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**INTRAHOUSEHOLD ALLOCATION AND GENDER
RELATIONS: NEW EMPIRICAL EVIDENCE FROM FOUR
DEVELOPING COUNTRIES**

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ABSTRACT

The paper reviews recent theory and empirical evidence testing unitary versus collective models of the household. In contrast to the unitary model, the collective model posits that individuals within households have different preferences and do not pool their income. Moreover, the collective model predicts that intrahousehold allocations reflect differences in preferences and "bargaining power" of individuals within the household. Using new household data sets from Bangladesh, Indonesia, Ethiopia, and South Africa, we present measures of individual characteristics that are highly correlated with bargaining power, namely human capital and individually-controlled assets, evaluated at the time of marriage. In all country case studies we reject the unitary model as a description of household behavior, but to different degrees. Results suggest that assets controlled by women have a positive and significant effect on expenditure allocations toward the next generation, such as education and children's clothing. We also examine individual-level education outcomes and find that parents do not have identical preferences toward sons and daughters within *or* across countries.

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1. INTRODUCTION

There is growing evidence that the household cannot be characterized as one where individuals share the same preferences or pool their resources. New research has shown that the unitary model of the household has been rejected in a variety of country settings in both developed and developing countries (see Strauss and Thomas 1995; Behrman 1997; Haddad, Hoddinott, and Alderman 1997 for reviews). Although the unitary model continues to be extremely powerful in explaining many phenomena, the evidence in favor of a model where individuals within the household have different preferences, or maintain control over their own resources, is of interest to researchers and policymakers alike.

In the concluding chapter of their book, Haddad, Hoddinott, and Alderman (1997) argue that using the unitary model of the household as a guideline for policy prescriptions may lead to four types of policy failures. First, the effect of public transfers may differ, depending on the identity of the income recipient. If this is so, targeting transfers to the household may not result in the desired consequences, if transfers directed to the husband or the wife have different impacts. Second, the response of nonrecipients of the income transfer must also be considered. If households reallocate resources away from the transfer recipient to compensate for the transfer receipt, the intended effect of the income transfer may not be realized. Third, at the project level, the unitary model predicts that it does not matter to whom policy initiatives are addressed, since information, like other resources within the household, will be shared. However, numerous examples, many from Sub-Saharan Africa, have shown that targeting one individual, rather than the other,

has led to nonadoption of particular policies or unintended consequences of policies adopted. Lastly, adherence to a unitary model of the household disables many policy levers that could be brought to bear on development problems. The unitary model predicts that household behavior can be changed only by changes in prices and household incomes. In contrast, the collective model posits that a large range of policies can be used to affect household allocation outcomes, such as changes in access to common property resources, credit, public works schemes, and legal and institutional rights.

While the evidence rejecting the unitary model is growing, the body of research from which generalizations can be drawn is still limited. Since the diversity of social structures makes generalizations difficult, few studies have been replicated over a range of conditions and cultures (Haddad, Hoddinott, and Alderman 1997). One could question, for example, whether the results of these studies are invariant to the policy regime the household faces. Moreover, there are clearly other factors that affect intrahousehold allocation, such as the extended family, community, and other social groups. More important, whether existing empirical work in economics adequately captures the specific cultural contexts in which individuals within household and families make decisions can be questioned. Most household surveys, while collecting information on individual outcomes, often are not designed to collect data with which to characterize decisionmaking processes.

This paper attempts to expand the literature on intrahousehold allocation in two ways. First, it applies the same methodological framework to test the unitary model in four regionally-diverse countries with very different social and economic conditions.

Second, it uses data sets that have been specifically designed to examine intrahousehold allocation and household decisionmaking, drawing on qualitative information to create culturally-specific but quantifiable indicators of bargaining power. The results suggest that much can be gained from applying the common framework to the design and analysis of household surveys.

The paper is organized as follows. Section 2 reviews the theory and empirical evidence testing unitary versus collective models of the household. Section 3 discusses the determinants and measurement of individuals' bargaining power, focusing on asset measures as indicators of power. Section 4 presents separate analyses of expenditure shares and children's educational outcomes as functions of male and female assets based on new data collected by the International Food Policy Research Institute in four countries. Section 5 summarizes the results and discusses the policy implications.

2. MODELING HOUSEHOLD BEHAVIOR: A REVIEW¹

UNITARY VERSUS COLLECTIVE MODELS

Unitary Models

The theory of the household was brought into mainstream economics by Gary Becker in the mid-1960s. Following this line of work, most economists see the household as a collection of individuals who behave as if they are in agreement on how best to combine time, goods purchased in the market, and goods produced at home to produce

¹This draws heavily from Behrman (1997), Haddad, Hoddinott, and Alderman (1997), Strauss and Beegle (1996), and Strauss and Thomas (1995).

commodities that maximize some common welfare index. Though this approach originates in standard demand analysis, it has been extended to include the determinants of education, health, fertility, divorce, child fostering, migration, labor supply, home production, land tenure, and crop adoption (cf. Becker 1973). This approach is appealing because of the relative simplicity of comparative statics generated and the diversity of issues it can address. It is sometimes called the "common preferences" model or the "altruism" model or the "benevolent dictator" model, based on the notion that either all household members share the same preference function or that a single decisionmaker acts for the good of the entire household. We call it the unitary model because this label describes how the household acts—as one with a single preference function.

More formally, suppose that the household consists of two individuals, m and f . Under the unitary model, all members of the household share the same preferences (or alternatively all decisions are made by a dictator, benevolent or otherwise). Household members derive utility from the consumption of a vector of individual commodities \mathbf{x} (including goods and leisure), influenced by a vector of household characteristics $\boldsymbol{\gamma}$, some of which are unobservable.² The household's utility function is given by

$$U(\mathbf{x}; \boldsymbol{\gamma}), \tag{1}$$

which is maximized subject to an income constraint:

$$Y = y_j + y_m + y_f. \tag{2}$$

²We denote vectors in bold (e.g., \mathbf{x}); individual elements of the vector, such as x_i are in ordinary type.

Total household income is composed of joint income y_j and individual incomes y_m and y_f . Since it is assumed preferences are identical, income is pooled and maximization leads to a series of demand functions for \mathbf{x} , which are functions of prices \mathbf{p} , total household income Y , and household characteristics γ .³

$$x_i = x_i(\mathbf{p}, Y; \gamma) \quad (3)$$

For a given set of prices and pooled income, resources are allocated to household members according to their ability to translate those resources into goods from which the household derives utility.

The unitary model is quite powerful; for example, it helps explain two important areas of household behavior: decisions regarding the quantity of goods consumed and the equal or unequal allocation of those goods among household members. Thus, despite a common misperception, the unitary model is able to explain differences in individual well-being and consumption patterns within a household, even when these differences are exhibited systematically by gender, age, or relation to household head grouping (cf. Becker 1981). For example, differences in allocation may be explained by different productivities that lead to higher incomes shared by all members. An empirical example of this approach is provided by Pitt, Rosenzweig, and Hassan (1990), who extend the agricultural household model (Singh, Squire, and Strauss 1986) by incorporating

³That is not to say that the identity of the income earner is unimportant in unitary models. If the price of leisure, (wage), of m and f differ, then changes to the wage of either is likely to have different demand impacts for other goods, due to gender specific cross price effects with wages.

individual work effort as a choice variable in the household welfare function. They show that unequal calorie allocations across gender and age classes may reflect different distributions of activities within those classes.

The existence of a single household welfare function reflecting the preferences of all members is not an innocuous assumption, however. If individual household members have different preferences, then these differing preferences must be aggregated in some fashion; the social choice literature illustrates the theoretical difficulties associated with this. Moreover, while the unitary approach allows person-specific prices, it assumes that all household resources (income, capital, labor, and land) are pooled. If preferences are not common to all household members, at least one household member must have the ability to monitor the others and to sanction those who fall foul of its rules, an issue both of information flows as well as control.⁴

Collective Models

Concerns regarding the assumptions underlying the unitary model have spawned a number of alternatives that weaken those assumptions and focus on the individuality of household members and the possible differences in their preferences. One class of these are the so-called collective models (Chiappori 1988b, 1992, 1997), which allow differing preferences and only assume that allocations are made in such a fashion that the

⁴Perhaps the most persuasive attempt to resolve the problems of aggregation and enforcement is Becker's "rotten-kid theorem" (1974, 1981).

outcomes are Pareto optimal or Pareto efficient.⁵ All collective models have two common features: first, they allow different decisionmakers to have different preferences, and, second, they do not require a unique household welfare index to be interpreted as a utility function, thereby allowing the index to be dependent on prices and incomes as well as "tastes" (Chiappori 1992). As a consequence, both unitary and collective models permit existing intrahousehold resource allocation rules to affect household responses to public policy. However while both models allow public policy to change intrahousehold allocations of a good, only the collective model permits public policy to affect the *rules* of intrahousehold allocation.

In the collective model as described above, nothing is assumed a priori about the nature of the decision process, i.e., it does not directly address the question of how individual preferences lead to a collective choice. This does not mean that the distribution rule governing intrahousehold allocation is not important, but rather that it has to be estimated from the data rather than postulated a priori. This more general viewpoint is especially convenient for assessing the relative suitability of the competing frameworks. In particular, an important finding is that the efficiency hypothesis is sufficient to generate strong testable restrictions on household behavior (Chiappori 1992).

If one is willing to put more structure on the decisionmaking process, two subclasses of collective models emerge, one rooted in cooperative and the other in noncooperative game theory. In the cooperative approach, individuals have a choice of remaining single or of forming a household or other grouping. They choose the latter

⁵A Pareto optimal allocation is reached when one individual within the household can only be made better-off at the expense of another household member.

option when the advantages associated with being in a household outweigh those derived from being single.⁶ The existence of the household generates a surplus, which will be distributed among its members; the rule governing this distribution is the central issue of the analysis. Unitary models represent a special case of cooperative collective models where preferences are identical and, as a consequence, resources are pooled.

Within the cooperative subclass are examples that represent household decisions as the outcome of some bargaining process applying the tools of cooperative game theory. The division of the gains from marriage, then, can be modeled as a function of the "fallback" or "threat point" position of each member: itself a function of extra environmental parameters (EEPs) such as laws concerning access to common property and prohibitions on women working outside the home (McElroy 1990). The vast majority of bargaining models rely on a Nash solution (Nash 1953).⁷

The second subclass of collective models are those that rely on noncooperative game theory. While all cooperative models are Pareto efficient, only some noncooperative ones exhibit this property; so not all of them would be included here. Instead, they would be part of the group of noncollective models, i.e., those that do not satisfy Pareto efficiency.

⁶The distribution of gains within marriage is a common application of cooperative models. However, it is possible that individuals (particularly females) may not have a choice about getting married or forming a household. One can argue that, in many contexts, the decision to marry or form a new household may be motivated by non-economic factors, such as society's views of individuals who do not marry.

⁷The Nash-bargained solution can also be reached through more complex negotiating procedures. Under quite general conditions, Harsanyi and Selten (1987) show that a sequential bargaining process converges to the Nash-bargained solution, if one exists.

The noncooperative approach (Ulph 1988; Kanbur 1991; Carter and Katz 1997; Lundberg and Pollak 1993) relies on the assumption that individuals cannot enter into binding and enforceable contracts with each other. Instead, an individual's actions are conditional on the actions of others. The conditionality of action implies that not all noncooperative models are Pareto optimal. However, work by McElroy suggests that this is not as serious as it may seem because noncooperative solutions can serve as threat points in cooperative models. As McElroy (1992) notes, dissolution of the group is not a credible threat in a cooperative bargaining model in the context of small daily decisions.

EMPIRICAL TESTS OF HOUSEHOLD MODELS

Since differential allocations across household members are consistent with both unitary and collective models, the empirical challenge lies in testing whether or not such differentials are consistent with a unitary model of the household, or with a decisionmaking process in which different household members have different preferences and varying abilities to enforce these. If the unitary model does not hold, then policymakers have an additional lever with which to influence intrahousehold outcomes.

Pareto Efficiency

Testing Pareto efficiency of household resource allocations is one general test of the collective model.⁸ If the assumption of Pareto efficiency is rejected, it is possible to improve household welfare by reallocating resources within the household. Suppose that

⁸The discussion in the next two sections follows Thomas and Chen (1994) and Bourguignon et al. (1993) closely.

the household is composed of two individuals, m and f . Assume that each has altruistic preferences, in the sense that each cares about the other's consumption of a private good, x_m and x_f , respectively. Let all public goods be represented by the vector x_0 . For all Pareto-efficient allocations, there exists some μ so that the household optimization program is

$$\text{Max } \mu U_m(\mathbf{x}_m, \mathbf{x}_f, \mathbf{x}_0; \boldsymbol{\gamma}) + (1-\mu) U_f(\mathbf{x}_m, \mathbf{x}_f, \mathbf{x}_0; \boldsymbol{\gamma}), \quad (4)$$

$$\mathbf{p}\mathbf{x} + \mathbf{p}\mathbf{x}_0 = Y, \quad (5)$$

where \mathbf{p} is a vector of prices for both private and public goods and Y is income. The weighting function μ is a function of prices, incomes, and household characteristics, while the demand for any private good x_i is a function of prices and income as well as the weights μ .

$$x_i = x_i(\mathbf{p}, Y; \mu, \boldsymbol{\gamma}). \quad (6)$$

Conditional on μ , the demand functions satisfy the properties of homogeneity, adding-up, and Slutsky symmetry. Treating the weights as endogenous leads to a series of Slutsky-like conditions and testable restrictions on the data (Browning and Chiappori 1994).

Given three sources of income, e.g., y_j, y_m, y_f , and differentiating the demand functions, the ratio of any two income effects $(\partial x_i / \partial y_m) / (\partial x_i / \partial y_f)$ is independent of i —which is true for both public and private goods. This result, which states that the ratio of male-to-

female income effects is identical across all pairs of goods, is a simple and powerful test of Pareto efficiency.⁹

Recently, further tests of Pareto efficiency have emerged in the literature. Fortin and Lacroix (1997) posit a flexible structural model of labor supply and derive the restrictions required for it to satisfy the unitary and/or collective models. This allows them to simultaneously test the nested models. Browning and Chiappori (1998) also provide a new set of nested tests of the unitary, collective, and noncollective models. As in their earlier work, they demonstrate that Pareto efficiency implies restrictions on household demands.¹⁰ Both of these papers use data from Canada and generally reject the unitary model but fail to reject Pareto efficiency, or the collective model, for couples.

The various tests described above are not, however, unproblematic. In particular, plausible extensions to the model, such as the inclusion of household production, have called into question their validity (Apps and Rees 1997; Chiappori 1997). When household production is included in the model, so that one's time can no longer be neatly divided into market work and leisure, special assumptions on the production process must be made in order to retain the main results regarding recoverability of the sharing rule. It is not clear what sort of biases this may introduce in the tests but does suggest that examining individual consumption levels or outcomes and more realistically modeling households should be an important component of future research.

⁹Using data from France and Canada, Bourguignon et al. (1993, 1994) find that the ratio of income effects is not unity, and so reject income pooling. However, the ratios are constant across a range of commodities, so the data are consistent with Pareto efficiency. Similar evidence for Taiwan is found in Thomas and Chen (1994).

¹⁰The tests are based on the structure of what they call the pseudo-Slutsky matrix, derived in the paper.

Finally, not all the evidence supports the collective model and Pareto efficiency. Extending to agricultural household models, Udry (1996) notes that Pareto efficiency for a household implies efficiency in its productive activities as well (i.e., profit maximization). He finds that this is not true in Burkina Faso, where plots controlled by women are farmed less intensively than those controlled by men, implying inefficiency.

Income Pooling

Tests of income pooling allow another interpretation of collective models. Suppose that public goods allocations, x_0 , are given. Suppose further that preferences are "caring," i.e., one person cares about the other's allocation to the extent that it gives the person individualistic welfare. This imposes weak separability in the individual's utility function, $U_f(\mathbf{x}_f, \omega(\mathbf{x}_m); \mathbf{x}_0)$. This can then be interpreted in the context of two-stage budgeting. In the first stage, all household members pool their incomes and allocate it according to some sharing rule. In the second stage, each household member maximizes his or her utility, given the income share, conditional on choices regarding the household public good. The income sharing rule is related to the weights μ ; these weights also provide an indicator of the individual's relative bargaining power within the household. (A more powerful individual would command a greater share of the household's resources.)

Suppose that there is no price variation (as is typical of a cross-section survey), and we want to test the effects of individual incomes. The demand functions can be written as a series of Engel curves:

$$x_i = x_i (y_m, y_f, Y; \mu, \gamma). \quad (7)$$

Holding household income constant, the effect of individual income on demand can be interpreted as the impact of changing the share of household income allocated to member i . According to the common preference model, these effects are zero.¹¹

Testing for Pareto efficiency involves testing the cross-equation restrictions and verifying that the ratio of any two income effects is independent of i , and is equivalent to the test:

$$[(\partial x_i / \partial y_m) / (\partial x_i / \partial y_f) - (\partial x_j / \partial y_m) / (\partial x_j / \partial y_f)] = 0 \text{ for all } i \neq j \quad (8)$$

for all pairs of goods. It is important to use appropriate income measures to test the ratios of income effects. Total income is not exogenous, nor is it likely to be measured without error. Several studies that point out the greater effect of women's income shares on household food expenditure, household calorie availability, and child health and nutrition outcomes use total income. This is appropriate only if the endogeneity of labor income is explicitly considered, since it is affected by time allocation and labor force participation decisions. We return to this issue subsequently.

¹¹This is not equivalent to a rejection of the unitary model per se. Non-zero effects are consistent with “altruism” or “dictatorial” models within the unitary framework.

Bargaining Models

The Nash-bargaining model, a cooperative bargaining model, provides another convenient illustration of empirical tests of collective models. Consider two individuals, m and f . As individuals not cooperating in any activities, their utility functions are

$$U_m^0(x_0, x_m, L_m) \text{ and } U_f^0(x_0, x_f, L_f), \quad (9)$$

respectively. Here, x_m is a good consumed by m (such as food, water, or health care), x_f is a good consumed by f , L_m and L_f are leisure, and x_0 is a public good consumed both when individuals cooperate and when they do not. Let \mathbf{p} be a vector of the prices of all goods, \mathbf{w} be the wage rates of m and f , and N_f and N_m their respective nonwage incomes.

Unearned incomes are used as arguments rather than total income because the former will not be affected by labor supply decisions. If m and f do not cooperate, their individual utility functions are each maximized subject to their individual full income constraints.

We can write their indirect utility functions as

$$V_m^0(p_0, p_m, w_m, N_m; \alpha_m) \text{ and } V_f^0(p_0, p_f, w_f, N_f; \alpha_f). \quad (10)$$

The V^0 's are interpreted as "threat points," the utility obtained independent of cooperation,¹² while the α 's are referred to as EEPs. In the context of household formation, these EEPs affect the relative desirability of being single and may include

¹²Manser and Brown (1980) and McElroy and Horney (1981) interpret the threat point as the utility associated with divorce, while in noncooperative models, e.g., Lundberg and Pollak (1993), the threat point could correspond to a noncooperative outcome within marriage, such as reverting to traditional gender roles.

access to common property resources and divorce laws. Now suppose that these two individuals are considering cooperating in some activity. There are a number of reasons why this might be advantageous. For example, there may be economies of scale associated with the production of certain goods (household or nonhousehold), or there may be some goods that can be produced and shared by couples but not by single individuals (e.g., children, in some societies). Denote utility functions when cooperating in a joint activity as U_m and U_f , respectively, where U is defined over the household public good and individual consumption of goods and leisure.

Both individuals gain from cooperation when $U_j - V_j > 0$, and $j = m, f$. How are these gains from cooperation apportioned? One approach is to assume that these individuals negotiate with each other. The outcome of this is a binding and enforceable agreement regarding the division of gains from cooperation. One such agreement, which has received much discussion in the literature, is to assume that individuals agree to maximize a "Nash utility gain product function." This takes the form of $M = (U_m - V_m)(U_f - V_f)$. This is maximized subject to a joint full income constraint yielding demand functions (for, say, food, water, health care) of the following form:

$$x_i = x_i(\mathbf{p}, \mathbf{w}, N_m, N_f, \alpha_m, \alpha_f); \quad i = 0, m, f; \quad (11)$$

$$L_i = L_i(\mathbf{p}, \mathbf{w}, N_m, N_f, \alpha_m, \alpha_f); \quad i = m, f. \quad (12)$$

Note that in addition to prices of goods and leisure, these demand functions include the extrahousehold environmental parameters. Moreover, individual nonwage

incomes affect both the threat points and the demand functions. As McElroy (1990) emphasizes, the unitary model is a special case of this Nash model, with the parameters on N_m and N_f set equal to each other, and the parameters on α_i set equal to zero.

Empirical tests of specific bargaining models, such as the Nash bargaining model, are more restrictive than tests of the collective model. Chiappori (1988a, 1988b) has argued that the Nash-bargaining assumption is overly restrictive and does not yield easily testable restrictions, unless the premarital (indirect) utility function is known. One empirical solution to this problem has been to estimate indirect utility functions for single person households and then to assume that these represent the threat points for "similar" persons in two-person households (Montalto 1995). However, this presupposes that individual preferences do not change within marriage, and that there is no "selection" into marriage. 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 1990). A test of the equality of unearned income effects suffices to test the common preference model against a broad class of alternatives, but is not a specific test of bargaining models.

3. BARGAINING POWER: DETERMINANTS AND MEASUREMENT

The above discussion has indicated that "bargaining power" determines the share of resources allocated to an individual within the household. However, the concept of bargaining power is elusive. It is perhaps useful, at this point, to outline the possible determinants of bargaining power, while not making any claims to measure power itself.

DETERMINANTS OF BARGAINING POWER

Bargaining power is affected by four sets of determinants: (1) control over resources, such as assets; (2) influences that can be used to influence the bargaining process; (3) mobilization of interpersonal networks; and (4) basic attitudinal attributes.¹³

Economic analysis of bargaining power has tended to focus on economic resources exogenous to labor supply as a major determinant of bargaining power. These include assets (e.g., Doss 1996; Thomas, Contreras, and Frankenberg 1997; Quisumbing 1994), unearned income (Schultz 1990; Thomas 1990), or transfer payments and welfare receipts (Lundberg, Pollak, and Wales 1997; Rubaclava and Thomas 1997). The threat of withdrawing both oneself and one's assets from the household grants the owner of those assets some power over household resources. These threats are credible if supported by community norms or divorce laws. Indeed, Thomas, Contreras, and Frankenberg (1997) use assets at marriage as an indicator of bargaining power because in most of Indonesia, spouses can take what they brought into the marriage with them were the marriage to dissolve.

Factors that can influence the bargaining process include legal rights, skills and knowledge, the capacity to acquire information, education, and bargaining skills. Some of these influences are external to the individual (e.g., legal rights), but many of them are highly correlated with human capital or education. In some instances, domestic violence can be used to extract resources from spouses or their families, as in the case of dowry-related violence in India (Rao 1997; Bloch and Rao 1996). Individuals can also mobilize

¹³This draws heavily on Jean-Pierre Habicht's presentation during the External Advisory Committee of the USAID/WID project, "Strengthening Development Policy through Gender Analysis," May 20-21, 1999.

personal networks to improve their bargaining power. Membership in organizations, access to kin and other social networks, and "social capital" may positively influence a person's power to affect household decisions.¹⁴ Lastly, basic attitudinal attributes that affect bargaining power include self-esteem, self-confidence, and emotional satisfaction. While the economic literature has not dealt extensively with this issue, part of the success of group-based credit programs such as the Grameen Bank has been attributed to its group-based empowerment approach. Many NGOs have explicit empowerment objectives that go beyond economic means to include legal awareness, political participation, and use of contraception (Schuler, Hashemi, and Riley 1997b).

MEASURING THE DETERMINANTS OF POWER

Attempts to measure the bargaining power of individuals within the household in the economics literature have focused on control over economic resources. Candidate proxies for bargaining power have included (1) public provision of resources to a particular member of the household and exogenous policy changes that affect the intrahousehold distribution of these resources (Lundberg, Pollak, and Wales 1997; Rubaclava and Thomas 1997); (2) shares of income earned by women (Hoddinott and Haddad 1995); (3) unearned income (Thomas 1990; Schultz 1990); (4) inherited assets (Quisumbing 1994); (5) assets at marriage (Thomas, Contreras, and Frankenberg 1997); and (6) current assets (Doss 1996).

¹⁴The value of kin support is illustrated by Bangladeshi sisters' giving up their share of land inheritance in return for their brothers' support (Subramanian 1998). The assurance of their brothers' support clearly has an economic value for these women.

Lundberg, Pollak, and Wales (1997) examine the effect of a policy that effectively transferred the child allowance from men to women in the United Kingdom in the late 1970s. They find that it increases the share of expenditures on women's clothing and children's clothing relative to men's clothing. Hoddinott and Haddad's (1994, 1995) work on Côte d'Ivoire investigates the effect of women's income share on the allocation of expenditures. Recognizing the endogeneity of women's income share, they use the difference in the educational attainment of the head and spouse, the proportion of landholdings and household business capital operated by adult women, the ratio of the spouse to the male head's education, and other dummy variables related to wife's schooling as instruments for the share of women's income. Thomas (1990) and Schultz (1990) use unearned income: Thomas (1990) tests the collective model by examining the effects of unearned income of men and women on nutrient intakes, fertility and child survival, and child anthropometrics, while Schultz analyzes the differential effects of men's and women's unearned income on labor supply and fertility in Thailand. Quisumbing (1994) examines the intrahousehold distribution of land and education as a function of father's and mother's education and inherited landholdings in the Philippines. Thomas, Contreras, and Frankenberg (1997) examine whether assets brought to marriage by husband and wife have a differential impact on child health in Indonesia. Finally, Doss (1996) examines the effects of current assets on the distribution of expenditure among different consumption categories in Ghana.

None of these measures is perfect. Labor income, which has often been included in computations of income shares (e.g., Kennedy 1992), is clearly problematic because it

reflects time allocation and labor force participation decisions. Several studies (e.g., Thomas 1990; Schultz 1990) use nonlabor income (also called unearned income or nonwage income), either directly, or as an instrument for total income (Thomas 1993). Schultz (1990) and Thomas (1990) assume that nonearned income is independent of tastes and labor market conditions, which may not be true if much of nonearned income is from pensions, unemployment benefits, and earnings from assets accumulated over the life cycle. However, these concerns may be less critical in studies that focus on children (and households early in the life cycle) and in those that rely on measures of wealth that are typically inherited or given at the time of marriage (Strauss and Thomas 1995).

Current asset holdings, used by Doss (1996) in her study of Ghanaian households, may also be affected by asset accumulation decisions made within marriage.¹⁵ Depending on provisions of marriage laws, assets acquired within marriage may be considered joint property and will not be easily assignable to husband or wife. The validity of inherited assets as an indicator of bargaining power may be conditional upon the receipt of these assets prior to marriage, unless bargaining power also depends on the expected value of inheritance.¹⁶ Inherited assets could also be correlated with individual unobservables, such as previous investments in the individual during childhood (Strauss and Thomas 1995). Finally, assets brought to marriage, while exogenous to decisions

¹⁵One of her sensitivity tests uses a specification with the percentage of land owned by women, but landownership by women in Ghana may be endogenous to marriage. In Western Ghana, Quisumbing et al. (1998) show that women obtain strong individualized land rights, equivalent to private ownership, from their husbands if they help in establishing cocoa fields. Husbands “give” their wives land to circumvent traditional inheritance practices among the matrilineal Akan.

¹⁶Admittedly, a potential heir could exert much power within his or her household, but the threat of disinheritance does exist.

made within marriage, could be affected by assortative mating and marriage market selection (Foster 1996).

Finding the appropriate indicator of bargaining power should be guided not only by the need to find a variable that is exogenous to bargaining occurring within marriage, but more importantly by the cultural relevance of these indicators. Increasingly, economists are turning to ethnographic evidence and qualitative methods used by sociologists and anthropologists to guide the construction of appropriate measures of bargaining power.¹⁷ Based on anthropological evidence from the rural Philippines, Quisumbing (1994) argues that inherited landholdings are a valid measure of bargaining power since land is usually given as part of the marriage gift and major asset transfers occur at the time of marriage. Thomas, Contreras, and Frankenberg (1997) used ethnographic evidence and focus-group discussions in Indonesia to identify areas where women bring substantial asset holdings to marriage, and where they can claim these assets upon divorce. Noting that if male or female “income” is measured with error, estimated income effects will be biased, Frankenberg and Thomas (1998) investigate the possible biases from reporting spouse’s assets by interviewing husbands and wives separately and comparing their responses in the Indonesian Family Life Survey. However, assets controlled by the couple may not be the only relevant variable. In societies where the extended family is a key player in intrahousehold allocation, such as

¹⁷See, for example, Rao’s (1997) analysis of wife-beating in South India, which uses a combination of qualitative and econometric methods.

those in South Asia, characteristics of the extended family may affect intrahousehold allocation outcomes.¹⁸

4. THE IMPACT OF MALE AND FEMALE PHYSICAL AND HUMAN CAPITAL ON INTRAHOUSEHOLD OUTCOMES

This paper uses new data from four household surveys to test whether assets brought to marriage by each spouse have differential effects on intrahousehold allocation outcomes. In this paper, we focus on two types of outcomes: household-level outcomes, and individual level outcomes. The household-level outcomes are expenditure shares of food, education, health, children's clothing, and, where applicable, alcohol and/or tobacco. The latter have frequently been used as "adult goods" in outlay equivalent analyses (Deaton 1989, Haddad and Reardon 1993). The individual-level outcomes analyzed are two measures of educational attainment: the deviation of the child's completed schooling from the cohort mean, and years of schooling completed. The analysis of both household-level and related individual-level outcomes is similar to Doss (1997), who examines the effect of current assets on expenditure shares and health and education outcomes in Ghana.

Assets at marriage are an attractive indicator of bargaining power for several reasons. From the economist's perspective, assets brought to marriage are exogenous to decisions made within marriage, even if they are endogenous due to marriage market

¹⁸In Bangladesh, for example, where related households (the *bari*) typically live around a common yard, landownership and education of the head in origin households affect educational attainment of children in partitioned households (Foster 1993).

selection. Second, in many cultures, marriage is one of two key occasions when assets are transferred during an individual's lifetime (the other is death). Third, assets transferred at marriage may have a symbolic meaning over and above their economic value. Guyer (1997: 123) argues that assets are imbued with value through cultural processes that are "much larger than the household or family, extending over much larger frames than the life cycle." Recognizing the cultural specificity of asset transfers and marriage customs, the authors and their collaborators designed and pretested survey modules on assets and related transfers at marriage in each of the study countries. In most of the countries, the household survey was informed by a qualitative study (Bangladesh, Ethiopia, South Africa) or by community interviews on marriage customs and transfers at the time of marriage (Sumatra). Using a broad definition of assets at marriage to include human capital, we can treat the educational attainment of each spouse as a proxy for the human capital they each bring to the marriage.

METHODOLOGY

To test our model using household-level outcomes, we estimate the following expenditure function:

$$w_j = \alpha_j + \beta_{1j} \ln pcexp + \beta_{2j} (\ln pcexp)^2 + \beta_{3j} \ln size + \beta_{4j} \ln A_h + \beta_{5j} \ln A_w + \sum_{k=1}^{K-1} \delta_{kj} dem_k + \sum_{s=1}^S \phi_{sj} z_s + \epsilon_j, \quad (13)$$

where

w_j is the budget share of the j th good;

$\ln pcexp$ is the natural logarithm of total per capita expenditures, and
 $(\ln pcexp)^2$ is its square;
 $\ln size$ is the natural log of household size;
 $\ln A_h$ and $\ln A_w$ are the natural logs of assets owned by the husband and wife,
 respectively;
 dem_k is the proportion of demographic group k in the household; and
 z_s is a vector of dummy variables indicating location and survey
 round;
 ε_j is the error term; and

α_j , β_{1j} , β_{2j} , β_{3j} , β_{4j} , δ_{kj} , and φ_{sj} are parameters to be estimated. We include the square of \ln per capita expenditure so that any observed differences in the effects of individual assets would not be simply picking up nonlinearities in the Engel curve (Thomas and Chen 1994). Controlling for levels of household income (as proxied by per capita expenditure), if the unitary model holds in a static framework, assets of husband and wife should have no effect on allocations so $\beta_{4j} = \beta_{5j} = 0$. In a more general (e.g., dynamic) framework, however, the equality of husband's and wife's effects to zero may not hold. We therefore use a more general version of the test of the unitary model, namely that the difference between the husband's and wife's asset effects is equal to zero.

While we could have included husband's and wife's human capital as regressors in the expenditure regressions, schooling would have been highly correlated with per

capita expenditures. In this version of the paper, for comparability with other estimates of expenditure functions, we do not include husband's and wife's education as regressors.¹⁹

We use a slightly different formulation for testing the effects of husband's and wife's resources on individual outcomes. Following Thomas (1990,1994, 1996a) and Quisumbing (1994), we estimate the child's schooling outcome as a function of child characteristics (gender, age, and age squared) and parental characteristics at the time of marriage: education of the husband and wife, and assets at marriage of the husband and wife. That is,

$$E_{ij}^* = \beta_0 + \beta_1 X_{cij} + \beta_2 X_{ff} + \beta_3 X_{mj} + \beta_4 G_{ij} \times X_{ff} + \beta_5 G_{ij} \times X_{mj} + e_{ij}, \quad (14)$$

where E_{ij}^* is the educational outcome of child i in family j ; X_c is a vector of child characteristics such as sex, age, and age squared; G is the daughter dummy, and X_f and X_m are vectors of exogenous father's and mother's human and physical wealth, respectively, and e_{ij} is the error term in each equation. Following some tests of the unitary model, which include both human and physical capital as assets brought to marriage, father's and mother's wealth at the time of marriage enter separately into the regressions.

Equation (14) is estimated both in levels and with family fixed effects. It is possible that omitted family-level variables are correlated with regressors, and thus their estimated effects on the educational outcomes may be biased. For those families with at least two children, the within family allocation can be used as the source of variation in

¹⁹We do include husband's and wife's education in the instrument set for the Bangladesh regressions.

the sample from which to estimate intrahousehold differences.²⁰ A fixed effects estimation procedure controls for these unobservables using family-specific dummy variables. In this specific application, only the child's sex, age, age squared, and the interaction between child sex and parent characteristics remain as explanatory variables. While the effects of variables that do not vary across children cannot be identified, their gender implications may be investigated to the extent that they impact differently on children of different sex. On the other hand, if educational outcomes were affected by individual heterogeneity, a random effects procedure would be appropriate. A Lagrange multiplier statistic tests for the appropriateness of the random effects model compared to ordinary least squares (OLS) without group effects, while a Hausman test compares the random effects model to a fixed-effects specification.

We first present the results for the expenditure regressions for all four countries, then turn to the individual education results.

DATA AND RESULTS OF EXPENDITURE REGRESSIONS

*Bangladesh*²¹

Similar to other countries in South Asia, Bangladeshi society is dominated by a patrilineal and patrilocal kinship system. Islamic law, which applies to 85 percent of the population, allows women to own property. However, situations of *benami*, where

²⁰Families with at least two children are included so that sex dummies are relevant in the family fixed effects specification. The fixed effects procedure eliminates selectivity bias since family size, which affects selection into the sample, is a family-specific variable.

²¹This draws heavily on Quisumbing and de la Brière (1999).

husbands acquire properties in their wives' name, and *naior*, where daughters are encouraged to relinquish their rightful claims to inheritance to their brothers, illustrate limitations that rural women face in trying to exercise their property rights (Subramanian 1998).

Our data come from 47 villages in three sites in Bangladesh, each site chosen as part of an impact evaluation of programs disseminating new agricultural technologies (IFPRI-BIDS-INFS 1998). In two sites (Saturia and Jessore), technologies are being introduced through NGO programs targeted exclusively to women, who are provided training and credit. At the third site (Mymensingh), project and Department of Fisheries extension agents provide training to relatively better-off households and training with credit to relatively poorer households, directed at both men and women, but men more often than women. The four-round survey collected information on production and other income earning activities by individual family member, expenditures on various food, health, and other items at the household level, food and nutrient intakes by individual family member, time allocation patterns, and health and nutritional status by individual family member. In the second round, information on parental and sibling background was also collected for both the husband and wife.

Between the second and third survey rounds, a parallel study using qualitative methods was also conducted in a pair of villages in each of the three sites to elicit group members' views on the effects of the NGOs and the new technologies on incomes, education and health of children, women's status and empowerment, among others (Naved 1997). We drew from the results of the qualitative study to formulate

questionnaire modules on premarriage assets, transfers at marriage, inheritance, and indicators of women's mobility and empowerment.

We restrict the following analysis to the monogamous households where both husband and wife are present and no change in household structure or marital status happened during the four survey rounds (divorce, separation, death of a member, second marriage).²² Our sample of intact couples with complete assets information consists of 826 households, of which 29 percent are three-generation households.

In the fourth survey round, respondents were asked to recall the assets they owned before their wedding (land, cattle, “durables”—jewelry, clothes, and household utensils—for both husband and wife, and in addition, houses for men and food items for women).²³ Both male and female respondents also provided information about their premarital occupation and experience in farming, wage labor, or other business activities. In addition, they had to compare the wealth of their family and their future spouse's family at the time of wedding (results not reported).

Female premarital assets are much less valuable than male (Table 1). They most often consist of food and durables.²⁴ In addition, a specific module about transfers at marriage was administered to the female respondents. Asset categories for these modules

²²This obviously does not address issues of household formation and dissolution (Foster and Rosenzweig 1998), nor the possibility that intact couples are those where bargaining has been "successful." We do not deal with the sample selection biases introduced by analyzing only intact couples. While we attempted to construct a similar set of variables for deceased, absent, or divorced spouses by recall, these measures are less reliable than those collected for "intact" couples.

²³This information was complimented with the data on inherited assets. When inheritance happened prior to the marriage, these assets were added to the premarriage assets if not reported in the corresponding module.

²⁴A bride will typically bring stores of grain and other food items with her when she moves to her in-laws' compound.

were complemented by specific questions about jewelry (nose pin) and cash (*shelami*) exchanges at the moment of the wedding. These specific assets were suggested by the qualitative analysis. The transfers to the bride and groom were computed by summing up all transfers to each individual and assigning to each individual half of the transfers reported "to the couple."

Data presented in Table 1 point to larger transfers to the bride at the time of marriage. Since only the wife was interviewed about these transfers, she might not have known about all transfers from her family to her husband's family.²⁵ For earlier marriages, recall bias and asset valuation might also lead to measurement errors. For the present analysis, we included those transfers that are comparable to the previous asset categories as well as cash (excluding transportation costs and food costs).²⁶ These data show a net asset transfer to the wife's side, although the most recent weddings exhibit a net transfer to the groom. The data are thus consistent with the shift to dowry reported in the qualitative survey,²⁷ although the shift occurs quite late in the 1980s, which might be attributed to underreporting. In no case are the transfers at marriage enough to compensate the wives for the value of the cattle and house owned by their prospective husbands.

²⁵We administered the module on transfers at marriage only to wives, to avoid overloading the male respondents' questionnaire. The wife was asked about five categories of transfers: to the bride, to the groom, to the couple jointly, to the bride's family, and to the groom's family. The practice of interviewing only the wife about transfers at marriage is consistent with work by Rao (1997), who suggests that women often have better recall of these transfers, since marriage is the most important event at which assets are transferred to women. (Men, on the other hand, may receive sizable transfers at the death of a parent.)

²⁶This definition is consistent with that of Bloch and Rao (1996), who define dowry as a groom-price, a payment in cash and/or kind directly made from a bride's family to a groom's.

²⁷This phenomenon is also largely reported in India (see Rao 1997 and Bloch and Rao 1996 for references).

Given that parental characteristics significantly affect the assets brought to a marriage by the couple, and that education and wealth may affect total expenditure, estimating an expenditure share equation without accounting for potential endogeneity of regressors would lead to biased estimates. We thus employ a two-stage least squares (2SLS) procedure using instruments suggested by the previous analysis. For assets at marriage, we use husband's and wife's education, age, age squared, birth order, number of siblings, and number of living brothers; husband's and wife's families' landholdings, and indicators of the educational attainment of their parents as instruments. Many of these instruments would also affect total expenditure and household size; for additional instruments, we include the lagged (first round) values of the *ln* of per capita expenditure and its square, and *ln* household size.²⁸ We thus perform the regressions only on the second to fourth round data.²⁹ Instrumentation may also help us deal with measurement error, particularly in the asset measures.

We present the complete results for the 2SLS regressions with assets at marriage in Table 2. Most of the expenditure coefficients, while of the expected signs, are insignificant, with the exception of health expenditures. The coefficients on the demographic composition variables are as expected, and illustrate the discrimination against females in Bangladeshi society. Relative to adult males (the excluded category), an increased proportion of adult females and female preschoolers in the household reduce

²⁸In the first stage regressions, the F-test statistics on the exclusion restrictions for the instruments were as follows: Ln per capita expenditure = 22.58; Ln per capita expenditure squared = 21.02; Ln household size = 13.54; Ln husband's assets at marriage = 7.47 ; and Ln wife's assets at marriage = 22.27; all with a p-value of [0.000].

²⁹According to the survey design, the first and the fourth rounds were conducted at a year's interval, so expenditure patterns in the fourth round are expected to be very similar to that in the first round.

the food expenditure share. The presence of elderly females also reduces the share of expenditures on health. The presence of children of all age groups increases the share spent on child clothing, and the share of children between 10-19 years of age increases the share of household expenditures on education. It is noteworthy that the coefficient on males 10-19 in the education equation is twice the size of the female coefficient. Clearly, male children are favored with respect to education.

Our results also reject the null hypothesis that a unitary model of the household operates in rural Bangladesh. Even in a patriarchal society where husbands control most of the household's resources, when household expenditure is controlled for, coefficients on husband's and wife's assets are significantly different from each other in the health and education regressions (F-tests reported on the second line from the bottom of Table 2).

Women's assets at marriage have a positive and significant effect on children's clothing and educational expenditures, and a negative effect on health expenditures. The results for children's clothing and education are consistent with most of the empirical evidence on the positive and significant effect of women's incomes on investments in children (e.g., Doss 1996; Thomas and Chen 1994). In societies where a woman's ability to accumulate assets is proscribed, children are probably her most important investment and insurance for the future. However, the negative effect on health should probably be taken with caution, since we do not take into account the possibility that a wealthier woman might be more likely to have healthier children, and thus lower expenditures on health.

Indonesia

In contrast to Bangladesh, our study site in Indonesia is characterized by matrilineal inheritance and matrilineal residence. The survey site is in West Sumatra, where communal land tenure is evolving toward individualized ownership, and commercial tree plots have been actively developed in the buffer zone of the Kerinci Seblat National Park. In this region, land has traditionally been bequeathed from a mother to her daughters, and joint ownership of paddy fields by lineage members (consisting typically of three generations descended from the same grandmother) or by sisters also has been common. Paddy lands are traditionally inherited by women, supposedly to ensure the family's food security. For commercial tree crops, such as rubber, cinnamon, and coffee, the trend has been towards more individualized tenure and ownership of agroforestry land and bush fallow areas by males (Quisumbing and Otsuka 1998).

We conducted a retrospective survey of inheritance and education in two villages in the Middle and Low Regions of West Sumatra (see Suyanto, Tomich, and Otsuka 1998a and 1998b for a detailed description of the study site).³⁰ The respondents were asked about premarriage wealth (education and landownership) of their parents and in-laws, the education and inheritance of their spouses, and schooling and proposed bequests to their children. Each respondent was also asked to list all of his or her siblings, their dates of birth, their educational attainment, and the areas of paddy land, agroforestry land, and bush-fallow land that they received or expected to receive from their parents. In many cases, respondents received land at marriage, but stood to inherit more land after

³⁰The retrospective survey on inheritance was patterned after a similar survey in the Philippines (Quisumbing 1994).

their parents' death. We use the data on land areas received at marriage in our regressions.³¹ Because land rights differ significantly by gender across paddy land and agroforestry lands in West Sumatra, we included two categories of land in our regressions: paddy land (traditionally inherited by women), and forestry land (the sum of agroforestry and bush-fallow land). Table 1 shows that women receive slightly more paddy land than their husbands, who, in turn, have more forest landholdings at marriage. Wives, however, have slightly lower educational attainment than their husbands. (We also estimated these regressions with the sum of total landholdings for each spouse. Aggregating land categories does not enable us to reject the null hypothesis that coefficients on husband's and wife's land are equal. We return to the implications of asset aggregation in the summary.)

Regressions on expenditure shares for food, health, education, children's clothing, and tobacco are presented in Table 3. Because some expenditure categories are censored, we estimated the expenditure share regressions using tobits; these results do not control for the endogeneity of total expenditures nor of household size. While the expenditure coefficients are of the expected signs, they are significant only in the education, child clothing, and tobacco regressions. In contrast to the Bangladeshi case, discrimination against females cannot be discerned from the coefficients on demographic categories. This is consistent with the egalitarian cultural values of Indonesian society.

³¹We also included a module on transfers at marriage, but we have not analyzed these data yet. Since land is the major asset transferred at marriage in these societies, the bias due to using data on land alone is unlikely to be large.

The results also lead to a rejection of the unitary model. Husband's paddy land has a negative effect on the food expenditure share, and the effect of husband's paddy land is significantly different from that of the wife's. Wife's paddy land has a significant and positive effect on the health expenditure share; again this coefficient is significantly different from the husband's. Husband's forestry land has a negative effect on expenditure shares on education, counteracted by the positive effect of wife's paddy land. This may reflect the increase in the opportunity cost of schooling due to larger holdings of forestry land, which require substantial labor input from family members to be productive (Quisumbing and Otsuka 1998). Finally, husband's paddy land has a positive and significant effect on expenditure shares on tobacco, a coefficient that is significantly different from the coefficient on wife's paddy land.

Ethiopia

Ethiopia ranks as one of the poorest countries in the world, in part a reflection of its tumultuous recent history. Over the past decade it has seen drought, famine, civil war, and the demise of a military government leading to a number of policy reversals.³² As the second most populous country in Africa, the people of Ethiopia are characterized by substantial ethnic and religious diversity; there are over 85 ethnic groups and most major world and animist religions are represented (Webb and von Braun 1994). For example, the anthropological evidence suggests that as one moves from north to south in Ethiopia,

³²In 1991, a coalition of opposing guerilla forces, the Ethiopian People's Revolutionary Democratic Front (EPRDF) defeated the communist-led Derg regime, which had been in power for 17 years. In addition, the 30-year war between Ethiopia and Eritrea ceased in 1993 when Ethiopia recognized Eritrean independence, though it began again this year.

women's status, and therefore possibly their bargaining power, declines. This diversity extends beyond the people and culture of Ethiopia to their environment since the agroecological zones, and consequently, farming systems vary dramatically around the country.

The 1997 Ethiopian Rural Household Survey (ERHS) surveyed approximately 1,500 households in 15 villages all across Ethiopia, thus capturing some of the diversity described above.³³ While sample households within villages were randomly selected, the choice of the villages themselves was purposive to ensure that the major farming systems were represented. As such, the sample is not representative of rural Ethiopia as a whole.

Reported expenditures (including imputed values for home produced items) on approximately 200 items have been aggregated and adjusted for different recall periods in order to calculate total expenditures and expenditure shares. Average per capita expenditures in the sample exceed 1,100 birr (\$160) per annum, about 20 percent above the national average for 1997. Consistent with the relative poverty of Ethiopia, households spend, on average, three-quarters of their budget on food; much smaller percentages are spent on the other expenditure categories (See Table 4, bottom row). This has at least two important implications for the analysis discussed further below: (1) many households report zero expenditures for nonfood items; (2) the amount of "discretionary" spending beyond food is often rather small, possibly limiting the space over which bargaining might take place.

³³The 1997 ERHS was undertaken by the Department of Economics, Addis Ababa University (AAU), in collaboration with IFPRI and the Center for the Study of African Economies (CSAE), Oxford University. The 1997 survey built on a panel survey conducted by AAU and CSAE in 1994/95 but these earlier rounds are not used in the present analysis.

In addition to the detailed demographic and expenditure information, the survey collected information from ever married individuals regarding their circumstances at the time of marriage (e.g., age, education, experience, family background, and assets) as well as the circumstances surrounding the marriage itself (e.g., type of marriage contract used, if any; decisionmaker regarding the choice of a spouse, etc.). While a variety of assets brought to the marriage, and transfers made at the time of the marriage, were recorded, this analysis focuses on the value of the two most important assets in the rural Ethiopian economy, land and livestock. This is done both to minimize recall error surrounding typically smaller and less important items and exchanges and because these more permanent assets (contrasted with, say food brought to the newlywed's home) are likely to be better proxies for bargaining power. The value of assets at the time of marriage is inflated to current value based on the date of marriage and a consumer price index. Given the difficulties inherent in a long recall period and choice of inflation factor for these items, it is hard to measure premarital assets precisely and these values are likely to be measured with error. Nonetheless patterns emerge; we see that, on average, men bring substantially more physical (and human) capital to the marriage than do women (see Table 1).

For the econometric analysis, the main two statistical problems described above are measurement error in husband's and wife's assets and the high degree of censoring for nonfood expenditure categories. Given the emphasis of this research on the novel measures of assets at marriage as indicators of bargaining power, this research uses two-stage least squares in order to address the first problem. Both husband's and wife's assets

are treated as endogenous and predicted using measures of parental education and the value of gifts transferred from the groom's to the bride's family at the time of the marriage and vice versa.³⁴ To reiterate, the main purpose for these instruments is to control for random measurement error; they are not intended to control for potential endogeneity due to, for example, selective matching in the marriage market.

The expenditure share regressions reported in Table 4 conform to typical patterns in the literature. Food shares decline with total per capita expenditures while the other reported categories increase with expenditures, although at a decreasing rate. The influence of demographic structure, where significant, is plausible. For example, having more boys or girls under age 5 (relative to adult men and holding household size constant) who are not yet of school age decreases the shares spent on education and child clothing.

During the past few decades, drought, war, and government policy have all contributed to resettlement and migration in Ethiopia. Therefore, while ethnicity is in part tied to location, the overlap is incomplete and it is important to control for both in any analysis. As a result, after controlling for each village with village indicators, controls for ethnicity are only occasionally significant, though they remain consistent with the ethnographic literature that describes women's status as relatively higher in the north, where the Tigreans typically reside. This is borne out by, for example, the negative coefficients on the ethnic indicator variables (relative to Tigray) for child clothing and the

³⁴In the first-stage equation for husband's assets the F-test on the exclusion restriction for the instruments is $F(6,1378) = 3.1$ with p-value [0.005], and for wife's assets, $F(6,1378) = 2.6$ with p-value [0.015].

positive (and jointly significant) ones for alcohol and tobacco, which are consumed mostly by men.

After controlling for village, ethnic, and religious variation, the effects of assets brought to marriage by the husband or the wife are significantly different for food and for alcohol and tobacco. More assets in the hands of wives (relative to husbands) increase the food budget share (see F-test of the equality of coefficients on husband's versus wife's assets, third row from the bottom). In contrast, more assets in the hands of husbands (relative to wives) increases the share spent on alcohol and tobacco, goods typically consumed by men. If one excludes the village, ethnic, and religious controls, however, the differences are stronger and also significant for the health shares as well (not shown). On balance, the evidence suggests that despite the relatively high fraction of the budget spent on food, there is bargaining over how resources are allocated, and that it varies both within and between communities and ethnic groups.

Unlike the other countries in this study, there is no apparent impact of the premarital assets on education expenditure shares. Indeed the point estimates of the effects of husband's and wife's assets on education shares, while insignificant, have the same sign and magnitude. Whether this result extends to educational outcomes themselves is explored below.

South Africa

Despite the fact that South Africa is considered an upper-middle income country with 1997 per capita GNP of approximately \$3,000, it is a highly unequal society and the

majority of the population lives in poverty (Carter and May 1998). Over the past decade, the country has faced a number of dramatic changes in the political, social, and economic environment as many of the policies underlying apartheid, for example, restrictions on mobility and residential location, are dismantled. At the same time, a new constitution puts gender equality firmly on the agenda; as such it is an interesting, albeit complicated, setting in which to analyze bargaining models.

The first South African national household survey, the Project for Statistics on Living Standards and Development (PSLSD), was undertaken in the last half of 1993 by a consortium of South African survey groups and universities under the leadership of the Southern Africa Labour and Development Research Unit (SALDRU) at the University of Cape Town with financial and technical support from the World Bank [PSLSD 1994]. KwaZulu-Natal Province, on the east coast, was resurveyed from March to June, 1998.³⁵ Formed by combining the former Zulu homeland and the former Natal province, KwaZulu-Natal is now South Africa's largest province, containing one-fifth of a population of approximately 40 million. Though not the poorest province, it is relatively poor despite being relatively urban (35 percent). Three-quarters of its people are African,³⁶ and nearly all of these Zulu, 14 percent Indian, 7 percent white, and 3 percent colored. During the mid 1980s and again in the early 1990s, there was substantial political unrest and violence in KwaZulu-Natal.

³⁵The 1998 re-survey examined here was directed by a consortium comprised of the University of Natal, the University of Wisconsin, and the International Food Policy Research Institute.

³⁶“African” here excludes the “colored,” Indian (or Asian), and white populations.

In 1993, the Kwazulu-Natal sample was representative at the province level, conditional on the accuracy of the sampling frame. White and colored households were not resurveyed in 1998. The analysis presented here uses only the 1998 data and includes Africans and Indians in both rural and urban areas of KwaZulu-Natal Province. Thus it is unique among the countries in this study, since it includes residents of urban areas. Africans and Indians are both economically and culturally different and this will be controlled for in the analysis. For example, annual per capita expenditures for Africans average just under \$500, while for Indians they are nearly four times as large. Consequently food shares are also quite large, with Africans spending over 50 percent of their budget on food, while Indians spend about one-third.

For couples, information was collected on whether or not each partner owned a variety of assets before marriage, including cattle, other livestock, land, a house, and jewelry, among other things. The logarithm of a simple count of the number of assets owned by each partner is used as a proxy for assets owned at marriage (see Table 1). While this measure obviates the need for respondents to impute values of items owned in the distant past, it suffers from the same concerns for assets at marriage described in detail above, i.e., it is imprecise. Once again, the analytic strategy to deal with this imprecision is instrumental variables.

Fewer than half the households in the sample had an intact couple coresiding, an issue to which we return below. Ethnographic evidence regarding relations between men and women for Africans and Indians indicate that they are very different, starting with the forms that marriage contracts take. For example, the traditional marriage agreement for

Zulus involves a payment, *lobola*, made from the groom and his family to the bride's family, usually before the couple can marry. For Indians, the more common scenario is the reverse, or dowry, with the majority of payments being made from the bride's to the groom's family. The expenditure share regressions presented in Table 5 control for community-level fixed effects. In addition, to allow differential effects by race, an Indian dummy variable is interacted with the measures of assets at marriage (due to segregation—Africans and Indians live in different communities, an Indian dummy variable is not needed). The regressions are estimated using two-stage least squares with measures of husband's and wife's assets, and their interactions with an Indian dummy variable, treated as endogenous. The instrumental variables include measures of gifts exchanged between families at marriage and *lobola* payments, parental education, and indicators of whether parents were alive at the time of marriage.³⁷

The expenditure share regressions are reported in Table 5. On the whole, the two-stage least squares estimates are rather imprecise; indeed, while the set of cluster dummies are highly significant in each of the models, all the other regressors are not even jointly significant for health. Only in the case of education is there a significant difference between the assets for African husbands and wives; more resources brought to the marriage by the wife relative to the husband increase the share of the budget spent on education. This is not true for Indians, however, and there is no difference.

³⁷In the first-stage equation for husband's assets the F-test on the exclusion restriction for the instruments is $F(12, 475) = 2.4$ with p-value [0.005] and is the same for wife's assets. For the first-stage equation of husband's assets interacted with Indian the F-test is $F(12, 475) = 1.9$ with p-value [0.039] and for wife's $F(12, 475) = 1.2$ with p-value [0.289].

With the two-stage least squares methodology, it is unlikely that the results are being driven by measurement errors alone, for example, due to coefficients on the asset measures being biased toward zero “favoring” the unitary model. However, it is possible that the complexity of households in South Africa contributes to the results that on the whole fail to reject the hypotheses of the unitary model. Over half the households in the sample (of 1,219) do not have a couple coresiding and are thus excluded from the analysis. This in part reflects the history of the South African economy that relied to a large extent on male migrant labor (to the urban areas and mines) and has left a legacy of partners not coresiding. Selection into this subsample may be influencing the results: couples who had more conflict over bargaining may no longer be coresiding.

Moreover, even for those households with a couple present, there are often other adults who may also be key decisionmakers. For example, over half the households in the sample have four or more adults. Analyses such as this, which ignore these complexities, may not have a lot of power to determine whether a unitary model is a poor description of reality. These sorts of problems further the need to focus in on more individual-level outcomes, such as education, and to include household fixed effects that can control in part for the selectivity described here.

INDIVIDUAL EDUCATIONAL OUTCOMES

Across the four countries, the most consistent effect is that relative resources controlled by women tend to increase the shares spent on education (in all countries but Ethiopia). However, the household-level analysis does not reveal *who* within the

household benefits from the increased allocation of resources towards education. Since the data sets provide more reliable information on coresident children (in some data sets, information was also collected on nonresident children), it is likely that schooling decisions of these children are not yet complete. To take into account incomplete schooling decisions, we use two individual-level outcomes: (1) the deviation of each child's completed years of schooling from the cohort mean; and (2) actual years of completed schooling, controlling for child age. In the first specification, we are measuring how well each child is doing relative to other children of the same age. In the second, we control for the correlation between age and schooling completion by including linear and quadratic terms in child age. While it could be argued that both measures are capturing the same phenomenon, an advantage of the deviation from cohort mean is that it is not prone to censoring, unlike schooling attainment, which could be censored at zero in countries where many children have never attended school. To test whether family-specific unobservables or individual heterogeneity are important, we estimated both fixed- and random-effects estimates; since the Hausman test shows that the fixed-effects estimates are preferred in most specifications, only these results are reported here, together with the levels estimates.³⁸

Bangladesh

Educational outcomes are estimated for two groups of coresident children: children 6-10 years of age, and children 11-15 years. Early marriage, particularly of girls,

³⁸The exception is Sumatra, where the Hausman test does not suggest that fixed effects are important. In Bangladesh, we only weakly reject random effects in favor of fixed effects.

may create sample selectivity bias, since girls who marry tend to leave both school and their parents' residence. We attempt to minimize the effect of selection bias by restricting the sample to children 15 and under. Regression results for both outcomes and age groups are presented in Table 6.

For children between 6 and 10 years of age, examining the levels results, mother's and father's schooling have positive and significant effects on the child's deviation from the cohort mean. Assets at marriage are insignificant, and none of the interaction terms with the daughter dummy are significant for the younger age group. While there seem to be no significant differences between father's and mother's schooling when only the coefficients of the schooling terms are considered, when interactions with child gender are accounted for, the total effect of father's schooling differs significantly from mother's schooling. When we control for family-level unobservables, higher educational attainment of fathers does not benefit daughters relative to sons. The coefficients of the interaction terms between the daughter dummy and parental education are significantly different for fathers and mothers.

Parental gender preference appears to be stronger for the older age group. In the levels estimates, sons with better-educated fathers, and daughters with better-educated mothers, seem to do better relative to other children of the same age. The effects of father's and mother's education, taking into account gender interactions, are significantly different from each other. When family-level unobservables are considered, the interaction of father's assets with the daughter dummy is negative and significant, indicating that wealthier fathers tend to favor sons, relative to daughters. The positive

(but weakly significant) coefficient on the daughter dummy in the older age group is a surprising result, which may reflect sample selectivity (coresident daughters are likely to have never been married so are still in school) or the effect of scholarship programs designed to keep girls in school. Arends-Kuenning and Amin (1998) have suggested that scholarship programs targeting girls have seemed to succeed in raising age at marriage and increasing school attendance; however, boys have reduced time spent in school in favor of wage work. This result deserves further investigation.

Results for regressions on completed years of schooling are similar. Since about 30 percent of children have never attended school, the regression on years of schooling is estimated as a tobit. As expected, age and age squared terms are significant. For the levels estimates, mother's schooling has a positive and significant coefficient for the younger age group; both father's and mother's schooling coefficients are significant for the older children. While the interaction terms do not indicate any parental gender preference for the younger children, older daughters of better-educated fathers complete fewer years in school. This may be linked to the South Asian pattern of wealthier families withdrawing females from public life, or from wealthier parents' desire for their daughters to marry early. In this society, wealthier fathers would be able to accumulate a dowry sooner than poorer fathers.

We also estimate this regression using fixed effects; however, given that the dependent variable is censored, future work will employ an estimator that yields consistent estimates with both censoring and fixed effects. The fixed effects results show that when family level unobservables are controlled for, clear patterns of gender

preference emerge. For the younger age group, daughters of better-educated fathers, and daughters of wealthier fathers, complete fewer years of schooling than their brothers. Better-educated mothers do seem to favor daughters in schooling, counteracting the effect of father's education and assets. For the older age group, the fixed effects results show that daughters of wealthier fathers do less well than sons.

Tests of the coefficients show that the main effects of father's and mother's schooling differ significantly from each other, while asset effects are statistically indistinguishable. For the younger children, taking into account interactions with child gender, the effects of mother's education differ significantly from father's. When family level unobservables are considered, for the younger children, we reject the null hypotheses that father's and mother's schooling have equal effects on children of different sex.

Indonesia

We estimate similar regressions on deviations from the cohort mean and completed years of schooling for Indonesia (Table 7). Unlike the Bangladesh case, small sample sizes prevent us from stratifying the sample by age. One advantage of the Indonesia data set, however, is that information on completed schooling was collected for all children of the household head, regardless of their current place of residence.

Similar to the results for the expenditure share regressions, we find that, in the levels estimates, mother's paddy land has a positive and significant coefficient. This coefficient is significantly different from that on father's schooling. While individual

coefficients are insignificant, coefficients on forestland are also significantly different for mother and father. We find remarkably little evidence of gender preference in this egalitarian society, consistent with the insignificant coefficients on the demographic categories in the expenditure regressions. The only significant interactions with the daughter dummy are found in the levels regressions: using deviations from the cohort mean, daughters fare less well relative to boys of the same age when their mothers have more paddy land, while girls do better relative to boys of the same age when their mothers have more forestland. The result that daughters complete fewer years of schooling when their mothers have more paddy land is also shown in the schooling attainment regressions. It is possible, however, that daughters whose mothers have more paddy land may choose to acquire less human capital since they anticipate inheriting land in this matrilineal society.

When we control for family-level unobservables, none of the interaction terms with the daughter dummy are significant. The Lagrange multiplier test also indicates that individual heterogeneity is important; moreover, the Hausman test does not lead us to reject random effects in favor of fixed effects. This suggests patterns of gender discrimination can be explained by factors that vary across families as well as individual differences, rather than unobserved family characteristics.

The marked contrast between these two Islamic Asian societies—one patriarchal and patrilineal, and the other matrilineal—illustrates how difficult it is to predict the direction of gender preference without understanding the underlying culture and its customs regarding marriage, caregiving, and inheritance.

Ethiopia

Educational outcomes are presented for coresident children aged 6-20. Of note is that splitting the sample into smaller subsamples based on different age categories does not qualitatively change the results; the selection biases resulting from children leaving the home do not appear to be strong.

Examining the levels results (Table 8), the first important finding is that girls are more likely to have less than the age specific mean education. While both mother's and father's schooling have a positive effect on the deviation from cohort mean, only the latter is significant, possibly picking up a wealth effect within the household. This effect is weaker for girls, however, as indicated by the negative effect of husband's education interacted with a female dummy.

As in the expenditure share regressions, dummy controls for village, ethnicity, and religion are also included in the levels regression. The negative ethnic group coefficients indicate that most of these groups have less education relative to the excluded Tigreans. Muslims also report on average significantly less schooling.

Levels of husband's and wife's assets at marriage are neither significant on their own nor are they significantly different from one another. When interacted with the gender of the child, however, the impact of the wife's assets is positive and significant, suggesting a gender preference, while the impact of the husband's assets is small and insignificant. Furthermore, these effects are significantly different. In households where the wife brings more assets to the marriage, the educational outcome of girls improves.

When we control for family level unobservables in the household fixed-effects specification presented in the second column, the same story emerges. Sons with better-educated fathers and mothers (insignificant) seem to do better relative to other children of the same age. In contrast, daughters of wives bringing more assets to the marriage do better. In a society where education is uniformly low, particularly for women, it may be that assets are what drive women's capability to exert their preferences.

The third and fourth columns in Table 8 present the regressions using completed years of schooling as the dependent variable. As in Bangladesh, there are a large number of individuals with no schooling so it is important to consider different specifications. Despite this censoring, the results show a strikingly similar pattern to the specification using deviation from cohort means; girls in households with better-educated fathers and mothers bringing fewer assets to the marriage have less education. While not inconsistent, these findings are in contrast to those in the education expenditure shares regression of no difference between the influence of husband's and wife's assets, and are perhaps in part due to the power of the different types of tests.

South Africa

Average levels of education in South Africa have risen in recent decades (Thomas 1996b) and the sample of children reflect this trend; few children do not progress through primary school and there is little variation among the younger cohorts. Therefore, the analysis presented in Table 9 focuses in on older students age 16-21 who are beginning to leave school in larger numbers.

In the levels regressions on deviation from cohort means presented in the first column, wife's education plays an important role in augmenting child education, though significantly less so for girls. In a society where boys are often important sources of old age security and women live longer, this may be an important investment strategy for mothers. The African assets at marriage measures are generally insignificant but wife's assets interacted with an Indian dummy and a female dummy is positive and significant. Indian women who bring more assets to marriage appear able to positively influence their daughters' educational outcomes.

Controlling for household-level unobservables, the effects are similar to those described above, though operating through slightly different channels. In this specification, it is husband's education that has a positive effect on girl's education (rather than wife's having a negative effect on boy's education). In addition, husband's assets at marriage (relative to wife's) have a positive effect on girl's education. Finally, as before, Indian wife's assets at marriage positively affect girl's educational outcomes.

Turning to the regressions using years of schooling as the dependent variable, the results are nearly identical. This is not surprising, given that there is much less censoring in these data compared with the other countries because of higher educational levels in South Africa and the older age group under examination. The evidence regarding differences in gender preferences between Indian men and women is even stronger here, with women significantly favoring their daughters and men significantly favoring their sons (fourth column). The possibility that African, but not Indian, households in South

Africa operate within a unitary framework has also been evidenced in work using men's and women's income measures (Thomas 1996b).

5. SUMMARY AND POLICY IMPLICATIONS

This paper tests the unitary model in a variety of country settings, using a common methodology and indicators of bargaining power that are exogenous to decisions made within marriage. While the use of assets at marriage as indicators of bargaining power is not new (see Quisumbing 1994 and Thomas, Contreras, and Frankenberg 1997, for examples), this paper is, to our knowledge, the first time that such data have been collected and analyzed for a number of countries using similar survey and analytical methodologies. Paying attention to country-specific nuances while using a common analytical framework has its pay-offs. While the framework may recommend different policy handles in each country, it also makes extracting generalizations much easier since the framework is based on a common set of assumptions.

The individual cases reveal that circumstances in each country are quite different. Nevertheless, one can still learn from a comparison of the patterns across countries. For example, as Table 1 demonstrates, while assets may be difficult to measure precisely, women appear to bring far fewer assets to the marriage, both in terms of physical and human capital. (The only exception is in matrilineal Sumatra, where women bring more paddy land to the marriage. However, they have less schooling than their husbands.) While the expenditure share analysis focuses only on physical capital (assets) brought to marriage, there is also much evidence that differences in the human capital of husband

and wife—education, age, and experience—have significant effects on intrahousehold allocation (see, for example, Thomas 1994 and Thomas, Contreras, and Frankenberg 1997). The importance of human capital on intrahousehold allocation is illustrated in the section on individual educational outcomes.

Table 10 presents the effects of the various measures of bargaining power for all four countries. Each column reports the sign of the significant coefficients for the measures of bargaining power in a specific country. For example, the fourth through sixth rows in the first column indicate that for the share of education expenditures in Bangladesh, the effect of wife's assets are positive and significant, the effect of the husband's assets are insignificant, and the difference between them is positive and significant.

These results show that the unitary model of the household is, on the whole, rejected. This finding is stronger in the Asian countries than in the African ones, in the sense that the unitary model is rejected in more expenditure share equations in the former. While strictly speaking, rejection for any single equation implies the unitary model does not hold, there is a sense in which more rejections for a single country are evidence of the extent to which the unitary framework breaks down. As such, it appears that the model is most strongly rejected in Indonesia and represents a closer approximation to reality in South Africa, in part due to the sample selection issues described above. The rejection of the unitary model has implications for the design of policies designed to transfer resources to households: the identity of the transfer recipient does affect the ultimate outcome of the intervention.

Across countries, the most consistent effect is that relative resources controlled by women tend to increase the shares spent on education (in all countries but Ethiopia). While it is tempting to say that mothers are more altruistic than fathers, this behavior may have a sound economic basis. Given age differences at marriage (women are younger) and gender differences in life expectancy, it is possible that women invest in the education of their children more heavily since they are more likely to rely on them for old age support. In societies where key assets that assure lifetime consumption-smoothing are controlled by men (land, in many cultures; pensions and social security in countries with low female participation in the formal labor market), women may attempt to meet the same long-term needs with other instruments, such as investment in the human capital of healthy and educated children (Guyer 1997, 121).

Having found that the most consistent effect at the household level was expenditures on education, we then turned to a more direct examination of educational outcomes. This provides a more relevant test by examining an outcome with which policymakers are directly concerned. In addition, it is a more powerful test since we can distinguish between the effects on boys and girls within households. The evidence described for years of schooling and deviations from cohort means supports the results from the expenditure share regressions (assets brought to marriage, including human capital by husband and wife, have differential effects on allocation in the household) but also suggests the mechanisms underlying the earlier results are quite complicated; indeed they differ substantially across the case studies. The expenditure share regressions

indicated that more assets in the hands of women had a beneficial impact on budget shares for education, but did not tell us which of the children were benefiting.

For example, in both Bangladesh and South Africa, there is evidence that more assets in the hands of women have a positive impact on the educational budget shares. Yet, in Bangladesh, fathers schooling (for the 6-10 year olds) and assets (for the 11-15 year olds) have a negative impact on girls schooling, whereas in South Africa it is the opposite: fathers schooling has a positive effect on girls schooling while mothers assets brought to marriage have a negative impact on girls. In South Africa, the pattern may be partly justified using the old-age security hypothesis outlined earlier, but in Bangladesh this is not true and different preferences are more likely the underlying cause. Wealthier Bangladeshi fathers may attach a higher premium to marrying their daughters off earlier, an effect opposite to that of better-educated mothers. Finally, the differences found between parental effects on children of different gender provide further evidence that households in these four countries are not operating within a unitary framework.

While one could rashly recommend unilaterally transferring assets to women, programs designed to transfer assets to women should be designed with caution. First, while the expenditure share evidence suggests more assets in the hands of women leads to higher budget shares for education, the beneficiaries of these gains (boys or girls or both) are different across the countries. These differences appear to be driven by both differences in preferences and underlying economic rationales possibly related to old-age support systems in different countries. An understanding of the latter is an important ingredient into policymaking aimed at exploiting these differences. Second, different

assets may have different implications for bargaining power if “status” or prestige is attached to a particular asset. For example, in the Sumatran case, paddy land (which is considered a higher form of wealth) and forestland affect expenditure shares in different directions. Indeed, the special meaning or significance attached to ritual transfers such as dowries or brideprice should warn us against asset-transfer interventions that are designed without paying attention to cultural contexts. Lastly, we must also remember the possibility of compensatory (or even retaliatory) action by nonrecipients. The cases of husbands taking control of an irrigation project designed to preserve women’s control of rice in The Gambia (Dey Abbas 1997) and Bangladeshi wives borrowing money for their husbands’ use from credit programs ostensibly targeted to women (Kabeer 1997) are often mentioned as words of caution to policymakers. Even more disturbing is the possibility of increased domestic violence towards women, should income transfer programs radically alter the distribution of power between husband and wife (Schuler, Hashemi, and Riley 1997b).

Our results also show that influences on intrahousehold allocation may be operating at different levels, with different implications for policy. For example, in the Ethiopian case, the effect of husband’s and wife’s assets was dominated by the site-specific characteristics, ethnic and religious differences. This indicates that variations *across* communities and ethnic groups may be larger than variations in the asset position of men and women within those groups. In this case, legal reforms that affect property rights, or that equalize property rights across groups, might have a larger potential impact on intrahousehold allocation than redistributing resources among men and women within

the group. Preliminary results (not reported here) on the distribution of assets upon divorce in Ethiopia, for example, show that having a written marriage contract, which is typical of some ethnic groups but not others, increases the share going to the woman. In the Bangladesh case, on the other hand, despite significant differences across sites, differences in asset positions of men and women *within* sites are large enough to warrant interventions to increase women's assets relative to men's.

TABLES

Table 1—Assets at marriage and human capital of husband and wife

	Husband		Wife	
	Mean	Standard Deviation	Mean	Standard Deviation
Bangladesh				
Assets at marriage (1996 taka)	81,929	145,584	7,064	8,472
Transfers at marriage (1996 taka)	4,053	15,014	5,856	11,646
Years of schooling	3.18	4.03	1.68	2.78
Sumatra				
Area of paddy land (hectares)	0.18	0.3	0.25	0.62
Area of forestry land (hectares)	0.9	1.64	0.42	1.03
Years of schooling	6.83	3.6	6.23	3.4
Ethiopia				
Land and livestock assets at marriage (1997 birr)	2,739	7,188	461	2,023
Total assets at marriage (1997 birr)	4,194	8,272	978	2,424
Years of schooling	1.9	1.9	1.3	1.1
South Africa				
Count of assets at marriage	1.99	1.98	0.8	1.21
Years of schooling	5.57	5	1.67	2.67

Table 2—Bangladesh: Expenditure shares as a function of assets at marriage, 2SLS estimates (n = 1,920)

	Food		Health		Education		Children's clothing		Cigarettes	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
<i>Endogenous regressors</i>										
Ln per capita expenditure	34.24	1.16	-21.84	-1.70	8.68	1.04	1.76	0.46	4.82	1.00
Ln per capita expenditure squared	-3.75	-1.62	1.85	1.84	-0.42	-0.64	-0.11	-0.36	-0.44	-1.16
Ln household size	-2.84	-2.67	0.51	1.11	0.57	1.92	-0.09	-0.64	-0.54	-3.11
Ln (husband assets +1)	0.42	1.29	0.18	1.28	-0.04	-0.41	0.03	0.68	0.07	1.36
Ln (wife's assets +1)	0.00	0.00	-0.34	-1.63	0.34	2.53	0.15	2.50	-0.06	-0.79
<i>Household demographics</i>										
Share females 20-65	-8.07	-1.69	-1.09	-0.53	-2.08	-1.54	0.08	0.14	-0.10	-0.12
Share males 10-19	-5.02	-1.38	-0.76	-0.48	4.09	3.98	1.70	3.60	-0.76	-1.28
Share females 10-19	-4.81	-1.19	-0.30	-0.17	2.51	2.21	3.01	5.74	-0.62	-0.93
Share males 6-9	-3.64	-0.83	0.82	0.43	1.41	1.14	2.46	4.31	-1.04	-1.44
Share females 6-9	-3.05	-0.67	0.03	0.02	0.07	0.05	3.11	5.26	-0.87	-1.17
Share males 0-5	0.04	0.01	1.46	0.79	0.94	0.79	2.59	4.74	-2.16	-3.12
Share females 0-5	-8.93	-2.05	1.44	0.76	0.82	0.67	2.88	5.12	-1.55	-2.18
Share males 65+	-6.19	-0.81	0.77	0.23	8.10	3.74	2.99	3.01	-3.15	-2.50
Share females 65+	-0.87	-0.12	-8.10	-2.58	1.80	0.89	-0.29	-0.31	-1.57	-1.33
<i>Site and round dummies</i>										
Saturia	-3.65	-4.62	-0.68	-1.99	0.87	3.91	0.42	4.13	0.35	2.74
Jessore	3.48	3.61	0.40	0.95	-0.17	-0.63	0.30	2.39	-0.27	-1.70
Round 3	1.26	1.57	-1.81	-5.17	-0.58	-2.57	0.61	5.82	-0.33	-2.48
Round 4	1.06	1.36	-1.23	-3.64	-0.76	-3.46	0.17	1.70	-0.32	-2.53
Constant	7.64	0.08	68.63	1.69	-39.51	-1.50	-8.63	-0.71	-8.31	-0.54
F-tests (p-values)										
Husband's assets=Wife's assets	0.44	0.508	3.52	0.061	4.4	0.036	2.33	0.127	1.65	0.199
Overid test(chi-square,p-value)	54.72	1	37.71	1	45.74	1	33.88	1	70.76	1
F	13.68		2.56		17.03		11.23		5.58	
p-value	0		0		0		0		0	

Notes: Instruments: Round 1 values: Ln per capita expenditure, Ln per capita expenditure squared, Ln household size; for both husband and wife: dummies for schooling (primary secondary, university (husband only), age and age squared, birth order, family background: father's schooling, mother's schooling or literacy, parent's land, number of siblings, number of living brothers, year of marriage (see Tables 5-8). Assets in marriage in 1996 taka; regressions on rounds 2, 3, and 4; t-statistics in bold are significant at 10% or better.

Table 3—Sumatra expenditure shares regressions; tobit estimates (n = 114)

	Food		Health		Education		Children's clothing		Tobacco	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Ln total expenditure per capita	0.319	0.777	0.199	0.859	0.209	1.662	0.365	2.116	1.544	3.184
Ln total expenditure per capita squared	-0.019	-1.312	-0.007	-0.846	-0.008	-1.694	-0.013	-2.173	-0.056	-3.218
Ln household size	-0.180	-5.739	-0.009	-0.516	0.016	2.150	0.004	0.410	0.070	2.778
<i>Household composition (males 20-65 excluded)</i>										
Males 0-5	0.080	0.830	0.014	0.264	0.024	1.121	0.113	4.101	-0.009	-0.123
Females 0-5	0.109	0.970	0.003	0.049	-0.001	-0.050	0.108	3.409	-0.006	-0.068
Males 6-9	0.060	0.505	0.028	0.424	0.074	2.893	0.156	4.750	0.089	1.002
Females 6-9	0.072	0.694	0.053	0.910	0.039	1.720	0.142	4.892	-0.007	-0.095
Males 10-19	0.067	0.704	0.057	1.060	0.051	2.371	0.099	3.577	-0.048	-0.679
Females 10-19	0.125	1.383	-0.006	-0.115	0.074	3.637	0.113	4.339	-0.002	-0.029
Females 20-65	-0.157	-1.315	0.061	0.898	0.032	1.189	0.044	1.279	0.065	0.729
Males 65+	-0.008	-0.092	0.170	3.418	-0.028	-0.960	-0.013	-0.369	-0.065	-0.806
Females 65+	-0.112	-0.805	-0.110	-1.405	0.029	0.881	0.000	-0.004	-0.051	-0.461
<i>Landholdings at time of marriage (hectares)</i>										
Husband's paddy land	-0.073	-1.874	-0.020	-0.901	0.011	1.269	0.015	1.390	0.052	1.800
Husband's forestry land	0.012	0.881	-0.001	-0.138	-0.008	-2.507	-0.002	-0.614	-0.011	-0.984
Wife's paddy land	0.014	0.471	0.037	2.153	0.014	2.312	0.002	0.236	-0.009	-0.415
Wife's forestry land	0.014	0.669	0.001	0.062	-0.003	-0.730	-0.005	-0.793	-0.002	-0.130
<i>Kerinci dummy</i>	0.055	2.978	-0.013	-1.202	0.003	0.673	-0.004	-0.769	0.010	0.722
Constant	-0.013	-0.004	-1.421	-0.860	-1.482	-1.674	-2.519	-2.082	-10.699	-3.157
Sigma	0.075		0.043		0.014		0.019		0.053	
F tests (p-value):										
Husband's paddy=wife's paddy	3.150	0.079	4.170	0.044	0.140	0.712	0.910	0.343	2.800	0.097
Husband's forestry land=wife's forestry land	0.000	0.950	0.020	0.900	0.610	0.435	0.090	0.759	0.200	0.656
Share uncensored	1		1		0.702		0.8421		0.772	
LR chi2(17)	148.12		37.01		69.13		103.03		29.44	
p-value	0.00		0.0034		0		0		0.0307	

Notes: t-statistics in bold are significant at 10% or better.

Table 4—Ethiopia expenditure share regressions (two-stage least squares) n = 1,418

	Food		Education		Health		Child clothing		Alcohol and tobacco	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Ln PCE	-7.602	-1.2	0.820	1.1	0.161	0.1	4.106	2.8	6.601	1.8
Ln PCE 2	0.656	1.4	-0.061	-1.1	-0.026	-0.2	-0.315	-3.1	-0.395	-1.5
Ln HH Size	1.003	0.9	0.144	1.5	-0.685	-2.1	1.196	4.4	0.642	0.9
<i>Household composition (Males 16-50 excluded)</i>										
Females 1-5	-4.945	-1.0	-0.661	-2.1	-1.781	-1.0	-3.491	-2.8	7.294	2.2
Males 1-5	1.803	0.3	-0.902	-2.4	-0.944	-0.6	-3.920	-2.8	3.427	1.0
Females 6-15	-2.200	-0.6	0.447	1.5	0.976	0.8	0.593	0.5	2.102	0.8
Males 6-15	5.112	1.4	0.441	1.2	-1.349	-1.4	-0.486	-0.5	0.929	0.4
Females 16-50	-2.482	-0.6	1.172	1.4	-0.162	-0.2	-0.496	-0.4	1.550	0.6
Females 50 +	1.352	0.3	0.147	0.4	-1.238	-1.0	-1.986	-1.7	4.170	1.4
Males 50 +	11.482	2.4	0.860	1.1	-0.274	-0.2	-2.230	-2.3	0.239	0.1
<i>Ethnicity (Tigray excluded)</i>										
Amhara	0.592	0.2	-0.166	-0.4	-0.462	-0.8	-1.017	-1.5	1.586	1.0
Oromo	3.421	0.9	-0.470	-1.0	0.647	0.8	-1.254	-1.7	1.211	0.6
South-Central	-1.028	-0.3	0.188	0.4	-0.131	-0.2	-0.818	-0.9	3.336	1.6
Other/mixed	4.489	1.4	-0.250	-0.7	0.082	0.1	-1.670	-2.4	2.230	1.2
Not identified	-4.228	-0.7	0.032	0.1	1.806	0.7	1.193	0.4	-2.905	-0.8
<i>Religion (Orthodox excluded)</i>										
Muslim	-0.186	-0.1	-0.042	-0.2	0.571	0.7	-0.104	-0.2	-3.178	-1.6
Other Christian	5.669	3.0	0.394	0.8	-0.651	-1.1	-0.399	-0.9	-4.141	-3.2
Other	0.669	0.2	-0.031	-0.1	0.031	0.0	0.745	1.0	2.671	1.4
Not identified	6.114	1.0	-0.249	-0.4	-2.847	-1.1	-1.318	-0.4	4.761	1.4
<i>Ln Value assets at marriage</i>										
Husband	-1.515	-1.5	-0.037	-0.3	-0.350	-1.2	-0.207	-0.7	1.543	2.4
Wife	2.648	1.8	-0.041	-0.3	0.624	1.4	-0.228	-0.6	-1.807	-1.7
F test overall	23.5 [0.00]		3.8 [0.00]		4.3 [0.00]		7.3 [0.00]		6.5 [0.00]	
F test Ln PCE quadratic	2.9 [0.06]		1.3 [0.28]		0.5 [0.61]		7.9 [0.00]		4.9 [0.01]	
F test husband = wife	4.1 [0.04]		0.0 [0.99]		2.2 [0.14]		0.0 [0.97]		5.3 [0.02]	
Fraction not censored	1.00		0.26		0.52		0.53		0.40	
Average budget share	0.74		0.01		0.02		0.02		0.04	

Notes: Regression also includes a constant and dummy control for all but one of the 15 villages (not shown). Husband and wife asset variables treated as endogenous. Instruments include parental education and value of gifts transferred from the groom's to the bride's family and vice versa.

Table 5—South Africa expenditure share regressions (two-stage least squares) n = 500

	Food		Education		Health		Child Clothing		Alcohol and tobacco	
	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic	Coefficient	t-statistic
Ln PCE	3.266	0.3	-6.072	-1.4	-1.247	-0.5	1.039	0.7	-0.213	0.0
Ln PCE 2	-1.433	-1.5	0.551	1.5	0.115	0.5	-0.086	-0.6	0.036	0.1
Ln HH Size	-6.393	-2.8	0.865	1.0	-0.630	-1.1	0.411	1.3	-0.048	0.0
<i>Household composition (males 16-50 excluded)</i>										
Females 1-5	-2.500	-0.3	5.806	1.5	-0.252	-0.1	0.501	0.4	0.290	0.1
Males 1-5	-12.313	-1.1	1.653	0.4	3.114	1.1	-0.302	-0.2	4.965	0.9
Females 6-15	-4.549	-0.6	4.166	1.4	0.913	0.5	2.109	1.9	-5.461	-1.4
Males 6-15	-1.119	-0.2	0.865	0.3	-1.606	-1.0	1.119	1.3	-7.742	-2.4
Females 16-50	4.200	0.7	3.404	1.4	-0.540	-0.3	-0.183	-0.2	-7.449	-2.3
Females 50 +	-1.094	-0.1	0.637	0.2	-2.635	-1.1	0.325	0.2	-3.315	-0.7
Males 50 +	5.376	0.6	-0.221	-0.1	4.173	1.9	-2.903	-2.4	-5.235	-1.2
<i>Assets at marriage</i>										
Ln(count of husband assets at marriage)	7.680	0.9	-2.195	-0.7	-0.613	-0.3	0.122	0.1	-0.160	0.0
Ln(count of wife assets at marriage)	-12.934	-1.3	7.411	1.9	1.420	0.6	-0.678	-0.5	0.655	0.1
<i>Assets at marriage interacted with Indian</i>										
Ln(count of husband assets at marriage)	-7.512	-0.4	1.775	0.3	-2.060	-0.5	-2.182	-0.9	3.936	0.4
Ln(count of wife assets at marriage)	41.483	1.3	-8.455	-0.7	-3.886	-0.5	2.974	0.6	-14.451	-0.9
F test of model: F(81, 418) =	4.7	[0.00]	1.3	[0.05]	1.2	[0.16]	2.1	[0.00]	1.5	[0.01]
F test Ln PCE quadratic	29.3	[0.00]	1.1	[0.33]	0.1	[0.88]	0.2	[0.78]	0.0	[0.97]
F test husband = wife	2.2	[0.14]	3.1	[0.08]	0.4	[0.56]	0.2	[0.68]	0.0	[0.91]
F test Indian husband = Indian wife	0.6	[0.44]	0.0	[0.96]	0.0	[0.87]	0.7	[0.39]	0.9	[0.42]
Fraction not censored	1.00		0.88		0.77		0.80		0.55	
Average budget share	45.88		3.87		1.54		2.26		4.63	

Notes: Regression also includes a constant and dummy control for all but one of the 69 clusters (not shown). Husband and wife asset variables, and their interactions with Indian, treated as endogenous. Instruments include parental education, indicators of whether parents alive at time of marriage, and the value of gifts transferred from the groom's to the bride's family and vice versa.

Table 6a—Effects of husband’s and wife’s resources on children’s education, Bangladesh, deviation from cohort means

	Coresident children ages 6-10				Coresident children ages 11-15			
	OLS with robust SEs		Fixed effects		OLS with robust SEs		Fixed effects	
Number of observations	1,210		1,210		1,466		1,466	
F test [p-value]	3.97 [0.000]		1.28 [0.258]		22.46 [0.000]		1.41 [0.197]	
R-squared	0.055				0.200			
<i>Child characteristics</i>								
Daughter dummy	0.045	0.664	0.062	0.812	0.119	0.409	0.580	1.908
Age	0.003	0.161	-0.019	-0.758	0.057	0.656	0.078	1.133
Age squared	0.000	0.152	0.002	1.017	-0.001	-0.533	-0.002	-1.458
<i>Parents' education</i>								
Father's schooling	0.019	1.838			0.286	7.652		
Mother's schooling	0.040	3.023			0.174	3.270		
<i>Parents' assets at marriage</i>								
Father's assets	0.000	-0.690			0.000	-1.054		
Mother's assets	0.000	-0.010			0.000	1.009		
<i>Interaction terms</i>								
Daughter x father's schooling	-0.011	-0.929	-0.034	-2.163	-0.148	-2.827	-0.072	-1.207
Daughter x mother's schooling	-0.003	-0.183	0.025	1.116	0.164	2.232	0.050	0.555
Daughter x father's assets	0.000	0.894	0.000	-1.314	0.000	-0.009	0.000	-1.743
Daughter x mother's assets	0.000	-0.336	0.000	1.142	0.000	0.507	0.000	-0.592
Saturia dummy	0.111	2.140			1.113	3.918		
Jessore dummy	0.046	0.928			0.887	2.863		
Constant	-0.196	-3.175	0.025	0.419	-2.591	-3.052	-0.620	-0.851
<i>F-tests on "main effects" (p-value)</i>								
Father's schooling=Mother's schooling	1.070	0.302			1.940	0.164		
Father's assets=Mother's assets	0.030	0.856			1.170	0.280		
<i>F-test on equality of total effects (p-value)</i>								
Father's schooling=Mother's schooling	4.320	0.038			4.160	0.042		
Father's assets=Mother's assets	0.450	0.501			1.390	0.239		
<i>F-test on interaction terms with daughter dummy (p-value)</i>								
Father's schooling=Mother's schooling			2.980	0.085			0.760	0.383
Father's assets=Mother's assets			1.760	0.185			0.070	0.095

Table 6b—Effects of husband’s and wife’s resources on children’s education, Bangladesh, years of completed schooling

	Coresident children ages 6-10				Coresident children ages 11-15			
	Tobit		Fixed effects		Tobit		Fixed effects	
Number of observations	1,210		1,210		1,466		1,466	
F test			99.710 [0.000]				28.130 [0.000]	
Chi-squared	803.130 [0.000]				486.710 [0.000]			
<i>Child characteristics</i>								
Daughter dummy	0.331	1.461	0.099	1.250	0.133	0.401	0.556	1.783
Age	2.740	3.707	-0.252	-9.428	0.792	9.115	0.804	11.413
Age squared	-0.106	-2.398	0.040	16.028	-0.014	-7.212	-0.015	-9.591
<i>Parents' education</i>								
Father's schooling	0.049	1.548			0.362	9.756		
Mother's schooling	0.201	4.233			0.196	3.333		
<i>Parents' assets at marriage</i>								
Father's assets	0.000	-0.680			0.000	-1.005		
Mother's assets	0.000	-0.431			0.000	1.314		
<i>Interaction terms</i>								
Daughter x father's schooling	-0.042	-0.870	-0.041	-2.558	-0.189	-2.843	-0.060	-0.983
Daughter x mother's schooling	0.007	0.094	0.045	1.923	0.166	1.618	-0.019	-0.205
Daughter x father's assets	0.000	0.972	0.000	-1.678	0.000	0.250	0.000	-2.077
Daughter x mother's assets	0.000	0.152	0.000	0.666	0.000	0.910	0.000	0.317
Saturia dummy	0.224	1.145			0.387	1.535		
Jessore dummy	0.555	2.994			-0.606	-2.469		
Constant	-15.983	-5.198	0.209	3.391	-6.126	-6.602	-4.184	-5.600
<i>F-tests on "main effects" (p-value)</i>								
Father's schooling=Mother's schooling	4.510	0.034			3.670	0.056		
Father's assets=Mother's assets	0.120	0.732			2.060	0.152		
<i>F-test on equality of total effects (p-value)</i>								
Father's schooling=Mother's schooling	5.770	0.016			2.120	0.145		
Father's assets=Mother's assets	0.090	0.761			2.620	0.106		
<i>F-test on interaction terms with daughter dummy (p-value)</i>								
Father's schooling=Mother's schooling			5.950	0.015			0.080	0.774
Father's assets=Mother's assets			0.830	0.363			0.490	0.486
<i>Breusch-Pagan LM test (p-value)</i>								
			23.600	0.000			20.240	0.000
<i>Hausman test, FE vs RE (p-value)</i>								
			11.530	0.117			12.760	0.078

Table 7—Effects of husband’s and wife’s resources on children’s education, Sumatra (levels estimates are OLS with standard errors corrected for clustering)

	Deviation from cohort mean				Years of schooling completed			
	Levels		Fixed effects		Levels		Fixed effects	
	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic
Number of observations	178		178		178		178	
F test	2.74 [0.0014]		0.6 [0.7963]		63.14 [0.0000]		37.29 [0.0000]	
R-squared	0.1716				0.7728			
<i>Child characteristics</i>								
Daughter dummy	0.783	1.060	-0.209	-0.314	0.946	1.120	-0.326	-0.432
Age	0.111	0.598	0.016	0.069	1.597	7.857	1.549	5.792
Age squared	-0.004	-0.548	-0.001	-0.118	-0.033	-4.159	-0.031	-3.233
<i>Parents' education</i>								
Father's schooling	0.065	0.922			0.080	1.346		
Mother's schooling	0.103	0.837			0.164	1.404		
<i>Parents' land</i>								
Father's paddy	-0.245	-0.294			-0.260	-0.331		
Father's forestland	0.076	0.817			0.053	0.560		
Mother's paddy	1.737	4.866			1.121	2.918		
Mother's forestland	-0.502	-1.473			-0.404	-1.277		
<i>Interaction terms</i>								
Daughter x father's schooling	-0.021	-0.278	0.016	0.155	-0.029	-0.392	0.006	0.049
Daughter x mother's schooling	-0.039	-0.381	0.029	0.236	-0.105	-1.048	0.031	0.223
Daughter x father's paddy	-0.686	-0.822	2.201	1.361	-1.024	-1.023	1.180	0.644
Daughter x mother's paddy	-1.648	-4.718	-1.512	-1.051	-0.985	-2.646	-1.584	-0.972
Daughter x father's forestland	-0.065	-0.572	0.095	0.405	-0.001	-0.009	0.075	0.282
Daughter x mother's forestland	0.830	1.783	0.464	0.523	0.740	1.642	0.533	0.530
Kerinci dummy	-0.155	-0.347			0.768	1.627		
Constant	-1.884	-1.372	-0.101	-0.066	-11.203	-7.017	-8.996	-5.161
<i>F-tests on "main effects" (p-value)</i>								
Father's schooling=Mother's schooling	0.050	0.818			0.370	0.542		
Father's paddy=Mother's paddy	5.100	0.027			2.890	0.093		
Father's forestland=Mother's forestland	2.850	0.095			2.030	0.158		
<i>F-test on equality of total effects (p-value)</i>								
Father's schooling=Mother's schooling	0.050	0.818			0.010	0.941		
Father's paddy=Mother's paddy	1.910	0.170			1.950	0.166		
Father's forestland=Mother's forestland	0.870	0.353			0.660	0.419		
<i>F-test on interaction terms with daughter dummy (p-value)</i>								
Father's schooling=Mother's schooling			0.000	0.948			0.010	0.911
Father's paddy=Mother's paddy			3.430	0.068			1.480	0.228
Father's forestland=Mother's forestland			0.170	0.685			0.200	0.657
<i>Breusch-Pagan LM test (p-value)</i>								
			24.450	0.000			29.130	0.000
<i>Hausman test, FE vs RE (p-value)</i>								
			6.140	0.730			8.180	0.516

Table 8—Ethiopia education regressions on children age 6-19 (ordinary least squares)

	Deviation from cohort mean				Years of Schooling			
	Level		Household fixed effects		Level		Household fixed effects	
	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic
<i>Child characteristics</i>								
(1) if female	-0.388	-2.0	-0.065	-0.3	-0.379	-1.9	-0.067	-0.3
Age	-0.034	-0.7	-0.047	-1.0	0.008	0.2	-0.007	-0.1
Age squared	0.002	0.8	0.002	0.9	0.007	3.6	0.008	3.8
<i>Parent's characteristics</i>								
Wife's age	0.042	2.8			0.042	2.8		
Wife's age squared	0.000	-2.6			0.000	-2.6		
Wife education	0.039	0.4			0.050	0.5		
Husband education	0.366	6.6			0.372	6.7		
Female X wife education	0.237	1.5	-0.113	-0.7	0.220	1.4	-0.117	-0.7
Female X husband education	-0.163	-2.2	-0.177	-2.3	-0.166	-2.2	-0.180	-2.4
<i>Ethnicity (Tigray excluded)</i>								
Amhara	-0.404	-1.6			-0.398	-1.5		
Oromo	-0.691	-2.7			-0.672	-2.7		
South-Central	-0.422	-1.4			-0.433	-1.5		
Other/mixed	0.091	0.3			0.099	0.4		
Not identified	-1.030	-1.3			-1.045	-1.4		
<i>Religion (Orthodox excluded)</i>								
Muslim	-0.709	-4.4			-0.703	-4.3		
Other Christian	-0.073	-0.6			-0.065	-0.5		
Other	-0.130	-0.6			-0.132	-0.6		
Not identified	-0.024	0.0			0.385	0.2		
<i>Assets at marriage</i>								
Ln(count of husband assets at marriage)	-0.010	-0.8			-0.010	-0.8		
Ln(count of wife assets at marriage)	-0.023	-1.2			-0.025	-1.3		
Husband assets X female	0.016	0.9	0.017	1.0	0.016	0.9	0.017	1.0
Wife assets X female	0.068	3.0	0.064	2.8	0.073	3.2	0.068	3.0
F test of model	13.0 [0.00]		5.8 [0.00]		31.8 [0.00]		77.0 [0.00]	
F test husband = wife	0.3 [0.61]				0.3 [0.56]			
F test husband assets X female = wife's	2.7 [0.10]		2.1 [0.15]		3.1 [0.08]		2.5 [0.12]	

Notes: Level regressions include a constant and dummy control for all but one of the 15 villages (not shown). Household fixed effects regressions contain a dummy for each household.

Table 9—South Africa education regressions on children 16-21 (ordinary least squares)

	Deviation from cohort mean				Years of schooling			
	Level		Household fixed effects		Level		Household fixed effects	
	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic	Co-efficient	t-statistic
(1) if female	-0.235	-0.5	0.975	1.5	-0.222	-0.4	1.030	1.6
Age	1.399	0.6	-1.157	-0.5	2.424	1.1	0.131	0.1
Age squared	-0.037	-0.6	0.028	0.4	-0.052	-0.9	0.006	0.1
Wife's age	0.206	1.8			0.207	1.8		
Wife's age squared	-0.002	-1.8			-0.002	-1.8		
Wife education	0.130	2.5			0.130	2.5		
Husband education	0.024	0.5			0.024	0.5		
Female X wife education	-0.136	-1.8	-0.104	-1.1	-0.132	-1.8	-0.110	-1.2
Female X husband education	0.078	1.2	0.136	1.8	0.070	1.1	0.135	1.8
<i>Assets at marriage</i>								
Ln(count of husband assets at marriage)	-0.301	-0.9			-0.284	-0.9		
Ln(count of wife assets at marriage)	0.049	0.1			0.040	0.1		
Husband assets X Indian	0.459	0.6			0.349	0.4		
Wife assets X Indian	-0.886	-0.8			-0.899	-0.8		
Husband assets X female	0.386	0.9	0.974	1.9	0.393	1.0	1.031	2.1
Wife assets X female	-0.117	-0.2	-0.219	-0.4	-0.126	-0.3	-0.204	-0.4
Husband assets X Indian X female	-0.864	-0.7	-4.387	-1.5	-0.829	-0.7	-5.230	-1.8
Wife assets X Indian X female	3.262	1.9	10.050	2.2	3.435	2.0	11.345	2.5
F test of model excl. cluster dummies	1.9 [0.02]		2.5 [0.01]		3.8 [0.00]		5.3 [0.00]	
F test husband = wife	0.4 [0.54]				0.3 [0.57]			
F test Indian husband = Indian wife	2.0 [0.16]				2.3 [0.13]			
F test Husband assets X female = wife's			1.7 [0.19]				1.9 [0.17]	
F test Indian husband assets X female = wife's			3.7 [0.06]				4.9 [0.03]	

Notes: Level regressions include a constant and dummy control for all but one of the 69 clusters (not shown). Household fixed effects regressions contain a dummy for each household.

Table 10—Summary for all countries

	Bangladesh	Indonesia		Ethiopia	South Africa (Africans only)
		Paddy	Forest		
<i>Food share</i>					
Wife assets	-	-	-	Positive	-
Husband assets	-	Negative	-	-	-
Wife - husband assets	-	Positive	Positive	Positive	-
<i>Education share</i>					
Wife assets	Positive	Positive	-	-	Positive
Husband assets	-	-	Negative	-	-
Wife - husband assets	Positive	-	-	-	Positive
<i>Health share</i>					
Wife assets	-	Positive	-	-	-
Husband assets	-	-	-	-	-
Wife - husband assets	Negative	Positive	-	-	-
<i>Child clothing share</i>					
Wife assets	Positive	-	-	-	-
Husband assets	-	-	-	-	-
Wife - husband assets	-	-	-	-	-
<i>Alcohol and/or tobacco share</i>					
Wife assets	-	-	-	-	-
Husband assets	-	Positive	-	Positive	-
Wife - husband assets	-	Negative	-	Negative	-

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