Help>0	106.787	141.595	***
	(145.340)	(183.885)	
Currently US Migrant	0.133	0.082	***
	(0.339)	(0.274)	
Number of Observations	2759	2746	

Table 3: Are Parents with Migrant Children Better Off?

Number of Children Currently in US:	None	At Least One	SD	
Total Children's Financial Help	886.904	1202.455	[3426.277]	
	(4923.598)	(3426.277)		
Total Children's Time Help	96.717	80.769	[184.136]	
	(201.358)	(184.136)		
Total Children's Financial Help/No.Children	186.270	215.689	[736.258]	
	(887.186)	(736.258)		
Total Children's Time Help/No. Children	20.561	12.518	[30.077]	***
	(47.469)	(30.077)		
Number of Children	5.502	6.993	[2.784]	***
	(2.614)	(2.784)		
Total Number of Migrant Children		2.201	[1.569]	
		(1.569)		
Number of Observations (Families)	660	268		

Standard Deviation in Parentheses below Mean Estimate
*** Difference in means is statistically significant at 1% level
* Difference in means is statistically significant at 10% level

Table 4: Results Under No Endogeneity

	(1) Migrants Tobit	(2) Non-Migrants Tobit	(3) Non-Migrants Tobit
Dependent Variable: Child's Contribution in Terms of:	Financial Help	Financial Help	Hourly Help
Financial Help from Other Siblings	0.243	0.19	-3.71E-04
	[0.036]***	[0.013]***	[.001]
Hourly Help from Other Siblings	-1.556	0.909	0.019
	[0.888]*	[0.427]**	[0.030]
Female	-18.931	-882.222	102.744
	[232.929]	[159.786]***	[12.925]***
Birth Order	-174.6	-131.071	-4.543
	[55.811]***	[40.933]***	[2.976]
Age	-18.847	71.381	0.998
	[70.226]	[50.578]	[3.421]
Age Squared	-0.193	-0.721	-0.064
	[0.811]	[0.586]	[0.041]
Education Group 1: 1-6 yrs	552.946	46.644	11.476
	[746.361]	[380.851]	[30.466]
Education Group 2: 7-9 yrs	877.607	138.115	2.645
	[765.601]	[402.884]	[31.901]
Education Group 3: 10-12 yrs	-192.343	44.02	29.042
	[892.551]	[471.404]	[36.245]
Education Group 4: 13+ yrs	1,196.14	784.783	-5.867
	[918.720]	[430.191]*	[34.689]
Married	-380.796	-453.493	-126.46
	[313.026]	[210.226]**	[15.314]***
Number of Kids	-46.858	-67.645	-19.44
	[68.239]	[42.650]	[3.720]***
Observations	590	4915	4915

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%
Other covariates include: Year dummy for 2003, Parent's Variables: Female, 5 indicator variables for Difficulty with Bathing, Eating, getting out of Bed, using the Toilet, Walking across the room, Age, Age Squared, 4 Education Categorical variables, Married, Parent's Assets, Parent's Monthly Income

Table 5: First Stage Least Squares Regression

	(1)	(2)
Dependent Variable: Sum of Siblings' Contributions in:	Financial Help	Hourly Help
<u>Sum of Siblings Characteristics:</u>		
Female	-203.297	8.65
	[43.540]***	[1.861]***
Birth Order	-33.012	0.329
	[10.365]***	[0.443]
Age	-33.067	-0.093
	[9.467]***	[0.405]
Age Squared	0.366	0.004
	[0.113]***	[0.005]
Education Group 1: 1-6 yrs	1.041	8.382
	[70.752]	[3.024]***
Education Group 2: 7-9 yrs	94.419	0.8
	[74.064]	[3.165]
Education Group 3: 10-12 yrs	-119.193	7.175
	[93.032]	[3.976]*
Education Group 4: 13+ yrs	215.46	3.688
	[82.005]***	[3.504]
Married	-260.585	-0.151
	[43.752]***	[1.870]
Number of Kids	34.734	-1.389
	[9.609]***	[0.411]***
Number of Siblings	1,142.81	2.649
	[211.117]***	[9.022]
F stat on Excluded Instruments	10.46	18.54
Observations	5505	5505

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%
Other covariates include: Female, Age, Age squared, 4 Education Categorical Variables, Married, Number of Children, Year dummy for 2003,Parent’s Variables: Female, 5 indicator variables for Difficulty with Bathing, Eating, getting out of Bed, using the Toilet, Walking

Table 6: Best Response Functions for Parental Contributions
Average Partial Effects

	(1) Migrants IVTobit Financial Help	(2) Non-Migrants IVTobit Financial Help	(3) Non-Migrants IVTobit Hourly Help
Financial Help from Other Siblings	0.100	0.017	-0.026
	[0.010]***	[0.008]**	[0.001]***
Hourly Help from Other Siblings	-1.365	-4.405	-0.588
	[0.127]***	[0.094]***	[0.008]***
Female	-11.000	-473.000	44.125
	[7.493]	[6.481]***	[0.341]***
Birth Order	-82.784	-28.967	2.955
	[2.634]***	[1.374]***	[0.116]***
Age	-7.108	28.574	-0.457
	[1.952]***	[1.314]***	[0.116]***
Age Squared	-0.116	-0.213	-0.013
	[0.021]***	[0.016]***	[0.001]***
Education Group 1: 1-6 yrs	270.375	61.625	11.875
	[18.328]***	[11.819]***	[1.110]***
Education Group 2: 7-9 yrs	431.625	23.250	-0.750
	[18.938]***	[12.121]*	[1.222]
Education Group 3: 10-12 yrs	-103.000	-56.625	2.125
	[32.507]***	[13.929]***	[1.309]
Education Group 4: 13+ yrs	544.250	337.625	-5.250
	[26.305]***	[14.280]***	[1.334]***
Married	-182.500	-157.000	-62.375
	[8.891]***	[5.372]***	[0.553]***
Number of Kids	-22.658	-32.883	-9.300
	[1.749]***	[1.589]***	[0.112]***
Year=2003	317.375	316.750	-9.750
	[7.991]***	[8.420]***	[0.772]***
Number of Observations	590	4915	4915

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%
Bootstrapped standard errors clustered at family level based on 500 replications

Table 6, continued: Best Response Functions
Average Partial Effects

	(1) Migrants IVTobit Financial Help	(2) Non-Migrants IVTobit Financial Help	(3) Non-Migrants IVTobit Hourly Help
Parent's Variables:			
Female	330.875	448.250	54.875
	[13.642]***	[9.730]***	[0.702]***
Bathing Difficulty	279.125	306.000	82.875
	[13.163]***	[9.005]***	[0.783]***
Eating Difficulty	34.500	432.375	113.875
	[28.614]	[15.350]***	[1.328]***
Bed Difficulty	-49.125	7.625	-19.625
	[8.054]***	[6.364]	[0.502]***
Toilet Difficulty	192.625	-10.125	11.375
	[9.536]***	[8.066]	[0.687]***
Walking Difficulty	-331.250	203.875	36.000
	[8.390]***	[6.875]***	[0.631]***
Age	54.671	2.809	-22.164
	[5.888]***	[3.667]	[0.370]***
Age Squared	-0.238	0.007	0.178
	[0.039]***	[0.026]	[0.003]***
Education Group 1: 1-6 yrs	-120.375	-40.000	1.250
	[8.220]***	[6.657]***	[0.612]**
Education Group 2: 7-9 yrs	-1171.625	329.875	22.000
	[117.839]***	[27.021]***	[2.000]***
Education Group 3: 10-12 yrs	-6119.125	-9707.250	22.750
	[70.858]***	[170.082]***	[2.469]***
Education Group 4: 13+ yrs	-1740.375	125.375	5.625
	[125.760]***	[18.622]***	[2.060]***
Married	-25.500	-36.125	-24.125
	[11.670]**	[5.946]***	[0.637]***
Assets	0.000	0.000	0.000
	[0.000]***	[0.000]***	[0.000]***
Monthly Income	0.022	-0.007	-0.001
	[0.001]***	[0.001]***	[0.000]***
Constant	-2754.625	-2756.875	558.750
	[199.870]***	[134.501]***	[12.272]***
Number of Observations	590	4915	4915

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%
Bootstrapped standard errors clustered at household level based on 500 Replications

Table 7: Best Response Functions Controlling for Within Family Heterogeneity
Average Partial Effects

	(1) Migrants IVTobit Financial Help	(2) Non-Migrants IVTobit Financial Help	(3) Non-Migrants IVTobit Hourly Help
Financial Help from Other Siblings	0.199	0.449	-0.005
	[0.009]***	[0.006]***	[0.001]***
Hourly Help from Other Siblings	-0.404	-2.725	-0.003
	[0.119]***	[0.108]***	[0.009]
Female	-89.750	-347.875	56.375
	[8.087]***	[4.428]***	[0.359]***
Birth Order	14.479	-60.574	6.553
	[2.374]***	[1.636]***	[0.159]***
Age	51.886	20.122	1.649
	[2.231]***	[1.429]***	[0.110]***
Age Squared	-0.450	-0.253	-0.027
	[0.024]***	[0.017]***	[0.001]***
Education Group 1: 1-6 yrs	201.250	79.625	9.625
	[15.972]***	[10.403]***	[0.863]***
Education Group 2: 7-9 yrs	341.750	280.250	8.625
	[16.636]***	[10.648]***	[0.939]***
Education Group 3: 10-12 yrs	-90.000	444.625	25.375
	[29.456]***	[15.595]***	[1.125]***
Education Group 4: 13+ yrs	860.750	728.500	-4.125
	[30.914]***	[17.727]***	[1.047]***
Married	-187.375	-192.875	-81.500
	[8.914]***	[5.690]***	[0.516]***
Number of Kids	-37.714	-19.909	-9.252
	[2.167]***	[1.697]***	[0.117]***
Year=2003	360.125	316.625	-2.125
	[8.348]***	[9.371]***	[0.480]***
Averages of IVs Within Families	Yes	Yes	Yes
Number of Observations	590	4915	4915

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%
Bootstrapped standard errors clustered at family level based on 500 Replications
Other covariates include: Parent’s Variables: Female, 5 indicator variables for Difficulty with Bathing, Eating, getting out of Bed, using the Toilet, Walking across the room, Age, Age Squared, 4 Education Categorical variables, Married, Parent's Assets, Parent's Monthly Income

Table 8: Marginal Effects From Probit Predicting Migration

	(1) Full Sample dProbit Migration
Sum of Siblings Characteristics:	
Female	-8.22E-03
	[4.991e-03]*
Birth Order	-2.07E-03
	[1.041e-03]**
Age	-1.75E-03
	[9.469e-04]*
Age Squared	1.72E-05
	[1.190e-05]
Education Group 1: 1-6 yrs	6.66E-03
	[7.295e-03]
Education Group 2: 7-9 yrs	-2.60E-03
	[7.886e-03]
Education Group 3: 10-12 yrs	1.41E-02
	[9.869e-03]
Education Group 4: 13+ yrs	-3.01E-03
	[8.715e-03]
Married	5.48E-03
	[4.487e-03]
Number of Kids	2.32E-04
	[1.091e-03]
Number of Siblings	5.15E-02
	[2.126e-02]**
Individual Characteristics	
Female	-4.80E-02
	[9.320e-03]***
Birth Order	7.29E-03
	[3.471e-03]**
Age	4.32E-03
	[2.664e-03]
Age Squared	-2.38E-05
	[2.874e-05]
Education Group 1: 1-6 yrs	5.77E-02
	[2.352e-02]**
Education Group 2: 7-9 yrs	4.54E-02
	[2.683e-02]*
Education Group 3: 10-12 yrs	2.14E-02
	[3.167e-02]
Education Group 4: 13+ yrs	-2.40E-02
	[2.385e-02]
Married	3.56E-02
	[1.115e-02]***
Number of Kids	-1.04E-02
	[2.456e-03]***
Observations	5505

Robust standard errors, clustered at family level, in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%
Other covariates include: Year dummy for 2003, Parent’s Variables: Female, 5 indicator variables for Difficulty with Bathing, Eating, getting out of Bed, using the Toilet, Walking across the room, Age, Age Squared, 4 Education Categorical variables, Married, Parent's Assets, Parent's Monthly Income

Table 9: IV Linear Regression Results for Best Response Functions With and Without Selection Term

	(1) Migrants IV Linear Financial Help	(2) Migrants IV Linear Financial Help	(3) Non-Migrants IV Linear Financial Help	(4) Non-Migrants IV Linear Financial Help	(5) Non-Migrants IV Linear Hourly Help	(6) Non-Migrants IV Linear Hourly Help
Financial Help from Other Siblings	0.063	0.065	0.116	0.125	-0.007	-0.007
	[0.023]***	[0.009]***	[0.031]***	[0.002]***	[0.005]	[0.000]***
Hourly Help from Other Siblings	-0.162	-0.122	-0.981	-0.987	-0.109	-0.111
	[0.750]	[0.124]	[0.363]***	[0.023]***	[0.054]**	[0.003]***
Female	-26.255	-50.055	-28.737	-28.644	10.775	12.964
	[114.646]	[7.468]***	[48.489]	[3.589]***	[2.495]***	[0.183]***
Birth Order	-92.849	-89.919	-11.905	-11.882	0.508	0.227
	[46.122]**	[2.766]***	[6.172]*	[0.323]***	[0.950]	[0.044]***
Age	7.824	8.020	-1.329	-1.280	0.578	0.518
	[19.868]	[1.484]***	[10.399]	[0.719]*	[1.006]	[0.055]***
Age Squared	-0.311	-0.305	0.035	0.034	-0.010	-0.009
	[0.249]	[0.017]***	[0.171]	[0.012]***	[0.012]	[0.001]***
Education Group 1: 1-6 yrs	172.556	199.962	26.598	29.706	0.452	-2.484
	[104.970]	[11.863]***	[48.125]	[2.868]***	[7.794]	[0.445]***
Education Group 2: 7-9 yrs	252.582	265.682	8.567	8.348	-4.185	-5.538
	[127.303]**	[12.296]***	[40.362]	[2.302]***	[8.255]	[0.436]***
Education Group 3: 10-12 yrs	214.150	216.521	-3.240	-0.381	-4.990	-5.459
	[137.995]	[13.690]***	[43.388]	[2.469]	[9.708]	[0.507]***
Education Group 4: 13+ yrs	439.502	416.825	81.482	77.698	-9.666	-8.330
	[313.793]	[20.762]***	[68.759]	[3.215]***	[9.394]	[0.481]***
Married	-287.015	-262.112	-15.447	-8.256	-24.613	-26.181
	[186.887]	[11.835]***	[64.322]	[4.054]**	[5.048]***	[0.291]***
Number of Kids	-31.863	-37.638	-20.318	-21.164	-2.146	-1.728
	[24.421]	[2.127]***	[21.966]	[1.235]***	[0.906]**	[0.059]***
Inverse Mills' Ratio	No	108.287	No	-33.499	No	26.753
		[21.451]***		[13.789]**		[1.606]***
Number of Observations	590	590	4915	4915	4915	4915

Robust standard errors clustered at family level in brackets
* significant at 10%; ** significant at 5%; *** significant at 1%

Table 10: IVTobit Results for Best Response Functions with Selection Term

	(1) Migrants IVTobit Financial Help	(2) Non-Migrants IVTobit Financial Help	(3) Non-Migrants IVTobit Hourly Help
Financial Help from Other Siblings	0.088	0.018	-0.026
	[0.013]***	[0.013]	[0.001]***
Hourly Help from Other Siblings	-3.170	-4.396	-0.594
	[0.189]***	[0.156]***	[0.013]***
Female	142.375	-484.750	49.625
	[11.967]***	[12.130]***	[0.831]***
Birth Order	-94.993	-27.303	2.102
	[3.719]***	[1.950]***	[0.171]***
Age	-2.423	29.064	-0.680
	[2.658]	[1.885]***	[0.154]***
Age Squared	-0.202	-0.216	-0.012
	[0.029]***	[0.022]***	[0.002]***
Education Group 1: 1-6 yrs	44.500	78.875	4.125
	[29.572]	[17.531]***	[1.665]**
Education Group 2: 7-9 yrs	291.500	31.250	-4.250
	[29.231]***	[17.104]*	[1.720]**
Education Group 3: 10-12 yrs	-192.375	-52.250	0.500
	[47.912]***	[19.380]***	[1.881]
Education Group 4: 13+ yrs	569.250	330.000	-1.375
	[37.701]***	[20.441]***	[1.853]
Married	-333.500	-146.875	-67.125
	[15.976]***	[8.540]***	[1.131]***
Number of Kids	22.130	-35.327	-8.079
	[3.474]***	[2.577]***	[0.219]***
Inverse Mills Ratio	-816.090	-154.590	75.490
	[42.391]***	[75.192]**	[6.865]***
Number of Observations	590	4915	4915

Standard errors in brackets * significant at 10%; ** significant at 5%; *** significant at 1%
Bootstrapped standard errors clustered at family level based on 300 Replications

Table 11: How Would an Exogenous Switch in Migrant Status Affect Elderly Contributions? Simulation Results

Panel A: Two Brothers; Older Brother Is Potential Migrant

	Mean	Std. Dev.	N
Financial Contributions (FC)			
FC as Migrant Family - FC as Non-Migrant Family	-261.48	1427.88	500
FC as Migrant Family>FC as Non-Migrant Family	0.476	0.501	188
Time Contributions (TC)			
TC as Migrant Family - TC as Non-Migrant Family	-15.52	58.73	500
TC as Migrant Family>TC as Non-Migrant Family	0.070	0.258	71

Panel B: One Sister, One Brother; Older Brother Is Potential Migrant

	Mean	Std. Dev.	N
Financial Contributions (FC)			
FC as Migrant Family - FC as Non-Migrant Family	-138.54	1342.76	500
FC as Migrant Family>FC as Non-Migrant Family	0.509	0.501	175
Time Contributions (TC)			
TC as Migrant Family - TC as Non-Migrant Family	-13.52	53.21	500
TC as Migrant Family>TC as Non-Migrant Family	0.118	0.325	76

Table 12: Simulation Results Based on Model with Selection

Panel A: Two Brothers; Older Brother Is Potential Migrant

	Mean	Std. Dev.	N
Financial Contributions (FC)			
FC as Migrant Family - FC as Non-Migrant Family	-244.32	1211.21	500
FC as Migrant Family>FC as Non-Migrant Family	0.410	0.493	183
Time Contributions (TC)			
TC as Migrant Family - TC as Non-Migrant Family	-14.30	56.08	500
TC as Migrant Family>TC as Non-Migrant Family	0.143	0.352	70

Panel B: One Sister, One Brother; Older Brother Is Potential Migrant

	Mean	Std. Dev.	N
Financial Contributions (FC)			
FC as Migrant Family - FC as Non-Migrant Family	-321.99	1377.27	500
FC as Migrant Family>FC as Non-Migrant Family	0.372	0.485	156
Time Contributions (TC)			
TC as Migrant Family - TC as Non-Migrant Family	-13.89	55.90	500
TC as Migrant Family>TC as Non-Migrant Family	0.167	0.375	72