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# BETTER RICH, OR BETTER THERE? GRANDPARENT WEALTH, CORESIDENCE, AND INTRAHOUSEHOLD ALLOCATION

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**ABSTRACT**

This paper uses three-generation retrospective data from the rural Philippines to examine the role of the extended family, proxied by alternative measures of grandparent coresidence, on investments in children. An extension of the wealth model of intergenerational transfers shows that extended family resources may affect transfers to children if parents are credit constrained. Family-level unobservables are important in determining the allocation of education and land between sons and daughters. Both parent and grandparent pre-marriage wealth affect children’s completed schooling levels. Grandparent wealth, however, does not seem to affect the distribution of education between sons and daughters, although it affects the allocation of land. Grandparent influence on child schooling appears to work through proximity rather than through wealth. Sons are clearly favored in terms of land inheritance, while daughters get more education. Better educated fathers favor daughters in terms of education, while mothers with more land favor sons. These patterns are consistent with both equity and efficiency objectives, investment in children under resource constraints, and parents' risk-diversification strategies.

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## 1. INTRODUCTION

This paper examines the effect of intergenerational extension on the level and intrahousehold distribution of intergenerational transfers. Although a substantial amount of literature exists on parents' motives for intergenerational transfers, the role of intergenerational extension in transfer behavior is much less studied.[1] The few exceptions consider the effects of linked-household (Foster 1993) and grandparent characteristics (Schoeni, Strauss, and Thomas 1993; Lillard and Willis 1994) on children's education; most studies have focused on the role of parental background on current educational outcomes of children in nuclear, two-generation families.

However, the nuclear family may not typify much of the developing world, where the extended family is the prevalent household structure. In economies with imperfect asset and insurance markets, the extended family provides avenues for consumption-smoothing and risk-sharing (Rosenzweig 1988; Townsend 1994), enabling families to smooth consumption over the family's life cycle.[2] In traditional agricultural environments, the prevalence of inheritance as a form of land transfer, together with intergenerational extension, permits family members to maximize gains from family farms (Rosenzweig and Wolpin 1985). Grandparent coresidence may also play a role in inculcating values for old age support among the young; this

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[1] See Behrman (1993) for a review of the literature on intergenerational transfers.

[2] Evidence for risk pooling in Indian villages has been found using both transfer and consumption data; see Rosenzweig (1988) and Townsend (1994). In contrast, in the United States, extended family resources have only a modest effect on household consumption after controlling for their ability to predict a household's permanent income (Altonji, Hayashi, and Kotlikoff 1992). The divergence of findings suggests substantial differences in asset and insurance markets in these economies.

"demonstration effect" is consistent with the higher incidence of grandparent coresidence among families with young children (Stark and Cox 1992).

Strict measures of coresidence could underestimate the influence of the extended family, since families may be functionally extended even if they are residentially nuclear.[3] In quasi-coresident arrangements, which are common in South and Southeast Asia, parents and children live separately but in close proximity, and see and help each other frequently (Johnson and DaVanzo 1996). This gives older family members who are nearby an opportunity to influence household decisionmaking. In Bangladesh, for example, where related households (the *bari*) typically live around a common yard, land ownership and education of the head in origin households affect educational attainment of children in partitioned households (Foster 1993).

In Peninsular Malaysia, frequent visits between adult children and mother are common among all ethnic groups, and frequent assistance is prevalent (Johnson and DaVanzo 1996). In the rural Philippines, since land from the family parcel is part of the marriage gift, nuclear families of siblings usually live near grandparents. Bilateral extension, multilineal descent, and the respect given to the elderly give grandparents of both spouses substantial influence on family decisions (Lopez 1991; Medina 1991).[4]

This paper tests whether intergenerational extension affects transfers of education and land to children in the rural Philippines. Using an extension of the

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[3] In this paper, I use the term" extended family" to refer to functionally extended families of several generations, regardless of whether or not the elderly reside with adult children and grandchildren. Unlike the Indian subcontinent and China, extended families composed of families of siblings (usually brothers) are not common in the Philippines.

[4] Bilateral kinship in Filipino families means that the individual at birth is affiliated with both paternal and maternal groups of relatives. Since descent lines are reckoned through ascending generations on both sides, the descent system is multilineal.

wealth model of transfers, it shows that family background—parent and grandparent pre-marriage wealth—and preferences influence the optimal investment in children when families face credit constraints or when capital markets are imperfect. It argues that transfer outcomes in extended families depend on both *inter*generational and *intra*generational bargaining. Based on a unique retrospective survey of three generations in the rural Philippines, it provides econometric evidence on the degree to which wealth and schooling levels of parents and grandparents interact with child characteristics, especially the sex of the child, and affect transfers of education and land to them. The paper also tests whether "extended family" effects, as proxied by alternative measures of grandparent coresidence, have an additional effect on investments in children when both parent and grandparent characteristics are included as regressors.

Econometric results show that both parent and grandparent pre-marriage wealth affect children's completed schooling levels. When family-level unobservables are considered, daughters have a slight advantage relative to sons. Daughters of better-educated fathers, and sons of land-owning mothers, are favored with respect to education. Grandparent wealth, however, does not seem to affect the distribution of education between sons and daughters. Indeed, grandparent influence on child schooling appears to work through proximity rather than through wealth, a finding robust to alternative coresidence measures. In these rural communities, daughters' advantage with respect to education is compensated by the preferential bestowal of land to sons. Moreover, grandparents seem to exhibit gender preference in land allocations: both grandparent wealth and coresidence affect the distribution of land between sons and daughters. These results suggest that in societies characterized by intergenerational extension, the extended family, as well as parental preferences, influences the allocation of wealth between sons and daughters.

## 2. PARENTAL PREFERENCES AND INTERGENERATIONAL EXTENSION

### A MODEL OF INTERGENERATIONAL WEALTH TRANSMISSION

To what extent does family background affect investment in future generations? In the wealth model of the family (Becker 1974; Becker and Tomes 1986), parents are altruistic and care about their children's adult incomes as well as their own consumption.[5] Parents maximize a utility function spanning generations, in which utility depends on the number of children, consumption of parents, and the income of children, which enter separately into the utility function:

$$U_{t-1} = U_{t-1}(C, z_{t-1}, Y_t^i, \alpha) \qquad i = 1, \ldots, C, \tag{1}$$

where $C$ is the number of children; $z_{t-1}$, parental consumption, is defined over goods and leisure ($z_{t-1} = (x_{t-1}, l_{t-1})$; $Y_t^i$ is the adult income of child $i$; $\alpha$ is a parameter reflecting parents' preferences for consumption vis-à-vis children's future income, and $t$ indexes generations.

Adult income for each child in generation $t$ is specified as

$$Y_t^i = \beta E_t^i + a_t^i + l_t^i, \tag{2}$$

where

$$E_t^i = \gamma(x_{t-1}^i, s_{t-1}^i, G_t^i) \ \ with \ \ \gamma_j > 0, \ j = x, s, G, \tag{3}$$

[5] In this initial exposition, I assume that a unitary model holds. This assumption will be relaxed to accommodate individual preferences subsequently.

where each child's income is the sum of adult earnings $Y_t^i$, which depends on human

$$a_t^i = \delta(a_{t-1}^i, r), \quad \textbf{(4)}$$

capital $E_t^i$, asset income $a_t^i$, and market luck $l_t^i$. Adult earnings are the product of a human capital production function $E_t^i$, defined over a parental efficiency parameter $\gamma$, genetic endowments $G$, and parental ($x$) and public expenditures ($s$) on his or her development. Asset income $a_t^i$ depends on assets inherited from parents $a_{t-1}^i$ and the rate of interest $r$.

The parents' income constraint is

$$Y_{t-1} = x_{t-1} + p_e \sum x_{t-1}^i + p_a \sum a_{t-1}^i, \quad \textbf{(5)}$$

where income of parents $Y_{t-1}$ is spent on parental consumption of goods, $x_{t-1}$ (the numeraire), and expenditures on education and asset transfers, $p_e \Sigma x_{t-1}^i + p_a \Sigma a_{t-1}^i$. The price of education, $p_e$, $x_{t-1}^i$, is educational investment in child $i$, $p_a$ is the price of the asset and $a^i$ is the amount of assets transferred to child $i$. The parents then jointly maximize equation (1) subject to equations (2) and (5) to obtain the optimal number of children and optimal expenditures on human capital and assets per child, $x^*_{t-1}{}^i$ and $a^*_{t-1}{}^i$.[6]

If capital markets are perfect, altruistic parents borrow to maximize the net incomes (earnings less debt) of their children. They make expenditures on their children's human capital to equate the marginal rate of return on human capital to the

[6] The utility maximization problem can also be interpreted as a lifetime optimization problem, in which case the relevant budget constraint would be the life-cycle constraint, and all decisions will be a function of wealth.

interest rate r, such that the optimal expenditure on children's human capital is given by[7]

$$x^*_{t-1} = g(G_t, s_{t-1}, r; \alpha). \qquad \textbf{(6)}$$

Since parents can borrow to finance their children's education, and debt can be passed on to children, parent's income does not affect educational expenditure. Differences in educational investment across children in the same family would arise only from variations in the returns to education for each child, due to differences in innate ability. Having invested to maximize the joint wealth of the family line, parents then use bequests (transfers) to equalize incomes across children. To illustrate, suppose that child 1 has better income-earning opportunities from education, while child 2 has a comparative advantage in asset-intensive (say land-intensive) activities (Figure 1). If credit markets are perfect, parents would choose E*, L* to equalize the marginal return to education relative to land, which is r*. This leads to an allocation of ($E_1$*, $L_1$*) to child 1, and ($E_2$*, $L_2$*) to child 2.[8]

However, if asset markets are imperfect, parents may not be able to finance educational investment by borrowing. They may therefore be forced to reduce their

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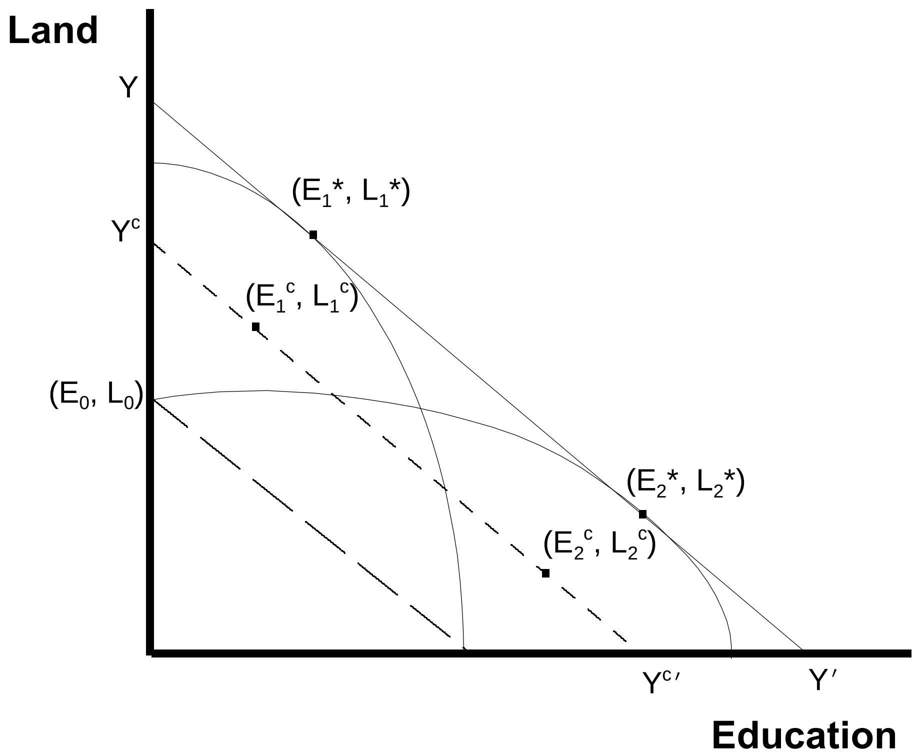
[7] For ease of exposition, the following discussion refers to any child *i*.

[8] While the notation suggests that both types of transfers are interchangeable, in practice, asset transfers tend to be lumpy and infrequent, land usually being bestowed during marriage. It is possible that the uniqueness of land bequests determines the allocation of investments between children (sons or daughters). Land may usually go to the sons because sons have acquired specific experience or out-of-school training in farming early. In some traditional societies, sons inherit land because of a desire to keep land owned in the family's name.

**Figure 1 Transfers of education and land to Child 1 and Child 2 under perfect and imperfect credit markets**



own consumption, liquidate some of their assets, or choose among children (Behrman, Pollak, and Taubman 1992).

Parental income is thus given by the line $Y_cY_c'$, where *c* indexes the constrained situation. The actual allocation may then lie within the wealth transfer opportunity curve at $(E_1^c, L_1^c)$, and $(E_2^c, L_2^c)$, where $E_1^c < E_1^*$ and $E_2^c < E_2^*$. In the extreme, in societies with limited mobility, or with resource scarcity, parents may invest the family's resources in the child with the greatest probability of success, as in traditions of unigeniture (Chu 1991).[9] This is illustrated by the corner solution $(E_0, L_0)$ where child 2 gets all the resources. Thus, when parental resources are limited, and asset markets are imperfect, expenditures on children would depend not only on endowments of children and public expenditure, but also on earnings of parents, $Y_{t-1}$ (which determines the intercept of the line YY'), their generosity towards children (and towards specific children in the sibset), as reflected in the parameter $\alpha$, and the uncertainty or luck of children, $\epsilon_t$.[10] Thus, expenditures on children would be given by

$$x_{t-1}^{*} = g^{*}(G_t, s_{t-1}, Y_{t-1}, \epsilon_t; \alpha)\,. \qquad \textbf{(7)}$$

Substituting $Y_{t-1}$ for $Y_t$ in equation (1) and in equation (4),

$$Y_{t-1} = \beta E_{t-1} + a_{t-1} + l_{t-1},$$

and, for simplicity, setting $\beta = 1$ and substituting $a_{t-1}$ for $a_t$ in equation (4),

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[9] While Chu (1991) analyzes primogeniture, unigeniture describes more accurately the bestowal of wealth to one heir. Among the Ilocanos in the Philippines, for example, land may be used to finance the elder children's education and work abroad, leaving it to be inherited by the youngest child.

[10] Since innate ability is not completely observable, parents may not know the wealth-maximizing investment in each child with complete certainty.

$$Y_{t-1} = \gamma(x^*_{t-2}, s_{t-2}, G_{t-1}; \alpha_{t-1}) + \delta(a_{t-2}, r) + l_{t-1}\,. \qquad \textbf{(8)}$$

That is, parents' income is determined by grandparents' and public expenditures in the past, their own endowments, income from assets inherited from grandparents, luck, and *grandparents'* preferences for investment in their children (parents), $''_{t-1}$. Substituting equation (8) for $Y_{t-1}$ in equation (7),

$$x^*_{t-1} = g^*(G_t, s_{t-1}, \gamma(x^*_{t-2}, s_{t-2}, G_{t-1}, \epsilon_{t-1}\,; \alpha_{t-1}) + \delta(a_{t-2}, r) + l_{t-1}, \epsilon_t\,; \alpha\,), \qquad \textbf{(9)}$$

and again substituting for $x^*_{t-2}$,

$$x^*_{t-1} = g^*(G_t, s_{t-1}, \gamma(G_{t-1}, s_{t-2}, Y_{t-2}, \epsilon_{t-1}\,; \alpha_{t-1})\, s_{t-2}, G_{t-1}, \epsilon_{t-1}) + \delta(a_{t-2}, r) + l_{t-1}, \epsilon_t\,; \alpha\,). \qquad \textbf{(10)}$$

Thus, if asset markets are imperfect, grandparents' earnings, $Y_{t-2}$, will affect transfers to parents, and, in turn, transfers to children. Note, however, that parental asset income is determined by assets inherited from grandparents. Thus, parents who were not beneficiaries of human capital but of physical assets can also support investments in their own children's human capital. Since assets inherited from grandparents $a_{t-2}$ are a part of $Y_{t-2}$, equation (10) can be rewritten as

$$x^*_{t-1} = g^*(G_t, s_{t-1}, \gamma(g^*(G_{t-1}, s_{t-2}, Y_{t-2}, (a_{t-2}, r), \epsilon_{t-1}\,; \alpha_{t-1}), s_{t-2}, G_{t-1}, \epsilon_{t-1}) + \delta(a_{t-2}, r) + l_{t-1}, \epsilon_t\,; \alpha\,). \qquad \textbf{(10}'\textbf{)}$$

Family background—and grandparent preferences—would therefore have a greater impact on investment in children in economies with imperfect asset markets and in families facing greater resource constraints.

## THE MODEL AND EMPIRICAL SPECIFICATION

Consider an agricultural household with two adult members (parents). Parents decide on the desired number of children and levels of education and asset transfers to them. Unlike in equation (1), however, parents may not share a single utility function nor pool their income completely, as in equation (5). In this case, the common preference model with a single parental utility function does not hold, and the outcome is the result of bargaining between spouses (McElroy 1990). Intergenerational transfers may thus reflect individualistic preferences and differences in transfer objectives.[11] Transfers may be based on future returns that the children would bring (Rosenzweig 1986), preferences for intersibling equality (Behrman, Pollak, and Taubman 1982), or trade-offs between equity and efficiency (Pitt, Rosenzweig, and Hassan 1990; Haddad and Kanbur 1990). They may also be motivated by family heads' desire to preserve the family line (Chu 1991).

Preferences of husband and wife may not be the only determinants of intrahousehold allocation. If grandparents influence parental decisions, outcomes will be affected by both intrahousehold and intergenerational bargaining. Indeed, potential bequests can be used to induce old-age support (Bernheim, Schleifer, and Summers 1985). Moreover, in Japanese two-generation (parent and adult child) households, the larger the share of income of the older generation, the more consumption patterns reflect the older generation’s tastes (Hayashi 1995). Extended family influences may thus be more important when liquidity constraints and imperfect asset markets compel parents to turn to the extended family as a resource pool.

Suppose that father and mother have their own utility functions and individual stocks of human and physical wealth, which are predetermined at the time of

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[11] For a comprehensive review of the literature on intrahousehold transfers, see Behrman (1993). An exhaustive review of empirical models of household decisionmaking, particularly with respect to human resources, is found in Strauss and Thomas (1995).

marriage.[12] The desired number of children and optimal levels of education and asset transfers to child *i* in family *j* are determined by maximizing equation (1) subject to equations (2) and (5), given a vector of prices **p,** but allowing for individual preferences and individual stocks of human capital and pre-marriage wealth.

The fertility and child investment decision takes place in each generation—grandparents decide on the number of children in the parent generation, and transfers to them; parents make analogous decisions for their children. As in many models of transfers that do not model family size, this work takes family size to be a family-specific characteristic, and concentrates on investments in children, conditional on family size.[13]

From the previous section, given imperfect asset markets, the optimal investment in human capital in the parent generation is given by equation (7):

$$x^*_{t-1} = g^*(G_t, s_{t-1}, Y_{t-1}, \epsilon_t; \alpha).$$

Let the subscript *p* refer to the parent generation, and *gp*, to the grandparent generation. No data are available on actual expenditures on education, but educational attainment, $E_p$ (years of schooling), is observed. Likewise, $Y_{t-1}$ or $Y_{gp}$ is not measured directly, but has measures of individual pre-marriage wealth, namely measures of human capital ($E_{gf}$ and $E_{gm}$, for education of the grandfather and

[12] I use "pre-marriage wealth" to denote human and physical capital not affected by allocation decisions within marriage. I refer to these as "parental characteristics" in subsequent discussions.

[13] This specification, which focuses on education and land transfers, departs from studies on intergenerational mobility that focus on the correlation between parents' and children's earnings (e.g., Becker and Tomes 1986; Goldberger 1989; Solon 1992; Zimmerman 1992; Behrman and Taubman 1990). I examine transfers of physical and human capital (which are predictors of lifetime earnings) rather than current earnings, due to the difficulty of obtaining permanent income measures in this agricultural setting, and because limited convertibility of assets may strengthen the correlation between successive generations' wealth.

grandmother, respectively) and assets ($a_{gf}$ and $a_{gm}$), as indicated by grandparents' individual landownership. In the absence of direct measures of government expenditure on human capital, the birth year $T_i$ captures secular changes in the availability of schooling.

Grandparents, *g*, decide on educational investment in child *i* in generation *p* (parents), conditional on the number of children, $C^*_p$:

$$E^*_{ip} = E^*_{ip}(p, E_{gf}, E_{gm}, a_{gf}, a_{gm}, T_{ip} ; \alpha_g, C^*_p) . \qquad \textbf{(11)}$$

Asset transfers, in turn, will be conditioned on the number of children, $C^*_p$, and previous investment in their human capital, $E^*_{ip}$:

$$a^*_{ip} = a^*_{ip}(p, E_{gf}, E_{gm}, a_{gf}, a_{gm}, T_{ip} ; \alpha_g, C^*_p, E^*_{ip}) . \qquad \textbf{(12)}$$

In the next generation, generation *c* (children), an analogous process would result in the following:

$$E^*_{ic} = E^*_{ic}(p, E_{pf}, E_{pm}, a_{pf}, a_{pm}, T_{ic} ; \alpha_p, C^*_c) , \qquad \textbf{(13)}$$

$$a^*_{ic} = a^*_{ic}(p, E_{pf}, E_{pm}, a_{pf}, a_{pm}, T_{ic} ; \alpha_p, C^*_c, E^*_{ic}) , \qquad \textbf{(14)}$$

where *pf* and *pm* index the father and mother in the parents' generation. However, note that

$$E_{pf} = E^*_{ip}(p, E_{gf}, E_{gm}, a_{gf}, a_{gm}, T_{ip} ; \alpha_g, C^*_p) ,$$

and similarly for $E_{pm}$; and

$$a_{pf} = a^*_{ip}(p, E_{gf}, E_{gm}, a_{gf}, a_{gm}, T_{ip}\,; \alpha_g, C^*_p, E^*_{ip}),$$

and analogously for $a_{pm}$. Thus, equations (13) and (14) can be rewritten in terms of the grandparent human-capital and pre-marriage-wealth variables.

In practice, within a family, $E^*_{ij}$ and $a^*_{ij}$ are all affected by the same unobservables, such as preferences, and could have common error components that persist across generations in the same family. It is difficult to find variables that would affect some of the decisions exclusively, in order to impose identifying restrictions. For example, spousal selection, child's marital status, and parental coresidence may be endogenous to individual characteristics and parent's previous investment in children. If assortative mating occurs in the marriage market, the effects of maternal education on child schooling may also be overstated (Foster 1995). If one assumes that previous levels are predetermined and that errors are not correlated across equations, then the model can be estimated recursively. Alternatively, one can estimate reduced-form equations and express outcomes in the grandchild generation as a function mainly of parents' and grandparents' characteristics at the time of marriage.

I use the second method, testing whether grandparent characteristics remain significant in an equation with both parent and grandparent characteristics as regressors.[14] The significance of coefficients on grandparent physical and human capital is an indirect test of parental credit constraints: if these are significant,

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[14] An alternative approach would have been to estimate a structural model in which parental characteristics are predicted based on grandparent characteristics. However, it is difficult to find instruments with which to predict parental characteristics with the existing survey data. Similar tests of the effects of grandparents' education on grandchildren's schooling have been performed for Malaysia by Lillard and Willis (1994) and for Brazil by Schoeni, Strauss, and Thomas (1994).

extended family resources matter. To test whether parents and grandparents treat grandchildren of the same sex preferentially, a vector of child characteristics, such as sex, birth year, an eldest child dummy, and interactions between sex and birth order, and interact child sex with measures of parent and grandparent human and physical capital, is included. By interacting child sex with measures of parent and grandparent wealth, preferences within and across generations can be tested.

For the extended family to influence investments in grandchildren, it matters whether grandparents are deceased or living. If deceased, they would presumably play a smaller role in the determination of preferences. Moreover, grandparent proximity may be more crucial in the child's formative years (Stark and Cox 1992). One would expect the effects of grandparents' wealth to differ: living grandparents can be expected to contribute to income through housework and care for children, and hence may help in situations of credit constraints. I take advantage of the variation in family structure in the sample to construct measures of intergenerational extension, and test whether the effect of grandparent coresidence is significant, controlling for grandparent and parent wealth.

Let transfers to child *i* in family *j* be given by a vector:

$$T_{ij}^{*} = [E_{ij}^{*}, a_{ij}^{*}], \qquad \textbf{(15)}$$

where $E^{*}_{ij}$, and $a^{*}_{ij}$ are levels of education and land, the major asset transferred in rural households. To test the effects of both parent and grandparent characteristics, the specification is

$$\begin{aligned} T^{*}_{ij} = {} & ß_0 + ß_1 X_{cij} + ß_2 X_{fj} + ß_3 X_{mj} + ß_4 X_{fj} X_{cij} + ß_5 X_{mj} X_{cij} + ß_6 X_{gff} + \\ & ß_7 X_{gmf} + ß_8 X_{gff} X_{cij} + ß_9 X_{gmf} X_{cij} + ß_{10} X_{gfm} + ß_{11} X_{gmm} + \\ & ß_{12} X_{gfm} X_{cij} + ß_{13} X_{gmm} X_{cij} + \epsilon_{ij}, \end{aligned} \qquad \textbf{(16)}$$

where $ß_k$ is a vector of coefficients [$ß_{ek}$, $ß_{ak}$] for each type of transfer (where *e* and *a* index education and asset transfers, respectively, and *k* refers to the regressors); $X_c$ is a vector of child characteristics such as sex, birth year, and a dummy for the eldest child; $X_f$ and $X_m$ are vectors of parental human and physical wealth at the time of marriage; $X_fX_c$ and $X_mX_c$ are interaction terms for child and parent characteristics; and $X_{g.}$ and $X_{g.}X_c$ are the corresponding terms for the grandparent generation, where gff, gmf, gfm, and gmm index the pre-marriage human and physical capital of both sets of grandparents; and $\epsilon_{ij}$ is the error term in each equation.[15]

Birth year is an explanatory variable that accounts for possible time trends in environmental conditions, such as the availability of public education and land reform implementation.[16] Years of schooling is the index of individual human capital, while individual landownership (or area of inherited land) is the indicator of individual asset positions, because land cultivated exclusively by women is not common in the Philippines, but landownership and inheritance by women is widespread. To test the effects of intergenerational extension beyond effects acting through family background, a vector of coresidence variables is included among the regressors. This is discussed in greater detail in the next section.

Equation (16) is estimated both in levels and with family fixed effects. Levels estimates yield information on the degree of intergenerational mobility: the larger the coefficients on family background (parent and grandparent human capital and pre-marriage wealth), the lower is intergenerational mobility, and the higher the possibility that income or wealth inequality is transmitted across generations. By

[15] The indices, gff and gmf, refer to the paternal grandfather and grandmother, while gfm and gmm index the maternal grandfather and grandmother.

[16] The survey areas were covered by the 1972 land reform legislation for tenanted rice and corn land, with land reform more successfully implemented in irrigated and favorable rainfed areas. For details on land reform in the Philippines, see Hayami, Quisumbing, and Adriano (1990) and Otsuka (1991).

using a richer set of household-specific variables, including measures of grandparent coresidence, some aspects of household-level heterogeneity may be controlled for in the levels estimates.

Nevertheless, it is still possible that omitted family-level variables are correlated with regressors, and thus their estimated effects on transfers may be biased. For those families with at least two children, I take advantage of the within-family allocation as the source of variation in the sample from which to estimate intrahousehold differences in transfers.[17] A fixed-effects estimation procedure could control for these unobservables, using family-specific dummy variables.[18] In this specific application, only the child's sex, birth year, the eldest dummy, interaction between child sex and birth order, and interaction between child sex and parent (or grandparent) characteristics remain as explanatory variables. While variables that do not vary across children cannot be identified, their effects may be estimated to the extent that they impact differently on children of different sex. On the other hand, if transfers were affected by individual heterogeneity, a random-effects procedure would be

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[17] I choose families with at least two children above 18 years of age of both sexes so that birth order and sex dummies are relevant in the family fixed-effects specification. The fixed-effects procedure eliminates selectivity bias since selection into the sample is a family-specific variable (Heckman and MaCurdy 1980; Pitt and Rosenzweig 1990). It therefore controls for selectivity regarding family size. Age 18 is used as a cutoff so that children in the sample will have completed schooling. Other studies (Schoeni, Strauss, and Thomas 1994) estimate cohort-specific schooling attainment equations or express schooling as a deviation from the cohort mean (Jamison and Lockheed 1987).

[18] That is, the observed transfer, $T_{ij}$, to child *i* in family *j* would be given by

$$T_{ij} = t_j + \beta X_{ij} + \epsilon_{ij},$$

where the family-specific effect is a dummy variable, $t_j$, which is taken to be constant for a family. However, this specification, while controlling for additive unobservables, does not consider interactions between observables and unobservables (Hsiao 1986).

appropriate.[19] A Lagrange multiplier statistic tests for the appropriateness of the random-effects model compared to ordinary least squares (OLS) without group effects, while a Hausman test compares the random-effects model to a fixed-effects specification.

The "lumpiness" of land transfers, which usually occur as part of the marriage gift, suggests that the intention to transfer land, and the amount transferred, are limited dependent variables. Suppose that observed transfers of land, $a_{ij}$, are being generated as transformations of unobserved latent variables, $a_{ij}*$, given by

$$a_{ij}* = a_j + X_{ij}\beta_q + \delta_{ij} \qquad i = 1,...C;\ j = 1,...F, \tag{17}$$

where $X_{ij}$ are the explanatory variables in equation (16), $\beta_k$ is the vector of coefficients, $a_j$ are the respective fixed effects, $\delta_{ij}$ is the error term, the subscript $i$ indexes the children in a family, and $j$ indexes the number of families, from 1 to F. We observe ($a_{ij}$, $X_{ij}$) where $a_{ij} = \max\{0, a_{ij}*\}$ and $a_{ij}*$ and $X_{ij}$ are distributed as in equation (17). A tobit procedure can be used to examine the determinants of the levels of land transfers, but this does not take into account possible household-level unobservables. The tobit model with (family) fixed effects is appropriate, since the data pertain to proposed bequests of land, which are nonnegative observations. I

[19] The relevant model would be

$$T_{ij} = t + \beta X_{ij} + u_i + \epsilon_{ij},$$

where the individual-specific constant terms, $u_i$, are randomly distributed across families. The individual-specific terms ($u_i$) are not estimated directly, but estimates of the variance components are used to compute the generalized least squares (GLS) estimator for the random-effects model.

estimate both a tobit in levels and a tobit with family fixed effects, the latter using Honoré's (1992) estimator.[20]

## 3. EVIDENCE FROM THREE GENERATIONS IN THE RURAL PHILIPPINES

DATA

I conducted a retrospective survey of 344 households in five rice-growing villages in the Philippines with different agroecological characteristics, from June to October 1989. Two villages are in Central Luzon and three are in Panay Island. The sample households were randomly selected and intensively surveyed by the International Rice Research Institute (IRRI) in 1985; I resurveyed the sample as it was initially surveyed by IRRI. The 1985 IRRI sample consisted of 396 households; the sample size was reduced to 344 as of 1989.[21]

The retrospective survey included questions on the parents, siblings, and children of the respondents, yielding information on three generations called the grandparents', parents' (respondents and siblings), and (grand)children's generations.[22] The respondents were asked about pre-marriage wealth (education and landownership) of their parents and in-laws, the education and inheritance of their spouses, and schooling and proposed bequests to their children. Spouses were present during most of the interviews, facilitating collection of data on spouses' family

[20] The estimator allows for an unbalanced sample: in this case, families with unequal sizes. See Campbell and Honoré (1991).

[21] No attempt was made to replace respondents, because I wanted to match present respondents with previously collected records on family histories.

[22] I refer to the grandchild generation as the child generation, for brevity.

background.[23] The survey permitted matching 170 sets of grandparents and parents with 795 children over 18. For the education regressions, estimation was performed on the subset of 795 children for the levels estimates, and on the subset of 700 children in the 122 families with at least two children above 18 of both sexes for the fixed-effects estimates.

Almost 10 percent (8.6 percent) of the children came from landless or nonagricultural families without any land to bestow to any child; these families are potentially more credit-constrained. Among families with agricultural land who expressed land-bequest intentions, responses either consisted of a specific area or a "no decision" response, which indicates that the parent had not decided on the specific size to bestow. Specific sizes of land are available for 353 children above 18 years, among which 255 belong to families with more than two children of both sexes. Such responses either consisted of zero (around 43 percent) or a positive response, the highest being 5 hectares. Excluding landless or nonagricultural families, a value of zero means that the parent had no intention of giving land to a particular child, but may plan to bestow land to another. Information on ex post bequests were not relevant, since most of the (grand)children were still single, and had not received land as part of the marriage gift.

Table 1 presents a summary of education and land inheritance patterns of the grandparent, parent, and child generations for the full sample of 265 households and for the subsample of 170 households with 795 children ages 18 and above. In the grandparent generation, males' educational attainment was slightly higher than females', with 3.79 and 3.71 years of schooling for paternal and maternal grandfathers, respectively, compared to 3.35 and 3.23 years for their spouses. The

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[23] Wives of the predominantly male respondents usually answered the fertility and child schooling questions; questions on proposed bequests were answered jointly by husband and wife.

**Table 1 Education, landholdings, and household characteristics of grandparent, parent, and child generations**

| Variable | Mean | Standard Deviation |
|---|---|---|
| Whole sample | | |
| Grandparent generation (265 households)[a] | | |
| Average birth year | 1909 | 38.82 |
| Education (years of schooling) | | |
| Paternal grandfather | 3.79 | 3.37 |
| Paternal grandmother | 3.35 | 2.90 |
| Maternal grandfather | 3.71 | 3.19 |
| Maternal grandmother | 3.23 | 2.84 |
| Land area owned (hectares) | | |
| Paternal grandfather | 1.44 | 3.27 |
| Paternal grandmother | 0.61 | 2.26 |
| Maternal grandfather | 1.04 | 2.34 |
| Maternal grandmother | 0.44 | 1.31 |
| Parent generation (265 households) | | |
| Average birth year | 1939 | 13.93 |
| Education (years of schooling) | | |
| Father | 6.29 | 3.06 |
| Mother | 6.29 | 3.00 |
| Land area inherited (hectares) | | |
| Father | 0.48 | 0.93 |
| Mother | 0.22 | 0.63 |
| Value of assets inherited (1989 pesos) | | |
| Father | 763.61 | 765.21 |
| Mother | 464.56 | 472.68 |
| Subsample | | |
| Families with children over 18 (170 households) | | |
| Grandparent generation | | |
| Education (years of schooling) | | |
| Paternal grandfather | 3.15 | 3.27 |
| Paternal grandmother | 2.67 | 2.78 |
| Maternal grandfather | 3.07 | 3.14 |
| Maternal grandmother | 2.52 | 2.76 |
| Land area owned (hectares) | | |
| Paternal grandfather | 1.49 | 3.48 |
| Paternal grandmother | 0.67 | 2.10 |
| Maternal grandfather | 1.21 | 2.74 |
| Maternal grandmother | 0.49 | 1.51 |
| Parent generation | | |
| Education (years of schooling) | | |
| Father | 5.70 | 3.09 |
| Mother | 5.58 | 2.93 |
| Land area inherited (hectares) | | |
| Father | 0.50 | 1.05 |
| Mother | 0.32 | 0.76 |
| Value of assets inherited (1989 pesos) | | |
| Father | 769.57 | 761.57 |
| Mother | 495.66 | 497.43 |
| Child generation (795 children over 18 years of age) | | |
| Average birth year | | |
| Son 1959 | 8.58 | |
| Daughter | 1959 | 9.05 |
| Education (years of schooling) | | |
| Son 8.53 | 3.02 | |
| Daughter | 9.54 | 3.19 |
| Land area to be inherited (hectares) | | |
| Son 0.76 | 0.97 | |
| Daughter | 0.32 | 0.64 |

[a] Ever-married respondents without remarriage.

gender difference in education appears to have been eliminated for the parent generation as a whole, with fathers and mothers both having an average of 6.29 years of schooling. In the older families with children 18 years of age and above, fathers had slightly more education, at 5.70 years, compared to mothers, at 5.58 years. School attendance is almost universal in the child generation: less than 1 percent of the sample had never attended school. Among children 18 and older, daughters had higher schooling attainment than sons, at 9.54 years and 8.53 years, respectively.

Men consistently had larger landholdings than women. Grandfathers on both sides owned about 1.2 hectares of land, compared with 0.5 hectares for the grandmothers. In the parent generation, mothers inherited about half the land area of fathers (0.22 compared to 0.48 hectares) for the whole sample; in the older subsample, women had slightly higher areas of inherited land (0.32 hectares), though less than men's (0.50 hectares). Daughters in the child generation stand to inherit about half the area proposed to be bequeathed to sons (0.32 versus 0.76 hectares).[24]

Family structure and grandparent living arrangements vary widely across the sample (Table 2). Forty-eight percent of respondents, and almost half of their spouses, had at least one parent living at the date of interview. Families with children 18 and older had fewer living grandparents: 39 percent of respondents, and 33 percent of spouses, had at least one living parent. In the whole sample, while only 15 percent of the respondents' parents, and 9 percent of spouses' parents, ever lived with their adult children for at least a year, the incidence of coresidence is

[24] I was not able to compute the value of land bestowed to children, since I was not able to determine the tenure status of individual parcels. However, since it is likely that a tenure type is common to a family, differences in tenure types across families will be accounted for by the family fixed-effects estimates.

**Table 2 Grandparent coresidence with adult children[a]**

| Variable | Mean | Standard Deviation |
|---|---|---|
| Grandparent coresidence (whole sample) | | |
| At least one parent of respondent living as of date of interview | 0.59 | 0.49 |
| At least one parent of spouse living as of date of interview | 0.48 | 0.50 |
| Parents ever lived with adult respondent | 0.15 | 0.36 |
| Spouse's parents ever lived with adult respondent | 0.09 | 0.28 |
| Grandparent coresidence (families with children 18 and older) | | |
| At least one parent of respondent living as of date of interview | 0.39 | 0.49 |
| At least one parent of spouse living as of date of interview | 0.33 | 0.47 |
| Paternal grandparent ever lived with adult respondent/spouse | 0.16 | 0.37 |
| Maternal grandparent ever lived with adult respondent/spouse | 0.12 | 0.32 |
| Grandparent ever lived in same village | | |
| Paternal grandfather | 0.42 | 0.50 |
| Paternal grandmother | 0.34 | 0.47 |
| Maternal grandfather | 0.30 | 0.46 |
| Maternal grandmother | 0.32 | 0.47 |
| Grandparent died in same village | | |
| Paternal grandfather | 0.38 | 0.48 |
| Paternal grandmother | 0.29 | 0.45 |
| Maternal grandfather | 0.28 | 0.45 |
| Maternal grandmother | 0.30 | 0.46 |

[a] Whether or not parents lived with the adult respondent for at least a year.

slightly higher in the older sample. This probably reflects parents' greater need to rely on children for old-age support. Among Filipino families, aging parents prefer to live independently, but eventually take up residence with adult children and may remain with one child or circulate among their children (Lopez 1991).

Strict coresidence can be problematic as a measure of grandparent influence, since it is potentially endogenous. Since grandparents live in close proximity to children on the family holding, a strict definition of coresidence—residence in the same household—would tend to underestimate grandparents' degree of involvement in family decisionmaking. Indeed, between 30 to 40 percent of grandparents live and die in the village where their adult children reside. Residence in the same village is a cleaner measure of proximity, since it is less affected by the endogeneity of household composition.[25] It is quite likely that grandparent proximity may be more critical at certain stages of the family's life cycle, e.g., a grandmother could be more likely to help out if she had a preschool-age grandchild, or, if children were in school and parents faced credit constraints, grandparents could augment family resources. I test this using a measure of coresidence constructed by linking information on grandparent residence in the same village to specific age ranges of children.

## EDUCATIONAL ATTAINMENT

Table 3 presents ordinary least squares (OLS) estimates for the educational attainment of children above 18, expressed as a function of child characteristics, parent and grandparent characteristics, and their respective interactions with child sex. These regressions were performed on the whole sample; an attempt to estimate

[25] Admittedly, a child's decision to remain in the same village as one's parents is endogenous, but abstract, from this issue here.

**Table 3 Education of children ages 18 and older, levels estimates, with complete interactions, and restricted estimates[a,b]**

| Variables | Specification with Complete Interactions | Restricted Estimates |
|---|---|---|
| Constant | -22,669.00*** | 21,941.00*** |
| | (-5.33) | (-5.00) |
| Child characteristics | | |
| Female dummy | 48.76 | 0.57 |
| | (1.05) | (1.22) |
| Birth year | 23.08*** | 22.35*** |
| | (5.30) | (4.99) |
| (Birth year/1,000) squared | -5.87*** | -5.69*** |
| | (-5.28) | (-4.97) |
| Eldest dummy | 0.19 | 0.30 |
| | (0.55) | (1.26) |
| Child sex-birth order interactions | | |
| Female x birth year | -0.02 | ... |
| | (-1.04) | |
| Female x eldest child | 0.18 | ... |
| | (0.36) | |
| Parent characteristics | | |
| Father's education | 0.11** | 0.14** |
| | (1.97) | (2.56) |
| Mother's education | 0.13** | 0.13** |
| | (2.28) | (2.29) |
| Father's inherited land | 0.24* | 0.22* |
| | (1.73) | (1.66) |
| Mother's inherited land | 0.50*** | 0.44** |
| | (2.90) | (2.54) |
| Child sex-parent characteristic interactions | | |
| Female x father's education | 0.20*** | 0.14** |
| | (2.62) | (2.14) |
| Female x mother's education | -0.04 | -0.04 |
| | (-0.52) | (-0.63) |
| Female x father's inherited land | 0.13 | 0.12 |
| | (0.63) | (0.58) |
| Female x mother's inherited land | -0.60*** | -0.49** |
| | (-2.64) | (-2.24) |
| Grandparent characteristics | | |
| Paternal grandfather's education | -0.03 | -0.02 |
| | (-0.51) | (-0.58) |
| Paternal grandmother's education | 0.001 | -0.05 |
| | (0.02) | (-1.00) |
| Maternal grandfather's education | -0.20*** | -1.23** |
| | (-2.79) | (-2.34) |
| Maternal grandmother's education | 0.18** | 0.11* |
| | (2.29) | (1.94) |
| Paternal grandfather's owned land | -0.001 | -0.03 |
| | (-0.03) | (-1.16) |
| Paternal grandmother's owned land | 0.01** | 0.06* |
| | (2.43) | (1.64) |

(continued)

## Table 3 (continued)

| Variables | Specification with Complete Interactions | Restricted Estimates |
|---|---|---|
| Maternal grandfather's owned land | 0.10 | 0.09 |
| | (1.97)* | (2.33)** |
| Maternal grandmother's owned land | 0.06 | 0.05 |
| | (0.66) | (0.90) |
| Child sex-grandparent characteristic interactions | | |
| Female x paternal grandfather's education | -0.01 | ... |
| | (-0.08) | |
| Female x paternal grandmother's education | -0.09 | ... |
| | (-0.89) | |
| Female x maternal grandfather's education | 0.13 | ... |
| | (1.29) | |
| Female x maternal grandmother's education | -0.11 | ... |
| | (-0.95) | |
| Female x paternal grandfather's owned land | -0.04 | ... |
| | (-1.08) | |
| Female x paternal grandmother's owned land | -0.11 | ... |
| | (-1.39) | |
| Female x maternal grandfather's owned land | -0.02 | ... |
| | (-0.34) | |
| Female x maternal grandmother's owned land | -0.004 | ... |
| Log-likelihood | -1,904.76 | -1,908.55 |
| Number of observations | 795 | 795 |
| Likelihood-ratio tests ($\chi^2$ statistics) | | |
| Parental wealth effects = 0 | 26.73*** | |
| Grandparent wealth effects = 0 | 18.10** | |
| Child sex-birth order interactions = 0 | 1.29 | |
| Child sex-parent interactions = 0 | 12.02*** | |
| Child sex-grandparent interactions =0 | 6.00 | |
| Child sex-parent-grandparent interactions =0 | 16.26 | |
| All interactions with child sex = 0 | 16.81 | |

[a] All specifications included village dummies.
[b] Asymptotic t-statistics in parentheses. Results were corrected for heteroskedasticity.

* Significant at $\alpha = .10$.
** Significant at $\alpha = .05$.
*** Significant at $\alpha = .01$.

... = Variables not in equation.

the equation separately for landless households failed, due to multicollinearity. Since grandparent wealth predicts parental wealth perfectly for landless families, this supports the hypothesis that extended family resources are more important for the credit-constrained. Results are presented for the full specification with complete interactions and for the restricted specification; I discuss the results from the restricted estimates in greater detail.

Parental wealth and grandparent wealth are both significant determinants of completed schooling. Both father's and mother's education and inherited land positively influence educational attainment; maternal grandmother's education, paternal grandmother's owned land, and maternal grandfather's owned land all have significant and positive effects. Surprisingly, maternal grandfather's education has a negative effect on grandchild's schooling. The secular expansion of educational opportunities, proxied by linear and quadratic terms in birth year, benefits later-born children. Daughters of better-educated fathers, and sons of land-owning mothers, are favored with respect to education.

This "cross-gender preference" result deviates from the findings of Thomas (1994) and King and Lillard (1987), which show greater impact of parental characteristics on children of the same gender. In some societies, maternal preferences for daughters and paternal preferences for sons may reflect technological differences in child rearing; fathers spend more time with sons, and mothers with daughters. Parents may also reap different returns from children of both genders, with daughters more likely to care for mothers after the father's death (Thomas 1994). However, the strength of same-sex preferences may be weaker in relatively egalitarian societies like the Philippines (Medina 1991), where daughters are socialized to care for both parents, even after marriage (Nurge 1965).

Son preference by mothers seems to be associated with higher levels of physical rather than human capital, and could indicate a wealth effect. This may be linked with the use of bequests to enforce old-age support arrangements (Bernheim, Schleifer, and Summers 1985). Mothers with more land may invest more in sons in order to extract a return from this investment in the future. In the Philippines, in particular, enforcement problems may be less with daughters, since transfers from more educated daughters, even if they move far away, are reliable (Lauby and Stark 1988). Income effects could also explain why better-educated fathers invest in daughters' education, if intrahousehold inequality declines with income (Haddad and Kanbur 1990).[26]

Likelihood ratio tests indicate that both sets of wealth variables for parents and grandparents are each jointly significant, and supports the idea that families do benefit from extended family resources. However, only the interactions of child sex with parental education and land are jointly significant; grandparents do not appear to have gender preference with respect to children's education. Neither are interactions of child sex with birth order or birth year terms significant.

Do grandparents then influence children's educational attainment through avenues other than grandparent resources? Table 4 presents regressions of children's educational attainment on the same set of regressors with alternative measures of grandparent coresidence. These measures were constructed to capture more accurately the potential effect of grandparent proximity on child schooling. Consistent with results in the earlier regressions, both sets of parent and grandparent wealth variables are each jointly significant, and interactions of child

[26] It remains to be tested whether cohort or income effects are involved, since preference for children of the same sex can be observed in the older sample (grandparent investment in parents' human capital and inheritance) (Quisumbing 1994). King and Lillard's (1987) result of same-gender preference is from a poorer region in the Philippines.

**Table 4 Education of children ages 18 and older, and effects of grandparent coresidence, levels estimates[a,b]**

| Variable | Measures of Grandparent Coresidence: Coresidence with Adult Child (1) | Measures of Grandparent Coresidence: Residence in Same Village (2) | Residence in Same Village at Child-Specific Age Ranges: Child Age 0-5 (3) | Child Age 6-10 (4) | Child Age 11-18 (5) |
|---|---|---|---|---|---|
| Grandparent coresidence | | | | | |
| Paternal grandparent ever lived with adult child | 1.08*** | ... | | | |
| | (2.84) | | | | |
| Maternal grandparent ever lived with adult child | 0.45 | ... | | | |
| | (1.26) | | | | |
| Grandparent residence in village | | | | | |
| Paternal grandfather | ... | 0.26 | 0.06 | 0.01 | -0.31 |
| | | (0.77) | (0.19) | (0.04) | (-0.86) |
| Paternal grandmother | ... | 0.36 | 0.15 | 0.18 | -0.01 |
| | | (1.04) | (0.44) | (0.50) | (-0.04) |
| Maternal grandfather | ... | -0.34 | 0.22 | 0.35 | 0.78* |
| | | (-1.01) | (0.59) | (0.91) | (1.85) |
| Maternal grandmother | ... | 0.11 | -0.21 | -0.18 | -0.56* |
| | | (0.36) | (-0.66) | (-0.54) | (-1.65) |
| Child sex-grandparent coresidence interactions | | | | | |
| Female x paternal grandparent coresident | -0.70 | ... | ... | ... | ... |
| | (-1.21) | | | | |
| Female x maternal grandparent coresident | -0.29 | ... | ... | ... | ... |
| | (-0.51) | | | | |
| Female x paternal grandfather in village | ... | -0.63 | -0.34 | -0.50 | -0.28 |
| | | (-1.32) | (-0.68) | (-0.99) | (-0.51) |
| Female x paternal grandmother in village | ... | 0.88* | 0.46 | 0.51 | 0.37 |
| | | (1.83) | (0.94) | (1.03) | (0.67) |
| Female x maternal grandfather in village | | 0.47 | -0.25 | -0.42 | -1.03 |
| | ... | (0.92) | (-0.44) | (-0.72) | (-1.64) |
| Female x maternal grandmother in village | ... | 0.77* | 1.12** | 1.07** | 1.38*** |
| | | (1.62) | (2.29) | (2.16) | (2.66) |
| Log-likelihood | -1,899.02 | -1,890.77 | -1,899.07 | -1,898.39 | -1,897.95 |
| Number of observations | 795.00 | 795.00 | 795.00 | 795.00 | 795.00 |
| Likelihood ratio tests ($\chi^2$ statistics) | | | | | |
| Parental wealth effects =0 | 24.42*** | 28.26*** | 25.67*** | 25.56*** | 23.62*** |
| Grandparent wealth effects =0 | 15.95*** | 17.28** | 19.04** | 19.21** | 20.07** |
| Child sex x birth order interactions = 0 | 1.64 | 0.44 | 0.63 | 0.71 | 0.84 |
| Child sex x parent characteristics interactions=0 | 12.86** | 12.82** | 11.33** | 12.06** | 11.95** |
| Child sex x grandparent characteristics interactions = 0 | 6.72 | 6.07 | 5.63 | 6.09 | 6.33 |
| Child sex x grandparent coresidence interactions = 0 | 2.07 | 11.58** | 6.79 | 7.08 | 9.63** |
| All interactions with grandparent characteristics and coresidence = 0 | 8.17 | 17.77 | 12.91 | 13.28 | 15.81 |

[a] Specifications included child characteristics, child sex interacted with birth-order terms, parent characteristics, child sex interacted with parent characteristics, grandparent characteristics, child sex interacted with grandparent characteristics, and village dummies.
[b] Asymptotic t-ratios in parentheses, results were corrected for heteroskedasticity.

*** Significant at $\alpha$=.01.
** Significant at $\alpha$=.05.
* Significant at $\alpha$=.10.
... = Variables not in equation.

sex with parental characteristics are significant. In contrast, interactions of child sex with grandparent human and physical wealth are insignificant.

Grandparent influence on child schooling appears to work through proximity rather than through wealth. Children in families with a coresident paternal grandparent appear to have more schooling. Resident grandparents do not appear to exhibit gender preference—likelihood ratio tests show that interactions of grandparent coresidence and child sex are insignificant. However, this could reflect the inaccuracy of strict coresidence as a measure of grandparent proximity, since the question on coresidence was phrased in terms of the grandparent having lived with the adult child for at least a year, with no reference dates.[27] While interactions of grandparent wealth with child sex are insignificant, interactions of grandparent coresidence with child sex, when proxied by residence in the same village, are jointly significant. This is a more inclusive measure of proximity than strict coresidence. Examination of individual coefficients reveals that this is largely driven by the effect of the maternal grandmother. Daughters with a maternal grandmother in the village obtain more schooling, a result robust to the use of age-dependent measures of grandparent residence. Indeed, having a maternal grandmother in the village when a daughter is between 11 and 18 years old increases her completed schooling attainment by over a year. Perhaps the maternal grandmother substitutes for daughters in caring for younger siblings.

Table 5 presents results of the education regression with family fixed effects, which is superior to a model with random effects. A test for the significance of interaction terms indicates that, while parental characteristics affect the relative educational attainment of sons and daughters, grandparent characteristics have no

[27] It was difficult to obtain a precise answer for the period of grandparent coresidence, since elderly parents typically rotate among siblings, particularly if they lived in a family compound.

## Table 5 Education of children ages 18 and older, family fixed-effects estimates, with complete interactions and restricted estimates

| Variable | Specification with Complete Interactions Fixed Effects | Restricted Specification Fixed Effects |
|---|---|---|
| Child characteristics | | |
| Female dummy | -70.49 | 0.82* |
| | (-1.22) | (1.70) |
| Birth year | 17.16*** | 17.01*** |
| | (3.20) | (3.24) |
| (Birth year/1000) squared | -4.35*** | -4.31*** |
| | (-3.18) | (-3.22) |
| Eldest dummy | 0.18 | 0.43 |
| | (0.40) | (1.34) |
| Child sex- birth order interactions | | |
| Female x birth year | 0.04 | ... |
| | (1.23) | |
| Female x eldest child | 0.50 | ... |
| | (0.78) | |
| Child-sex parent characteristic interactions | | |
| Female x father's education | 0.17* | 0.17** |
| | (1.93) | (2.16) |
| Female x mother's education | -0.19** | -0.13 |
| | (-2.11) | (-1.58) |
| Female x father's inherited land | 0.20 | 0.19 |
| | (0.84) | (0.86) |
| Female x mother's inherited land | -0.54** | -0.47** |
| | (-2.22) | (-2.10) |
| Child sex-grandparent characteristics interactions | | |
| Female x paternal grandfather education | 0.09 | ... |
| | (0.88) | |
| Female x paternal grandmother education | -0.15 | ... |
| | (-1.18) | |
| Female x maternal grandfather education | -0.26 | ... |
| | (-0.23) | |
| Female x maternal grandmother education | 0.11 | ... |
| | (0.84) | |
| Female x paternal grandfather owned land | 0.004 | ... |
| | (0.07) | |
| Female x maternal grandmother owned land | -0.07 | ... |
| | (-0.68) | |
| Female x maternal grandfather owned land | 0.15 | ... |
| | (1.59) | |
| Female x maternal grandmother owned land | 0.06 | ... |
| | (0.44) | |
| Log-likelihood | -1,379.24 | -1,384.52 |
| Number of observations | 700.00 | 700.00 |
| Hypotheses tests ($\chi^2$ statistics) | | |
| X's and group effects vs. X variables only | 678.21*** | 679.03*** |
| Random effects vs. X variables only (LM test) | 149.08*** | 158.40*** |
| Fixed vs. random effects (Hausman) | 36.40*** | 31.08*** |
| Likelihood ratio tests ($\chi^2$ statistics) | | |
| Child sex-birth order interactions = 0 | 2.60 | |
| Child sex parent characteristics interactions=0 | 20.88*** | |
| Child sex-grandparent characteristics interactions=0 | 9.00 | |
| Child sex parent grandparent characteristics interactions | 26.29*** | |
| All interactions with child sex=0 | 30.24*** | |

Note: Asymptotic t - statistics in parentheses.
*** Significant at α=.01.
** Significant at α=.05.
* Significant at α=.10.
... = Variables not in equation.

such effect.  The restricted estimates show that daughters have a slight advantage in education, although this effect is only weakly significant ($\alpha = .10$).  Similar to the results for the levels estimates, later-born children—sons and daughters equally—benefit from the secular expansion in schooling.  Consistent with the levels estimates, better-educated fathers favor daughters in education, but better-educated mothers favor sons.  Sons of land-owning mothers also receive more schooling.

Table 6 presents fixed-effects estimates of the effect of grandparent coresidence on the educational attainment of grandchildren; the Hausman test  indicates that a model with fixed effects is preferred to a random-effects specification.  Parental interactions with child sex are jointly significant in all four specifications presented in Table 6.  Similar to results in Table 4, grandparent residence in the same household does not affect schooling of sons relative to daughters; indeed, in that specification, only the interaction of child sex with parental characteristics is significant.  In contrast, grandparent residence in the same village appears to affect intrahousehold differences in schooling: in all four specifications using alternative measures of coresidence based on village residence, the interactions of grandparent coresidence with child sex are jointly significant.  This result is all the more striking because, with one exception, interactions of child sex with grandparent wealth are not jointly significant.  In contrast to the levels estimates, however, daughters with resident grandparents do not necessarily complete more years of schooling.  The presence of the paternal grandfather in the same village negatively affects daughters' schooling in three out of four specifications, although this is somewhat mitigated by the presence of the paternal grandmother in two out of four specifications.

**Table 6 Education of children ages 18 and older and alternative measures of grandparent coresidence, family fixed-effects estimates, full specification**

| Variables | Coresidence With Adult Child (1) | Coresidence in Same Village as Adult Child (2) | Coresidence in Same Village: Child Age 0 - 5 (3) | Coresidence in Same Village: Child Age 6 - 10 (4) | Coresidence in Same Village: Child Age 11 - 18 (5) |
|---|---|---|---|---|---|
| Grandparent coresidence with adult child | | | | | |
| Female x paternal grandparent ever lived with adult child | -0.63 | ... | ... | ... | ... |
| | (-1.07) | | | | |
| Female x maternal grandparent ever lived with adult child | -0.33 | ... | ... | ... | ... |
| | (-0.51) | | | | |
| Grandparent resident in village | | | | | |
| Female x paternal grandfather resident in village | ... | -0.91* | -0.75 | -1.02** | -1.21** |
| | | (-1.83) | (-1.61) | (-2.16) | (-2.34) |
| Female x paternal grandmother resident in village | ... | 1.24** | 0.50 | 0.50 | 0.91* |
| | | (2.41) | (1.06) | (1.06) | (1.85) |
| Female x maternal grandfather resident in village | ... | 0.87* | 0.46 | 0.26 | -0.04 |
| | | (1.68) | (0.83) | (0.46) | (-0.08) |
| Female x maternal grandmother resident in village | ... | 0.20 | 0.38 | 0.37 | 0.12 |
| | | (0.41) | (0.75) | (0.73) | (0.23) |
| Log-likelihood | -1,377.97 | -1,367.63 | -1,375.01 | -1,373.98 | -1,372.93 |
| Number of observations | 700 | 700 | 700 | 700 | 700 |
| Hypothesis tests ($\chi^2$ statistic) | | | | | |
| x's and group effects vs. x variables only | 679.89*** | 680.73*** | 678.34*** | 679.67*** | 684.41*** |
| Random effects vs. x variables only (LM test) | 144.99*** | 150.50*** | 149.67*** | 147.88*** | 149.76*** |
| Fixed vs. random effects (Hausman) | 40.42*** | 39.12*** | 37.37** | 38.58** | 37.83** |
| Likelihood ratio tests ($\chi^2$ statistic) | | | | | |
| Child sex-birth order interactions=0 | 1.55 | 4.83* | 2.62 | 2.16 | 3.39 |
| Child sex-parent characteristics interactions=0 | 21.66*** | 22.22*** | 21.90*** | 23.22*** | 21.79** |
| Child sex-grandparent characteristics interactions=0 | 9.82 | 9.05 | 24.94*** | 6.87 | 6.82 |
| Child sex-grandparent coresidence interactions=0 | 2.55 | 23.23*** | 8.45* | 10.51** | 12.62*** |
| All interactions with grandparent characteristics and coresidence=0 | 11.54 | 32.22*** | 17.45 | 19.51* | 21.62* |

[a] Specifications included child characteristics and interactions of child sex with birth-order terms, parent characteristics, grandparent characteristics, and coresidence measures, respectively.
[b] Asymptotic t-ratios in parentheses.
*** Significant at α=.01.
** Significant at α=.05.
* Significant at α=.10.
... = Variables not in equation.

LAND BESTOWALS

To investigate whether parental and grandparent resources affect the transmission of land across generations, I examine a subset of 68 families that have decided on specific sizes of bestowals to 353 children above 18. Using households where parents have decided on land bestowals to all adult children makes the sample more comparable to that in the education equation, where schooling decisions are complete. Table 7 presents tobit estimates of the levels of ex ante land bequests to children above 18 from a specification with complete interaction terms, and from the restricted specification. The last column of Table 7 also presents results from the tobit model with family fixed effects. These regressions were performed on a subset of 44 families with at least two children, one of each sex. Selection into the sample of parents who have decided on land bestowals depends on the parents' life cycle and village characteristics, a family-specific characteristic captured by the fixed effect. Table 8 shows that the father's age and village dummies are significant in a probit regression of the probability that parents have decided on land sizes for all their adult children.

Likelihood ratio tests show that, while parental resources are jointly significant in determining levels of ex ante land transfers, grandparent resources are insignificant. However, both parent and grandparent characteristics interacted with child sex are each jointly significant, showing that grandparent wealth does affect the allocation of land between grandsons and granddaughters. Results from the restricted specification show that land is allocated preferentially to sons, although better-educated fathers favor daughters. Mother's education is positively associated with the size of the bequest, while father's education has a negative effect. Both coefficients are small, but statistically significant.

## Table 7 Ex ante land bequests to children ages 18 and older, tobit estimates, levels and family fixed effects[a,b]

| Variables | Levels: Specification with Complete Interactions | Levels: Restricted Estimates | Family Fixed Effects[c] |
|---|---|---|---|
| Constant | 2,142.0 | 3,528.7 | ... |
| | (0.66) | (1.12) | |
| Child characteristics | | | |
| Female dummy | -19.48 | -1.58*** | -1.87*** |
| | (-0.51) | (-4.80) | (-3.67) |
| Birth year | -2.17 | -3.58 | 2.55 |
| | (-0.65) | (-1.13) | (0.40) |
| (Birth year/1,000) squared | 0.55 | 0.91 | -0.65 |
| | (0.64) | (1.11) | (-0.40) |
| Eldest dummy | 0.10 | 0.15 | -0.03 |
| | (0.44) | (0.87) | (-0.16) |
| Child sex-birth order interactions | | | |
| Female x birth year | 0.009 | ... | ... |
| | (0.46) | | |
| Female x eldest child | 0.29 | ... | ... |
| | (0.83) | | |
| Parent characteristics | | | |
| Father's education | -0.10*** | -0.10*** | ... |
| | (-2.61) | (-2.94) | |
| Mother's education | 0.13*** | 0.11*** | ... |
| | (2.88) | (2.68) | |
| Father's inherited land | -0.02 | 0.04 | ... |
| | (-0.23) | (0.41) | |
| Mother's inherited land | -0.16 | -0.14 | ... |
| | (-1.30) | (-1.21) | |
| Child sex-parent characteristic interactions | | | |
| Female x father's education | 0.11* | 0.12** | 0.29 |
| | (1.87) | (2.34) | (1.50) |
| Female x mother's education | -0.005 | -0.03 | -0.26 |
| | (-0.08) | (-0.52) | (-1.00) |
| Female x father's inherited land | 0.17 | 0.13 | 0.03 |
| | (1.00) | (0.86) | (0.11) |
| Female x mother's inherited land | 0.23 | 0.19 | 0.16 |
| | (1.38) | (1.33) | (0.77) |
| Grandparent characteristics | | | |
| Paternal grandfather's education | -0.02 | ... | ... |
| | (-0.39) | | |
| Paternal grandmother's education | 0.01 | ... | ... |
| | (0.30) | | |
| Maternal grandfather's education | 0.07 | ... | ... |
| | (1.55) | | |
| Maternal grandmother's education | -0.08 | ... | ... |
| | (-1.52) | | |

(continued)

## Table 7 (continued)

| Variables | Levels: Specification with Complete Interactions | Levels: Restricted Estimates | Family Fixed Effects[c] |
|---|---|---|---|
| Paternal grandfather's owned land | 0.03 | ... | ... |
| | (0.90) | | |
| Paternal grandmother's owned land | -0.002 | ... | ... |
| | (-0.06) | | |
| Maternal grandfather's owned land | -0.007 | ... | ... |
| | (-0.29) | | |
| Maternal grandmother's owned land | -0.01 | ... | ... |
| | (-0.20) | | |
| Child sex-grandparent characteristic interactions | | | |
| Female x paternal grandfather's education | 0.09 | ... | ... |
| | (1.35) | | |
| Female x paternal grandmother's education | -0.11 | ... | ... |
| | (-1.37) | | |
| Female x maternal grandfather's education | -0.05 | ... | ... |
| | (-0.72) | | |
| Female x maternal grandmother's education | -0.008 | ... | ... |
| | (-0.09) | | |
| Female x paternal grandfather's owned land | -0.01 | ... | ... |
| | (-0.24) | | |
| Female x paternal grandmother's owned land | 0.01 | ... | ... |
| | (-0.24) | | |
| Female x maternal grandfather's owned land | 0.08* | ... | ... |
| | (1.75) | | |
| Female x maternal grandmother's owned land | -0.39** | ... | ... |
| | (-2.17) | | |
| Sigma | 1.15*** | ... | ... |
| | (18.87) | | |
| Log-likelihood | -414.80*** | -426.93*** | ... |
| Likelihood function value | ... | ... | 652.00 |
| Number of observations | 353 | 353 | 255 |
| Likelihood-ratio tests (ϰ2 statistics) | | | |
| Parent wealth effects =0 | 12.37** | | |
| Grand parent wealth effects = 0 | 4.68 | | |
| Child sex-birth order interactions = 0 | 0.72 | | |
| Child sex-parent interactions = 0 | 10.24** | | |
| Child sex-grandparent interactions=0 | 13.92* | | |
| Child sex-parent-grandparent interactions = 0 | 23.92** | | |
| All interactions with child sex = 0 | 25.48** | | |

[a] All levels specifications included village dummies.
[b] Asymptotic t-statistics in parentheses.
[c] The quadratic loss function was used for this specification.

*** Significant at $\alpha = .01$.
** Significant at $\alpha = .05$.
* Significant at $\alpha = .10$.
... = Variables not in equation.

**Table 8 Probability that parents have decided on land bestowals to children, probit estimates**[a]

| | Dependent Variable: P(decide) (1) | (2) |
|---|---|---|
| Intercept | -3.60*** | -4.92*** |
| | (-5.90) | (-6.25) |
| Husband's age | 0.42** | 0.06*** |
| | (2.31) | (3.17) |
| Wife's age | 0.01 | 0.01 |
| | (0.82) | (0.49) |
| Husband's education | 0.04 | 0.01 |
| | (1.09) | (0.39) |
| Wife's education | -0.02 | 0.01 |
| | (-0.62) | (0.23) |
| Husband's inherited land | -0.003 | -0.006 |
| | (-0.36) | (-0.39) |
| Wife's inherited land | -0.004 | -0.008 |
| | (-0.47) | (-0.29) |
| Pandan | ... | -0.80** |
| | | (-2.01) |
| Signe | ... | -0.51 |
| | | (-1.39) |
| Maragol | ... | 1.11*** |
| | | (3.46) |
| Gabaldon | ... | 0.63* |
| | | (1.89) |
| Number of observations | 256 | 256 |
| Number of observations = 1 | 68 | 68 |
| Log-likelihood | -116.72 | -95.82 |
| $\chi^2$ | 62.94*** | 104.74*** |

[a] P(decide) = 1 if responses for all children above 18 are either zero or positive.

* Significant at $\alpha = 0.10$.
** Significant at $\alpha = 0.05$.
*** Significant at $\alpha = 0.01$.
... = Variables not in equation.

To take into account both family-level unobservables and the "lumpy" nature of land transfers, I estimated a tobit model with family fixed effects.[28] The results, presented in the last column of Table 7, indicate that the female dummy is negative and significant. None of the other regressors is independently significant, although the regressors are jointly significant. However, as will be shown later, the explanatory power of the regressors—and the significance of individual variables—improves when extended family effects are considered.

Table 9 examines the effect of grandparent proximity on land bequests. While parental wealth affects the levels of ex ante land transfers, grandparent wealth effects are jointly insignificant (with the exception of one specification). Interactions of parent wealth with child sex are significant (three out of five specifications at 5 percent, the remaining two at 10 percent), while interactions of child sex with grandparent wealth are significant at 5 percent for one specification and weakly significant for two specifications. Interactions of grandparent coresidence measures with child sex are insignificant, except when coresidence is more strictly defined. In this case, daughters seem to benefit in households with a coresident maternal grandparent. The levels results suggest that grandparent wealth, and not proximity, affects the allocation of land between grandsons and granddaughters.

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[28] The coefficients from the restricted equations were used as starting values for the fixed-effects tobit estimator, since the latter is very sensitive to the inclusion of extraneous (statistically insignificant) regressors. The pantob estimation procedure (Honoré 1992; Campbell and Honoré 1991) offers a number of choices for loss functions. If the dependent variable has a high censoring probability (as in this case), the assumption that the covariance matrix of the objective function's first and second derivatives are each of full rank when evaluated at the true value of $\beta$ is likely to be violated. When the quadratic loss function defines the estimator, this assumption puts the least demands on the data. On the other hand, the absolute value loss function is more robust when there are outliers. I use both the quadratic loss function and the polynomial loss function, which allows trade-offs between the two extremes.

# Table 9 Ex ante land bequests to children ages 18 and older, effects of grandparent coresidence, tobit estimates[a,b]

| Variable | Measures of Grandparent Coresidence: Coresidence With Adult Child (1) | Measures of Grandparent Coresidence: Residence in Same Village (2) | Residence in Same Village at Child-Specific Age Ranges: Child Age 0 - 5 (3) | Residence in Same Village at Child-Specific Age Ranges: Child Age 6 - 10 (4) | Residence in Same Village at Child-Specific Age Ranges: Child Age 11 - 18 (5) |
|---|---|---|---|---|---|
| Grandparent coresidence | | | | | |
| Paternal grandparent ever lived with adult child | 0.31 | ... | ... | ... | ... |
| | (1.13) | ... | ... | ... | ... |
| Maternal grandparent ever lived with adult child | 0.33 | ... | ... | ... | ... |
| | (1.27) | ... | ... | ... | ... |
| Grandparent residence in village | | | | | |
| Paternal grandfather | ... | -0.24 | -0.30 | -0.34 | -0.15 |
| | | (-1.01) | (-1.32) | (-1.51) | (-0.59) |
| Paternal grandmother | ... | -0.15 | 0.005 | 0.007 | 0.06 |
| | | (-0.73) | (0.03) | (0.03) | (0.27) |
| Maternal grandfather | ... | 0.07 | -0.19 | -0.21 | -0.76 |
| | | (0.30) | (-0.70) | (-0.73) | (-2.35)** |
| Maternal grandmother | ... | 0.15 | 0.19 | 0.18 | 0.07 |
| | | (0.67) | (0.80) | (0.73) | (0.29) |
| Child-sex grandparent coresidence interactions | | | | | |
| Female x paternal grandparent coresident | 0.22 | ... | ... | ... | ... |
| | (0.44) | | | | |
| Female x maternal grandparent coresident | 1.05** | ... | ... | ... | ... |
| | (2.20) | | | | |
| Female x paternal grandfather in village | ... | 0.40 | 0.33 | 0.21 | 0.37 |
| | | (1.03) | (0.92) | (0.58) | (0.89) |
| Female x paternal grandmother in village | ... | 0.51 | 0.24 | 0.24 | 0.13 |
| | | (1.35) | (0.69) | (0.66) | (0.36) |
| Female x maternal grandfather in village | ... | -0.07 | 0.21 | 0.35 | 0.71 |
| | | (-0.18) | (0.45) | (0.74) | (1.44) |
| Female x maternal grandmother in village | ... | -0.07 | -0.11 | -0.34 | 0.14 |
| | | (-0.18) | (-0.27) | (-0.85) | (0.35) |
| Log-likelihood | -405.34 | -411.57 | -412.80 | -412.46 | -411.15 |
| Number of observations | 353 | 353 | 353 | 353 | 353 |
| Likelihood ratio tests ($\chi^2$ statistics) | | | | | |
| Parental wealth effects=0 | 14.14** | 12.33** | 28.06*** | 13.56*** | 12.62*** |
| Grandparent wealth effects=0 | 6.81 | 5.12 | 19.76** | 4.70 | 5.79 |
| Child sex x birth order interactions=0 | 1.20 | 1.0 | 0.8 | 0.64 | 1.1 |
| Child sex parent characteristics interactions=0 | 11.46** | 11.66** | 9.02* | 8.42* | 9.84** |
| Child sex x grandparent characteristics interactions=0 | 16.72** | 14.46* | 12.94 | 12.64 | 14.50* |
| Child sex x grandparent coresidence characteristics interactions=0 | 5.52* | 5.46 | 2.10 | 2.34 | 3.64 |
| All interactions with grandparent characteristics and coresidence=0 | 21.58** | 17.78 | 14.86 | 14.3 | 19.40* |

[a] Specifications included child characteristics, child sex interacted with birth order terms, parent characteristics, child sex interacted with parent characteristics, grandparent characteristics, child sex interacted with grandparent characteristics, and village dummies.

[b] Asymptotic t-ratios in parentheses.

*** Significant at α=.01.
** Significant at α=.05.
* Significant at α=.10.

... = Variables not in equation.

Levels results, however, do not consider family-level unobservables that may affect the allocation of land among grandchildren. The fixed-effects tobit estimates, reported in Table 10, consistently show that ex ante land bequests are made preferentially to sons. Parental gender preference does not seem to be significant, except in the "strict coresidence" specification (in column [1]), where daughters of better-educated fathers benefit. Most of the grandparent wealth variables, when interacted with child sex, are insignificant, except again for the strict coresidence specification. In this case, daughters of wealthier (landowning) maternal grandfathers stand to get more land. In contrast, in the specification with village residence as the measure of proximity, daughters do not seem to gain if the maternal grandfather lives in the village.

The specifications with age-linked coresidence measures are more suggestive of the role grandparents play in determining land bequests. Daughters stand to receive more land if the maternal grandmother is present when they are between 6 and 10, or between 11 and 18. The maternal grandmother does not seem to influence allocations to granddaughters preferentially if she was present while the latter were between birth and five years, suggesting that grandmothers may develop, over time, an affinity for older granddaughters that may then favorably affect land transfers to them.

## 4. SUMMARY AND CONCLUSIONS

This paper has examined the role of the family background, over two generations, on investments in children. In this rural setting (characterized by coresidence and quasi-coresidence of grandparents), grandparent resources—education and land—affect the allocation of land to grandchildren. Grandparent proximity rather than wealth has a greater influence on both children's

**Table 10 Ex ante land bequests to children ages 18 and older, effects of grand parent coresidence, tobit with family fixed effects[a,b]**

| Variable | Measures of Grandparent Coresidence: Coresidence With Adult Child (1) | Residence in Same Village (2) | Residence in Same Village at Child Ranges: Child Age 0 - 5 (3) | Child Age 6 - 10 (4) | Child Age 11 - 18 (5) |
|---|---|---|---|---|---|
| Child Characteristics | | | | | |
| Female dummy | -3.42*** | -2.63** | -2.15*** | -2.03** | -2.25** |
| | (-4.59) | (-2.42) | (-2.73) | (-2.20) | (-2.29) |
| Birth year | ... | ... | -0.54 | -0.47 | ... |
| | | | (-0.21) | (-0.20) | |
| (Birth year/1,000) squared | ... | ... | 0.14 | 0.12 | ... |
| | | | (0.21) | (0.20) | |
| Eldest dummy | 0.04 | -0.02 | 0.03 | 0.01 | 0.01 |
| | (0.46) | (-0.09) | (0.15) | (0.10) | (0.07) |
| Child sex-parent characteristic interactions | | | | | |
| Female x father's education | 0.19*** | 0.10 | 0.12 | 0.10 | 0.03 |
| | (2.70) | (1.17) | (0.75) | (0.64) | (0.12) |
| Female x mother's education | 0.13 | ... | 0.03 | 0.04 | 0.12 |
| | (1.03) | | (0.10) | (0.21) | (0.23) |
| Female x father's inherited land | 0.05 | 0.31 | 0.11 | 0.18 | 0.20 |
| | (0.28) | (0.85) | (0.36) | (0.36) | (0.75) |
| Female x mother's inherited land | -0.26 | ... | -0.20 | -0.21 | -0.20 |
| | (-1.37) | | (-0.61) | (-1.51) | (-1.63) |
| Child sex-grand parent characteristic interactions | | | | | |
| Female x paternal grandfather's education | 0.10 | 0.17 | ... | ... | 0.09 |
| | (0.28) | (1.14) | | | (0.83) |
| Female x paternal grandmother's education | 0.08 | -0.03 | ... | ... | ... |
| | (0.14) | (-0.15) | | | |
| Female x maternal grandfather's education | ... | ... | ... | ... | ... |
| Female x maternal grandmother's education | -0.12 | -0.11 | ... | ... | 0.04 |
| | (-1.56) | (-0.27) | | | (0.34) |
| Female x paternal grandfather's owned land | ... | ... | ... | ... | ... |
| Female x paternal grandmother's owned land | ... | ... | ... | ... | ... |
| Female x maternal grandfather's owned land | 0.20*** | ... | ... | ... | ... |
| | (7.70) | | | | |
| Female x maternal grandmother's owned land | -0.21 | -0.41 | ... | ... | 0.04 |
| | (-0.78) | (-0.62) | | | (0.34) |
| Child-sex grandparent coresidence interactions | | | | | |
| Female x paternal grandparent coresident | 1.38 | ... | ... | ... | ... |
| | (1.49) | | | | |

(continued)

**Table 10 (continued)**

| Variable | Measures of Grandparent Coresidence: Coresidence With Adult Child (1) | Measures of Grandparent Coresidence: Residence in Same Village (2) | Residence in Same Village at Child Ranges: Child Age 0 - 5 (3) | Child Age 6 - 10 (4) | Child Age 11 - 18 (5) |
|---|---|---|---|---|---|
| Female x maternal grandparent coresident | 0.82 | ... | ... | ... | ... |
| | (0.72) | | | | |
| Female x paternal grandfather in village | ... | 0.63 | -0.36 | -0.63 | -0.30 |
| | | (0.64) | (-0.78) | (-0.89) | (-0.46) |
| Female x paternal grandmother in village | ... | 1.03 | 0.69 | 0.68 | 0.46 |
| | | (1.13) | (1.30) | (1.36) | (0.38) |
| Female x maternal grandfather in village | ... | -2.10* | 0.52 | 0.37 | 0.21 |
| | | (-1.83) | (0.56) | (0.35) | (0.61) |
| Female x maternal grandmother in village | ... | 0.82 | 0.63 | 0.75* | 1.28* |
| | | (0.95) | (1.05) | (1.72) | (1.79) |
| Likelihood function value | 14,526.53 | 429.58 | 16,317.63 | 16,002.03 | 15,256.01 |
| Number of observations | 255 | 255 | 255 | 255 | 255 |
| x2 for joint significance statistic | 2,260.3*** | 93.6*** | 129.2*** | 303.9*** | 452.7*** |

[a] Asymptotic t-ratios in parentheses.

[b] Estimated using the polynomial loss function, except for specification (2), which used the quadratic loss function.

*** Significant at $\alpha$ = .01.
** Significant at $\alpha$ = .05.
* Significant at $\alpha$ = .10.

... = Variables not in equation.

educational attainment and the relative schooling completion of sons and daughters, even when alternative measures of coresidence are used. In contrast to conventional models of intrahousehold allocation that focus on spousal bargaining, these results show that both parent and grandparent pre-marriage wealth affect allocations within the household. This suggests that, in many developing country settings, a model that features only the parents as decisionmakers may oversimplify family decisionmaking processes.

Delving into the definition and structure of the family may be essential to understanding intergenerational transfer outcomes in rural societies: family-level unobservables are consistently significant determinants of the relative educational attainment of sons and daughters. While levels estimates do not show that daughters have an advantage in education, daughters have a slight advantage relative to sons when family-specific unobservables are controlled for. These are consistent with national data that show that Filipino girls attain higher levels of schooling than boys. Parents appear to exhibit cross-gender preference: daughters of better-educated fathers, and sons of landowning mothers, are favored with respect to education. Grandparent wealth, however, does not seem to affect the distribution of education between sons and daughters.

In these rural communities, daughters' advantage with respect to education is compensated for by the preferential bestowal of land to sons. While interactions with parental resources significantly affect the distribution of land between sons and daughters, so do grandparent resources. That is, grandparents seem to exhibit gender preference in land allocations: both grandparent wealth and coresidence affect the distribution of land between sons and daughters.

The above results suggest that Filipino parents and grandparents consider both equity and efficiency goals when making transfers to children. The bestowal of land to sons may be motivated by efficiency objectives, since rice farming is intensive in male labor, and returns to specific experience (Rosenzweig and Wolpin 1985) can better be captured by sons who typically assist in farm tasks from an early age. If sons remained in their natal villages to farm, they would be a more secure source of old-age support. The higher educational attainment of daughters may result from a relatively egalitarian family structure, but may also reflect children's own demand for schooling. Girls remain in school longer than boys, partly because the formal educational system, whose staff is predominantly female, reinforces the socialization patterns of girls (Bouis et al. 1994). Since girls are socialized to be responsible and loyal to their families, they are likely to remit incomes to their parents if they migrate (Lauby and Stark 1988). Preferential investment in girls' education, and transfers of land to sons, would then be consistent with a risk-diversification strategy for parents. Cross-gender preference may also be a part of parents' portfolio diversification strategy tied with enforcing the intergenerational contract.

While parental characteristics have a stronger influence on intrahousehold allocation, the grandparents' role in resource-constrained situations cannot be minimized. By relieving child-care constraints, coresident grandparents, or those in close proximity, may substitute for mother's time, allowing her to participate in the labor market. Grandparents may also substitute for daughters' time in caring for younger siblings. Grandparents may likewise serve as guardians of tradition in allocating land, an asset with high social and economic value in these rural communities, and may be consulted when land transfers to children are planned. However, to be able to ascertain the exact mechanism by which grandparent coresidence affects investment in children, measures of time spent in child care by parents and alternative caregivers (such as grandparents), as well as caregiver characteristics, need to be examined. Further research needs to explore the impact of alternative family structures and caregiving arrangements on human capital investment and other forms of intergenerational transfers.

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