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INTERGENERATIONAL TRANSFERS IN PHILIPPINE RICE VILLAGES: GENDER DIFFERENCES IN TRADITIONAL INHERITANCE CUSTOMS

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ABSTRACT

Traditional inheritance customs of village communities can be viewed as rules governing intergenerational wealth transfers. Parents' choices among education, land, and nonland assets as transfers to children are modeled assuming individualistic preferences of parents in an agricultural household. Empirical evidence is provided from a retrospective survey of five rice-growing villages in the Philippines. Parental gender preference in inheritance decisions is examined using family fixed effects estimates with interactions between gender of the child and parental endowments. Results indicate that, in level terms, daughters receive more education and total inheritance but less land. When family fixed effects are accounted for, however, education is gender-neutral, nonland asset transfers weakly favor daughters, and sons receive higher values of land and total inheritance. Interactions of child gender with parent endowments are relatively unimportant determinants of educational levels, although they are significant in bestowals of nonhuman capital. Daughters of better educated mothers, land-owning fathers, and land-owning mothers receive higher levels of land and nonland assets. On the other hand, better educated fathers and parents cultivating larger areas tend to bestow land and nonland assets preferentially to sons.

Key words: intergenerational transfers, bargaining models, agricultural households

Subject index: economic demography and labor economics; agriculture, technical change and science policy

INTERGENERATIONAL WEALTH TRANSFERS IN PHILIPPINE RICE VILLAGES:

Gender Differences in Traditional Inheritance Customs[1]

Agnes R. Quisumbing

1. Introduction

The process of intergenerational wealth transmission in rural societies is manifested in traditional inheritance customs and practices of village communities. Substitution among children, land rights, and human capital as alternative forms of holding wealth, and differences in wealth-holding by men and women have profound implications on both intra- and intergenerational inequality, occupational mobility, and migration.

In the rural Philippines, for example, transfers made by parents at the time of their children's marriage may have a significant impact on respective spouses' subsequent bargaining power. Land plays an important part in marriage among rural families. A parcel of land usually forms the main portion of the bride gift, or male land dowry, and is among several points bargained for between parents at the time of the formal marriage proposal (Anderson 1962; Scheans 1965; Lewis 1971). Other assets, like farm animals, residential lots, or a residential house, may also be provided to the

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newlyweds as part of the fund needed to establish them as a separate family unit (Fegan 1982).[2] Gifts and transfers at the time of marriage, however, are not the only transfers made by parents to children, since they may have invested previously in their children's human capital. Transfer behavior by parents and gender differences in inheritance customs are therefore observed in educational levels and bestowals of land and other assets to children.

Differences in human capital investment and inherited assets may influence the bargaining position of household members and subsequent decisions taken with respect to fertility, schooling, and transfers to children. Bargaining models of the household posit that individually-owned assets and the incomes therefrom may be significant determinants of household behavior. Empirical applications of the Nash-bargaining model provide evidence for differential effects of male and female unearned incomes on leisure choice (Horney and McElroy 1988), and in developing countries, on fertility and the probability that a woman engages in wage labor (Schultz 1990) and on family health outcomes (Thomas 1990a, 1990b).

Although there is evidence for gender differences in household resource allocation to children, it is not clear whether this is the result of genetic or ability differences, parental response to expected gender wage differentials, systematic differences by gender in the cost of investment in

[2] In his account of frontier life in a Central Luzon barrio, Fegan (1982:99) states: "In the marriage negotiations between parents, each family stated what components of their establishment fund it would be responsible for in a process of matching contributions of goods and labor. Aside from workbeasts, other farm equipment ... could be made by skilled older kinsmen. Kinsmen could also cooperate in the initial clearing of a farm, building a house, and making essential household equipment."

children, or parental gender preference (Behrman, Pollak and Taubman 1986).[3] While parental allocation of human capital investment may mildly reinforce gender wage differentials in the United States, this is offset by parental preferences which exhibit equal concern for or slightly favor girls (Behrman, Pollak and Taubman 1986). Discrimination against females in the intrahousehold distribution of nutrients is not supported by the equivalence scale literature (Deaton 1989, cited in Thomas 1990a) at least in Cote d'Ivoire and may be due to different activity levels (Pitt, Rosenzweig and Hassan 1990). Behrman and Deolalikar (1990) find differential adjustment of male and female nutrient intakes to changes in food prices in India, but their data do not show lower average nutrient intakes nor higher variances in females over males. In contrast, Thomas (1990a, 1990b), using data from the United States, Brazil, and Ghana, finds that mother's education has a bigger impact on daughter's height than on son's height, while father's education affects son's height more.

Intergenerational wealth transfers from parents to children are analyzed in five rice-growing villages in the Philippines. An additional perspective is obtained by modeling the intergenerational transfer as the outcome of bargaining between parents.[4] This approach differs from common preference models of intergenerational transfers where a single parent or both parents

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[3]Behrman et al. (1986: 33) define gender preference to mean that parents value identical outcomes at identical cost more highly for one sex than for the other.

[4]The use of a bargaining model to describe interactions within Philippine households can be justified since smooth interpersonal relations are not attached to established rules or ideals, nor to an ethical system, but are maintained through negotiation (Lewis 1971:84). The result is a "social pragmatism" in negotiating conflict avoidance and adjusting social relations to accomodate changes in the life cycle or family fortunes (Lopez 1991: 7).

acting collectively make transfers to children due to altruism (Becker 1974; Becker and Tomes 1979). It also departs from more recent studies which have modeled transfers as outcomes of strategic behavior between parents and children (Bernheim, Schleifer and Summers 1985; Cox 1987; Cox and Jimenez 1990). This paper focuses on gender differences in transfers received, in the forms of education, land and nonland assets. Parental gender preference in inheritance decisions is examined using family fixed effects estimates with interactions between gender of the child and endowments of the parents.

Empirical evidence is provided from a sample of 331 households with 2241 children in five Philippine rice-growing villages. A retrospective survey was conducted from July to October 1989 to acquire family inheritance histories for three generations, namely the parents', children's (respondents') and grandchildren's generations. Data is available on parents' characteristics, schooling and inheritance of the respondent and siblings, and on the respondent's spouse and children. This paper focuses on decisions made by the parents of current respondents, since fertility decisions, and most inheritance and schooling decisions, would have been completed by the time of the survey.

The agricultural household model (Singh, Squire, Strauss 1986) is modified to consider intergenerational wealth transfers (Becker and Tomes 1979, Tomes 1981) and a bargaining approach to household decision making (McElroy and Horney 1981, Manser and Brown 1981), although we do not impose a particular bargaining rule on the decision-making process.

The paper is organized as follows. Part 2 briefly reviews the literature on intergenerational transfers and presents a model of intergenerational wealth transfers for an agricultural household in which parents have individual preferences. Part 3 describes the data and presents the regression results for both level and family fixed effects estimates. Part 4 presents the summary and conclusions. A data appendix describes the study villages in greater detail.

2. Intergenerational Wealth Transfers and the Agricultural Household

2.1 Theories of Intergenerational Transfers

Inheritance rules can be viewed as an intergenerational contract between parents and children. The literature on private income transfers suggests three motives for intergenerational transfers: altruism, exchange, and insurance. In the altruistic model (Becker 1974, Becker and Tomes 1979), a benevolent individual (parent) cares about the well being of other individuals (children) and makes transfers to them. In this model, parents maximize a utility function spanning generations, in which utility depends on the consumption of parents and the quantity and quality of children. Parents curtail current consumption due to altruistic concern for their children and maximize utility by choosing optimal investments in the human and nonhuman capital of children.

The parental utility function can be written as

$$(1) \quad U_p = U_p(C,\ z_c,\ z_p)$$

where C is the number of children, z_c is per capita consumption of children when they become adults, z_p is parental consumption, and z_i is consumption of goods and leisure by parents and children, $z_i = (x_i,\ l_i)$. Typically, child consumption is assumed equal across children in the same family and z_p

is treated as the aggregate of parents' consumption, without any distinction between consumption by individual parents.

An income generating function for children is specified as

$$(2)\ Z_c = Y_c = g + \beta(E,\ g) + a = g + k + a$$

where children's consumption exhausts their income, defined as the sum of child's endowed income g (a function of genetic endowments), earnings from human capital k, and asset income a (Tomes 1981). Earnings are the product of a human capital production function defined over a parental efficiency parameter β, education E and the genetic endowment g.

The income constraint is

$$(3)\ Y_p = x_p + p_eCE + p_aCA$$

where income of parents Y_p is spent on parental consumption of goods x_p (the numeraire), and expenditures on education and material transfers, $p_eCE + p_aCA$. The price of education is p_e per head, C is the number of children, and E is educational investment per child. With regard to asset transfers, p_a is the price of the asset and A is the amount of assets transferred per child. In most models which assume altruism, a parent maximizes (1) subject to (2) and (3) to obtain the optimal number of children and optimal investments in human and physical capital per child.

In their model of intergenerational transfers, Behrman, Pollak and Taubman (1982) introduce the notion for parental preferences for intersibling equality in their choice of human capital investment and material transfers.

They argue that parental preference leads to schooling outcomes different from a wealth model of investment, given differences in genetic endowments among children. Thus, depending on the value of the parental preference parameter, parents may choose investment (schooling) strategies which may reinforce, compensate, or be neutral with respect to the child's genetic endowments. Empirical application to a sample of adult male twins yields the result that parents care about offsprings' earnings inequality and provide more (less) resources to the less (more) able than is consistent with a purely return maximizing investment model.

In later work, Behrman et al. (1989) examine the Becker-Tomes wealth model with equal parent concern for all children and the implications of the availability of parental resources for human capital and financial transfers to children. According to the wealth model, if parental resources are large enough, parents can provide each child with the wealth maximizing level of education and use (unequal) financial transfers to equalize present discounted value of children's income. However, if parents are resource-constrained, the wealth model implies that parents will allocate transfers unequally among children, do not equalize the present discounted value of children's income, and do not necessarily provide each child with the wealth-maximizing level of education. Behrman et al. do not find empirical evidence to support the predictions of the wealth model, since disinheritance and unequal sharing of estates among siblings are not the norm in the United States. They argue that the Becker and Tomes model add together earnings and returns from financial assets for each child, while their own study treats these as separable arguments in the parents' utility function.

Altruistic models of family behavior have been criticized for not taking into account nonaltruistic motives of parents to provide transfers to their children.[5] In exchange models of intergenerational transfers, the parental utility function is defined over parental consumption and child consumption, but also includes parental consumption of child services, the provision of which causes disutility to the child.[6] The parent's utility function is

$$(4)\ U_p = U_p\ (z_p,\ s,\ V(z_c,\ s))$$

where U_p, z_p, and z_c are as defined above, s is child services and V is the child's level of well-being, defined over z_c and s. Both parental and child consumption are normal goods, and $\partial U_p/\partial V > 0$, indicating that parents are altruistic. However, while parents enjoy child services ($\partial U_p/\partial s > 0$), their provision causes disutility to the child ($\partial V/\partial s < 0$). It is over the provision of child services that motives for transfers may depart from pure altruism. Whether or not the parents act altruistically or strategically is determined by the constraint

$$(5)\ V(z_c,\ s) >= V^o\ (Y_c,\ 0)$$

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[5]In the exchange model of Bernheim, Shleifer and Summers (1985), for example, the parent makes transfers to children in return for services received from them. Kotlikoff and Spivak (1981) view the family as an incomplete annuities market, where children make regular transfers to their parents, and the share that each child contributes to the parents determinces his or her share of the parental estate. Pollak's (1988) model of tied transfers and paternalistic preferences is midway between the altruistic and exchange models. Pollak argues that parents care about their children's consumption even after the children have grown up and left home, and use tied transfers to influence the children's consumption of particular goods and services.

[6]This exposition follows Cox (1987) closely.

that is, whether the child's utility when providing services is greater than his/her reservation utility or "threat point," defined over child's income (without transfers) and no provision of child services. If (5) is not binding, transfer behavior is altruistic and the child's gain is strictly positive. Otherwise, transfers provide compensation for child services. Cox (1987) tests altruism versus exchange motives using a data set on inter-vivos transfers for the United States. A negative relationship between pretransfer income and transfers suggests altruism, while a positive relationship signals the presence of exchange motives. His results support the idea that inter-vivos transfers are payments for services exchanged among family units.

Other studies on intergenerational transfers (Cox and Jimenez 1991) have explicitly incorporated the idea of bargaining between parents and children. Suppose that parents and children are mutually altruistic. The parents' utility function is defined over own consumption x_p and child utility V:

$$(6)\ U_p = U_p(x_p, V)$$

and child utility is defined over child consumption and parent utility

$$(7)\ V = V(x_c, U_p).$$

Assuming imperfect capital markets, a common subjective rate of time preference, and the possibility that parents lend to children in the latter's youth in return for transfers received in their old age, Cox and Jimenez

(1991) suggest that the terms of the intergenerational loan are determined by Nash bargaining. Parents and children choose transfers to maximize

$$(8) \quad N = (U_p - U_p^{\circ}) \times (V - V_o)$$

where U_p° and V° are the utilities obtained by parents and children on their own. Cox and Jimenez's empirical results for urban Peru support the presence of altruistic motives at low levels of pretransfer income and exchange motives at higher levels of pretransfer income.

Finally, the insurance motive for wealth transfers views the family as a means for diversifying against risk. This view is especially prevalent in the literature on the family in developing countries. For example, Rosenzweig (1988) argues that family structure and kinship ties are sustained over space and time in implicit insurance-based schemes to smooth incomes in the face of covariant income risks. Such familial transfer arrangements are preferred to the use of credit markets, particularly by households able to self-insure because of their ability to accumulate wealth. Moreover, the intergenerationally extended nature of farm families and the prevalence of inheritance rather than land market sales are viewed as ways of capturing returns to specific experience by farm families (Rosenzweig and Wolpin 1985).

Testing alternative models of intergenerational transfers in a developing country will require a formulation to take into account not only the differences in risk faced by families, but also the existence of imperfect asset markets which may constrain the form in which wealth is held and in which transfers are made. The absence of a well-developed financial system may increase the desirability of nonfinancial assets, especially land, as forms of transferring wealth. In the absence of modern property rights, or the existence of institutional constraints on these rights (such as land reform laws forbidding the sale of tenancy rights), even usufruct rights to land acquire the status of an asset. Children are also viewed as an asset in rural economies; variables positively associated with returns to child labor--size of landholding, agricultural productivity, and wage rates--have been shown to be positively related to fertility and negatively related to child schooling (Rosenzweig and Evenson 1977).

Education is another form in which parents may transfer wealth to their children. In developing countries, educational investment is motivated partly by altruism, but may also be due to the parents' desire to capture returns to children's schooling. Agricultural parents may want to diversify the family's occupational portfolio by investing in children's education, since better educated children have better chances of moving into a nonagricultural occupation for which returns may covary less with agricultural incomes and thus provide insurance to smooth fluctuations in family income. Parents in rural areas may also invest preferentially in family members (e.g. children of the head) who have higher probabilities of making remittances from urban incomes than other members (sons- or daughters-in law, or even spouses). In Botswana, remittances from own young are significantly higher than among all absentee members of the household, supporting the notion that remittances are partly a result of an intergenerational contract to repay initial educational investments (Lucas and Stark 1985).

Although recent studies of intergenerational transfers have incorporated the notion of bargaining between parents and children, they do not recognize individualistic preferences of parents or asymmetries in parents' bargaining position (Manser and Brown 1981; McElroy and Horney 1981; McElroy 1990). Most of the above studies do not distinguish between utility functions of individual parents. In other words, while bargaining between parents and children has been admitted, these studies usually hold that parents have common preferences.

A number of studies have relaxed the neoclassical assumption of common preferences between husband and wife in household decision-making. McElroy and Horney's (1988) Nash bargaining formulation relaxes the restriction that nonearned incomes of husband and wife have identical effects on family labor supply and commodity demands; this restriction is empirically rejected for female labor supply and fertility in Thailand (Schultz 1990). Thomas (1990a, 1990b) examines the differential effects of father's and mother's endowments on sons and daughters' health in the United States, Ghana and Brazil, and points out greater impact of parents' endowments on children of the same gender.

It has been argued (Chiappori 1988a, 1988b) that the Nash-bargaining assumption is overly restrictive and does not yield easily testable restrictions, unless the pre-marital (indirect) utility function is known. In addition, McElroy and Horney assume independence of pre- and post-marital preferences. In consequence, unless preferences are known, Nash bargaining implies only Pareto optimality of household decisions. Thus, one need only assume Pareto efficiency in household allocation outcomes. Even if the Nash-bargaining solution (if it exists) may be reached through more complicated processes of sequential bargaining (Harsanyi and Selten 1987), one does not need to assume a particular bargaining rule to test the common preference model of household decision-making. If we assume only that household allocations are Pareto efficient, but parents have different preferences, household demands should be affected only by prices and individual components of unearned income (Thomas 1990a). That is, the optimal household demands x^*_i are:

$$(9)\ x^*_i = g(p, I_1, \ldots, I_m)$$

where p is a vector of prices, and $I_1, \ldots, I_m$ are unearned incomes of individuals 1 to m. One can therefore test the common preference model against a broad class of alternatives by testing for the equality of unearned income effects.

Suppose that the desired number of children, education, and transfers are outcomes of household decision making, and that parents have individualistic preferences. It is possible that these outcomes will be affected by differences in parents' bargaining power, and that realizations among sons and daughters will be likewise affected. Different preferences in intergenerational transfers to sons and daughters could then be manifested in observed inheritance outcomes. This paper aims to provide econometric evidence on inheritance rules in rural Philippine households. Are male heirs favored in land and asset inheritance? Do differences in father's and mother's individual endowments and child characteristics affect household allocation decisions among sons and daughters? If daughters are not favored in land inheritance, are other forms of transfers (schooling or assets) meant to offset this bias? We attempt to answer these questions in the remainder of the paper.

2.2 The Model

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. We assume individualistic preferences--the father and mother have their own utility functions--and individual sources of unearned income. The demand for goods, leisure, the desired number of children and optimal levels of education and asset transfers can be expressed as:

$$(10a)\quad x^*_i = x^*_i(p, w^*_f, w^*_m, L, I_f, I_m)$$

$$(10b)\quad l^*_i = l^*_i(p, w^*_f, w^*_m, L, I_f, I_m)$$

$$(10c)\quad C^* = C^*(p, w^*_f, w^*_m, L, I_f, I_m)$$

$$(10d)\quad E^* = E^*(p, w^*_f, w^*_m, L, I_f, I_m)$$

$$(10e)\quad A^* = A^*(p, w^*_f, w^*_m, L, I_f, I_m)$$

where p is a vector of prices of consumption goods, including the cost of education p_e and assets p_a, w^*_i is the shadow wage rate, L is a vector of fixed inputs, such as land, and I_f and I_m are unearned incomes of father and mother respectively.[7] The shadow wage rate is endogenously determined by market prices, fixed inputs, and unearned income. Wages are endogenous because of the possibility that an individual may not participate in the wage labor market. Since the w^*_i are endogenous, appropriate

[7]Although area cultivated can be considered a choice variable in any cropping season, we assume that the landholding size (including cultivated and fallow land) is largely determined at the time of marriage, since farming households typically receive land rights as a marriage gift from parents, or enter into tenancy contracts prior to setting up a separate household.

instruments must be found for them; candidates are parents' previous investment in human capital (completed schooling), individual unearned income or indicators thereof, such as individual land or asset ownership.

Theoretically, the optimal quantities are derived from solving the Hicksian demand functions simultaneously, given prices, virtual wages, unearned income, and fixed inputs. In practice, however, due to the sequential nature of decision-making over the life cycle, later decisions may be based on previous decisions, plus the realization of "luck" or deviations from the expected outcome. This added error, or changes in the initial conditions, could lead to a revision of earlier goals. For example, in the typical family life cycle, completed fertility is determined prior to the completion of investment in children's human capital; schooling may also be completed before the child's earning capacity is known (Tomes 1981). Given that, at the time bequests are made, parents' fertility is predetermined and human capital investment already precommitted, no adjustment of these choice variables may be possible, so material transfers will have to adjust if decisions are revised.

Thus, let us assume that parents decide completed family size in family j using the rule

$$(11) \quad C^*_j = C^*_j(p, w^*_f, w^*_m, L, I_f, I_m; \alpha)$$

where α is a vector of other variables, such as parental tenure, irrigation, or location. Educational investment in child i of family j will then take into account the number of children C^*_j as well as the parental efficiency parameter β_j:

(12) $E^*_{ij} = E^*_{ij}(p, w^*_f, w^*_m, L, I_f, I_m; \alpha, \beta_j, C^*_j)$

and asset transfers, in turn, will be conditioned on the number of children C^*_j and previous investment in their human capital E^*_{ij}:

(12) $A^*_{ij} = A^*_{ij}(p, w^*_f, w^*_m, L, I_f, I_m; \alpha, \beta_j, C^*_j, E^*_{ij})$.

In practice, C^*_j, E^*_{ij}, and A^*_{ij} are all affected by the same unobservables, such as preferences, and could have common error components. It is difficult to find variables which would affect some of the decisions exclusively in order to impose identifying restrictions. For example, it could be argued that parents may grant smaller bequests to children who marry wealthier spouses. But to the extent that family formation is an endogenous process and depends on individual characteristics such as marital attractiveness and educational attainment (Boulier and Rosenzweig 1984), spousal characteristics or even child's marital status is not exogenous.[8] Even the provision of child services is not independent of previous parental decisions; better educated children may be more able to provide old age support, or children not in the labor market may have more time to spend visiting parents. If one assumes that previous levels are predetermined and that errors are not correlated across equations, then the model can be

[8]In the rural Philippines, for example, marriage partners are chosen to a great extent with an eye for equivalent or higher status. The institution of the salonson (formal marriage proposal in Pangasinan) is purely a meeting for economic bargaining between parents before marriage plans are allowed to proceed further. Land rights may be withheld by parents if they disapprove of a son's choice of bride (Anderson 1962: 54).

estimated recursively. Alternatively, one can estimate reduced form equations and express family outcomes as a function mainly of parental characteristics at the time of marriage. We use the second method, but also include a vector of child characteristics such as gender, birth year, dummies for eldest or youngest child, and interactions between gender and birth order.

2.3 Empirical Specification

We assume that parents can transfer wealth through human capital investment (education), land rights (usufruct rights or land ownership), and nonland assets.[9] The reduced form equations are expressed as a function of parental endowments in the fertility equation and of both parent endowments and child characteristics in the education, land, and nonland asset transfer equations.

The fertility equation can be written as

$$(14) \quad C^* = c_1 + c_2X_f + c_3X_m + \epsilon_1$$

where C^* is completed family size, defined as number of children ever born minus child deaths below age five, and X_f and X_m are vectors of parental endowments at the time of marriage, such as education, size of land owned, and area cultivated or joint landholding at the time of marriage. We study completed family size rather than number of children ever born because we are

[9]Most of these are inter-vivos transfers, since parents usually transfer the land right to their children while the former are still living, usually when the child gets married. Single children generally claim their rights only after the final division of the estate; i.e. after their parents' death, since they continue to live in the parental household while unmarried. The exception occurs if the child worked in a distant location. In their old age, however, parents usually stay with the youngest child, who then inherits the parental house. Since bestowal of land rights is linked to marriage, it can be argued that the decision to marry may be motivated partly by the desire to realize claims to land.

unable to measure confidently child mortality and replacement fertility with our data. Individual landownership is our indicator of individual asset positions, because area cultivated exclusively by women is not common in the Philippines, but landownership by women is widespread. Area cultivated at the time of marriage, on the other hand, is a measure of family income generating capacity in agriculture. Lastly, since we are looking at a sample whose family sizes have been completed by the time of the survey (the youngest child in the sample was born in 1980), we do not include mother's age as a regressor to take into account differential fertility across age cohorts. A linear trend across cohorts in completed fertility is captured by mother's year of birth.

<u>Level Estimates</u>.

Education and wealth transfer decisions involve not only parental endowments but also child characteristics and their interaction with parental endowments. Thus, we specify the levels of education, land and assets received by child i in family j as:

$$(15)\quad E^{*}_{ij} = e_1 + e_2X_{cij} + e_3X_{fj} + e_4X_{mj} + e_5X_{fj}X_{cij} + e_6X_{mj}X_{cij} + \epsilon_2$$

$$(16)\quad L^{*}_{ij} = l_1 + l_2X_{cij} + l_3X_{fj} + l_4X_{mj} + l_5X_{fj}X_{cij} + l_6X_{mj}X_{cij} + \epsilon_3$$

$$(17)\quad A^{*}_{ij} = a_1 + a_2X_{cij} + a_3X_{fj} + a_4X_{mj} + a_5X_{fj}X_{cij} + a_6X_{mj}X_{cij} + \epsilon_4$$

where X_c is a vector of child characteristics such as gender, birth year, and dummies for the eldest or youngest child, and X_fX_c and X_mX_c are interaction terms for child gender and parent endowments, i indexes the child, j indexes the family, and ϵ_i is the error term in each equation.

Birth year is included as an explanatory variable to account for possible time trends in environmental conditions, such as the availability of education.

Family Fixed Effect Specification.

Level estimates do not adequately capture the effects of family level variables that may influence the capacity of parents to transfer assets to their children. Aside from endowments at the time of marriage, assets accumulated by the couple over their adult life cycle would affect their ability to make bestowals. However, many of these family-specific variables are not observed. Should these omitted family level variables be correlated with those included in the previous model, their estimated effects on transfers may be biased. For those families with at least two children, the within family allocation may be the critical source of variation in the sample from which to estimate gender differences in transfers.[10]

Consequently, we adopt a fixed effect specification that includes a family "effect". One way of accounting for family fixed effects is to introduce dummy variables for those omitted variables that are specific to each family.[11] An equivalent method is to estimate the slope parameters using first differences in the dependent and explanatory variables. We simply compute the means of the individual observations for each family unit, transform the observed variables by subtracting out the family means Y_j and X_j for the dependent and independent variables, respectively, and apply least squares to the transformed data. In this specification, the effect of family

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[10]We choose families with at least two children of both sexes so that eldest, youngest, and gender dummies are relevant in the family fixed effects specification.

[11]See Hsiao (1986: 29-31) for a more detailed exposition.

variables that do not vary across children cannot be identified, such as parent endowments at marriage or residential location. However, the effects of these variables may be estimated to the extent that they impact differently on children of different gender. Thus, in our specific application, only the child's gender, eldest and youngest dummies, interaction between child gender and birth order, the child gender and parent endowment interaction terms, and the birth year difference (difference between the child's birth year and the average birth year within the family) remain as explanatory variables in the family fixed effects specification.

3. An Application to the Philippines

3.1 Data

Data were obtained from a retrospective survey of 344 sample households in five selected villages, which were randomly selected and intensively surveyed by the International Rice Research Institute (IRRI) in 1985.[12] A complete village census was initially conducted in 1984 to obtain general information on farm and household characteristics, demographic data, migration histories, and changes in tenancy and landownership status. A sample survey of farming and landless households was then conducted twice, pertaining to the dry (January to May) and wet (June to December) seasons of 1985. The sample households were selected from the population list stratified by migration status and farm size for farm households and by migration status and family size for landless households. Although the choice of stratification variables is debatable, this study resurveyed the sample as it was initially surveyed by

[12]Results of the survey on rice production and income distribution are reported by Otsuka, Cordova and David (1990).

IRRI.[13] The 1985 IRRI sample consisted of 300 farming households and 96 landless households; due to outmigration the sample size was reduced to 344 as of 1989.[14] Since the initial survey focused on rice farming practices, heads of households (usually male) were chosen as respondents; this may have led to a larger number of observations on males compared to females in the 1989 survey. The retrospective survey included questions on the parents, siblings, and children of the respondents, yielding information on three generations which we term the parents', children's and grandchildren's generations. The survey enable us to match 331 sets of parents with 2241 offspring for the children's generation.[15] Familiarity of the enumerators with the sample respondents and their spouses established through repeated interviews greatly facilitated the resurvey in 1989.

Two villages are located in Central Luzon, while three villages are in Panay Island. These villages are typical rice growing villages in these regions, and the whole area is planted to rice during the wet season (June to December). Rice cultivation during the dry season depends on the availability of irrigation. Cropping patterns, irrigation facilities, tenure distribution,

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[13] Migration and family size are inappropriate stratifying variables since both are endogenous to family decisions. To some extent, since farm size may be limited by land reform regulations, this may be considered exogenous, although informal land pawning agreements may change actual area cultivated in a given season. It is perhaps more accurate to state that land legally acquired through land reform is subject to award limits and is exogenous.

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

[15] We only included observations for which information was complete. Due to the nature of the retrospective survey, it was difficult for some respondents to recall some of the information being requested. Estimation was also carried out on set of smaller subsamples; this will be discussed later in the text.

and modes of land acquisition are discussed in greater detail in the Appendix.

A summary of family, parent, and child characteristics, classified by father's tenure status at marriage is presented in Table 1. Completed family size in the children's generation is 6.72, with mean birth year in 1940. The implied sex ratio of 1.27 suggests that more sons than daughters are represented, and could be due to the choice of the household head (usually male) as respondent in the IRRI survey. On the average, fathers owned 1.42 hectares at the time of marriage; mothers, 0.58 hectares. The average size of joint landholding at the time of marriage, 3.46 hectares, is larger than the sum of father's and mother's owned land because of tenancy agreements.[16] On the average, fathers tend to be better educated than mothers, with 3.69 and 3.16 years of schooling, respectively. This trend is reversed in the next generation, where daughters have 7.01 years of schooling and sons, only 6.54 years. The gain in female education (daughter's education minus mother's education) is larger than the corresponding gain for males in all tenure categories.

Sons receive almost twice the area bestowed to daughters (0.42 hectares, compared to 0.22 hectares). The value of land inherited is also higher for

[16]Seventy-five percent of fathers and twenty-five percent of mothers had individual rights to owned land. In many cases, howeveer, owned land was in the respective parents' provinces of origin and not in the survey area.

sons than for daughters.[17] Sons also receive a higher value of nonland assets and of inherited assets.[18]

Means and standard deviations of the variables used in the regressions are presented in Table 2. For the levels estimates, estimation was performed on a smaller sample of 2212 individuals belonging to families with at least two children, of which 1366 belonged to families which had bestowed land to at

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[17]Land values for different tenure categories were computed using 1989 prices. Prices of owned land are readily available. Prices for other tenure categories are obtained from informal transactions for usufruct mortgage (land pawning), since existing land reform laws restrict the sale and transfer of cultivation rights.

A comprehensive land reform program in rice and corn areas was implemented by virtue of Presidential Decree (PD) No. 27, promulgated in 1972. Share tenants on land greater than seven hectares in size were allowed to purchase the land they cultivated (subject to award limits) through amortization payments based on the value of crop production to the Land Bank of the Philippines. Share tenants on land less than seven hectares in size were converted to fixed-rent leaseholders; the rent was based on 25 percent of the output, net of customary expenses, as of 1972. Under this program, land rights for the former category of tenants were formalized in Certificates of Land Transfer (CLT), which are transferable only by hereditary succession or to the government through the Department of Agrarian Reform (DAR) (Hayami, Quisumbing and Adriano 1990). Leasehold rights, however, can be sold with the approval of the landowner and the local DAR office. Despite these laws, there is a growing, albeit illegal, market for cultivation rights through land pawning arrangements (Nagarajan, Quisumbing and Otsuka 1990). Using pawn-out value as an indicator of the implicit market price of a tenancy right, we found that in the Central Luzon villages in 1989, the price of a share tenancy right was, on the average, approximately equal to the pawning price of leasehold land, but the pawning price of CLT land was approximately twice that of leasehold land. In the Panay Island villages, which have a mix of tenant and owner-cultivators, the price of title sale is from two to five times the pawning price.

[18]Nonland assets are valued in 1989 prices. For assets whose present values were declared by the respondent, these present values were used. Asset values for which only values at bestowal were available were inflated to 1989 values using the farm gate rice price index for farm animals, farm assets, on-farm residential house and lot, or a region-specific consumer price index (CPI) for readily tradeable consumer durables. Since mobility and fungibility of farm assets is limited, and the value of farm property linked to returns to rice production, the rice price index is thought to be a better adjustment factor than the CPI.

least one child. Families with less than two children were excluded since the eldest and youngest dummies would not apply. For the fixed effects estimates, single-gender families were excluded; this reduced the sample size to 2083 individuals.

3.2 Estimation

Ordinary least squares estimates for the fertility equation are presented in Table 3. Completed (surviving) family size, defined as number of children ever born minus child deaths below age five, is regressed on mother's birth year, father's and mother's education, father's and mother's land owned, and joint landholding at the time of marriage. A female respondent dummy was included to control for differential recall by gender of respondent. The results of the fertility equation are disappointing: none of the coefficients are statistically significant at the 5% level, and the overall regression is statistically insignificant at the 5% level. Only the coefficients for mother's birth year and education are significantly different from zero at the 10% level, with the latter being negative. We are therefore led to conclude that, for this generation, fertility behavior is random.[19]

Table 4 presents OLS estimates of children's educational levels, stratified according to the family's land inheritance status, i.e., whether or not parents bestowed land to at least one child, which is taken as exogenous in this study.[20] Children's years of schooling is regressed on parental

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[19]To some extent, this could be due to respondents' difficulty in recalling earlier births and parental characteristics. Preliminary results indicate that fertility behavior of the next generation is highly responsive to the same economic variables.

[20]Parents' probability of bestowing land is strongly affected by exogenous variables which are given at the time of marriage. Father's and mother's land owned (or landholding at marriage, in an alternative specification) are statistically significant in a probit regression of the probability that parents

characteristics (father's and mother's education and landownership), child characteristics (gender, birth year, and dummies for the eldest and youngest child), interaction between child gender and birth order terms, and interaction terms for child gender and parental endowments.[21] To control for differential recall by respondents of their own schooling and transfer levels relative to their siblings, a respondent dummy is included; differential recall by female respondents is controlled for through a female respondent dummy.[22]

For the entire sample, including the full range of interactions, the coefficient of child's birth year is positive and significant while the quadratic in birth year (divided by 1000) is significant and negative, indicating secular increases in schooling at a diminishing rate. The youngest child is weakly favored in terms of education. Both father's and mother's education and mother's land owned are positively and significantly associated with child schooling. However, likelihood ratio tests for the joint significance of gender interactions lead us to accept the null hypothesis that gender-birth order interactions are insignificant, and that all gender interactions (with birth order and parent endowments) are equal to zero. We

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bestow land to at least one child (Table A.4, in the Appendix). Although it is conceivable that parents may accumulate land in the hope of making bequests to their children, this is constrained by land reform laws. Share tenants were allowed to receive a maximum of three hectares of irrigated land or five hectares of unirrigated land. There is, however, no constraint to the purchase of owned land.

[21]So that the eldest and youngest dummies would be relevant, families with less than two children were excluded. This reduced the number of individuals in the sample from 2241 to 2212, and the number of families from 331 to 307.

[22]This is an effort to account for respondent-related measurement errors. An attempt was made to interact child gender with the gender of the respondent, but this led to multicollinearity among regressors.

do reject the null hypothesis that gender-parental interaction effects are equal to zero ($\chi^2 = 21.76$). There is some weak evidence (at 10%) that better educated fathers tend to favor sons, while land-owning mothers favor daughters. We weakly reject the null hypothesis that gender interactions with parents' education are equal (F=2.77), that interactions between gender and landownership equal (F=2.55), and that parental interaction effects are both equal (F=3.10). The respondent dummy is insignificant but the female respondent dummy is significant and positive.

The effects of different resource availabilities can be discerned by comparing families with land bequests, which presumably have more resources, to families which are unable to make land bequests. While the birth year coefficient is significant and positive, and the quadratic term significantly negative for both subsamples, there is weak evidence that daughters receive less education in the sample with land bequests. This result is somewhat modified by the positive (though weakly significant at 10%) coefficient of the female-birth year interaction, which may indicate better education for later-born females. However, these results should be taken with caution since for both types of families, we accept the null hypotheses that (1) gender-birth order interactions are equal to zero, and (2) that all gender interactions are equal to zero. The coefficients of father's and mother's education are significant and positive for the sample with land bequests, while that of father's land owned is significant and positive for both subsamples. It is interesting to note that area cultivated at marriage exerts a negative though weak effect on schooling levels, which could reflect higher opportunity costs of schooling due to the demand for on-farm family labor. This is consistent with evidence from India (Rosenzweig and Evenson 1977) which suggests a negative relationship between size of landholding and child schooling. There is weak evidence that daughters of better educated mothers receive more schooling in the sample without land bequests. However, this does not necessarily reflect only parental gender preference, but may indicate technological differences in the household division of labor since mothers' occupations may benefit from better trained daughters.[23] We reject the null hypothesis that gender-parental interaction terms are equal to zero only for the sample with land bequests. For the entire sample and the subsample without land bequests, we reject the null hypothesis that gender interactio effects with parents' education are equal (F=2.77; F= 2.10), and for the entire sample we reject the equality of parental landownership interaction terms (F=2.55) and of both education and landownership interaction terms (F=3.10).

Differences across siblings within the same family are analyzed using family fixed effects estimates, with a complete set of gender interactions (Table 5).[24] For the entire sample and the families which make land bequests, the dummy for the eldest child is positive and that for the youngest negative. These coefficients are weakly different from each other; F-statistics are 2.82 and 4.96, for the two sample categories, respectively. In the sample without land bestowal, later-born female children are favored with

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[23]Anthropological evidence also suggests that daughters not only act as mother-surrogates if the latter is absent or feeble, but have strong responsibilities toward their mothers. A daughter has an obligation to provide moral and financial support for her mother, and even when married, a daughter commonly attends to her mother's needs first (Nurge 1965: 102; quoted in Lopez 1991: 18).

[24]Single-gender families and families with less than two children were excluded. The sample size for the fixed effects estimation is 2083.

respect to education, although if the youngest is female, she appears to receive less education than her siblings. The strongest and most consistent effects, however, are for birth year differences. Later born children receive better than average education within the family. Respondents, who are, by sample design, usually involved in agricultural production, have significantly lower levels of education than the sibling average. The above results must be qualified, however, since tests for the joint significance of gender interaction terms lead to the acceptance of the null hypotheses that (1) gender-birth order effects are insignificant (except for the sample without land bestowal); (2) gender-parental interaction terms are equal to zero; and (3) all gender interactions are equal to zero. In the whole sample and the sample with land bestowal, we reject the null hypothesis for equality of eldest and youngest children in education (F=2.82 and F=4.96, respectively); for the latter subsample, we weakly reject the equality of gender-birth order interaction terms (F=2.58).

Having rejected the joint significance of the gender interaction terms, we reestimate the model as a function purely of child characteristics and parent endowments (Table 6). In level terms, daughters are clearly favored with respect to education. Educational levels increase secularly at a diminishing rate, and there is weak evidence to support that the youngest child may receive more education, a reversal of the results mentioned above. Both parents' levels of schooling exert positive and significant effects, and mother's education has a stronger effect on child's education, regardless of the gender of the child. We reject the null hypotheses that parents' education effects are equal (F= 2.94 for the whole sample; F= 2.49 for the sample without land bestowal). Education is also positively related to parents' landownership, although both effects are statistically equal. In the sample without land bestowal, area cultivated exerts a negative influence on children's education, possibly due to competing demands for children's time. When we take into account family fixed effects without the gender interaction terms (Table 7), the two variables which remain significant are the birth year difference (positive) and the respondent dummy (negative). The female dummy is insignificant.

We examine determinants of the levels of land and nonland asset transfers in families which make land transfers to at least one heir, with all gender interactions included (Table 8). None of the child characteristics, except for the positive and significant eldest female dummy, is a significant determinant of the value of land received by heirs. In contrast, some parental characteristics and most of the gender-parent endowment interaction terms significantly affect land bestowal levels. Mother's education has a significant and negative effect on land bestowals, while area cultivated at marriage has a significantly positive effect. The latter probably indicates a larger area of land to divide among children and would thus be positively associated with land transfer levels. Differential effects of parental endowments by child gender are more obvious from examination of the interaction terms. Better educated fathers tend to give land to boys, while better educated mothers favor girls. Land-owning fathers <u>and</u> mothers tend to give land to girls. Families with larger cultivated areas, however, tend to give land to sons. This supports anthropological evidence (Takahashi 1969; Umehara 1974) that among land-owning families, both sons and daughters inherit land, while among tenant families (who do not own land but cultivate rented land) tenancy rights are bestowed to male heirs. We reject the equality of

(1) parents' education effects, (2) parents' landownership effects, and (3) both education and landownership effects. Moreover, we reject the equality of gender-parental education effects and the equality of both sets of parental interaction terms.

Younger children tend to get lower levels of nonland asset transfers, although if the youngest child is female, she receives higher levels of nonland assets. This may be due to the cultural expectation for the youngest child, especially if she is a daughter, to care for the parents in their old age. The youngest child usually receives the parental home as a bequest. Mother's education and father's and mother's owned land have negative coefficients, but area cultivated is a significant and positive determinant of nonland asset transfers. Better educated fathers and land-owning fathers tend to give nonland assets to daughters, although families who cultivate larger areas may give nonland assets to sons, possibly because of complementarity between farm assets and land bestowed.

Levels of total inheritance appear to be weakly higher for daughters but lower for younger children. Later-born daughters, however, appear to receive lower values of total inheritance. Mother's education is negatively related to total value of inheritance, but larger areas cultivated positively affect the total value of inheritance a child can receive. Sons of better educated fathers and daughters of better educated mothers receive larger total bestowals. Land-owning fathers and mothers bestow higher values of inherited wealth to daughters, though the latter are at a disadvantage in families which cultivate large areas. The respondent dummy is significant and positive in all equations.

In contrast to the education equations, we reject the null hypotheses that the gender interactions are jointly equal to zero. In all three equations, we reject the null hypotheses that (1) gender-parental interaction effects are equal to zero; and (2) that all gender interaction effects are equal to zero. However, we can reject the hypothesis that gender-birth order effects are equal to zero only in the land value equation. In the other equations, we accept the null hypotheses that these effects are equal to zero--birth order interactions do not seem to be important determinants of nonland assets and total value of inheritance. We also reject the hypotheses that (1) parents' education effects are equal in all equations; (2) parents' landownership effects are equal in the land and total inheritance equations; (3) parental effects are jointly equal in the land and total inheritance equations; (4) parental education interactions are equal; and (5) both types of parental interaction terms are equal. Parental landownership interactions with gender are equal, lending support to anthropological findings on transfer behavior by landowning families.

When we account for family fixed effects (Table 9), the bias against daughters in land inheritance becomes evident. While other child characteristics are insignificant, the female dummy is significant and negative. Daughters of better educated mothers, however, tend to receive more land. Daughters and later-born children also receive more nonland assets, although the youngest child is not especially favored, unless it is a daughter. Surprisingly, the coefficients for later born daughters and eldest female children are negative. Daughters in families cultivating larger areas tend to receive less nonland assets compared to the sibling average.

The bias against females persists when we examine differences in total inheritance value. Females, especially younger females, receive less inheritance than their siblings. Better educated fathers favor sons, while landowning mothers favor daughters. The respondent dummy is significant and positive, which may indicate either that the respondent has received more relative to his siblings, or that respondent recall for his own receipts is more accurate. In contrast to the level estimates, we can reject the null hypothesis that gender-birth order effects are equal to zero only in the nonland asset equation, and that all gender interactions are equal to zero in the same equation. We reject the null hypotheses that eldest daughters and youngest daughters are treated equally in nonland asset bequests. We also reject the hypotheses that (1) child gender interaction terms with parents' education are equal; and (2) both child gender-parental interaction effects are equal.

Since gender-interaction effects are significant in the levels equations, we do not reestimate these without the interactions. We present the results of the family fixed effects estimates without the gender interactions in Table 10. Relative to sibling means, female children receive significantly less in terms of land value. The eldest child also receives more than the average, although this coefficient is not significantly different from that for the youngest child. Nonland asset bestowal seems to be neutral with respect to gender, although the eldest child does not appear to be favored. Finally, daughters receive less total inheritance relative to sibling averages. The respondent dummy is significant and positive in all equations, and there is no significant difference between eldest and youngest children in any of the equations.

4. Summary and Conclusions

Intergenerational wealth transfers by households in rice-growing villages were modeled as the outcome of bargaining between parents. Empirical results support previous findings that differences in parents' bargaining positions--indicated by education and landownership--have significant consequences on intergenerational transfers to children. Coefficients of father's and mother's education are significantly different from each other in the education, land, and nonland asset transfer equations, while coefficients of father's and mother's landownership are significantly different from each other in land and total inheritance equations.

We summarize our findings by focusing on two dimensions of intrahousehold differences in wealth transfers: (1) differences between sons and daughters; and (2) interactions between parental characteristics and child gender. Our findings are remarkably consistent with the anthropological literature and field studies on inheritance in the lowland Philippines (Anderson 1962; Scheans 1965; Takahashi 1969; Umehara 1974; Lewis 1971).

Despite Philippine laws which stipulate equal inheritance by sex, there are marked differences in transfers towards sons and daughters. In absolute (level) terms, daughters receive more education and total inheritance but less land. In terms of deviations from the sibling mean, however, education is neutral with respect to gender, nonland asset transfers weakly favor daughters, while sons get more land and higher values of total inheritance. The preference for sons in land bestowal can be attributed to the custom of giving a portion of the parents' holdings to their son, or sons, when they got married (Umehara 1974). The Ilocanos, who account for a majority of respondents in the Central Luzon villages, subscribe to the custom of the male land dowry (*sabong*) whereby parents bestow land (or a tenancy right) to the son upon marriage, with the understanding that he will take care of his parents in their old age. Land bestowals are almost exclusively to sons in Ilocano tenant families, though males and females usually inherit equal shares in landowning families (Takahashi 1969; Umehara 1974).[25] Land bestowals to son may reflect higher returns to specific experience for boys (Rosenzweig and Wolpin 1985), since rice farming is more intensive in male labor.

To highlight the differential effects of parent endowments and birth order by child gender, we summarize the gender interaction terms in Table 11. In general, gender interactions with birth order are insignificant, except in land bestowal, where the eldest daughter may receive a higher level of land transfers. Gender interactions are relatively unimportant determinants of educational levels, although they are significant in bestowals of nonhuman capital. In most cases, child gender interacts significantly with parent endowments. These interactions are most obvious in the equations for nonhuman capital transfers, where daughters of better educated mothers, land-owning fathers, and land-owning mothers receive higher levels of land and nonland assets. On the other hand, better educated fathers and families with larger

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[25]There is actually wide variation in land inheritance practices among lowland Filipinos. In our Panay Island villages, for example, daughters also inherit tenancy rights, as documented in Ledesma (1982). Even among the Ilocanos, both primogeniture and ultimogeniture have been observed. It has been suggested that the availability of land determines the actual practice in a community. In areas like Ilocos Norte where land pressures are extreme, parents postpone giving land to the older son at marriage, and use the land to finance him and others to migrate abroad. This leaves the land in the hands of the youngest son. In areas like Isabela where frontier areas are available, the oldest gets the largest share of land, encouraging younger sons to open up new farmlands from surrounding forests (Lews 1971: 92).

areas cultivated tend to bestow preferentially to sons. The finding that gender interactions are relatively unimportant in educational choices, and that females receive more education, suggests that educational investment in girls may serve to offset the bias against daughters in land and total inheritance.

Trend analysis of levels of transfers also indicates that education may become more prevalent as a means for intergenerational transfers by rural households. Figures 2 and 3 present predicted values of education and nonhuman capital transfers, respectively, evaluated at the means of the independent variables, with varying birth year.[26] Educational levels rise through time, but levels of land and nonland asset transfers per child decline. This reflects not only secular improvements in the school system, particularly in the postwar era, but, more importantly, the increased desirability of education as nonagricultural employment opportunities expanded and population pressure on limited land led to diminishing farm sizes.[27] The increased attractiveness of nonagricultural occupations and more binding land constraints led to a revision of parents' choices of transfers to children.

[26]Education levels were predicted without gender interactions terms using the coefficients in Table 6; land, asset, and total inheritance were predicted using the tobit estimates with interaction terms (Table 8).

[27]After the 1950s, the appearance of import-substituting manufacturing industries, mostly near Manila, was accompanied by the urbanization of the population and a shift of the labor force from agriculture. Although labor absorption in industry was constrained by relatively capital-intensive technology, the urban sector continued to attract migrants, many of whom were absorbed in the services sector. At the same time, the exhaustion of frontier land in the late 1950s and the acceleration of population growth after World War II ended the traditional pattern of agricultural growth based on expansion of cultivated area. Instead, subsequent increases in growth were due to increases in productivity attributed to multiple cropping and the adoption of the modern seed-fertilizer technology (International Labor Office, 1974).

Thus, after the 1950s, the cost of an education for a nonagricultural (usually civil service) position became the substitute for a farm, and in the calculation of property division for inheritance and in arranged marriage negotiations, the extent to which a child or suitor's life chances had been provided for by expenditure on education became a valid consideration (Fegan 1982:119).

These inheritance rules observed in rice farming communities have implications on intrafamily and intergenerational inequality. In terms of household formation and bargaining power within marriage, within agricultural communities, the bias against women in land inheritance would create a disadvantage in terms of asset position, unless this is compensated by higher human capital investment.

While our results suggest that daughters receive more education while sons get more land, tests of parental preferences for equal concern should involve comparable units of measurement. For human capital to be regarded on a par with land and other assets, estimates of the discounted value of returns to education must be made and risk assessment performed. This would require the estimation of wage and earnings functions for men and women in both agricultural and nonagricultural occupations from other data sources.

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APPENDIX

This data appendix provides a more detailed description of the study villages, and is taken from Nagarajan, Quisumbing and Otsuka (1990).

Two villages are located in Central Luzon, whereas three villages are in Panay Island (see Fig. 1). In the Central Luzon villages, large rice haciendas of more than a hundred hectares existed before the 1972 land reform. On the other hand, in the three villages in Panay Island, called P1, P2, and P3, landlords are only small to medium landowners.

These five villages are typical rice growing villages in Central Luzon and Panay Island, respectively, and the whole area is planted to rice during the wet season (June to December). Table A.1 shows the number of sample farmers, average farm size, and technology characteristics in rice farming by village in 1985. The average farm size was substantially larger in the Central Luzon villages than in the Panay Island villages. CL1 and P1 are fully irrigated by well-maintained gravity irrigation systems, whereas CL2 and P2 are characterized by shallow, favorable rainfed conditions commonly found in the country. P3 is also rainfed but is located in the most unfavorable mountainous environment, which is prone to drought. Modern rice varieties (MVs) were fully adopted in CL1, CL2 and P1, whereas traditional varieties (TVs) were planted in the hilly part of P2 and the mountainous part of P3 during the wet season.[28] In the irrigated villages, more than two rice crops were grown. Double cropping of rice was practiced by several farmers in CL2 using irrigation pumps. With shorter growth duration of MVs and more even

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[28]According to a recent study of MV adoption in the Philippines by David and Otsuka (1990), MVs have been almost fully adopted both in irrigated and shallow rainfed areas.

rainfall patterns in Panay Island, two crops of rice were grown under rainfed conditions in some parts of P2 and P3. Because of non-photo sensitivity of MVs, all rice varieties grown as second and third crops were MVs. Reflecting the differential adoption of MVs and different production environments, average yield per hectare was significantly higher in the irrigated than in rainfed villages, particularly the most unfavorable village P3.

Before the land reform program initiated in 1972, most farmers were share tenants in the Central Luzon villages, whereas both share tenants and owner-cultivators coexisted in the Panay Island villages. Table A.2 shows the percentage distribution of operational area by tenure in 1985 and 1989. Due to a relatively thorough implementation of land reform, share tenancy had almost disappeared in CL1 and CL2. Share tenancy persisted in P1 and P2, even though many share tenants had been converted to leaseholders. In contrast, share tenancy was still very common in P3, where practically no land reform was implemented. An important finding from Table A.2 is that areas under pawning contract (usufruct mortgage) increased considerably from 1985 to 1989, particularly in CL1 and CL2. Correspondingly, areas under leasehold and CLT decreased in these two villages. In the Panay Island villages, pawning was much less common. However, area under the illegal practice of share tenancy increased in P2 and area under leasehold increased in P3.[29]

Table A.3 indicates the distribution of area cultivated by mode of acquisition. Inheritance and tenancy agreements negotiated directly with landowners (not subtenancy arrangements) are the two major ways by which

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[29]Note that our tenure classification in Table A.2 is based on tenure status of cultivators, so that sub-leaseholders and sub-share tenants were included in leasehold/CLT and share tenancy categories, respectively.

households have acquired land rights. Inheritance is the dominant mode of land right acquisition in P1, with 49% of area cultivated by respondents being inherited. Inheritance is also the major mode of land acquisition in CL1, with land rights to 38% of the area having been inherited. In the villages of P2 and P3, rights to most of the area cultivated were acquired through tenancy arrangements with landowners, while roughly equal percentages of land cultivated (37%) were acquired through either inheritance or tenancy agreements in CL2. In general, average area of land transacted is higher in the Central Luzon villages. Furthermore, in all villages except P2, rights to the major portion of area cultivated were inherited through the husband.

TABLE 1. Parental characteristics, child schooling and inheritance, by father's tenure status

	Father's tenure status at time of marriage				
	Agricultural laborer	Self-employed or nonagricultural wage earner	Tenant	Owner	Total
No. of parents (couples)	37	19	133	142	331
No. of sons	133	55	515	551	1254
No. of daughters	105	43	430	409	987
Sex ratio (sons/daughters)	1.27	1.28	1.20	1.35	1.27
Completed family size[a]	6.54	5.16	7.07	6.65	6.72
No. of female respondents	6	1	9	20	36
Landholding at marriage (ha)					
Father's land owned	0	0	0.06	3.25	1.42
Mother's land owned	1.97	0.33	0.23	0.64	0.61
Area cultivated at marriage[b]	1.96	.033	3.55	4.20	3.46
Year of birth					
Son	1939	1940	1944	1936	1940
Daughter	1942	1942	1944	1936	1941
Education (years of schooling)					
Father (A)	3.43	5.00	3.69	3.58	3.69
Mother (B)	2.32	5.16	3.28	3.00	3.16
Son (C)	5.99	7.45	6.48	6.64	6.54
Daughter (D)	6.13	8.35	6.98	7.13	7.01
Land area inherited (ha)					
Son	0.33	0.06	0.49	0.41	0.42
Daughter	0.16	0.01	0.15	0.33	0.22
Value of inheritance (in thousand pesos, as of 1989)					
Land[c]					
Son	16.81	3.31	17.43	22.70	19.06
Daughter	8.81	1.84	5.58	21.04	12.17
Nonland assets[d]					
Son	2.82	2.92	3.08	5.07	3.92
Daughter	1.80	4.31	0.83	4.41	2.57
Total value of inheritance					
Son	19.63	6.23	20.51	27.77	22.98
Daughter	10.60	6.14	6.41	25.45	14.74
Change in male education (C-A)	2.56	2.45	2.79	3.06	2.85
Change in female education (D-B)	2.64	3.19	3.70	4.13	3.85

TABLE 1, continued

Notes:

[a]Number of children ever born minus child deaths below age 5.

[b]Size of land cultivated by the household, regardless of tenure status.

[c]Agricultural land.

[d]Includes residential house and lot.

TABLE 2. Means and standard deviations of selected variables

Variable	Mean	Standard deviation
<u>Full sample</u>		
No. of families: 331		
No. of individuals: 2241		
Completed family size (number of children ever born minus child deaths below age five)	6.72	2.52
<u>Sub-sample</u>		
No. of families with 2 or more children: 307		
No. of individuals with complete information: 2212		
Individuals in families with land bestowal: 1366		
Individuals in families without land bestowal: 846		
Completed family size in subsample	7.66	2.28
<u>Parental characteristics</u>		
Education (years of schooling)		
Father	3.60	3.39
Mother	3.03	2.69
Size of land owned (ha)		
Father	1.70	3.22
Mother	0.74	2.42
Area cultivated at marriage (ha)	4.33	4.59
<u>Child characteristics</u>		
<u>Families with land bestowal</u>: (1366 individuals)		
Education (years of schooling)	6.83	3.47
Value of land inherited (in thousand 1989 pesos)	25.26	63.23
Value of nonland assets inherited (in thousand 1989 pesos)	4.93	39.12
Total value of inheritance (in thousand 1989 pesos)	30.19	75.77
<u>Families without land bestowal</u>: (846 individuals)		
Education (years of schooling)	6.64	3.70

TABLE 3. Fertility equation, OLS estimates

	Dependent variable: (1)	Completed family size[a] (2)
Intercept	-24.89	-17.10
	(-1.31)	(-1.01)
Mother's birth year	.02*	.01
	(1.67)	(1.41)
Years of schooling		
Father	.06	—
	(1.02)	
Mother	-.11*	—
	(-1.63)	
Size of land owned		
Father	-.06	-.06
	(-.97)	(-1.01)
Mother	-.04	-.06
	(.46)	(-.66)
Area cultivated (ha)	.07	.07
	(1.42)	(1.43)
Female respondent dummy	-.65	-.61
	(-1.46)	(-1.36)
Adjusted R^2	.01	.01
F-statistic	1.40	1.42
Number of observations[b]	321	321

[a]Number of children ever born minus child deaths below age five.

[b]Number of observations with complete information on parent and family characteristics.

*Significant at $\alpha = .10$.

TABLE 4. Educational levels of children, by family land inheritance status, OLS estimates

	Dependent variable: Levels of Child's years of schooling		
	Whole sample	Sample without land bestowal	Sample with land bestowal
Intercept	-3197.11***	-5812.91***	-2102.55***
	(-3.86)	(-3.53)	(-2.16)
Child characteristics			
Female dummy	-19.69	29.28	-49.33*
	(-.94)	(.82)	(-1.88)
Birth year	3.23***	5.91***	2.11**
	(3.78)	(3.48)	(2.10)
(Birth year/1000) squared	-814.300***	-1498.46***	-528.65**
	(3.69)	(-3.43)	(-2.04)
Eldest dummy	.21	.50	.09
	(.80)	(1.14)	(.27)
Youngest dummy	.49*	.52	.46
	(1.78)	(1.20)	(1.31)
Gender × birth order interaction			
Female × birth year	.01	-.01	.03*
	(.95)	(-.80)	(1.88)
Female × eldest dummy	-.05	-.30	.05
	(-.11)	(-.43)	(.09)
Female × youngest dummy	-.39	-.70	-.14
	(-.97)	(1.03)	(-.28)
Parent endowments			
Education (years of schooling)			
Father	.11***	.08	.13***
	(2.94)	(1.09)	(3.00)
Mother	.12***	.09	.16***
	(2.58)	(1.14)	(2.78)
Size of land owned (ha)			
Father	.09**	.21**	.08*
	(2.27)	(1.90)	(1.68)
Mother	.06	.18	.05
	(1.14)	(.79)	(.98)
Area cultivated (ha) at marriage	-.04	-.14	-.06*
	(-1.32)	(-1.30)	(-1.58)

TABLE 4, continued

	Dependent variable: Levels, Child's years of schooling		
	Whole sample	Sample without land bestowal	Sample with land bestowal
<u>Gender × parent endowment interaction</u>			
Female × father's education	-.10*	-.01	-.09
	(-1.79)	(-.94)	(-1.40)
Female × mother's education	.08	.18*	-.02
	(1.18)	(1.61)	(-.29)
Female × father's land owned	4.82×10^{-3}	.12	.04
	(.08)	(.69)	(.50)
Female × mother's land owned	.14*	.02	.12
	(1.59)	(.04)	(1.32)
Female × area cultivated	.02	-.18	.06
	(.40)	(-1.11)	(1.13)
<u>Respondent controls</u>			
Respondent dummy	-.25	-.54*	-.08
	(-1.23)	(-1.58)	(-.32)
Female respondent dummy	.75***	1.77***	.38
	(3.22)	(4.19)	(1.36)
<u>F-tests on coefficients</u>			
Eldest = Youngest	.58	.00	.65
Gender-birth order effects equal	.40	.19	.08
Parents' education effects equal	.01	.00	.14
Parents' landownership effects equal	.41	.02	.19
Parents' effects jointly equal	.20	.01	.14
Gender-parents' education effects equal	2.77*	2.10*	.25
Gender-parents' landownership effects equal	2.55*	.07	.86
Parental interaction effects jointly equal	3.10**	1.06	.65
<u>Tests for joint significance of gender interactions</u> (χ^2 statistics)			
Gender-birth order effects = 0	1.64	2.10	3.74
Gender-parental interaction effects = 0	21.76***	4.56	12.84**
All gender interactions = 0	11.02	6.28	2.12

TABLE 4, continued

	Dependent variable: Levels, Child's years of schooling		
	Whole sample	Sample without land bestowal	Sample with land bestowal
Adjusted R^2	.19	.20	.20
F-statistic	27.56***	11.57***	17.79***
Mean of dependent variable	6.76	6.64	6.83
No. of observations	2212	846	1366

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

TABLE 5. Education of children, by family land inheritance status, family fixed effects[a]

	Dependent variable: First differences Whole sample	Sample without land bestowal	$E_{ij} - E_j$ Sample with land bestowal
<u>Child characteristics</u>			
Female dummy	.08	.36	-.04
	(.47)	(1.32)	(-.17)
Birth year difference	.11***	.06*	.14***
	(6.08)	(1.88)	(5.87)
Eldest dummy	.49*	.27	.58*
	(1.89)	(.71)	(1.66)
Youngest dummy	-.21	.55	-.66*
	(-.77)	(1.44)	(-1.81)
<u>Gender-birth order interaction</u>			
Female × birth year difference	.02	.08*	-.10
	(.54)	(1.81)	(-.40)
Female × eldest dummy	-.46	-.04	-.67
	(-1.13)	(-.07)	(-1.21)
Female × youngest dummy	-.11	-1.42**	.68
	(-.28)	(-2.41)	(1.24)
<u>Gender-parent endowment interaction</u>			
Female × father's education	-4.47×10^{-3}	-.03	6.17×10^{-3}
	(-.13)	(-.49)	(.14)
Female × mother's education	.01	.02	-1.14×10^{-4}
	(.26)	(.39)	(-.002)
Female × father's land owned	3.35×10^{-3}	.11	-.02
	(.08)	(1.17)	(-.39)
Female × mother's land owned	-5.78×10^{-3}	-.05	-.02
	(-.10)	(-.15)	(-.28)
Female × area cultivated	-.02	-.11	2.40×10^{-4}
	(-.50)	(-1.21)	(.01)
<u>Respondent control</u>			
Respondent dummy	-.55***	-.78***	-.40*
	(-3.22)	(-3.18)	(-1.75)
<u>F-tests on coefficients</u>			
Eldest = youngest	2.82*	.22	4.96**
Gender-birth order effects equal	0.31	2.27	2.58*
Gender-parents' education effects equal	0.05	0.24	0.01
Gender-parents' landownership effects equal	0.03	0.27	0.00

TABLE 5, continued

	Dependent variable: First differences $E_{ij} - E_j$		
	Whole sample	Sample without land bestowal	Sample with land bestowal
Parental interaction effects jointly equal	0.03	0.23	0.00
Tests for joint significance of gender interaction (χ^2 statistics)			
Gender-birth order effects = 0	2.96	7.24*	3.40
Gender-parental interaction effects = 0	6.78	2.00	0.44
All gender interactions = 0	3.74	9.28	3.88
Adjusted R^2	.04	.04	.05
F-statistic	9.15***	3.74***	6.33***
No. of observations	2083	786	1297

t-statistics in parentheses.

***significant at α = .01

**significant at α = .05

*significant at α = .10

[a]Estimated for nonsingle-sex families with at least two children.

TABLE 6. Educational levels of children, by family land inheritance status, without gender interactions, OLS estimates

	Dependent variable: Levels, Child's years of schooling		
	Whole sample	Sample without land bestowal	Sample with land bestowal
Intercept	-3265.22***	-6056.23***	-2111.61**
	(-3.95)	(-3.70)	(-2.18)
<u>Child characteristics</u>			
Female dummy	.34**	.36	.32*
	(2.36)	(1.49)	(1.78)
Birth year	3.30***	6.16***	2.11**
	(3.86)	(3.66)	(2.11)
(Birth year/1000) squared	-830.36***	-1567.04***	-525.49**
	(-3.77)	(-3.61)	(-2.03)
Eldest dummy	.19	.37	.08
	(.92)	(1.09)	(.32)
Youngest dummy	.34*	.17	.42*
	(1.70)	(.51)	(1.68)
<u>Parent endowments</u>			
Education (years of schooling)			
Father	.06**	.03	.09***
	(2.30)	(0.55)	(2.75)
Mother	.15***	.18***	.14***
	(4.62)	(3.26)	(3.38)
Size of land owned (ha)			
Father	.10***	.26***	.10***
	(3.19)	(3.04)	(2.76)
Mother	.10**	.20	.09**
	(2.39)	(1.12)	(2.03)
Area cultivated at marriage (ha)	-.03	-.22***	-.03
	(-1.28)	(-2.64)	(-.90)
<u>Respondent control</u>			
Respondent dummy	-.25	-.58*	-.08
	(-1.25)	(-1.71)	(-.31)
Female respondent dummy	.74***	1.77***	.36
	(3.17)	(4.21)	(1.27)

TABLE 6, continued

	Dependent variable: Levels, Child's year of schooling		
	Whole sample	Sample without land bestowal	Sample with land bestowal
F-tests on coefficients			
Eldest = youngest	.32	.21	1.03
Parents' education effects equal	2.94*	2.49*	.74
Parents' landownership effects equal	.01	.10	.02
Adjusted R^2	.19	.20	.19
F-statistic	44.96***	18.81***	28.27***
Mean of dependent variable	6.76	6.64	6.83
No. of observations	2212	846	1366

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

TABLE 7. Education of children, by family land inheritance status, without gender interactions, family fixed effects[a]

	Dependent variable: First differences Whole sample	Sample without land bestowal	$E_{ij} - E_j$ Sample with land bestowal
Female dummy	9.70×10^{-3}	.08	-.06
	(-.10)	(.55)	(-.48)
Birth year difference	.12***	.09***	.13***
	(8.65)	(4.37)	(7.35)
Eldest dummy	.31	.33	.29
	(1.55)	(1.12)	(1.07)
Youngest dummy	-.24	-.06	-.34
	(-1.21)	(-.22)	(-1.24)
Respondent dummy	.51***	-.69***	-.40*
	(-3.03)	(-2.87)	(-1.78)
<u>F-tests on coefficients</u>			
Eldest = youngest	3.19*	.74	2.26
Adjusted R^2	.05	.04	.05
F-statistic	26.58***	8.91***	18.08
No. of observations	2083	786	1297

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

[a]Estimated for nonsingle-sex families with at least two children.

TABLE 8. Levels of children's land and nonland asset inheritance, families with positive land bestowals, tobit estimates

	Dependent variables: Levels		
	Land value L_{ij}	Nonland asset value A_{ij}	Total inheritance value T_{ij}
Intercept	879.99	1312.67	1389.91**
	(1.49)	(1.49)	(2.02)
Child characteristics			
Female dummy	1370.63	2071.63	1771.36*
	(1.45)	(1.45)	(1.66)
Birth year	-.48	-.74*	-.73**
	(-1.54)	(-1.62)	(-2.06)
Eldest dummy	10.30	-10.88	6.24
	(.91)	(-.68)	(.49)
Youngest dummy	11.07	-13.21	12.23
	(.95)	(-.71)	(.92)
Gender-birth year interaction			
Female × birth year	-.73	-1.08	-.93*
	(-1.49)	(-1.46)	(-1.69)
Female × eldest dummy	32.38*	-15.98	27.35
	(1.83)	(-.55)	(1.35)
Female × youngest dummy	8.96	47.99*	14.36
	(.50)	(1.78)	(.72)
Parent endowments			
Education (years of schooling)			
Father	1.44	1.96	1.27
	(1.01)	(.94)	(.77)
Mother	-4.59**	-6.34**	-5.27**
	(-2.34)	(-2.17)	(-2.34)
Size of land owned (ha)			
Father	2.21	-7.09***	2.60
	(1.48)	(-3.26)	(1.52)
Mother	-2.71	-5.10**	-3.31
	(-1.49)	(-2.10)	(-1.59)
Area cultivated (ha)	5.61***	9.11***	6.52***
	(4.67)	(5.59)	(4.74)

TABLE 8, continued

	Dependent variables: Levels		
	Land value L_{ij}	Nonland asset value A_{ij}	Total inheritance value T_{ij}
Gender-parent characteristic interaction			
Female × father's education	-6.66***	-3.23	-6.88***
	(-2.87)	(-.92)	(-2.62)
Female × mother's education	8.69***	8.31*	8.74***
	(2.86)	(1.78)	(2.53)
Female × father's land owned	4.38*	6.44*	4.54*
	(1.83)	(1.72)	(1.68)
Female × mother's land owned	7.38**	3.91	7.25**
	(2.29)	(.80)	(1.98)
Female × area cultivated	-2.82	-8.70***	-4.07*
	(-1.41)	(-2.90)	(-1.80)
Respondent controls			
Respondent dummy	31.68***	42.51***	41.15***
	(3.82)	(3.59)	(4.35)
Female respondent dummy	23.19**	-35.71**	16.38
	(2.36)	(-2.04)	(1.46)
Sigma	95.27***	107.81***	109.66***
	(34.33)	(20.25)	(35.81)
Tests on coefficients (χ^2 statistics)[a]			
Eldest = youngest	.00	.01	.12
Gender-brith order effects equal	1.00	2.99*	.24
Parents' education effects equal	4.26**	3.69**	3.81**
Parents' landownership effects equal	6.43***	.50	7.14***
Parental effects jointly equal	12.83***	3.84	13.04***
Gender-parents' education effects equal	10.99***	2.64*	8.82***
Gender-parents' landownership effects equal	.91	.24	.57
Parental interaction effects jointly equal	13.13***	2.74	10.27***
Tests for joint significance of gender interactions (χ^2 statistics)[b]			
Gender-birth order effects = 0	7.00*	4.80	6.00
Gender-parental interaction effects = 0	20.60***	14.00**	16.20***
All gender interaction effects = 0	29.80***	20.14***	25.20***

TABLE 8, continued

	Dependent variables: Land value L_{ij}	Levels Nonland asset value A_{ij}	Total inheritance value T_{ij}
Log-likelihood	-4309.1	-1754.0	-4682.2
Mean of dependent variable	25.26	4.93	30.19
No. of nonlimit observations	658	238	706
No. of observations	1366	1366	1366

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

[a]Wald tests.

[b]Likelihood-ratio tests.

TABLE 9. Land and nonland asset inheritance, families with positive land bestowals, family fixed effects

	Dependent variables:[a] First differences		
	Land value $L_{ij} - \bar{L}_j$	Nonland asset value $A_{ij} - \bar{A}_j$	Total inheritance value $T_{ij} - \bar{T}_j$
<u>Child characteristics</u>			
Female dummy	-11.19***	2.95	-8.24*
	(-2.88)	(1.67)	(-1.94)
Birth year difference	-.34	.49***	.15
	(-.86)	(2.76)	(.36)
Eldest dummy	8.16	.66	8.82
	(1.42)	(.25)	(1.40)
Youngest dummy	.84	-5.93**	-5.08
	(.14)	(-2.15)	(-.77)
<u>Gender-brith order interaction</u>			
Female × birth year difference	.17	-1.29***	-1.12*
	(.28)	(-4.67)	(-1.68)
Female × eldest dummy	4.52	-10.70***	-6.17
	(.50)	(-2.60)	(-.62)
Female × youngest dummy	4.66	9.75**	14.42
	(.51)	(2.37)	(1.46)
<u>Gender-parent endowment interaction</u>			
Female × father's education	-1.04	-.20	-1.24*
	(-1.46)	(-.63)	(-1.59)
Female × mother's education	1.56*	-.25	1.31
	(1.74)	(-.62)	(1.34)
Female × father's land owned	-.17	.47	.30
	(-.21)	(1.30)	(.35)
Female × mother's land owned	1.41	.50	1.90*
	(1.28)	(.99)	(1.58)
Female × area cultivated	-.49	-.54*	-1.03
	(.73)	(-1.77)	(-1.40)
<u>Respondent control</u>			
Respondent dummy	8.24**	5.44***	13.69***
	(2.17)	(3.15)	(3.30)
<u>F-tests on coefficients</u>			
Eldest = youngest	.63	2.47	1.90
Gender-birth order effects equal	.00	10.54***	1.85
Gender-parents' education effects equal	3.35*	.00	2.70*

Table 9, continued

	Dependent variables:[a] First differences		
	Land value $L_{ij} - \bar{L}_j$	Nonland asset value $A_{ij} - \bar{A}_j$	Total inheritance value $T_{ij} - \bar{T}_j$
Gender-parents' landownership effects equal	2.07	.00	1.79
Parental interaction effects jointly equal	3.14**	.00	2.61*
<u>Tests for joint significance of gender interactions</u> (χ^2 statistics)			
Gender-birth order effects = 0	.78	21.92***	3.36
Gender-parental interaction effects = 0	6.80	5.44	7.44
All gender interaction effects = 0	8.00	26.76***	10.76
Adjusted R^2	.02	.02	.02
F-statistic	3.66***	3.26***	4.82***
No. of observations	1297	1297	1297

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

[a]The dependent variable is defined as $Y_{ij} - \bar{Y}_j$ where Y_{ij} is the inheritance of individual i in family j, and $\bar{Y}_j$ is the average across siblings in family j.

[b]Defined as individual deviation from the family birth year average $B_{ij} - \bar{B}_j$.

TABLE 10. Land and nonland asset inheritance, families with positive land bestowals, without gender interactions, family fixed effects

	Dependent variables:[a] First differences		
	Land value $L_{ij} - \bar{L}_j$	Nonland asset value $A_{ij} - \bar{A}_j$	Total inheritance value $T_{ij} - \bar{T}_j$
Female dummy	-10.78***	.10	-10.69***
	(-4.95)	(.10)	(-4.49)
Birth year difference	-.25	-.04	-.29
	(-.84)	(-.29)	(-.88)
Eldest dummy	10.16**	-3.52*	6.64
	(2.29)	(-1.73)	(1.37)
Youngest dummy	3.42	-1.62	1.80
	(.76)	(-.79)	(.37)
Respondent dummy	7.41**	5.38***	12.79***
	(1.99)	(3.16)	(3.14)
<u>F-tests on coefficients</u>			
Eldest = youngest	.96	.37	.42
Adjusted R^2	.05	.01	.02
F-statistic	18.08***	3.05**	8.81****
No. of observations	1297	1297	1297

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

[a]The dependent variable is defined as $Y_{ij} - \bar{Y}_j$ where Y_{ij} is the inheritance of individual i in family j, and $\bar{Y}_j$ is the average across siblings in family j.

[b]Defined as individual deviation from the family birth year average $B_{ij} - \bar{B}_j$.

TABLE 11. Summary of gender interactions[a]

Sample/Levels of transfers	Whole sample	Sample without land bestowal	Sample with land bestowal			
	Education	Education	Education	Land value	asset Value	Total inheritance value
<u>Gender-brith order interaction</u>						
Female × birth year difference	.01	-.01	.03*	-.73	-1.08	-.93*
Female × eldest dummy	-.05	-.30	.05	32.38*	-15.98	27.35
Female × youngest dummy	-.39	-.70	-.14	8.9	47.99*	14.36
<u>Gender-parent endowment interaction</u>						
Female × father's education	-.10*	-.01	-.09	-6.66***	-3.23	-6.88***
Female × mother's education	.08	.18*	-.02	8.69***	8.31*	8.74***
Female × father's land owned	4.82×10^{-3}	.69	.04	4.38*	6.44*	4.54*
Female × mother's land owned	.14*	.02	.12	7.38**	3.91	7.25**
Female × area cultivated	.02	-.18	.06	-2.82	-8.70***	-4.07*
<u>Tests for joint significance of gender interactions (χ^2 statistics)</u>						
Gender-birth order effects = 0	1.64	2.10	3.74	7.00*	4.80	6.00
Gender-parental interaction effects = 0	32.76***	4.56	12.84**	20.60***	14.00**	16.20***
All genderinteraction effects = 0	11.02	6.28	2.12	29.80***	20.14***	25.20***

t-statistics in parentheses.

***significant at $\alpha = .01$

**significant at $\alpha = .05$

*significant at $\alpha = .10$

[a]See Tables 4 and 8 for complete results and t-statistics.

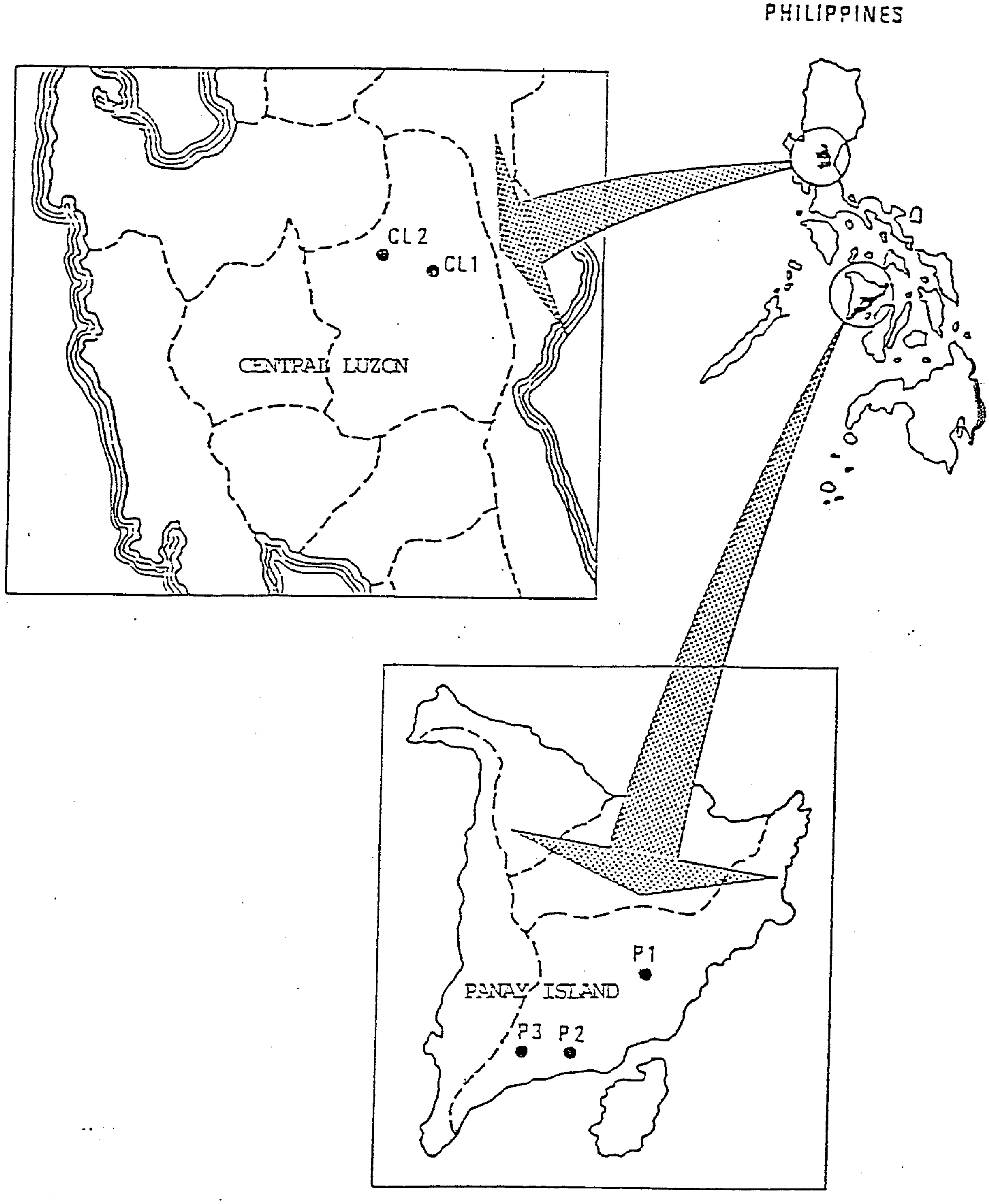

Fig. 1. Location of sample villages.

Figure 2. Trends in Education, Predicted

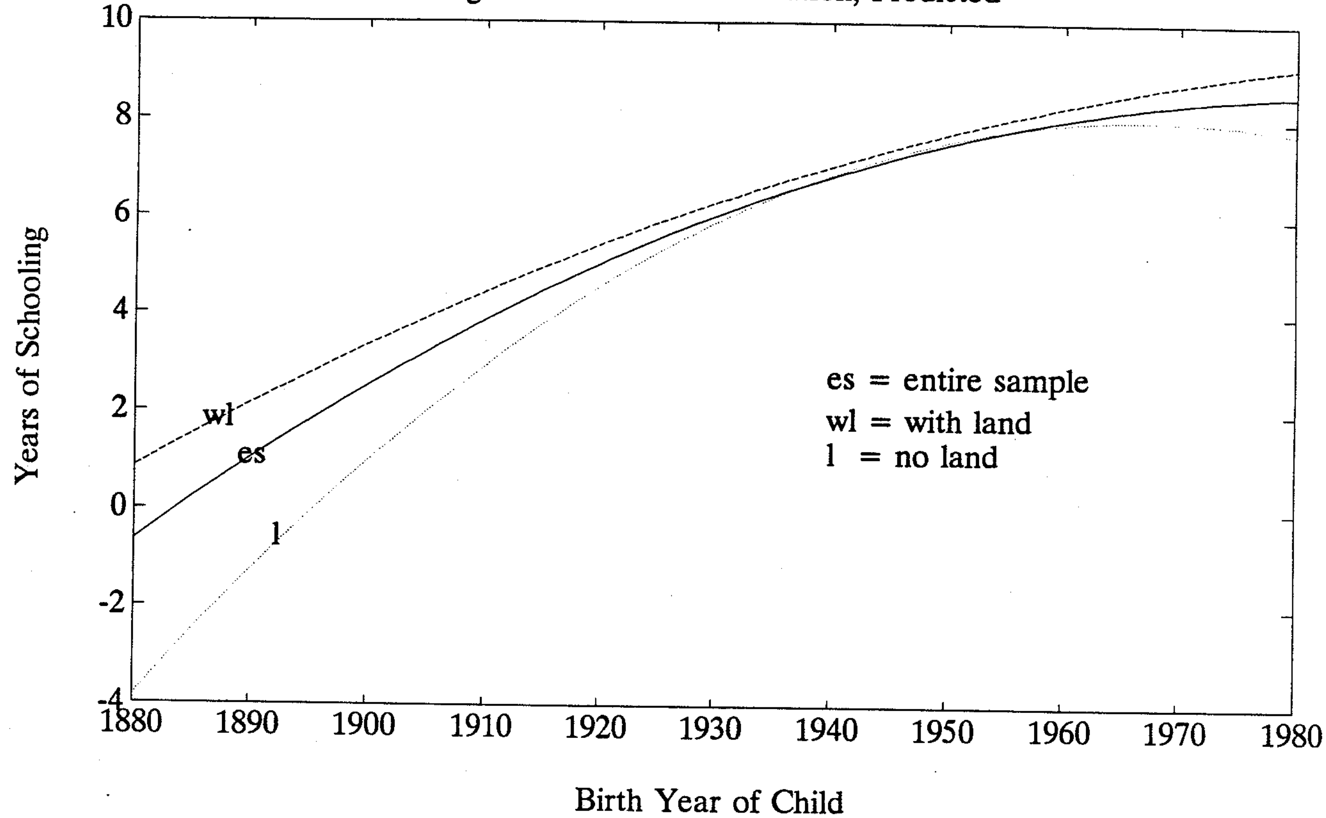

Figure 3. Trends in Land and Asset Transfers, Predicted

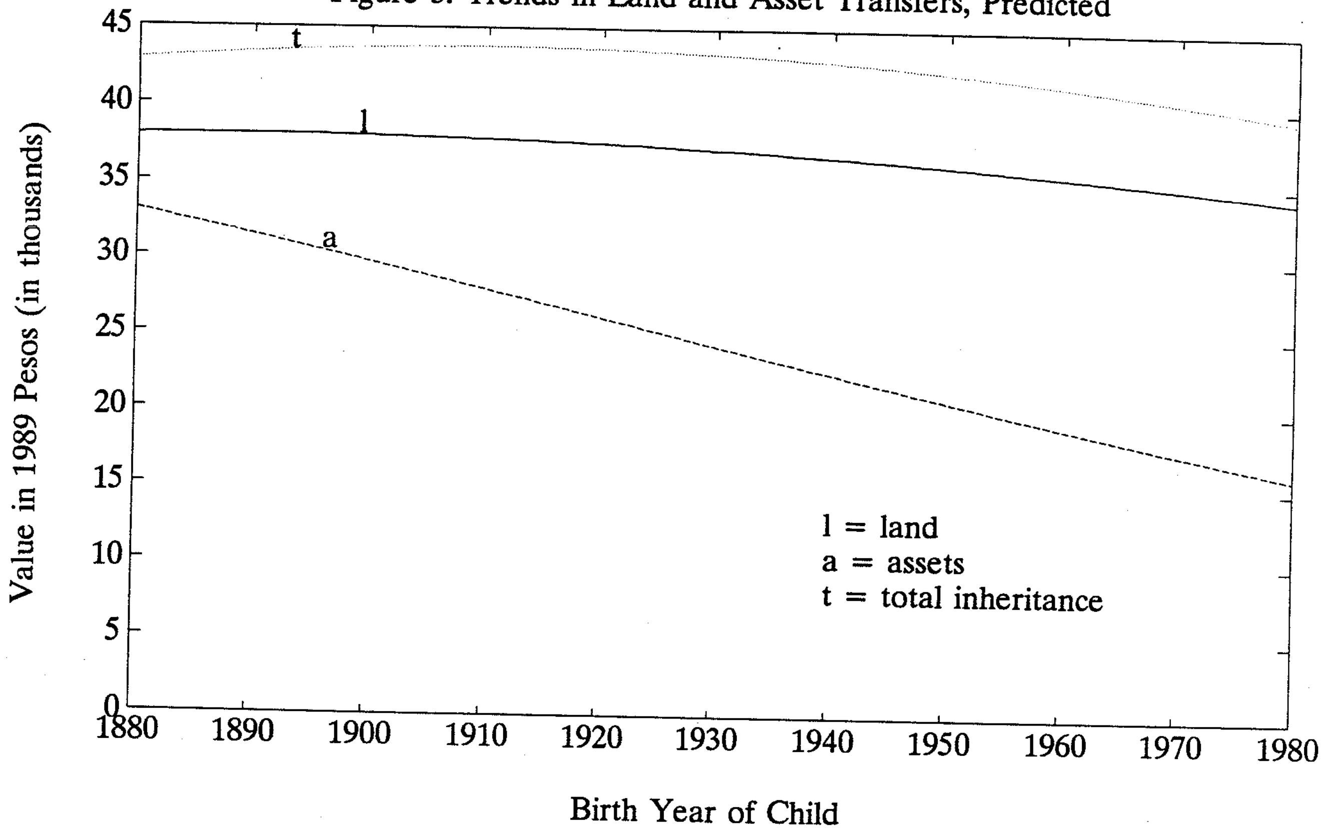

TABLE A.1. Average farm size and technology characteristics in rice farming by village, 1985.

	Central Luzon		Panay Island		
	CL1	CL2	P1	P2	P3
No. of sample farmers	85	52	37	65	47
Average farm size (ha)	2.1	1.7	1.1	1.4	0.9
Ratio of irrigated area (%)	100	16	100	0	0
Adoption rate of MVs (%)[a]	100	100	100	79	59
Rice cropping intensity	200	114	243	131	125
Average rice yield (t/ha)[b]	4.7	3.4	3.6	2.9	1.9

[a]Figures refer to wet season only.

[b]Weighted average of wet and dry season yields, weights being the ratios of planted areas.

TABLE A.2. Distribution of operational farm areas by tenure and by village, 1985 and 1989 wet seasons (%)

	Central Luzon		Panay Island		
	CL1	CL2	P1	P2	P3
Owner cultivator:					
1985	9	18	27	47	33
1989	7	11	25	48	39
Leasehold & CLT:[a]					
1985	80	76	38	32	8
1989	65	68	31	25	15
Share tenancy:					
1985	5	0	34	17	58
1989	2	1	35	22	42
Pawning:					
1985	6	6	2	5	1
1989	26	20	9	5	5

[a]CLT refers to certificate of land transfer.

TABLE A.3. Distribution of area cultivated by mode of acquisition

	Panay Island						Central Luzon			
	P_1		P_2		P_3		CL_1		CL_2	
	%	Ave. Size (ha)	%	Ave. Size (ha)	%	Ave. Size (ha)	%	Ave. Size (ha)	%	Ave. Size (ha)
Inheritance of title or right	48.6	0.67	37.4	0.75	38.6	0.63	37.5	1.28	32.6	1.27
Husband	43.6	0.69	15.7	0.76	28.8	0.65	27.6	1.36	26.2	1.34
Wife	5.0	0.50	21.7	0.74	9.8	0.56	9.9	1.09	6.4	0.99
Offered by landowner	43.3	0.82	36.7	0.68	46.6	0.64	32.7	2.20	42.3	3.46
Purchase of title	5.5	0.44	17.3	0.73	9.8	0.57	-	-	3.1	1.88
Purchase of right	-	-	1.6	1.50	-	-	6.1	1.53	6.1	1.88
Exchange	-	-	0.5	0.45	-	-	1.9	1.75	1.6	1.90
Pawned-in	-	-	4.9	0.41	5.1	0.36	6.8	0.85	7.0	1.23
Others	2.5	1.0	1.5	0.68	-	-	1.6	0.50	7.2	0.98
Total area cultivated (ha)	39.8 (100)		92.3 (100)		63.6 (100)		188.9 (100)		122.51 (100)	

TABLE A.4. Probability of parents making land bequests, probit estimates[a]

	Dependent variable: (1)	(2)	Probability of land bequest (3)	(4)
Intercept	.24	.15	-.01	-.08
	(2.05)	(1.22)	(-.11)	(-.46)
Education (years of schooling)				
Father	-.01	-.03	-.01	-.03
	(-.45)	(-1.06)	(-.47)	(-.95)
Mother	-.16	-.02	-.02	-.02
	(-.48)	(-.46)	(-.45)	(-.47)
Size of land owned (ha)				
Father	.03	--	.04*	--
	(1.49)		(1.73)	
Mother	.17**	--	.16**	
	(2.16)		(2.04)	
Landholding size at marriage	--	.09***	--	.09***
		(4.58)		(4.52)
Village dummies				
P1	--	--	-.07	-.04
			(-.28)	(-.16)
P2	--	--	.76***	.81***
			(3.00)	(3.18)
CL1	--	--	.36*	.26
			(1.74)	(1.27)
CL2	--	--	.37*	.19
			(1.62)	(.80)
Log-likelihood	-215.83	-209.61	-208.76	-202.90
No. of observations	331	331	331	331

*significant at $\alpha = .10$.

**significant at $\alpha = .05$.

***significant at $\alpha = .01$.

[a]Probability of parents bestowing land to at least one child.