

**INTRODUCTION TO A STUDY OF INTRAHOUSEHOLD RESOURCE
ALLOCATION AND GENDER DISCRIMINATION IN RURAL ANDHRA
PRADESH, INDIA***

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I. INTRAHOUSEHOLD RESOURCE ALLOCATION

A. Why Intrahousehold Resource Allocation Issues? An Introduction

Many important decisions that affect economic development outcomes take place at the household level, including fertility decisions, education of children, labor force participation, and production activities at various agricultural and nonagricultural household enterprises.¹ Naturally, many empirical studies in development economics use the household as the unit of analysis. Most of those studies, albeit with a growing number of exceptions, treat the internal decision-making processes within the household as a “black box”; that is, relatively little attention has traditionally been paid to what happens within the household, such as how the decisions are made and how resources are allocated among household members.

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There has been an increasing recognition, however, that some aspects of intrahousehold resource allocation issues are of potential importance for policymakers for at least two reasons. First, paying attention to the individual-level welfare, rather than the household-level welfare, may affect the policymakers' views about whom and where the poor are. There is a possibility, for example, that some households whose average per capita incomes/expenditures are above the poverty line may still contain household members whose standard of living actually falls below the poverty line due to intrahousehold inequality in resource allocation (e.g., Haddad and Kanbur 1990). Second, the way household members allocate resources among themselves could potentially affect the effectiveness of policy interventions and may even lead to unintended consequences for policymakers. One classic example is the possible household responses to school feeding programs; there has been reported incidences that when children receive meals at school their food allocation at home is reduced in response in order to feed other household members in the household who do not receive meals at school (e.g., Beaton and Ghassemi 1982).² There are other instances where policy interventions are nullified by the "unanticipated" responses by the household, including some instances of the introduction of new agricultural technologies and microcredit programs.³ Those examples reveal that understanding how resources are allocated within the household and how policy interventions could potentially affect such allocation behavior is of great importance for policymakers.

B. Modeling Intrahousehold Resource Allocation Behavior

Modeling household behavior has been central to microeconomics, and traditionally in the majority of studies (exclusively until the 1980s and many of them still today), household behavior is analyzed under the assumption that household members are in complete agreement as to how best to combine their time and other resources to attain maximum possible welfare among the members (e.g., Becker 1991; Rosenzweig and Evensson 1977; Singh, Squire and Strauss 1986). The models based on such a view have been termed "unitary" household models (Alderman *et al.* 1995). Certain types of intrahousehold resource allocation phenomena, including some aspects of gender disparity, have been analyzed under this theoretical/conceptual framework in the literature (Behrman 1988a, 1988b; Rosenzweig and Schultz 1982; Pitt, Rosenzweig, and Hassan 1990).

However, there has been an increasing recognition that the unitary model of household behavior may not be adequate for analyzing intrahousehold resource allocation behavior. In addition to the fact that the unitary model assumption (i.e., household members are always in agreement in priority and preferences) is perhaps not a good description of the reality, certain phenomena such as the incidence of domestic violence, for example, apparently contradict the unitary view of household behavior. In addition, there has been accumulating empirical evidence that contradicts key underlying prediction of the unitary model, especially the income pooling outcome (e.g., Browning *et al.* 1994; Haddad and Hoddinott 1994; Thomas 1990, 1993, 1997; Thomas and Chen 1994; Schultz 1990).

As a consequence, various alternative theoretical models have been developed that relax the key assumptions of the unitary model. Those more general models have been loosely called "collective" models of household behavior, where the unitary models are special cases (Alderman *et al.* 1995). Collective models typically assume that different household members have different preferences and/or different "bargaining powers," and intrahousehold resource allocation outcomes emerge as a result of interactions among those elements (e.g., McElroy and Horney 1981; Manser and Brown 1980; Chiappori 1988; Lundberg and Pollak 1993; Carter and Katz 1997). Although it is customary to use "collective models" for Pareto-efficient household models which may not have a single household utility function, we will refer to the broader class of non-unitary models as "collective models" which may include Pareto-inefficient, noncooperative household models following Alderman *et al.* (1995).

It is important to recognize that, as noted above, some of the intrahousehold resource allocation phenomena can be and have been explained by unitary models, as well as by collective models. From a policymaker's point of view, as far as different theoretical models produce the same predictions about the relationships between policy instruments and intrahousehold outcomes, which model to base her/his analysis on is not of much significance in terms of how she/he may design policy interventions (Hoddinott 1992). For example, the study by Rosenzweig and Schultz (1982) is a classic one explaining the differential survival probabilities by gender in rural India by differential employment opportunities

for women based on the unitary model framework. The same reduced form relationship can also be interpreted as the outcome of bargaining processes between the husband and the wife within the household based on a collective model approach (Folbre 1984). Whatever theoretical models one uses, however, the policy implication is essentially the same: enhancing employment opportunities for women could reduce the gender gap in survival probabilities between boys and girls.

C. When and Why Theoretical Models Make Significant Differences for Policymakers

There are ample examples where the theoretical framework that is used for policy analysis makes a significant difference in terms of policy implications. Some of those issues will be explored in detail in the specific papers collected in this special issue. One such example has to do with the validity of the so-called income pooling outcome of unitary models. This posits that incomes brought into the household by different household members are necessarily “pooled” and the question of “who” brings “how much” income into the household has no bearing on how such pooled incomes are subsequently allocated/spent on various goods and services within the household. In contrast, however, if the identity of income earners within the household affects the patterns of household consumption expenditures, then policy makers, in implementing welfare payment programs, for example, would need to carefully design who (among the household members, such as the wife or the husband) should be the designated recipient of such transfer payments from the government (Lundberg, Pollak, and Wales 1997).

Second, while all the unitary models and a subset of the collective models assume that intrahousehold resource allocation processes result in Pareto efficient outcomes, such outcomes may not always result in reality. If resource allocation outcomes are not efficient, there may be additional room for policy intervention. Most notably, such examples of inefficient resource allocation outcomes within the household have been documented in the context of agricultural production in some African countries (Jones 1986; Udry 1996). Udry (1996) demonstrated that the marginal productivity of land is not equalized between wife-managed plots and husband-managed plots in the case of Burkina Faso, even after controlling for land quality, which is in clear violation of the Pareto efficiency in intrahousehold resource allocation. More recently, stochastic extension of the Pareto efficiency test has been attempted by Dercon and Krishnan (2000) and Duflo and Udry (2004) who found that income shock was not fully pooled within a household, which is another violation of the Pareto efficiency.

Finally, collective models often point to a possibility that institutions and social norms that differentially affect the access of different household members to various economic resources can have significant implications for intrahousehold resource allocation outcomes. Such institutions include: laws and other social norms governing marriage, inheritance, and access to common property resources (Haddad and Kanbur 1990; Chiappori, Fortin, and Lacroix 2002). Under such circumstances, Pareto optimal resource allocation is not necessarily guaranteed. Moreover, specific rules and norms governing household members are not sufficient to mitigate enforcement problems and often fail to overcome issues of commitment failure under a state of serious imperfect information within a family. Using experiments with microfinance participants in the Philippines, Ashraf (2005) found that intrahousehold information sharing and communication is important in order to enhance efficiency of resource allocation. While growing numbers of programs provide transfer income solely to women and exclude men, such programs may induce intrahousehold conflict such as domestic violence. Alternatively, transfers can be provided to husband and wife together when information is shared fully within a household.

In sum, under certain circumstances, distinguishing alternative models of household behavior is not only of academic interest but is also likely to have important implications for designing policies. As the evidence in this special issue suggests that the collective models are more realistic than the unitary models in the surveyed region, policymakers must take into account the possible repercussions within the household when designing policies.

D. Some Common Limitations in the Empirical Literature and the Main Contributions of the Present Study

There appear to be two notable data limitations that are common across many studies in the existing literature. The dataset used for the empirical papers included in this special issue attempts to rectify (at

least partially) those limitations. Demonstrating the utility of such innovation in data collection is among the major contributions of the papers included in this issue.

- Lack of time use data: Intrahousehold allocation of time among its members is among the most important outcomes of intrahousehold cross-persons effects. In typical large scale household survey data (such as most surveys conducted for the Living Standards Measurement Study [LSMS]), the consumption of leisure is not documented (mainly due to the lack of information on household chores);
- Potential endogeneity of “bargaining power” proxy variables (see Quisumbing and Maluccio [2000], for a short review of the measurement issues concerning bargaining power): Early studies of testing (and rejecting) unitary models tested the “income pooling” assumption of the unitary model by using information on nonlabor incomes. But as often pointed out, such incomes cannot be regarded as exogenous. Some developed country studies used samples limited to “couples of full-time employed workers,” with the assumption that labor supply decisions are largely fixed for such a population. Given the relatively small population in developing countries of such couples (many jobs are not stable and self-employment is more important in developing countries), applying the same approach does not seem feasible. While some studies (in developed countries) used spatial (or temporal) variations in laws governing gender relationships (marriage laws), in developing country contexts, instances of such clear variations in legal statute are perhaps not readily available, nor is it clear if such statutes are enforced as rigorously as in developed country contexts.

The empirical papers in this special issue are based on the dataset collected with those limitations of the existing studies in mind. In the survey, we collected detailed time use data (to remedy to the first problem), and we went back in time (premarital; parental generation) and collected information on extra-household linkages, such as existence or absence of parents of the couple (to remedy the second problem).

II. WOMEN’S WORK AND INTRAHOUSEHOLD RESOURCE ALLOCATION

In examining intrahousehold resource allocation, the allocation of time is an important aspect since the way a household allocates its members’ time among various economic activities is a crucial determinant of its income level and human capital investments (Harvey and Taylor 2000). In this section, we review selectively the existing studies on female labor participation as an important dimension of intrahousehold time allocation and as a key determinant of household income.

In general, it is known that the female labor force participation rate tends to decline in the early stages of economic development and then increases. This is the U hypothesis of female labor market participation in the process of economic development (Durand 1975; Goldin 1995). The association between the two variables can be seen in Figure 1, which used a dataset for 144 countries. The horizontal axis of Figure 1 is log GDP per capita based on purchasing power parity (in 1985 US dollars), i.e., gross domestic product converted to international dollars using purchasing power parity foreign exchange rates; the vertical axis represents the female labor force as a percentage of the total, which shows the extent to which women are active in the labor force. The quadratic fitted line does indicate the U-shape relationship, especially if we omit the “outlier” Persian Gulf countries.

Along the latter part of the U curve, an increase in female labor market participation is regarded as a sign of better achievements in developed countries. While women’s low labor participation rates are often regarded as an outcome of quantity and wage discrimination against female labor, in general more women decide to work outside as a result of better labor market conditions due to the improvement in the country’s economic conditions (Mammen and Paxson, 2000). Even in the context of middle-income countries, there is an emerging literature on the positive impact of child care services on maternal employment (Hallman *et al.*, 2005; Connelly, DeGraff, and Levison 1996; Lokshin, Glinskaya, and Garcia 2000).

While in developed countries, women’s labor force status is regarded as an important progress indicator of a society, in developing countries, maternal labor participation often occurs as a consequence of poverty, involving undesirable outcomes such as the withdrawal of children from school and children engaging in domestic and outside labor. In the earlier stages of economic development when agriculture

is the dominant mode of production, female labor participation in family farms, household businesses, and domestic workshops is very high. During these stages, however, the level of women's education is low, and thus their only wage labor opportunity outside the home is paid manual work. Using Indian household data, Mammen and Paxson (2000) found that more than 60 percent of both rural and urban working women at the lowest levels of per capita expenditure work for wages. Accordingly, unlike in developed countries, women's high labor participation rate in developing countries should be understood as a response to poverty and resource constraints under limited market accessibility. Researchers often identify the low level of female labor-market participation and their exclusion from the formal sector as a source of women's lower levels of well-being, i.e., "female marginalization." However, such an interpretation is misleading unless we carefully consider the constraints households face and the consequences of maternal labor participation on intrahousehold labor allocation. Assessing the effects of women's labor participation requires attention to how resources are allocated within families (Mammen and Paxson 2000).

Poor households without assets for collateral are likely to lack accessibility to credit. For example, Pender (1996) found severe credit constraints on poor households in rural India. Theoretically, the marginal utility of current consumption is likely to be relatively high when households are credit constrained. Under this situation, labor income becomes an important source for extending household resources. For example, studies on Indian villages found that labor market participation acts as an informal but strong insurance device against crop income fluctuations (Walker and Ryan 1990, pp. 87–88; Kochar 1999; Ito and Kurosaki 2006). Yet, credit market imperfections can considerably impede the intertemporal smoothing of labor supply, leading to "excessive" labor participation. More importantly, it has been supported empirically that such effect may be significant especially for adult women's labor market participation. For example, by using panel data from India, Skoufias (1996) found that labor inducement effects on women appear to be more serious for landless and small-farm households than large-farm households. In studies by Rose (2001) and Ito and Kurosaki (2006), the responses of households were divided into those that were given *ex ante* to and those given *ex post* of shocks experienced by households. The study found that, *ex ante*, households facing greater risks were more likely to participate in the labor market, while *ex post*, unexpected shocks increased labor force participation. The study showed that reducing the variability of household income streams through labor market participation comes at a cost: risk-averse households accept a risk penalty in terms of lower expected income in order to maintain more certain income streams.

Moreover, under binding credit constraints, induced maternal labor participation further generates serious consequences on intrahousehold time allocation and human capital investments. By using data from Bolivia, Columbia, Côte d'Ivoire, and the Philippines, Grootaert and Patrinos (eds.) (1999) found that the mother's employment usually leads to an increase in child labor, usually the domestic labor of daughters. In spite of the different social and cultural characteristics of these four countries, the consistency of the result is remarkable. One reason why girls might fare badly within households is that in poor credit-constrained families, siblings must compete for resources (Mammen and Paxson 2000). When net returns to education of daughters seem to be consistently lower than that for sons, girls may be treated badly within households. There is ample empirical evidence showing that elder daughters bear a good part of the burden of limited household resources by providing domestic labor (Strauss and Thomas 1995, p. 1990). For example, Parish and Willis (1993) found that having many elder sisters increases the school entry probability for both younger brothers and sisters, suggesting that older sisters receive fewer resources than other siblings.

III. CHILD LABOR

Among intrahousehold resource allocation issues, the phenomena attracting the greatest public attention are child labor and schooling. Although education is widely acknowledged in both policy making and academia as a key to rapid economic development, the record shows that there is substantial variation in primary and secondary net school enrollment rates among low income countries (see Ito [2006]). Moreover, a recent survey conducted in India shows that a significant portion of school children are underachievers (*Hindu*, February 16, 2006).

India is a country with a dismal school enrollment record, but which has made rapid improvements in

recent years. It is thus important to go out into the field in order to learn about the effectiveness of policies, and obtain structural interpretations about underlying economic forces. Such field work was a part of a joint study conducted by the Institute of Developing Economies (IDE) and the M. Venkatarangaiya Foundation (MVF). The study collected household data that is used in the papers that are included in this special issue.

A great mass of the earlier literature on child labor consisted of analysis of household labor supply with a special emphasis on child labor. Leading examples include Jacoby and Skoufias (1997) who used International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) Village Level Survey data collected from villages including Andhra Pradesh. These studies share an econometric feature in that they deal with endogeneity/omitted variables/measurement error problems with a choice of instrumental variables.

More recent studies, such as those by Duflo (2004b, 2005), Glewwe (2002), Glewwe and Kremer (2005), emphasize the explicit randomization of particular education interventions. Unlike studies that use observational data and instruments, this approach has the advantage that the consistency of parameter estimates of policy impacts is guaranteed. This advantage allows us to have a causal interpretation. In effect, this research approach is in sync with actual policy implementation: increasingly, economists are working with policy implementers to ensure random assignments of programs.

This line of research has found that, among others, directed monetary transfers to mothers conditional on child school attendance increases school attendance (Schultz 2004; Skoufias 2005). In food-for-education programs and school lunch programs, it is also found that attendance is responsive to such incentives (Ravallion and Wodon 2000; Vermeersch 2003). In other incentive schemes, school vouchers are found to enhance secondary school enrollment in the private schools in a middle income country (Angrist *et al.* 2002) where a private school system is well established and most children are enrolled in schools. As these incentive schemes transfer resources conditional on school attendance, they are appropriately called “conditional transfer programs.”

Another line of research that carefully looks for randomization is the study of supply-side interventions. While conditional transfer programs can be referred to as demand-side policies, as they support household decisions to send children to school, supply-side policies aim at reducing the access costs of schooling born by the household, and at increasing the returns to education. A typical example is school expansion in backward areas which is examined by Duflo (2001). Using Indonesian census data and the government’s school construction rules, Duflo finds that school expansion significantly increased enrollment, along with subsequent labor participation rates and wages. Based on a similar identification strategy, Chinn (2005) finds that an Indian program that allocates teachers from large schools to small schools significantly increases the primary completion rates of girls. While these two studies use the government’s intervention rules, Spohr (2003) relies on the uniformity of intervention in Taiwan’s compulsory education law, and finds a significant increase in enrollment. Remedial schooling in northern India, studied by Banerjee *et al.* (2005), is an example of supply-side intervention that aims at increasing the returns to education through school quality improvement. Their empirical strategy is to use the randomized placement of improved schools.

Except for quality improvement studies, both conditional transfers and large scale supply-side interventions share the view that the opportunity costs of schooling are too high for poor households. Conditional transfer programs address this problem by handing out resources, while supply-side policies address it by reducing access costs. Although reduction of the opportunity costs plays a central role in achieving universal education, in India there is an increasingly visible argument that money (or wealth) is not a sufficient condition for promoting schooling. The MVF is explicitly committed to such an argument, and it does not hand out any cash or in-kind resources, or even provide access to credit. MVF records show that its methods do have merits. In the last 15 years, it has taken more than 250,000 children out of child labor and sent them to school. Given the magnitude of operations and the MVF’s distinctive methodology, it is both interesting and important to know the effectiveness of its approach, and the adjustment mechanism of the households. The primary purpose of the joint IDE-MVF survey is to conduct a randomized trial of MVF interventions in the remote areas of Andhra Pradesh, India. The papers in this special issue are intended to pave the way for studying the mechanism underlying child labor by documenting the incidence of child labor, the substitutability of child time use and mother time use, and intrahousehold resource allocation rules.

IV. OVERVIEW OF JOINT IDE–MVF SURVEY

A. Sampling Strategy

Given our limited monetary and human resources, we used a variable probability (VP) sampling scheme (see Cosslett [1993, pp. 6–7] and Wooldridge [2002, pp. 590–96]). This is a version of choice-based (CB) sampling which has a cost advantage over random and exogenous sampling when there are only a limited number of people (households) choosing the strata of interest. One example, taken from Amemiya (1985, p.321), is sampling at the train/bus stations when one wants to survey train and bus commuters, which will be cheaper than conducting a large-scale household survey asking each individual about their preferred mode of transportation.

The essential estimation problem entailed in CB sampling is that, by definition, there is a systematic selection of who appears in the data. This is corrected by dividing the likelihood by sampling weights, or probabilities of each strata being sampled. For example, if one stratum is sampled twice as much as other strata, then one has to divide the likelihood for the stratum by two to adjust for its overinfluence on estimation. This also indicates that the coverage of the strata in the CB sampling must be exhaustive: to infer the characteristics of a population, no single stratum must be left unsampled. This can be considered a pitfall, or a cost, in CB sampling.

The strata we used are households with and without child laborers. We chose VPS to ensure that a sufficient number of households with child laborers are included in the sample. This was partly done for the purpose of measuring the impact of MVF’s intervention on child labor eradication. Naturally, one needs to have a sufficient number of households with child laborers if one wants to measure the impact of a child labor eradication program. In the survey the definition of a child is a person aged below 14, following the widely used definition of the International Labor Organization (ILO)’s convention on banning child labor (ILO Convention No. 138).⁴

Elementary and secondary school children in India are those aged between 5 and 16. Thus our survey definition treats children who are 15 and 16 years old as adults, which does not fully conform with the Indian school system. This is not problematic for two reasons. First, the legal upper age limit for compulsory education as set in Article 45 of the Indian Constitution is 14.³ The Child Labor Act (Prohibition and Regulation Act) of 1986 also sets the upper age limit at 14. But as casual observations indicate, this legal age limit to prevent child labor exerts little constraint on parents and employers living in the surveyed region. But the survey’s age definition is consistent with the legal basis for the right of a child to education which will form any basis for enforcement of child-labor ban, if it exists. Second, when facing two different upper age limits, parents are more likely to choose the lower limit in an area where child labor is prevalent. The surveyed region is particularly backward in the state of Andhra Pradesh, which is known nationally as a state with a high incidence of child labor (Kurosaki *et al.* 2006). In addition to these two reasons, we adopted the 5–14 definition to make international comparison easier.

Variable probability sampling uses the following procedure:

1. For each village $v = 1, \dots, 32$, randomly sample a household.
2. If the household is in the stratum $j = 1, 2$, sample the household with probability p_j ; reject the household with probability $1 - p_j$.
3. Go to 1 and repeat for M_j times.

$j = 1$ denotes stratum 1 households with child laborers, $j = 2$ is stratum 2 households without child laborers. We set $p_1 = 1 - p_2 = 2/3$ to oversample the households with child laborers.

One complication arose because the national census data we used in selecting households misclassified the strata. Some households recorded as stratum 1 did not have a working child, while others recorded as stratum 2 had a working child. These error probabilities are r_1, r_2 , respectively, which we assume to be common among villages. Therefore, the actual sampling probability for correctly stratified stratum j households is:

$$\pi_j = \frac{M_j p_j (1 - r_j) + M_j p_j r_j}{N_j + N_j}, \text{ for } j \neq j. \quad (1)$$

Given that we assume that each village belongs to a different set of population with different village-level parameters, the denominator is the total number of households with children in each village $N_v = N_{v,1} + N_{v,2}$. Having set $M_1 = M_2 = M = 15$, we have:

$$\pi_{v,j} = \frac{M}{N_v} [p(1-r_j) + (1-p)r_{j'}]. \quad (2)$$

For estimation, the common multiplicative term can be dropped, so for all villages $v = 1, \dots, 32$:

$$\pi_{v,j} = \frac{p(1-r_j) + (1-p)r_{j'}}{N_v}, \text{ for } j = 1, 2, j' \neq j. \quad (3)$$

Probabilities in the numerator are $\pi_1 = 0.4388$, $\pi_2 = 0.5488$. For better or worse, due to errors in stratum classification, our intention to oversample child labor households was nullified, and the survey was closer to random sampling.

B. Estimating Descriptive Statistics under VP Sampling

Thus, for estimating the population mean of $x_{v,j,i}$ for village v , stratum j , individual i , one notes:

$$\hat{\varepsilon}[x_{v,j,i}] = \sum_v \sum_j \bar{\pi}_{v,j} \bar{x}_{v,j} = \sum_v \sum_j \bar{\pi}_{v,j} \sum_i \frac{x_{v,j,i}}{n_{v,j}}, \quad \sum_v \sum_j \bar{\pi}_{v,j} = 1, \quad (4)$$

where $n_{v,j}$ is the total number of sampled households from village v stratum j , and $\bar{\pi}_{v,j}$ is normalized to sum to 1:

$$\bar{\pi}_{v,j} = \frac{\pi_{v,j}}{\sum_v \sum_j \pi_{v,j}}. \quad (5)$$

For estimating variances, we have:

$$\hat{v}[x_{v,j,i}] = \hat{\varepsilon}[(x_{v,j,i} - \hat{\varepsilon}[x])^2], \quad (6)$$

$$= \sum_v \sum_j \sum_i \pi_{v,j,i} (x_{v,j,i} - \hat{\varepsilon}[x])^2,$$

where for all i in village v , stratum j ,

$$\bar{\pi}_{v,j,i} = \frac{\frac{\pi_{v,j}}{n_{v,j}}}{\sum_v \sum_j \frac{\pi_{v,j}}{n_{v,j}}}, \quad \sum_v \sum_j \sum_i \bar{\pi}_{v,j,i} = 1. \quad (7)$$

As for the various quantiles, one cannot readily estimate population quantiles under VP sampling, as quantiles are not continuous functions that can be computed with weights and sampled quantities. However, one can use an appropriately weighted resampling method similar to bootstrapping to obtain

the empirical distribution of the quantile of interest. Note that under VP sampling one can approximate the population by using individual weights $\pi_{v,j,i}$. Then, if one randomly chooses households of v, j, i from a pool of households whose incidence is weighted with an inverse of $\pi_{v,j,i}$, one can get an unweighted (re)sample of the population. By repeating the process for sufficiently large N times, one can obtain the empirical distribution of the quantiles of interest. The procedure is as follows:

1. Augment the sampled households v, j, i by the factor $\delta / \pi_{v,j,i}$ where δ is the least common multiple of $\pi_{v,j,i}$ that satisfies $\delta / \pi_{v,j,i}$ to be an integer. In practice, the magnitude of augmentation is such that $\delta / \pi_{v,j,i}$ has four or five digits above the decimal point, so the rounding errors become a factor of 0.1% to 0.01%.
2. Sample 400 households $\delta / \pi_{v,j,i}$ from the augmented data and store it as $F^{(1)}$. Take a l th quantile $q_l^{(1)}$
3. Repeat sampling from the same augmented data for N times.
4. Compile an empirical distribution of q_l by plotting $q_l^{(k)}$ for $k = 1, \dots, N$. Mean or median estimates of q_l and its standard deviation can be obtained directly from the empirical distribution of q_l .

C. Logistics

A team of fifteen English-speaking enumerators were formed into five to seven groups, and each group visited households selected by the VPS scheme. A questionnaire written in English was used which asked about roster, time use, expenditures, land use, health conditions, access to credit, and risks.⁶ The enumerators were trained in several rounds of pilot surveys conducted prior to the main survey. They asked the questions in Telugu (the official language of Andhra Pradesh) but wrote the responses in English. The enumerators were all employees of the MVF and were accustomed to surveys because the MVF carries out village censuses jointly with local collaborators before expanding its programs into new villages (see MVF [2005, pp. 263]).

A team surveyed roughly 15 households in a village, visiting each household twice or more times daily, early in the morning before the farmers went to the fields, late in the afternoon after they came back from the fields, and sometimes out in the fields at lunch time to ensure that respondents answer. As they stayed in the region for an extended period, the team members were able to avoid surveying during the frequent local festivities. The resultant data were inputted electronically in Hyderabad and cleansed in Japan. In the first round of the survey, a total of 400 households were surveyed from 32 agricultural villages in two *mandals* during February and March 2005. The second round of the survey was conducted in October 2005. The empirical papers in this special issue used the information from the first round of the survey which is available for statistical analysis.

V. CONTRIBUTIONS OF THE PAPERS

The study by Fuwa *et al.* (2006), the first of this special issue's three empirical papers based on the IDE-MVF survey data, investigates the characteristics of intrahousehold resource allocation in poor households. The authors first test for the presence of discrimination in allocating consumption among household members. Gender discrimination is a much talked about problem in India and other developing countries, but the argument has concentrated on school enrollment or morbidity of females, and has rarely been examined using expenditure data. This is due to the relative ease of observing enrollment and morbidity, and the difficulty of acquiring detailed information on assignable goods, a group of goods that can determine the end user, such as men's clothing. As the welfare of individuals primarily derives from consumption, it is important to formally test the existence of gender discrimination using expenditure data. The detailed expenditure information compiled in the survey provides us a unique opportunity to study discrimination in everyday consumption.

The study follows Deaton (1989) in allowing the data to classify by itself the assignment of goods (known as the "adult goods approach"). Point estimates suggest a general pattern of discrimination against daughters in consumption, although the estimates are mostly insignificant. This is roughly in line with the existing literature that uses Indian National Sample Survey data, suggesting that the power of the adult goods approach may be weak in detecting statistically significant evidence of gender discrimination.

Given the suggestive evidence of consumption allocation discrimination within households, the paper examines if such an allocation rule is decided unanimously by adult household members. It presents a unified framework for testing unitary and collective models of households using expenditure data. It uses the rich set of grandparental variables collected in the survey, so-called extra-household environmental parameters (EEPs), that are predicted by theory to influence bargaining power, hence expenditure decisions, within a household.

Using the results of Chiappori (1992), the paper derives and tests a set of testable restrictions of collective models against the data. An analogous argument is employed to derive a set of testable restrictions for the unitary model without requiring information on individual income. This distinguishes the approach in this paper from the commonly used test of income pooling. The results do not reject the unitary nor collective models, while providing some supportive evidence for the collective models.

The coefficient on the rainfed land holding owned by the surviving father of the spouse shows a positive impact on both the mother and father goods, implying a wealth effect. But the size of the wealth effect is much larger for the mother goods, lending support to the collective models. In line with collective models, the literacy of the surviving father of the spouse reduces the father goods consumption. The mere significant estimates of EEPs cannot tell if they are capturing preference heterogeneity or the parameters of the sharing rule function. The last finding is stronger evidence of collective models because it is not plausible that differences in the surviving or death of grandparents of the child would change the preferences of a unitary household. A collective model has a natural interpretation of change in bargaining power.

The authors further discuss the plausibility of spurious correlation between residential proximity of spousal fathers and an increase in child/mother goods spending. The paper introduces a sorting mechanism through risk diversification, which predicts a positive correlation between residential proximity and greater ability of spousal fathers. A simple check on the correlation between proximity and ability, and on the correlation between proximity and income risk measure gives no support of such a sorting mechanism. Thus the authors conclude that providing support for spousal parents who live close by may result in less discrimination in the household of a married-off daughter.

The second empirical paper, by Kurosaki *et al.* (2006), investigates the determinants of child labor and school enrollment using the IDE-MVF dataset. Employing a reduced-form approach, the paper estimates a village fixed-effect logit model for each child with the incidence of child labor or school enrollment as the dependent variable, in order to investigate individual and household characteristics associated with the incidence.

Among the determinants, this paper focuses particularly on whose education matters most in deciding the status of each child, an issue rarely investigated in the context of the joint family system. The regression results show that the education of the child's mother is more important in reducing child labor and in increasing school enrollment than that of the child's father, the household head, or the spouse of the head. The effect of the child's mother is similar on boys and girls while that of the child's father is more favorable on boys.

As other covariates associated with the incidence of child labor and school enrollment, the authors find that the age and sex of the child, a dummy variable for the ration card holder under the Public Distribution System of the Government of India, and some of the characteristics of the grandparents of the child (proxy for EEPs) are statistically significant predictors. The sign of the ration card dummy is opposite to what was expected: the variable has a positive coefficient on school enrollment. This variable may capture the effect of households' interaction with local administration: households with ration cards may have superior access to the local administration so that they send their children to school more. The significance of the EEP proxy variables suggests that the status of children is determined in a process consistent with collective household models. The impact of land is insignificant on child labor, which suggests that in the drought-prone environment, the impact of land holding on improving marginal returns on child labor in farm work is small.

The third empirical paper, by Sawada *et al.* (2006), recognizes that in developed countries, the status of women in the labor force is an important indicator of a society's progress. In developing countries, however, maternal labor participation often occurs as a consequence of poverty involving undesirable outcomes such as the withdrawal of children from school and their engagements in domestic and outside labor. On the other hand, there is an emerging consensus in the literature that the lack of access to credit

is a major source of child labor and intrahousehold resource inequality. In existing studies, however, there has been little exploration of the intervening structure composing the credit constraint-child labor nexus. For these reasons, this paper examines the effects of credit constraints on maternal labor and those of maternal labor on the intrahousehold inequality of labor allocation within a unified framework, treating both maternal employment and credit constraints as endogenous. By doing so, this study fills the gap in the literature by uncovering the relationship involving the credit constraints, maternal labor, and child labor.

Three findings emerged from the analysis by Sawada *et al.* (2006). First, labor participation by mothers generates an undesirable negative impact on intrahousehold labor resource allocation. Elder daughters bear a major part of the burden of maternal labor participation by quitting school and providing domestic labor. Second, a mother is more likely to work outside when a household lacks sufficient resources and her domestic labor can be easily replaced by other family members: The presence of adult male members who lack education, the availability of daughters and sons who can supply labor for domestic chores, and the absence of infants in the family all increase the probability of mother participation outside the household. Finally, credit market accessibility is identified as a major factor inducing maternal labor by constraining the household's resource availability.

Also included in this special issue is a review by Ito (2006) which presents an overview on the current conditions of schooling across countries. Ito notes that the net school enrollments rates vary substantially among low income countries, and net school enrollment rates are positively correlated with government spending per student, which in turn is positively correlated with national dependency rates.

Ito presents a model in order to classify the interventions as demand-side or supply-side: the former varies at the household level while the latter varies at the community level. The paper's literature review shows that demand-side policies, i.e., conditional transfer programs, are successful in raising enrollment rates. It also shows that supply-side policies which reduce access costs and increase returns to education have been successful. However, Ito points out that little is known about the reasons behind the successes (and failures). This is partly due to the recent emphasis on randomized trials that ensure consistent estimates of program impacts. He argues that while it is a scientifically correct way to conduct research, one needs to weigh the trade-offs between randomized trials and observational studies.

Ito's paper also examines the program run by the MVF as another approach to supply-side interventions promoting education. The program's emphasis clearly departs from previous findings that one needs to reduce the opportunity costs of schooling, which are addressed in conditional transfer programs by giving subsidies to parents and in supply-side policies by reducing access costs through school expansion. The paper argues that a rigorous study on the MVF program impacts and household adaptation mechanisms will provide new insights into child labor.

To sum up the papers presented in this special issue, their research focuses in particular on three important topics: child labor, gender discrimination, and intrahousehold resource allocation. A wide range of findings are presented, some of which are shared among the papers. Child labor is a major phenomenon in the surveyed region, and some of the findings confirmed the known tendency: less educated parents and poorer parents are more likely to send their children out to work. The present research examines more closely the status of the child and shows more clearly that girls are less favored than boys, which also shows clearly in household spending patterns, including those on school related goods. Gender discrimination against girls is clear and strong in our sample. It takes the form of lower school enrollment rates, longer working hours, shorter leisure and schooling time, and less spending on them. Girls are set to work at a younger age with less investment in them. Partly in response to ameliorate the inequality, mothers cut their own consumption for their daughters. Thus recovering intrahousehold resource allocation rules becomes crucial to understanding and reducing poverty. Whether the household follows the norm of unitary or collective models fundamentally affects policy design. For example, the recipient of a transfer of resources will increase his/her bargaining position in the household, and the transfer should be directed to those who care about the weak and vulnerable household members. The evidence shown in this special issue is supportive of the collective models, although the identification may suffer from the usual omitted variable biases. One exception found is in the estimation of expenditure patterns where certain characteristics of the surviving father of the spouse increase female and child consumption, but those characteristics have no effect where the spouse's father is deceased. With an additional assumption of fixed preferences, this lends stronger support to the collective models.

FOOTNOTES

- ¹ This section draws on Fuwa *et al.* (2000).
- ² Yet, whether such unintended effects exist is an important empirical question. For example, Jacoby (2002) finds that under the school feeding program in the Philippines, parents of programmed participants do not withdraw calories from their children on school days. These intrahousehold ‘fly paper effects’ are found even for poorer households.
- ³ See Alderman *et al.* (1995), Fuwa, *et al.*, 2000, for other such examples.
- ⁴ ILO (1996) sets different upper age limits of being a child depending on the type of work. For jobs regarded as “light” work, a person is a child if under 13 years of age; for work regarded as “hazardous,” being under 18 years of age is deemed a child.
- ⁵ “The State shall endeavour to provide, within a period of ten years from the commencement of this Constitution, for free and compulsory education for all children until they complete the age of fourteen years.”
- ⁶ The questionnaire used in the survey can be found in the Appendix of Ito (ed.) (2005).

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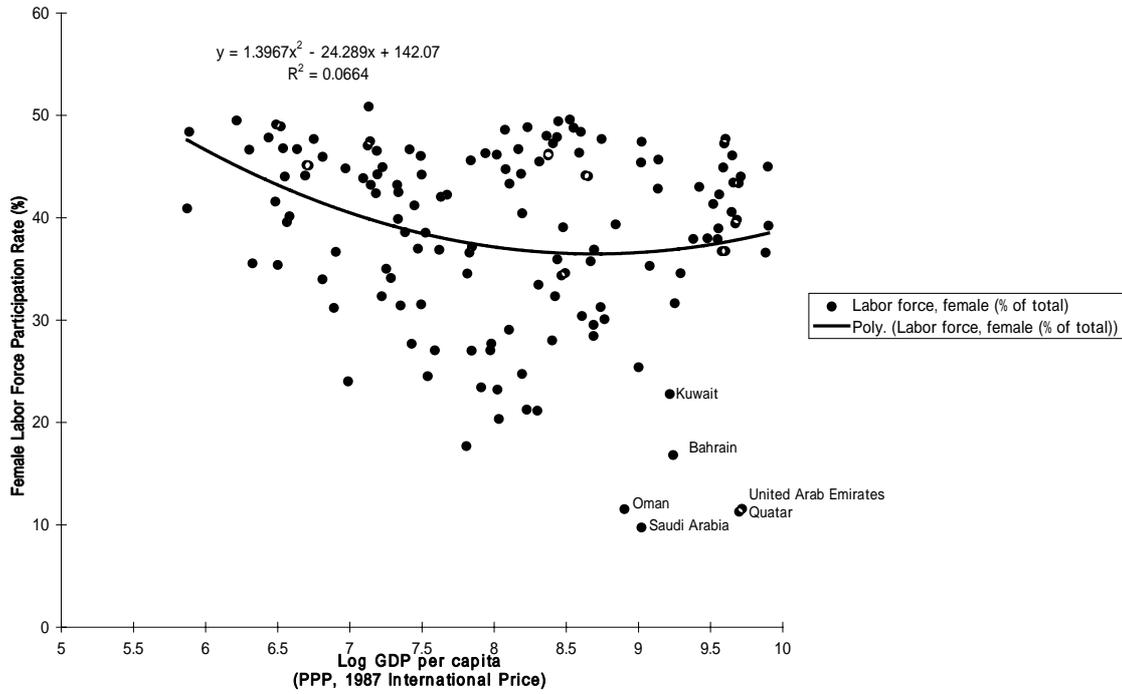
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Figure 1

The U-Shaped Female Labor Force Participation



The U-Shaped Female Labor Force Participation Rate (in 1990)

Data source: World Development Indicators, World Bank

TABLE 1
Summary of Empirical Findings on Child Labor, Gender Discrimination, and Intrahousehold Allocation

Paper	Child labor	Gender discrimination	Unitary versus collective models
Fuwa <i>et al.</i> (2006)	<ul style="list-style-type: none"> • School-related expenditures on older daughters decrease. 	<ul style="list-style-type: none"> • Detected a weak bias against infant girls in consumption allocation. • School-related expenditures on boys remain constant with age. • Mothers cut own spending for daughters. 	<ul style="list-style-type: none"> • Formal tests reject both models. • A less formal test using interaction terms supports collective models.
Kurosaki <i>et al.</i> (2006)	<ul style="list-style-type: none"> • Birth parents' education matters, not household head's or spouse's. 	<ul style="list-style-type: none"> • Significant estimates on sex dummies. • Fathers favor sons, while mothers treat both sons and daughters equally. 	<ul style="list-style-type: none"> • Supportive of collective models.
Sawada <i>et al.</i> (2006)	<ul style="list-style-type: none"> • Given gender, a positive correlation between maternal labor supply and child labor.* • In credit constrained households, when mothers work more outside of households, the daughters do more domestic work and go less frequently to school.* 	<ul style="list-style-type: none"> • Maternal employment increases the time girls spent on household chores relative to boys.* • Maternal employment reduces the time girls spent on schooling and leisure.* 	<ul style="list-style-type: none"> • Supportive of collective models.

*indicates control for household fixed effects. All regressions control village and caste fixed effects.