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PREFERENCES OR CULTURAL OBLIGATIONS:

REEXAMINING THE SOURCE OF GENDER DIFFERENTIAL IN RESOURCE ALLOCATION AND CHILD WELL-BEING

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Abstract

The empirical literature examining intrahousehold resource allocation finds that mothers' incomes have a larger impact on the well-being of children than fathers' incomes. Although this finding is amenable to various interpretations, the most widely held view is that, as a matter of preference, women care more about the well-being of children than do men. This implies that policies that reallocate resources toward women are beneficial for the quality of children's well-being. Many policy interventions are targeted toward a specific gender in part due to this interpretation.

Although the findings in this literature are largely not disputable, given the frameworks from which the results are derived, the interpretation can be questioned. Although most of the findings are obtained from analyzing data collected in developing countries where household structures depart from the Western model, the data sets have been analyzed within the context of two-person, independent households. Interdependence among households and interhousehold resource transfers in lineages and extended families that are widespread in developing societies are incompatible with the independent household model.

In this paper, I argue that the finding of differential effects between fathers' and mothers' incomes is not necessarily an outcome of differential preferences. I demonstrate through a simple framework of extended families that the outcomes are consistent with models of household behavior where fathers and mothers care equally about child well-being but fathers play an expanded role in extended families. I draw data from societies with different systems of family organization to emphasize the importance of social contexts in interpreting empirical findings related to household behavior.

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INTRODUCTION

Various empirical tests of common preference and income pooling within households reject the neoclassical model of household behavior pioneered by Becker (1973) and show that income controlled by men and women can have significantly different effects on the demand for goods and services, whether measured by expenditure patterns or by outcomes such as child education and health (Strauss and Beegle 1996 provides an excellent summary of this literature). In many of these studies, the authors find that more resources are allocated to children when mothers control larger portions of household resources. This finding has been interpreted as evidence in support of the contention that women care more about the well-being of children than do men.

An important shortcoming of this literature is the insensitivity of theoretical frameworks to variations in social contexts. Whereas most of the data from which the findings are derived are collected from low-income countries,[1] the empirical approach is generally based on models that are suited to household dynamics in high-income countries. In particular, households are embedded in extended families and lineage groups in the societies where the data are collected, but analysts assume implicitly that they are independent economic units. The omission or mistreatment of important and nontrivial third-party effects in such analyses may lead to incorrect inferences about household behavior. Thomas (1994) acknowledged the possibility that extended families might affect intrahousehold outcomes by diluting men's resource effects in the household but lacked data to test the hypothesis.

In this paper, I examine intrahousehold allocation outcomes using a framework that accounts for interhousehold economic interactions in extended families. An important implication is that interhousehold ties affect the way resources are allocated in a given household. Differences between parents in resource allocation toward their own children may emerge even when parents' preferences toward child well-being converge. The predictions of the framework are tested using data on measures of individual control of resources within a given household and in related households. I use data from a multipurpose household survey conducted in rural Bangladesh and the third wave of the Indonesian Family Life Surveys. The empirical analysis estimates uncles' and aunts' resource effects on the quality of children's well-being in the household, which are condi-

tional on the resources of parents. In a situation of equilibrium with interhousehold effects, the rationale is that the dilution of men's resources by other children in the lineage can be inferred from the effect of the lineage's men's resources on children within the household. To overcome the econometric challenge posed by family-level heterogeneity, I compare the results obtained from patrilineal lineages in Bangladesh with similar estimates from matrifocal lineages in Indonesia where the framework predicts different sets of outcomes.

The results show that the existence of a paternal uncle's household raises the quality of children's well-being in the household and reduces the effect of the father's resources within the household in patrilineal Bangladesh settings. I do not find an effect for a paternal aunt; nor do I find similar effects for maternal uncles and aunts. I seek to shed light on this result by examining the effects of parents' siblings' resources on the quality of child well-being, and find that resources of the husband's brothers improve the quality of children's well-being in an important way. Conversely, the wife's sister's resources improve the quality of children's well-being in Indonesian matrifocal family systems rather than those of the husband's brother, as I found for patrilineal systems.

These results suggest that intrahousehold outcomes are affected in important ways by implicit obligations in gender-specific kinship systems rather than preferential differences between parents. In particular, they demonstrate that the findings of differential income effects are consistent with common preferences among parents about child well-being but differences in the sets of children to which men and women allocate their resources.

The remainder of the paper is structured as follows. I briefly review the relevant literature in the second section, and in the third section I describe the framework underlying my tests. I discuss the data used and settings in the fourth section, present descriptive statistics in the fifth section and discuss the results in the sixth section. I summarize the findings in the seventh section and then offer conclusions.

LITERATURE REVIEW

Hoddinott and Haddad (1995) developed a bargaining model of the household where the member with the greater resources shifts household expenditures toward items of his or her preference. Using data from the Côte d'Ivoire Living Standard Measurement Surveys, these researchers find that an increase in a wife's income relative to her husband's is associated with reduced expenditures on alcohol and tobacco.[2] Using data from the same survey, Haddad and Hoddinott (1994) find that an increase in the proportion of cash income accruing to women increases boys' height-for-age relative to girls' and suggest that this effect may reflect equity concerns of mothers over children's health status.[3] Lundberg, Pollak and Wales (1997) examined the effect of a policy change in the United Kingdom that transferred a substantial child allowance from husbands to wives in the 1970s. They find that higher expenditures on women's clothing and children's clothing coincided with implementation of the policy. Using data from rural Bangladesh, a study by Pitt, Shahidur and Khandker (1998) shows that credit taken by women has a larger effect on child schooling and other categories of household assets than credit taken by men. Using data from Brazil, the estimated differences in the effects of mothers' and fathers' resources on child survival probabilities are about 20 times those of the fathers' incomes (Thomas 1990). These intrahousehold outcomes, as argued in the literature, reflect differential preferences among household members in collective models of decisionmaking where, in effect, women are more interested in child welfare than are men.[4]

This literature and the empirical strategies rely heavily on the idea that preferences can always be directly inferred from expenditure patterns. However, there are several instances where this concept may be violated; there are two-person household settings where expenditure patterns on child-related goods may diverge from individual preferences regarding child well-being. Of particular importance, the findings may reflect gender specialization in resource allocation within the household. Lundberg and Pollak (1993) show the evidence is compatible with "separate spheres" household models, whereby traditional gender roles determine resource allocation within a marriage. In these models, women specialize in the provision of children's goods while men specialize in the provision of other goods in the household. A number of studies support this view, both in developed and developing countries. In a study of households in Guatemala, Engle (1993) finds that women tend to use their income for food expenses but found no evidence that fathers and mothers contribute different percentages of income toward family well-being. Phipps and Burton (1998) used data from the 1992 Statistics Canada Family Expenditure Survey to test the hypothesis that a dollar of male income is spent in the same way as additional dollar of female income using samples where husband and wife couples are both employed full time for a full year. Their results failed to reject the hypothesis for 6 of the 14 categories of consumption goods they tested. In particular, they found that an extra dollar of the wife's income is more likely to be spent on child care than a similar increase in the husband's income. In reverse, an extra dollar of income earned by the husband is more likely to be spent on transportation than a similar increase in the wife's income. Strauss and Beegle (1996) suggest another possibility based on a study by Pitt and Rosenzweig (1990) on the effects of child illness on household members in Indonesia. They infer that child health outcomes could be more positively correlated with income earned by the mother, conditional on household income, if children with a low quality of well-being draw mother's time away from market work, and fathers work extra time to make up for the loss of the mother's income. In this instance, the estimated income effects would reject income pooling (which is associated with unified preferences) when in principle households pool income. Another possibility emerges in settings where child education is determined by fathers. Mother's schooling and child schooling will be more correlated with men's preferences for schooling than with men's own schooling if men with greater preference for child education (which they themselves may not attain) marry women with high levels of schooling and invest heavily in child schooling (Behrman et al. 1999). In this setting, it would be incorrect to estimate the father's preference for child schooling directly from the correlation between the father's schooling and child schooling, whereas it is possible to do so for mothers.

Applications of the two-person household models to settings where households are not independent economic units (or where the sphere of resource allocation is not confined to the walls of the household as data collection) pose another difficulty in using intrahousehold allocation findings to infer preferences. This difficulty is reflected in the paper by Duflo (2003), one of the most-cited sources of evidence on preferential differences that exploits the expansion of old-age pensions to blacks in South Africa. Using the qualification for a pension to exploit exogenous shocks to the relative incomes of men and women in a household, Duflo finds that girls cohabiting with a grandmother who suddenly becomes eligible for a pension have better health outcomes than girls cohabiting with a grandfather who becomes eligible. This evidence is then interpreted as a preferential difference between men and women. However, there was no effort on the part of the author to examine the institutional setting of

the South African household. Indeed, the paper does not describe the family settings in the area where data were collected. Anthropological studies are very clear about the institutional role of the mother's brother in South Africa, and in particular about the fact that men's resources are not likely to be spent in the same way as women's resources. Radcliffe-Brown (1952, 19) describes the functioning of the South African family in which the mother's brother, popularly referred to as *malume*, is expected to provide important support for his nephews and nieces. Indeed, the title *malume* simply means "male mother." The institution requires men to always be left with surplus that they can provide to their sisters' children whenever they require his assistance. This necessity is summed up in the phrase "*va tatana va na mali minkarhi hi nkwayo*," which is translated "fathers have money always."[5] But the accounts also indicate that the reverse—that women spend part of their resources on their brothers' children—is not the case. Instead, children are expected to treat their father's sisters like "female fathers," who should be respected like their fathers without depending on them like mothers.

Another factor that weighs on Duflo's (2003) findings is the nature of family kinship, which combines the role of the mother's brothers (a feature of matrilineal systems) with a perpetuation of lineages through sons (a feature of patrilineal systems). In this setting, it is not surprising that men would be more involved in raising male descendants for lineage perpetuation, whereas women are more likely to focus on females as a balancing act. It is thus plausible that grandmothers would focus their attention on granddaughters. However, Duflo found an interesting twist in table 4 of her paper. In explaining this table, she remarks that "strikingly, only the eligibility of the mother's mother has a significant effect on girl's weight for height." That is, grandmothers only care about the daughters of their daughters and not the daughters of their sons! This is not plausibly a story about some innate preferences. But in conjunction with the family kinship system, a more important factor that explains the results is the effect of uncertainty of paternity in South African society. As a result of high rates of adolescent pregnancies and refusals on the part of boys to accept responsibility for pregnancies in many cases, child paternity has become a significant issue for child welfare in South Africa (Kaufman, de Wet and Stadler 2001). Grandmothers are more likely to invest in the quality of the daughters of their daughters than the daughters of their sons because they are quite sure that the former are truly their granddaughters but may have doubts about on the paternity of the latter. In general, social contexts matter and need to be taken into consideration in order to correctly interpret intrahousehold evidence.

In positing a theory of social interaction, Becker (1974) examines the potential impact of interhousehold interactions in extended families on household behavior. His analysis implies that interhousehold transfers will affect the pattern of resource allocation in households when households that are not affected by a shock adjust their allocations in order to absorb the shocks experienced by a member household. A similar but reverse effect should also be observed when a household experiences a positive income shock.

A striking difference between Western households and low-income households in developing countries exists in the type of good under which children are classified. Although the literature on intrahousehold allocation considers children pure public goods in independent households, cultural patterns of childrearing in developing societies reinforce the view that children are common resources in extended families,[6] thus widening the economic sphere within which child outcomes are determined. A number of studies validate this view.

Using data from extended family households in rural Bangladesh, Foster (1993) finds that the educational attainment of children depended not only on education and the landholdings of their own households but also on education and the landholdings of other linked households. Using data from Burkina Faso, Akresh (2004) finds that children who are fostered into other households in extended families are more likely to be enrolled in school compared with their nonfostered siblings, and concludes that characteristics of other households in family networks are important in determining child schooling.[7] Using data from Malawi, Taiwo (2012) demonstrates that traditional adoptions of orphaned children in extended families affect both fertility and the quality of the well-being of children born to surviving adults in other households. Although these studies are not focused on gender differentials, they establish the nontrivial effect of extended families and social networks on household outcomes.

Asymmetry in the structure of rights and obligations of men and women in extended families, such as in the South African case, may have an important effect on intrahousehold behavior. For example, in terms of old-age care, men in the corporate lineage can expect to receive old-age support from other children in the lineage differently than women. In reciprocation, they may be motivated to invest in them. In both patrilineal and matrilineal lineage settings, men are implicitly responsible for the welfare of all children in the lineage. In addition, whereas property belonging to men can be inherited by both biological children and the children of kin, particularly in the absence of individual property rights, biological children are typically the main beneficiaries of women's inheritable property. There is also evidence that most societies in low-income countries are patrilineal or patrilocal; men remain with their consanguineous kin throughout their lives, whereas women are removed from their natal kin upon marriage. In this setting, a dollar of income earned by husbands whose social environment is populated by consanguineous kin and children is likely to be spent differently than the same amount of money earned by their wives. To the extent that a husband engages in social interaction with local kin groups more than his wife or wives, Becker (1974) predicts relatively lower income elasticity for his demand for his own consumption of private goods as a result of his contributions to the characteristics of others in his social environment.[8] This rule will apply to investment in the husband's biological children to the extent that their schooling is considered a private good to a certain degree by parents in an extended family setting.[9]

CONCEPTUAL FRAMEWORK

To capture the basic elements of economic interaction in family networks, I begin with a model of two households i and j, each comprising a husband, a wife and a child. Interhousehold transfers ensure that some resources of a household enter the quality production function of the child in the other household. For child i, the quality production function is given by

$$q_i = f(x_i^i, x_i^j, \epsilon_i) \tag{1}$$

where x_i^i and x_i^j are allocations from households i and j, respectively, and ϵ_i captures endowment (subscripts denote the recipient child, and superscripts denote the household giving the resources). I assume that household income is entirely allocated to child-quality goods. Allocation to their own child

$$x_i^i = h[y_i^h, y_i^w, x_j^i] \tag{2}$$

depends on own household's income, which comprises income earned by the husband y_i^h and income earned by the wife y_i^w, and contributions to child well-being in household j. For the purpose of exposition, I assume that the income components are independent across parents in a household and across households. Allocation to biological child x_i^i is increasing in both income components but is decreasing in the outward transfer component. Consistent with the notations, allocations to child i from household j are given by

$$x_i^j = g[y_j^h, y_j^w, x_j^j] \tag{3}$$

which increases with income in household j and decreases with investment in household j's biological child. I assume generally that when transfers take place, they are fractions of income earned in the household making them. This amount of transfer is derived from the components of household income, with weights corresponding to lineage obligation parameters that are allowed to be different for men and women. Let α_h and α_w be parameters that capture obligations that husbands and wives respectively have over the well-being of other children in the extended family, subject to $0 \leq \alpha_h \ \alpha_w \leq 1$. I define the part of household i's income that enters the quality production function of child in household j as

$$x_j^i = \alpha_h y_i^h + \alpha_w y_i^w. \tag{4}$$

For example, when $\alpha_w = 0$, women are not culturally involved in caring for the well-being of children outside the nuclear family, and transfers are made entirely out of the husband's income. Similarly, this representation also implies that

$$x_j^j = (1 - \alpha_h) y_j^h + (1 - \alpha_w) y_j^w \tag{5}$$

Having defined allocations in terms of individual incomes, I substitute equations (4) and (5) into (2) and (3), respectively, and substitute the evolving expressions into equation (1). Following these steps, I obtain

$$q_i = f(h[(1-\alpha_h)y_i^h, [(1-\alpha_w)y_i^w], g[\alpha_h y_j^h, \alpha_w y_j^w], \epsilon_i). \quad (6)$$

I linearize the functions f, h and g, and assume that the arguments enter the production function additively. These simplifications lead to a quality production function of the form

$$q_i = c_1c_2(1-\alpha_h)y_i^h + c_1c_2(1-\alpha_w)y_i^w + c_1c_3\alpha_h y_j^h + c_1c_3\alpha_w y_j^w + \epsilon_i \quad (7)$$

where c_1, c_2, and c_a are constants of proportionality pertaining to the functions f, g, and h, respectively. Equation (7) provides a general framework for analyzing income effects on outcomes pertaining to the quality of child well-being.

Implications

Consider the case where households are economically independent, so that $\alpha_h = \alpha_w = 0$. In this case, the data-generating process is

$$q_i = c_1c_2(y_i^h + y_i^w) + \epsilon_i \quad (8)$$

and the coefficient of the husband's income is not different from the coefficient of the wife's income. When households are interdependent, an analysis of the quality of child well-being that assumes independence omits the last two terms of equation (7). Consider the setting where $\alpha_h > 0$ and $\alpha_w = 0$. In this setting, the husband in household i has an implicit obligation to look after the child in household j, whereas his wife does not. The determination of the quality of child well-being from equation (7) reduces to

$$q_i = c_1c_2(1-\alpha_h)y_i^h + c_1c_2y_i^w + c_1c_3\alpha_h y_j^h + \epsilon_i \quad (9)$$

In effect, the husband's income effect on the quality of child well-being would be lower than the wife's effect due to the *dilution* effect captured by $(1-\alpha_h)$. However, an estimation procedure that considers households in this setting as independent economic units will omit the third term—the uncle's effect on the quality of child well-being. The uncle's effect on q_i, captured by $c_1c_3\alpha_h$ in equation (9), is symmetrically identical to father's effect on q_j. Thus, estimates stimulated by the two-person household ignore the dilution of the husband's resources by the child in household j, and consequently underestimate the father's income effects. Assuming that the functions f and g are identical—that is, $c_3 = c_2$—the sum of the coefficients of y_i^h and y_j^h equals the coefficient of y_i^w; thus, the difference between the income effects within the household is equal to the dilution effect.

Societies where $\alpha_h = 0$ and $\alpha_w > 0$ hardly exist. For example, children are accounted for in women's lineage and sisters reside close enough to interact differentially from men in matrilineal societies. However, men are overseers of the well-being of their sisters' children. It is common among the matrilineal Akan ethnic group to use the phrase "any child that has no uncle is unfortunate." The more generalized phrase "fathers always have money" is more indicative of the role that men play in extended families in developing societies.

The Empirical Model and Issues

Following from equation (7), an econometric model examining the quality of child well-being in the presence of interdependence among households should generally be of the form

$$q_i = \lambda_0 X_i + \lambda_1 y_i^f + \lambda_2 y_i^m + \lambda_3 Z_i + \epsilon_i \quad (10)$$

where q_i is a measure of the quality of child well-being, X_i is a vector of observed child characteristics that includes a unit column, y_i^f measures the father's income or resources and y_i^m measures the mother's income or resources, Z_i is a vector of incomes or resources of relatives of the father and mother, and ϵ_i is the unmeasured endowment. One's understanding of societies and the structure of rights and obligations in extended families will guide one's expectations regarding the size of each component of λ_3.

An estimate of λ_3 may be biased if Z_i is correlated with ϵ_i through family-level heterogeneity. For example, conditional on the father's resources, the uncle's resources may not have an independent effect on children, but regression may yield nonzero estimates of λ_3 that simply capture an endowment of abilities or healthiness in the lineage. I address this potential problem by estimating a similar regression from societies with different social institutions where the nature of extended family obligations predicts different coefficient estimates for components Z_i.

IMPLEMENTATION

The primary empirical finding to be detected in this paper is whether a father's effect on his own children is smaller than that of the mother when there are other households in the lineage to which the father's resources may extend in a patrilocal setting. That is, if men care about their brother's children, then some fraction of a man's resources should be distributed toward other children outside his household, if he has brothers, and thus have a smaller impact on his own children. Expectations in matrifocal settings should be different.

Detecting lineage effects on resource allocation requires detailed data on measures of income or endowment of other parents and outcomes of children in the lineage, a requirement that existing data sets can hardly meet.[10] Previous tests of bargaining in households have used labor income (Phipps and Burton 1992; Hoddinott and Haddad 1995), nonlabor income (Thomas 1990), credit (Pitt, Shahidur and Khandker 1998) and other measures of individual control over assets. Apart from the limited effort by Pitt, Shahidur and Khandker (1998) to—albeit indirectly—collect data on the extended families of the sampled households, none of the other efforts have attempted to collect data on lineage networks.

In terms of measuring bargaining power in households, the literature on intrahousehold allocation makes a distinction between income, which is potentially endogenous due to labor supply decisions and the possibility of gender wage differentials, and endowment, which is predetermined and hence is considered a more reasonable measure of bargaining. To avoid endogeneity of income and wealth, a number of studies—including Thomas (1994), Lillard and Willis (1994), Glewwe and Jacoby (1994) and Deolalikar (1993)—have used education to measure parental resources.

Foster (1993) used landowning and education levels of heads of households as measures of resources in his analysis of household outcomes in rural Bangladesh. In most rural areas of the societies where his data and mine were gathered, men and women are mostly unlikely to return to school after marriage. This characteristic allows one to treat education as a premarital endowment. In addition, land markets are almost nonexistent in these societies; instead, land undergoes division when an adult son marries and decides to establish a separate household. This observation allows one to qualify the amount of land owned by individuals as endowment through inheritance.

Data

In my analysis, I use two data sets. The first is a multipurpose household survey done in 87 villages of 29 *thanas* (subdistricts) randomly drawn from 391 *thanas* in rural Bangladesh, conducted during the year 1991–92.[11] These data cover the education of parents, but instead of the education of siblings of parents, the survey only collected data on their landholdings. An econometric concern is that landowning may not measure siblings' resources as well as education does. Measurement error in a regressor will bias its effects downward rather than upward, and I think that the estimation procedure will yield coefficients that are lower bounds. My second source of data is the third wave of the Indonesia Family Life Surveys conducted in 2000. These data cover the education of parents and that of their siblings rather than their landowning. I restrict the sample to the Minangkabau, Javanese and Sundanese ethnic groups of Indonesia, which exhibit a matrilineal/matrifocal orientation.

I must place a caveat here. My objective in using data from a patrilineal/patrilocal lineage system in Bangladesh and a matrilineal/matrifocal-oriented fam-

ily system in Indonesia is not to test the implications of patrilineal and matrilineal family systems. Instead, I only rely on the comparison to illustrate the empirical implications of differences in lineage systems for household behavior.

My data do not cover the education or landowning of the spouses of siblings. But this omission does not constitute a serious problem in interpreting my results, for the following reasons. If the resources of the uncle's wife affect the quality of children's well-being in the household but are omitted from the regression, the coefficient of the uncle's resources will pick that effect in the presence of assortative mating. Although such an omission will overstate the paternal uncle's effect, it does not totally contradict my claim of lineage effect on child well-being. Conversely, if the wife's education is correlated with the brothers' wives education, which is a more plausible case—especially in Bangladesh society, where parents (especially mothers) exert substantial influence on spouse selection[12]—then the omission of the education of the uncle's wife merely overstates the effect of the mother's education and does not affect the coefficient of the husband's brother.

My measure of the quality of child well-being also differs in the two data sets. In the Bangladeshi data, I use years of schooling of children age 6 to 16 years, whereas in Indonesia, I use anthropometric measures of child well-being for children under age 10. Although the Indonesia data provide education of children of the same age as in Bangladesh, education is compulsory for children up to age 15 in Indonesia. Conditional on age, I suppose that there is potentially little variation in child education to be explained in the regressions. Conversely, the sample of children for which we have child health measures in Bangladesh is very small. Although a comparison of different measures of the quality of child well-being may seem like comparing apples and oranges, my objective is not to compare the demand for these goods themselves but to compare the pattern of lineage effects on household demand for two normal goods.

Settings

Lineage systems are both patrilineal and patrilocal in Bangladesh. A household comprising the husband, wife and children is an integral part of the husband's lineage. Husbands remain in their villages of birth or natal compound, and wives move to join them upon payment of the bride price in a move that is considered as changing affiliation from her natal kin to that of the husband. A woman exercises little or no control over farmland, and her access to land is usually through her husband, although there are some exceptions. The basic lineage group consists of a group of brothers under the headship of their father or the eldest son in the family.

The Javanese and Sundanese ethnic groups, which make up about 90 percent of the Indonesian sample, reckon kinship bilaterally. Both male and female bloodlines are equally important, and married couples are mostly free to choose the location of their household. However, evidence shows that family relationship exhibit matrifocal orientation.[13] On the basis of the cultural information collected in the villages during the second wave of the Indonesia Family Life Surveys, about 70 percent of households identified with the two ethnic groups live in villages where newly married couples live with the parents of the wife rather than those of the husband. In this setting, though sisters are more likely to locate their households near their natal household, interact more frequently and share resources, brothers are more likely to be dispersed. The Minangkabau ethnic group that forms part of the sample is a well-known matrilineal descent group whose property and

family names descend through the female bloodline. A man's properties are not inherited by his children but by the children of his sisters. At marriage, a husband pays no bride price, he often moves from his parents' household or village to live with his wife and her relations in her village, and he exercises little control over his children and productive resources.

DESCRIPTIVE STATISTICS: LINEAGE SYSTEM AND RESIDENCE

To demonstrate how lineage systems determine the social environment of the household, table 1 summarizes my data on the residence of siblings of the household head and his spouse in male-headed households. In the Bangladesh panel, I exclude households where brothers jointly reside in the same household, leaving a sample of 1,498 male-headed households. In the first panel, the husband's number of siblings is significantly fewer than those of the wife—a demographic regularity that derives from age differences between spouses in most patriarchal societies. The average age difference between husband and wife in the data is about eight years. Thus, the husband is likely to have more deceased siblings than his wife. In the second panel, 1.69 of the 2.09 brothers of the male household head who are alive live in the same village as the sampled household, whereas only about 0.45 brothers of the wife live in the same village with her. The data do not support the converse—the possibility that sisters marry into the same village. Instead, the sisters of the husband (who perhaps are unmarried sisters) are more likely to live in the same village than are the sisters of the wife (0.53 vs. 0.31). The third panel allows us to see how far individuals move away from their village of origin. It shows that women are likely to marry across villages in the district, and perhaps outside the district, whereas men are less likely to move away from their villages. This reflects the general practice of patrilocal exogamy, whereby daughters are married into other villages and sons marry wives from outside the village.

Table 1. Residential Location of Relatives (head of household is male)		
Type of Kin	**Brothers**	**Sisters**
A. Bangladesh Credit Program Survey		
Number who are alive		
Head of household	2.09	1.92
Spouse of the head	2.27	2.18
Difference ($Head_{stat}$ – $Spouse_{stat}$)	–0.18	–0.26
t-stat: Difference = 0	**3.28**	**4.81**
Number who live in the village		
Head of household	1.69	0.53
Spouse of the head	0.45	0.31
Difference ($Head_{stat}$ – $Spouse_{stat}$)	1.24	0.23
t-stat: Difference = 0	**24.06**	**7.58**
Number who live in the upazilla		
Head of household	1.85	1.43
Spouse of the head	1.64	1.43
Difference ($Head_{stat}$ – $Spouse_{stat}$)	0.21	0.00
t-stat: Difference = 0	**3.80**	0.01
B. Indonesia Family Life Survey		
Number who live in the village		
Head of household	0.52	0.54
Spouse of the head	0.5	0.61
Difference ($Head_{stat}$ – $Spouse_{stat}$)	0.02	(0.07)
t-stat: Difference = 0	0.95	**2.89**
Number who live in the subdistrict		
Head of household	0.20	0.20
Spouse of the head	0.20	0.19
Difference ($Head_{stat}$ – $Spouse_{stat}$)	0.00	0.01
t-stat: Difference = 0	0.09	0.89
Number who live in the district		
Head of household	0.29	0.28
Spouse of the head	0.26	0.25
Difference ($Head_{stat}$ – $Spouse_{stat}$)	0.03	0.03
t-stat: Difference = 0	**2.09**	**1.59**

Conversely, the social environment is composed differently for households in matrilineal systems. The Indonesia panel summarizes the social environment of 3,224 male headed households. The first panel of table 1 shows that there are no differences in the number of married brothers of the husband and married brothers of his wife who reside in the same village, although siblings tend to be more dispersed in Indonesia's data than in those of Bangladesh. However, more sisters of the wife are married into households in the same village than are sisters of the husband. Although the social environment of the household is composed of those brothers of the household head in the Bangladesh data, the social environment of the household, although more mixed among the Indonesian ethnic groups, has more sisters of the wife than those of the husband.

RESULTS

As a measure of the quality of child well-being, I examine regressions of child schooling in the rural Bangladesh data and exclude households with coresident brothers. An obvious econometric implication of this choice is that if those brothers who are more likely to honor lineage norms for resource sharing are the ones who coreside, then my sample is biased toward finding smaller effects for the presence of brothers in the village. In the results presented in table 2, I estimate the effects of education of the husband and wife on the education of children age 6 to 16 years, assuming a framework in which education has a bargaining effect on resource allocation. That is, I assume that higher education confers command over more resources in the household.

Table 2. Ordinary Least Squares Regression: Years of Schooling of Children Ages 6–16, Bangladesh Credit Program for the Poor, 1991–92 Survey Data
(sample of households where brothers are not coresident)

Variable or characteristic	Father Has Brothers		Father's Brother in Village		Father Poorer Than His Brothers	
	No	Yes	No	Yes	No	Yes
	(1)	(2)	(3)	(4)	(5)	(6)
Mother's education	0.21229*** [0.06869]	0.24962*** [0.03044]	0.21229*** [0.05271]	0.25624*** [0.03280]	0.26796*** [0.03525]	0.16078*** [0.06018]
Father's education	0.20660*** [0.04650]	0.15245*** [0.02190]	0.20565*** [0.03610]	0.13996*** [0.02363]	0.15079*** [0.02609]	0.15805*** [0.03972]
Number of children	484	1869	794	1559	1441	428
R^2	0.32	0.36	0.33	0.37	0.38	0.33
F-Statistic $\beta_2 = \beta_3$	0.0000	4.2800	0.0400	5.2500	4.3400	0.0000
***p*-value**	0.9551	0.0389	0.8402	0.0223	0.0375	0.9726

Note: Robust standard errors in brackets; children are clustered by mothers.
* significant at 10%; **significant at 5%; ***significant at 5%. Other regressors: child age and sex dummies.

First, I examine the intuition that differences in the father's and mother's effects on the household should depend on whether fathers have nephews or nieces. In columns 1 and 2 of table 2, I estimate a baseline regression on samples where the father has no brother and where the father has brothers, respectively, and I test whether the coefficients of the parents' education differ conditional on age and the sex of their children. The coefficients and the test suggest an equality of parental effects when the father has no brother but a significantly smaller effect for the father when he has brothers. A plausible interpretation of this difference is that relative to the wife, the husband spends less of the resources accorded by increased education in the household when there are brothers' households in existence. One might wonder whether the differences only arise because of sample size differences, because the sample in the no-brother group is about a quarter of the size of the with-brother group. The test results given in columns 3 and 4 are similar but allow a redistribution of the sample into the two categories. I find that a parent's education effects are not different in the absence of brothers in the village but are different when there are father's brothers in the village. In addition to the presence or absence of statistically significant differences in the parent's effects according to the father's brother's presence, the change in the coefficients may also be suggestive. The mother's effects tend to increase when the father's effects decrease due to the brother's presence in the village. As the number of children that fathers expect to provide old-age support for him increases, the less the impact of his resources is felt in the household as a result of investment in children outside the household. In turn, the mothers may invest more resources in the children to compensate for the loss of investment from the fathers. Furthermore, if transfers reduce the father's effects in the household, then, in the presence of common preferences, one should expect equal parental effects when the father is not likely to be transferring resources outside the household and greater mother's effects when transfers are likely. One way to test this is to use a measure that compares the father's resources with those of his brothers. Unfortunately, the Bangladeshi data do not cover the education of the parents' siblings, but do include their landowning, which is comparable to that of the parents being considered. Using this measure, a father is considered to be poorer than his brothers if he owns fewer acres of land than his brothers, and not poorer if otherwise. Separating the sample into those in which the father is poorer than his brothers and those in which he is not, I find in columns 5 and 6 that the father's and mother's effects are not different when the father is poorer than his brothers (i.e., the father is likely to be a transfer recipient) but smaller effects for the father when he is richer or as rich as his brothers (i.e., the father is likely to be making transfers).

Next, I pool the data and examine the effects of the presence of both siblings of parents, and present the results in table 3. In the baseline regression that is generally estimated in the literature, one sees that the father's effect is smaller than the mother's effect. In the next three columns of the table (2 to 4), I test whether residence of each type of parents' siblings changes intrahousehold effects. If the presence of the husband's brother's household in the village leads only to the husband spending less resources in his household, then his brother's residence in the village should reduce the father's education effect, and might increase the mother's effect. The results given in column 2 show exactly that: having a brother in the village raises the child's education level by 0.26 year but reduces the father's education effect by 0.08 year, while raising the mother's effect, although insignificantly. The addition of the father's sister's residence and interaction with education does not change the result (comparing columns 2

Table 3. Ordinary Least Squares Regression: Years of Schooling of Children Ages 6–16, Bangladesh Credit Program for the Poor 1991–92 Survey Data (sample of households where brothers are not coresident)

		Husband's Sibling Type			Wife's Sibling Type		
	Baseline	Brother[a]	Brother[b]	Sister	Brother	Sister[1]	Sister[2]
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Mother's education	0.23609*** [0.02967]	0.20863*** [0.05622]	0.21219*** [0.05670]	0.24028*** [0.03557]	0.22531*** [0.03350]	0.23137*** [0.03331]	0.22681*** [0.03523]
Father's education	0.18396*** [0.02120]	0.23438*** [0.03806]	0.23259*** [0.03895]	0.18590*** [0.02506]	0.18552*** [0.02439]	0.19074*** [0.02303]	0.18824*** [0.02473]
Sibling's residence in village		**0.26211**** [0.13009]	**0.27135**** [0.13792]	0.03839 [0.14041]	**–0.25173*** [0.13571]	0.19913 [0.15654]	–0.10238 [0.18886]
Sibling's residence in village x father's education		**–0.07778*** [0.04583]	**–0.08153*** [0.04644]	–0.00748 [0.04748]	–0.00764 [0.04839]	–0.06664 [0.06098]	–0.07929 [0.07275]
Sibling's residence in village x mother's education		0.04433 [0.06635]	0.05277 [0.06833]	–0.0167 [0.06468]	0.05662 [0.07271]	0.04521 [0.07063]	0.02782 [0.07272]
Number of children	2,426	2,426	2,426	2,426	2,426	2,426	2,426
R^2	0.35	0.35	0.35	0.35	0.35	0.35	0.36

Note: Robust standard errors in brackets; children and clustered by mothers.
* significant at 10%; **significant at 5%; ***significant at 5%. Other Regressors: child age and sex dummies.
[a]Does not include dummy for residence and interaction of parents' education with residence of the other type of sibling.
[b]Includes dummy for residence and interaction of parents' education with residence of the other type of sibling

and 3), and the father's sisters' residence in the village has no effect on child schooling (column 4). I also examine the effects of residence in the same village with the siblings of the wife, in columns 5 to 7. Turning to the mother's siblings, the results given in column 5 show that the residence of the household in the same village as the wife's brother reduces child education levels but does not change either the husband's or wife's effects. Residence of the household in the same village as the sisters of the wife does not affect child schooling, with or without controls for the residence of her brothers (columns 6 and 7).

There also exists the possibility of reverse causation. It is arguable that if a father has brothers with resources in the village who can serve as a network for income generation, the provision of informal insurance, or sharing of a lineage common good, he may be less motivated to invest in his children, and accordingly there may be a weaker relationship between his education and children's outcomes that has nothing to do with investing in other children. However, under this scenario, one would expect to observe a weaker relationship between the father's education and his children's outcomes when the father is poorer than his brothers and consequently depends on his brothers to take care of his children. This idea is refuted by the results given in columns 5 and 6 of table 2: The relationship between the father's education and child outcomes is weaker than between the mother's educa-

Table 4. Ordinary Least Squares Regression Years of Schooling of Children Ages 6–16, Bangladesh Credit Program for the Poor, 1991–92 Survey Data		
	Regression Using Reported Number of Siblings	**Regression Using Dummy for at Least One Sibling**
	(I)	(II)
Mother's education	0.22807*** [0.02996]	0.23276*** [0.02941]
Father's education	0.17535*** [0.02137]	0.17018*** [0.02141]
Nonpoor mother's brothers	0.06641 [0.04193]	0.23427* [0.13085]
Nonpoor mother's sisters	0.01593 [0.05209]	–0.07605 [0.12849]
Nonpoor father's brothers	0.10892*** [0.05090]	0.39331*** [0.12710]
Nonpoor father's sisters	–0.0482 [0.05379]	0.01361 [0.11739]
Number of children	2469	2469
R^2	0.36	0.36

Note: Nonpoor siblings are those reported to possess more than half an acre of land.
Robust standard errors in brackets; children and clustered by mothers.
* significant at 10%; **significant at 5%; ***significant at 5%. Other Regressors: child age and sex dummies.

tion and child outcomes when the father is likely to be richer than his brothers rather than when he is poorer.

In this paper, I focus on resource sharing among households as the channel through which the residence of siblings in the village can affect the quality of children's well-being in the household. To examine this, I study the effect of parental siblings' resources on children in the household. Using data on landowning, I classify kin who have more than a half acre of land as nonpoor and others as poor. I investigate the effect of this classification on the schooling of children, as shown in table 4. Conditional on the education of parents, column 1 of the table shows that the number of nonpoor brothers, most of whom reside in the same village as the household, significantly raises the level of child schooling. I do not observe any effects from the husband's sisters, nor from the wife's brothers and sisters.[14] In column 2, I used dummies rather than the count of relatives. The results are qualitatively similar, except that the dummy variable for the wife's brothers becomes significant and positive. The difference between the schooling of children of a husband who has at least one nonpoor brother and that of a husband whose brothers are all poor is about 0.39 year.

The presence of siblings in the village may incorrectly measure other children in the lineage if the parent's siblings without children have different residential location choices than the siblings with children. This

Table 5. Ordinary Least Squares Regression Anthropometric Measures of Children Ages 0–10 Years, Indonesia Family Life Survey, 2000				
	Height-for-Age Percentile			
	(I)	(II)	(III)	(IV)
Mother's education in years	0.93571*** [0.18643]	0.96630*** [0.21600]	0.83122*** [0.20560]	0.87723*** [0.23411]
Father's education in years	0.59607*** [0.16521]	0.45777** [0.17849]	0.45568** [0.17915]	0.36049* [0.19273]
Father's brothers' education			0.20024 [0.12197]	0.06928 [0.12881]
Father's sisters' education			0.20548 [0.14044]	0.23739 [0.14866]
Mother's brothers' education		–0.10095 [0.13291]		–0.04557 [0.13723]
Mother's sisters' education		0.40068*** [0.14025]		0.39503*** [0.14613]
Number of children	3759	3298	3469	3030
R^2	0.13	0.14	0.13	0.13

Note: Robust standard errors in brackets; children and clustered by mothers.
* significant at 10%; **significant at 5%; ***significant at 5%. Other Regressors: child age and sex dummies.

is, however, less of a problem if the brothers with children are more likely to live in the village, in a setting where the joint rearing of children in extended families seems to be a norm. It also seems reasonable to assume that those who migrate from the village are most likely to be unmarried brothers who do so for employment purposes.

It is also possible that the brother's effects on children reflect unmeasured heterogeneity. The existence of a nonpoor father's brothers may raise the level of child schooling if unmeasured ability determines both child schooling and the father's brother's landholding. I deal with this possibility by examining regressions using data from social groups whose family systems imply a different set of implications for lineage effects. For this purpose, I turn to the data from Indonesia, and I use a measure of child health that reflects cumulative investment. Table 5 presents estimates of child height-for-age from the Indonesia Family Life Surveys 2000, using the restricted sample. The estimates of parental education level's effect on child height-for-age show that women's effects are bigger than men's effects, even in the baseline regression. In column I, a unit increase in the wife's education raises child height by about 0.94 percentile, whereas the same increase in the husband's education does so by only 0.60 percentile. Observe that the gap in the baseline regression between the husband's and wife's effects in these data is wider than that of the Bangladesh data. This differ-

ence is likely to reflect in large part differences in the technologies generating education (in the Bangladeshi case) and health (in the Indonesian case); women's education means much more than resources in terms of input into child health. In the household, the husband's resource effects are necessarily smaller than the wife's, even when husband and wife do not have siblings. Because some of the groups are matrilineal-leaning, it is possible that the children of sisters inherit property from the same source. The data covers the education of all the siblings of each parent, and from this information, I computed the maximum years of schooling of siblings by their gender. Columns II to IV in table 5 thus show that the education of women's female siblings leads to an important improvement in the health of children (by 0.40 percentile per year of schooling), whereas the brother's education does not have any effect. In addition, the education level of the husband's brothers and that of the husband's sisters have no effect on child outcomes.

SUMMARY

In interpreting the empirical results, the essential comparison of effects is between paternal uncles (and aunts) and maternal uncles (and aunts) within each data set. Using similar measures of siblings' resources for husband and wife in the Bangladeshi data, the results show that having a brother's household in the village raises the quality of child well-being in the household but decreases the effects of the husband's education level on the human capital of children. Other regressions show that having a rich paternal uncle raises the quality of child well-being, but does not hold for maternal uncles. To further buttress this idea, I showed that instead of the paternal uncle's effect on children, it is the maternal aunts' resources that are important in the matrifocal/matrilineal-leaning society because sisters are more likely than other siblings to live close by. Interpreted with respect to the pattern of residence, these results suggest that the effects are not driven by correlated heterogeneity but by resource sharing among households arising from the system of lineage and kinship.

CONCLUSION

Most of the theoretical conceptions of household behavior in developing countries and the empirical studies they have stimulated consider the household as an independent, nuclear entity. Meanwhile, households in developing countries to a large extent depend on relatives for their livelihood—and sometimes survival. Private resource transfers within extended families also affect the distribution of economic well-being. The analytic channels through which resource sharing in extended families affects household behavior have not been sufficiently incorporated into the economic literature. Contrary to the widely held interpretation of a greater effect of women's resources on children as evincing their possession of a higher level of altruism toward children than men possess, I demonstrate in this paper that the results are consistent with common parental preferences for children's well-being. Parents' altruism, however, extends over different sets of children; whereas women's resources are generally spent within the household, men's resources are more likely to be spent both inside and outside the household, so the observed differences arise from a "dilution" of the men's resources rather than from a lack of altruism. Taken together, these results suggest that the scope of policies targeting a specific gender as the recipient of a given benefit may be very narrow when interhousehold sharing is taken into account.

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ENDNOTES

1. Exceptions are Lundberg, Pollak and Wales (1997) that used data from the U.K. and Phipps and Burton (1998) that used data from Canada.
2. This paper and the evidence provided therein have generally been taken as evidence that men spend their resources on alcohol, tobacco and concubines while women struggle to feed children.
3. The authors provide anecdotal evidence that boys fare worse in terms of health outcomes than girls during the age range of children in the data. They interpret their results in the sense that women deliberately use their resources to correct this imbalance.
4. Explanations for this difference have been rooted in biological asymmetry between men and women. Trivers (1972) relates this asymmetry to the amount of investment a parent makes in the offspring. He argues that the male's only contribution to the survival of his offspring is his sex cells and that the female's contribution exceeds the male's contribution by a large ratio. Eswaran and Kotwal (2004) argue that the asymmetry lies in differences in childbearing capacity: Whereas men have an almost unlimited capacity to sire (father) children, females are relatively limited in their capacity to bear them. Using simulation results, they showed that female altruism toward children will be stronger than that of male's, and the extent of disparity between their altruism levels will be influenced by the relative importance of their inputs into children, the degree of substitutability of their inputs and the scarcity of resources.
5. In farm settings, husbands and wives cultivate separate plots of food crops. At harvest, wives' crops are first consumed before the husband's crops. When asked for the rationale, the explanation is that this practice allows men to maintain a stock of grains to meet demand for transfers from the extended family, particularly those from his nephews. In contemporary times, the role of fathers in the household is traditionally limited to providing 2-kilogram bags of maize meal flour (mealy meal), sugar, tea and cooking oil. Alternatively, the man provides an allocation to his wife out of his income while the woman is required to provide the rest of the materials for sustaining the household. Men often are not aware of the needs of the family, and mothers always only resort to fathers for additional resources when specific items are needed in the household.
6. Extensive socialization and joint rearing of children in extended families and lineages are the rule rather than exception.
7. Although France is not a developing country, evidence from that country contributes to this literature. Lacroix, Picot and Sofer (1998) provide evidence using data from French extended families that patterns of child care and labor supply in households reflect specialization in extended families.
8. Sherman (1977) suggests from his study of alarm calls among ground squirrels that geographical proximity may induce kin selection. In his theory of the evolution of social behavior, Hamilton (1964) shows that agents may find it beneficial to incur a cost on behalf of another if the donor and recipient are kin.
9. Foster (1993) concludes that child schooling satisfies this requirement.
10. I attempted using the data that were used in some of the studies cited above, but we could not link children across households.
11. See Pitt, Shahidur and Khandker (1998) for detailed description of the data.
12. This is more likely the case in patrilocal societies, where arranged marriages are prevalent. A stronger correlation between the educations of the wives than between the education of conjugal spouses might arise, particularly where the input

of the husband's mother into wife selection takes into account her ability to get along with them as well as the desired level of home care.

13. Frankenberg and Kuhn (2004) suggest that although there are no strict rules about residence in the bilateral Indonesian societies, newly formed households are generally more likely to reside with the parents of the bride to allow the mother advise her in the early periods of matrimony.

14. I obtained similar result for uncles, although a substantial number of them seem to live outside the village.

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