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The Power to Choose in India: Gender Balance of Power and Intra-Household Educational Spending[#]

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Abstract: We assess the impact of female bargaining power on the share of educational expenditures in the household's budget. We augment the collective household model by endogenizing the female bargaining power and use a 3SLS approach to simultaneously estimate female bargaining power, per capita household expenditure and budget share of education. Our key results are: (i) female bargaining power has a positive and significant impact on the share of educational spending in urban areas and a negative impact in rural areas; (ii) this bargaining power has a positive impact on girls' educational expenditure only in urban areas; (iii) we observe a pro-male bias in educational spending for all age groups with some differentiation by location; and (iv) we identify differences based on caste affiliation: while in rural areas, an increase in female bargaining has a negative effect on spending on both girls and boys among OBCs, in urban areas, we find that for all caste groups, female bargaining leads to greater educational spending on girls than on boys.

Keywords: collective household model, female bargaining power, gender bias, education, India

JEL codes: D13, C31, J16, I25

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1. Introduction

Achieving gender equality in educational inputs and outcomes has been recognized as a key policy objective in the United Nations' Millennium Development Goals. In recent decades, empowering women has also been acknowledged as an important outcome not just in its own right, but also as a way to confer benefits to their households, and thereby contribute to overall economic development. This is also the view echoed recently in the World Development Report (2012) and in Duflo (2012).

In this paper, our objective is to understand how gender matters for intra-household decision-making processes. More specifically, using the recently available nationally representative India Human Development Survey of 2011-12, we ask the following three questions (i) does the bargaining power of women affect the household's budget share devoted to education?; (ii) does the intra-household allocation of educational expenditure among sons and daughters depend on female bargaining power?; and (iii) do these effects vary by caste?

An increase in female bargaining power and autonomy has been linked to greater allocation of resources in favor of children in the household (see Doss, 2013 for a recent overview). The underlying explanation proposed for such findings is that women tend to be more altruistic than men and are therefore inclined to make decisions that benefit children's welfare and, thus, overall household welfare. Therefore, resources in the hands of women have a larger positive impact on outcomes for children than similar amounts of resources held by men. For example, Hoddinott and Haddad (1995) show that raising the share of women's cash income increases the budget share of food and reduces the share of expenditures on alcohol and cigarettes in Cote D'Ivoire. Reggio (2011) finds that an increase in maternal bargaining power is associated with fewer hours of work for their daughters in Mexico. Using an artefactual field experiment, Dasgupta and Mani (2015) focus on eliciting the role of entitlements on altruistic consumption choices among husbands and wives. They find that wives are more likely to choose the joint household consumption bundle whereas their husbands are more likely to choose a private consumption good, irrespective of the way their economic resources are earned, thereby suggesting greater altruism on the part of women.

Afridi (2010) investigates the effect of female autonomy on children's educational outcomes, as measured by grade attainment in India. She finds that households with more educated and autonomous mothers exhibit lesser bias against girls' schooling. While an increase in both father's and mother's education is associated with a larger effect on daughter's attainment, the mother's education level has a more marked relationship with the gender gap in schooling compared to

father's education. Alfano, Arulampalam and Kambhampati (2011) study the effect of female autonomy on school starting age of children using data for three states in India and find it to be a significant positive determinant in only one of the states. Specifically, in terms of educational expenditures, Quisumbing and Maluccio (2003) using data from four countries (Bangladesh, Indonesia, Ethiopia and South Africa) find that female bargaining power as defined by a woman's assets at marriage increases the share of household expenditures on children's education, but whether boys or girls benefit more differs substantially across countries, highlighting the relevance of cultural factors. For instance, in Bangladesh, mother's schooling and assets have a positive effect on girls' education. In Ethiopia, on the other hand, the mother's asset ownership reduces investments in daughter's education but increases it for boys.

That there exists a gender gap in educational expenditures in India is not a new finding. However, this finding has been shown to be dependent on the methodology used. Kingdon (2005) discusses that any gender bias in educational expenditures can be on account of two decisions; one, the decision to enroll sons and daughters; and two, conditional on enrollment of sons and daughters, how much to spend on their education. She further argues that aggregating these decisions and using the traditional Engel curve approach is one of the reasons that studies have failed to consistently detect gender bias in educational expenditures, even when other development markers indicate the presence of gender discrimination.[1] Using a hurdle model that takes these two decisions into account, Azam and Kingdon (2013) find a greater pro-male bias in enrollments in the 15-19 age group but a greater bias in expenditure decisions in the 10-14 age groups. Zimmerman (2012), using both hurdle models and the Engel curve method, also finds discrimination against girls in educational expenditures to be increasing in age.

Possible differentiation of the effect of female bargaining power by caste[2] is worth investigating. Since Schedule Caste (SC) women have historically worked outside the home, even though typically in low-paying occupations, it has been argued that the resulting income and the

[1] The Engel curve approach regresses the household budget share of the good in question on log of per capita expenditure, log of household size, shares of different age-sex groups and other household characteristics. Using this approach, Subramanian and Deaton (1991) find a weak pro-male bias in the 10-14 age group in rural Maharashtra, India. Lancaster, Maitra and Ray (2008) find a pro-male bias in the 11-16 year age group in the rural areas of the states of Bihar and Maharashtra, India.

[2] The caste system is a centuries old social stratification system that places individuals into hereditary, largely endogamous and occupation-specific groups. At the bottom of the hierarchy, are the 'Ati-Shudras' ('untouchables', also referred to as Scheduled Castes) with whom any contact was seen as polluting. They were forced to live in segregated housing; denied access to schools and places of worship attended by upper castes; and required to maintain physical distance from upper castes in order to not pollute them. Also, there are the indigenous tribes (Adivasis, also known as Scheduled Tribes) who on account of geographical isolation and distinct lifestyle have been socially distanced and face large-scale exclusion. In addition to the SCs and STs, there is a third category known as the Other Backward Classes (OBCs) which while not burdened with the stigma of untouchability, was socially and educationally backward.

independence gave rise to a culture in which these women were relatively assertive within their households, enjoyed greater financial autonomy and greater control over household resources (Kapadia, 1997; Chakravarti, 1993; Mencher, 1988). Similarly, within Scheduled Tribes (STs), attitudes towards women are more liberal in general, and in some northeastern Indian states, there is also a presence of matrilineal tribes. In contrast, among the upper castes, irrespective of their economic status, maintaining ritual purity has been an important concern, which results in greater restrictions on the mobility, decision-making, and labour force participation of women.

In this paper, to account for the endogeneity of female bargaining power and per capita expenditure, we simultaneously estimate equations for female bargaining power (as measured by the share of the sum of females' gross wages in the household), log of per capita household expenditure and budget share of education using a three stage least squares (3SLS) methodology. In addition to taking into account the potential endogeneity, this method acknowledges that error terms are correlated across equations via a non-diagonal covariance matrix. The empirical methodology is similar to that used in Lancaster, Maitra and Ray (2006). Some of the key differences between our analysis and theirs are: firstly, while their paper is concerned with the effect of male bargaining power on expenditure patterns covering various goods, we focus solely on the effect of female bargaining on educational expenditures and are further able to study its impact on gender-specific expenditures, as facilitated by our data; secondly, acknowledging that caste is a major aspect of one's social identity in India, we also comment on how this relationship is mediated by caste; finally, while they study only three states in India, we use a nationally representative data covering all states thereby providing more generalizable results for a recent time period.

Our key results are: (i) female bargaining power has a positive and significant impact on the share of educational spending in urban areas and a negative impact in rural areas; (ii) this bargaining power has a positive impact on girls' educational expenditure only in urban areas; (iii) we observe a pro-male bias in educational spending for all age groups with some differentiation by location; and (iv) we identify differences based on caste affiliation: while in rural areas, an increase in female bargaining has a negative effect on spending on both girls and boys among OBCs, in urban areas, we find that, for all caste groups, female bargaining leads to greater educational spending on girls than on boys.

The rest of this paper is organized as follows. Section 2 describes the methodology to be used. Section 3 discusses the data. Section 4 lays out the summary statistics and results. Section 5 provides concluding comments.

2. Methodology

We depart from the collective household model (Bourguignon, Browning, Chiappori and Lechene, 1993; Browning and Chiappori, 1998) which relaxes the unitary model assumption of income pooling between the household income earners in determining the expenditure outcomes. A potential drawback of such a model is that the welfare weight assigned to each income earner is assumed to be exogenous to the household's decision-making. Basu (2006) criticizes this assumption, and proposes a framework where the welfare weight of the adult male vis-à-vis the adult female income earner, namely the "bargaining power" variable, is jointly determined with the household's expenditure outcomes. In this paper, we follow this approach and adopt the empirical framework developed in Lancaster et al. (2006) and Lancaster et al. (2008).

We consider a household with two members, a man (*m*) and a woman (*f*). Utility depends on both consumption (*x*) and leisure (*l*). Following the collective approach developed by Browning and Chiappori (1998), the household's objective function can be written as the weighted sum of utilities of the two members. The household thus faces a utility maximisation problem as follows:

$$(1)\ \text{Max}\ \theta U_f\left(x_m, x_f, l_m, l_f\right) + (1-\theta) U_m\left(x_m, x_f, l_m, l_f\right)$$

which is subject to the income constraint

$$(2)\ \sum_{i=m,f} p' x_i \leq \sum_{i=m,f} w_i (T_i - l_i) + I.$$

U_i denotes the utility of member i ($i = m, f$), x_i represents a vector of private consumption of individual i; w_i, T_i, and l_i correspond to the wage rate, time endowment and leisure of individual i. I is the total unearned income of the household while p represents a vector of prices for good x. In this setting, price and wage are assumed to be exogenous. The welfare weight of member f, $\theta \in [0,1]$, depends on prices, household income and other characteristics such as the distribution of income, bargaining power, etc.

Equations (1) and (2) can be solved to obtain demand functions for each good *g*.[3] The household level budget shares of good *g*, (b^g), can be written as the θ-weighted average of the budget shares of that good for each spouse (*m*, *f*), namely, b_f^g and b_m^g, so that

(3) $b^g = \theta b_f^g + (1-\theta) b_m^g$.

The demand functions of education (*edu*) for each spouse (*m*, *f*) is written as:

(4) $b_f^{edu} = \alpha_f^{edu} + \beta_f^{edu}[\theta\mu] + \epsilon_f^{edu}$

(5) $b_m^{edu} = \alpha_m^{edu} + \beta_m^{edu}[(1-\theta)\mu] + \epsilon_m^{edu}$

where θ is used as the income sharing rule, and μ denotes the household income, so that $\theta\mu$ is the income assigned to the female and $(1-\theta)\mu$ is assigned to the male. With regular datasets, one cannot use information on 'exclusive' goods, in particular spending by each household member, as such information is rarely collected in household surveys. With the inclusion of demographic variables (household size and age-sex composition) as independent variables, an aggregated budget share of education can be derived from (3), (4) and (5) as follows: [4]

(6) $b \quad = \alpha_0 \ + \alpha_1 \ \theta + \beta_f \ \theta^2\mu + \beta_m (1-\theta)^2\mu + \gamma \log(n) + \sum_{k=1}^{K} \varphi_k \ \left(\frac{n_k}{n}\right) + \varepsilon \quad ,$

where *n* denotes the household size, and n_k the number of individuals in the age-sex group *k*.

With the data that we use (as described in the next section), one can separate the amounts of expenditures on girls' and boys' education, hence allowing us to identify gender-specific budget shares in the total household expenditures. In one version of the models, we can separately estimate for girls (*g*) and boys (*b*):

(7) $b^g \ = \alpha_0^g \ + \alpha_1^g \ \theta + \beta_f^g \ \theta^2\mu + \beta_m^g \ (1-\theta)^2\mu + \gamma \log(n) + \sum_{k=1}^{K} \varphi_k^g \ \left(\frac{n_k}{n}\right) + \varepsilon^g$

and

(8) $b^b \ = \alpha_0^b \ + \alpha_1^b \ \theta + \beta_f^b \ \theta^2\mu + \beta_m^b \ (1-\theta)^2\mu + \gamma \log(n) + \sum_{k=1}^{K} \varphi_k^b \ \left(\frac{n_k}{n}\right) + \varepsilon^b$

[3] See Lancaster et al. (2003) for details on the derivation procedure.
[4] We remove the superscript *edu* for simplicity.

An alternative modelling involves the hurdle model (Kingdon, 2005).[5] To test for subjective gender bias, Masterson (2012) uses the hurdle model and adds variables that are proxies for female bargaining power within the household (such as female ownership of land and the share of household income earned by the female spouse or partner). While this model allows the author to simultaneously detect both what he calls *objective* and *subjective* gender bias in the allocation of consumption expenditure[6], it does not allow him to jointly determine the "bargaining power" (the welfare weight of the adult male vis-à-vis the adult female income earner) with the household's expenditure outcome. As a consequence, in this paper, we follow Lancaster et al. (2006, 2008) who relax a potentially limiting characteristic of the conventional model of unitary households, namely, that the welfare weight assigned to each income earner is exogenous to the household decision-making process.[7]

Hence, as in Lancaster et al. (2006), the "bargaining power" variable is jointly determined with the household's expenditure outcomes. We define a bargaining power, θ, such as $\theta = \theta(z)$, with z being a set of choice variables. These z are then not exogenous, as in the traditional literature, but are part of the household's decision-making process. Indeed, the bargaining power could be deemed endogenous if it is correlated with the unobserved determinants of budget shares. That would be the case if for instance the household decision-making process evolves in function of the type of goods the household needs to consume, whose goods are in turn dependent on other household unobserved characteristics. We then allow for an endogenous determination of $\theta(z)$. θ is proxied by the share of the sum of females' gross wages in the household's total gross wages, as a measure of female bargaining power within the household.[8] Previous literature indicates that the extent to which a woman contributes to the household income determines her say in decisions that affect the household (e.g., Blumberg and Coleman, 1989; Desai and Jain, 1994).

[5] The hurdle model is a two-step estimation whose first step estimates the likelihood of a household deciding to spend money on children's education. The second step is an OLS regression of educational spending for the subset of households that have positive levels of spending, referred to as a conditional OLS.

[6] *Subjective* gender bias refers to systematic differences in economic decision making between sexes, the focus being on the decision maker. *Objective* gender bias includes systematic differences in the allocation of resources depending on the sex of the recipients, the focus being on the object of the decision (Masterson, 2012).

[7] In other words, an important feature of the unitary household model is that the identity of the income recipient or, alternatively, the share of earnings of an individual member, does not matter for the household's expenditure outcomes.

[8] We tried alternatives (the share of males' gross wages, or cash wages), which provide similar qualitative results. Another possibility would have been to use the gross wages of the household head male (or female) only to calculate the share of the most significant male (female) earnings. The problem is that it is difficult to identify this income in the case of non-nuclear households, and/or when the household head (either male or female) is in fact not an income earner.

We jointly estimate bargaining power, per capita household expenditure and the budget share of education spending using three-stage least squares (3SLS) estimation methodology. The advantage of 3SLS estimation methodology is that it takes into account not only the potential endogeneity of the bargaining power, expenditure and budget share variables, but also allows for mutual feedback between the equations via a non-diagonal covariance matrix of their residuals.

The following system of equations is thus estimated:

(9a) $\theta = \theta(X_1, TotExp) + \vartheta_1$

(9b) $PCExp = PCExp(X_2) + \vartheta_2$

(9c) $b^{edu} = b^{edu}(\theta, PCExp, X_3) + \vartheta_3$

where *TotExp* and *PCExp* represent, respectively, total household expenditure and per capita household expenditure, X_1, X_2, X_3 are vectors of exogenous determinants, and $\vartheta_1, \vartheta_2, \vartheta_3$ are stochastic error terms. X_1, in the bargaining power equation (9a), includes the education share of adult females in household, and its squared value, the log household size, dummies for caste, religion and urban location, and the log age of the household head. X_2, in the log per capita expenditure equation (9b), includes the log age, years of education and a sex dummy of the household head, dummies for caste, religion and urban location, the total number of adults in household, and two household wealth controls (electricity, home owner). Finally, the set of exogenous variables (X_3) in the budget share of educational expenditure equation (9c) include the log household size, urban location and share of individuals in different sex-age categories. We include the shares of males and females in the following age groups: 0-4, 5-9, 10-14, 15-19, 20-55, and over 55. Females over 55 years of age comprise the omitted category. In all regressions, we also include district dummy variables.

In one version of the 3SLS regressions, we replace the aggregated share of educational expenditures b^{edu} by the shares of sex-specific educational expenditures, thus for boys (b^{edu_b}) and girls (b^{edu_g}). In all sets of estimates, we run separate regressions for rural and urban households.

3. Data

The data used in this paper are from the India Human Development Survey 2011-12 (IHDS-II) conducted by the University of Maryland in collaboration with the National Council of Applied

Economic Research, New Delhi between November 2011 and October 2012. The nationally representative data covers 1,420 villages and 1,042 urban areas across 33 states and union territories of India.[9] The survey covering 42,152 households was carried out through face-to-face interviews by pairs of male and female enumerators in local languages. The respondents included a person who was knowledgeable about the household economic situation (usually the male head of the household) and an ever-married woman aged 15-49. The detailed modules of the survey canvass data on a wide range of questions relating to economic activity, income and consumption expenditure, asset ownership, social capital, education, health, marriage, gender relations and fertility, etc.[10]

Since our primary interest is in understanding the allocation of educational expenditure, we restrict the analysis to households where there is at least one member aged 5-19. The educational expenditure data is collected at the household level and also individually for each child. Data is available on the following categories of education-related expenses for each enrolled child: school fees; school books, uniforms and other materials; transportation; and private tuition. We calculate the total education expenditure as the sum of the abovementioned categories.[11]

4. Results

4.1 Summary Statistics

Summary statistics are reported for the full sample and for rural and urban samples in Table 1. About 33 percent of the households are in urban areas. The share of female wages in total household wage income, our proxy of female bargaining power, is about 21 percent. We find that females' share of wage income in the households is significantly lower in urban areas as compared to rural areas. In contrast, the share of adult female education in total adult education in the household is greater in the urban areas than in the rural areas. This reflects the higher educational attainment among women in urban areas but their lower labour force participation (and consequently, lower wage contributions) as compared to rural women.

[9] Andaman and Nicobar and Lakshadweep were not included in the sample.

[10] The IHDS-II data are a successor to the IHDS-I data. IHDS-I conducted in 2004-05 surveyed 41,554 households. The IHDS-II re-interviewed about 83 percent of these households, and used an additional replacement sample of 2,134 households.

[11] As a robustness check, we can also use the total educational expenditure reported at the household level in our analysis. We aim to add this in the next draft.

On average, the share of household expenditure devoted to education is about 5.5 percent with the corresponding averages in rural and urban areas being 4.5 percent and 7.8 percent respectively. In both rural and urban areas, we find that the share of household budget on girls' education is lower than that incurred on boys' education. In Table 2, we present the average educational expenditures for boys and girls in different age brackets in all areas and in rural and urban areas separately. The key points to note are: first, education expenditures are increasing in age for both boys and girls in all areas. Second, significantly more is spent on boys than on girls and this gender gap in expenditures tends to be higher in older age groups. Thirdly, the gender gap in expenditures is generally smaller in rural than in urban areas for all age groups. Further, in statistics not reported here, we find that, for each category of educational expenditure – school fees, schoolbooks, uniforms and other materials, transportation, and private tuition – families spend significantly lower amounts on girls than boys.

As expected, households in urban areas tend to be better-off, as is evident from higher total household consumption expenditures and also higher per capita expenditures in the urban areas. In urban areas, heads of households on average also have greater educational attainment than their counterparts in rural areas. We observe greater proportions of Scheduled Castes and Tribes (SCSTs) and lower proportions of upper castes (UCs) in rural areas in our data. Share of Other Backward Classes (OBCs) is fairly similar across areas.

4.2 Estimation Results

We first discuss 3SLS estimates of the system of equations (9a), (9b) and (9c). Given the existence of differences in educational expenditures, female share of wage income and other characteristics between rural and urban areas as shown in Section 4.1, we report all the regressions disaggregated by location. It should be noted that for each of the regressions that follow, the Breusch Pagan test statistic shows a clear rejection of the null hypothesis of diagonal covariance matrix of the disturbance terms, thereby justifying the use of the 3SLS technique instead of OLS (these are available upon request from authors). As a robustness check, we also report OLS regressions for comparison purposes in Appendix A for the pooled, rural and urban samples.

4.2.1 The determinants of balance of power

Table 3 reports the coefficient estimates of the female bargaining power equation (9a) for the full sample and for rural and urban samples separately. The female bargaining power is negatively

associated with the household size, implying that this power is weaker in larger households. The magnitude of the household size coefficient is larger for urban households. Similarly, ceteris paribus, the negative sign on the urban dummy reveals that females in urban households have lower bargaining power, as also seen in the descriptive statistics in Table 1. As the female share of total educational attainment in the household increases, female bargaining power initially decreases, but less and less, till it reaches a minimum to then rise. The returns to the household share of female education on female bargaining power hence describe a U curve: at the average points of the samples, these returns are, respectively for the overall, rural and urban samples, 0.17, 0.13 and 0.24. Female education is then more powerful for improving female bargaining power in urban areas.

Other coefficients are worth commenting on. The coefficients on total household expenditure are positive and significant in the pooled sample but disaggregated results show that this is driven by only urban households. Interestingly, age of the household head is positively associated with greater female bargaining power. Urban Hindu households report greater bargaining power for females compared to households with other religions. Finally, low caste households (SCSTs and OBCs) in rural areas exhibit a greater female bargaining power compared to upper caste households. This result is in accordance with the assumption that low caste women experience greater autonomy and control over household resources (Kapadia, 1997; Chakravarti, 1993; Mencher, 1988), and that attitudes towards women may be more liberal in general compared to upper caste women who face greater restrictions on mobility, decision-making, and labour force participation due to the value placed on ritual purity.

Table 4 reports the coefficient estimates of the same specification using segmented samples by castes for urban and rural areas. The regressions again indicate that the female bargaining power is negatively associated with the household size, especially in low caste households in urban areas where the magnitudes are the highest. The returns to the household share of female education on the female bargaining power proxy confirm the U curve pattern, except for high caste households in rural areas, for whom the effect is rather linearly increasing. Whatever the locality of the households, females in high caste households get higher “returns” to their education in terms of bargaining power: the returns at the sample means are 0.19, 0.10, 0.15, respectively for UC, SCST and OBC groups in rural areas, while these returns amount to 0.40, 0.20 and 0.18 respectively for households in urban localities. For UC households in urban areas, this suggests that a one percent increase in female education share within the household leads to a 4 percent increase in the bargaining power proxy (the share of female wages to total wages).

4.2.2 The determinants of per capita household expenditure

Table 5 presents the 3SLS coefficient estimates of the determinants of log per capita expenditure (9b) for the full sample, and for rural and urban samples. These mostly conform to intuition and are in accordance with previous literature: SCSTs and OBCs are worse-off than upper castes, Hindu households fare better than other religions, and households in urban areas are richer than those in rural ones. More educated and older heads are associated with richer households. One surprising result is the negative association between the household head being male and the log per capita expenditure. This is contrary to previous literature that typically finds female-headed households to be poorer and more vulnerable.[12]

4.2.3 The determinants of budget share of educational expenditures

In Table 6, we report the 3SLS estimates of the budget share equation of educational expenditures (9c) for the full sample, and for rural and urban samples. In terms of assessing the effect of female bargaining power on the expenditure share of education, note that there are two channels through which it works. The first is the direct effect as measured by the coefficient of θ, and the second is through the income-sharing rule. Only considering one or the other would not take into account the full picture. Using equation (6), we test jointly if α_1 = 0 and $\beta_m\ \theta = \beta_f$ (1- θ). Since this test will be dependent on the value of θ, we report the Wald test statistics at the bottom of Table 6 and all the other tables as well, for the following values of θ: 0, 0.2, 0.4, 0.6, 0.8 and 1. The null hypothesis is that the bargaining power has no effect, which would conform to the unitary household model against the collective model. We also report the joint effects of female bargaining power at the bottom of the table, which are evaluated at the average values of per capita expenditure and θ.[13] As the test statistics indicate, we are able to reject the null for all reported values of θ, indicating that female bargaining power is positively associated with the share of household budget devoted to education. We however note that there are differential effects in rural and urban areas such that the effect of female power is negative in rural areas and positive with a larger absolute magnitude in urban areas.

[12] We also obtain the same result using OLS regressions. See Table A.2.

[13] Note that since this effect is dependent on the value of θ, one can compute this for all values in the interval 0 to 1. We aim to add that in the next draft.

In terms of other covariates, as seen previously in Table 1, we find the share of household spending on education to be significantly higher in urban areas and in larger households. This is in line with previous findings that suggest that at any given level of household expenditure, larger households will be better-off due to economies of scale on account of shared goods within the household.

In Table 7, we estimate equation (9c) separately for each caste group in rural and urban areas. In rural areas, we find that female bargaining power is not a significant determinant of educational spending among upper castes at any value of θ in the interval of 0 to 1 (as indicated by Wald tests). On the other hand, it is always significant among rural OBCs but, at average sample values, we find the effect to be negative. Among SCSTs, only once the female bargaining power is at least 0.4, we observe that it significantly and positively affects the household's education budget. On the other hand, in urban areas, at average values of θ for all caste groups, we observe a positive and significant relationship between female power and educational spending, with effects being larger among upper castes and SCSTs as compared to OBCs. Further, we find that household size has a positive and significant effect on household's share of educational expenditure and this holds irrespective of the location and caste. However, SCSTs exhibit a somewhat greater association between household size and budget share of education.

We test for systematic differences in the effects of the age-sex composition variables (shares in household) in the budget share equations. A significant negative difference between females and males within an age group would indicate the existence of a significant pro-male bias in educational expenditures for that specific age group. In Table 8, we list the difference in marginal effects (defined as female minus male) for age groups 5-9, 10-14 and 15-19 for all areas, rural and urban areas, and for each caste group. Overall, the difference in the marginal effects (female minus male) is statistically significant and negative for all the age groups, meaning that families spend more on boys' education than that of girls (column 1). As columns 2 and 3 indicate, we observe differences based on location. While the difference in marginal effects is significant in rural areas for the 10-14 age group only, the gender gap is significant only for the 5-9 age group in urban areas. For this group, there is a large gap of more than 4 percentage points to the detriment of girls. This may reflect that, in rural areas, 10-14 is a decisive age group in that parents may make girls help out with household chores leading to dropouts or lower school attendance.

Moving onto differences by caste, in the rural areas, the gender gap in educational expenditure is significant for the following age groups: 5-9 (among OBCs), 10-14 (among SCSTs and OBCs) and

15-19 (among upper castes and SCSTs). In the urban areas, this gender gap in educational spending is significant for the following age groups: 5-9 (among upper castes and OBCs), 10-14 (among SCSTs), and 15-19 (among upper castes). We observe that for each of the caste groups, gaps appear to be larger in urban than in rural areas. Further, while in the urban areas, the gender gap is always significant for upper castes (with the exception of age group 10-14 where the difference is significant at 12 percent level of significance), it is significant in fewer cases for SCSTs and OBCs.

4.2.4 The determinants of budget share of sex-specific educational expenditures

In Table 9, we estimate the system of equations separately for boys and girls where equation (9c) measures the share of household expenditures on girls' education and on boys' education respectively. Looking at columns 1 and 2, we see that female bargaining power appears to matter uniformly for educational expenditure on girls but not always for that on boys. Further, at average values, it has a positive effect on share on girls' educational expenditure but a diametrically opposite effect on that for boys. In Table 6, we found that female bargaining was negatively correlated with the household's education budget in rural areas, and upon disaggregating by sex, we see that this is the case for expenditure on both girls' and boys' education with the impact being worse for girls. By contrast, in urban areas, girls' educational expenditure is positively affected by the bargaining power of females in their household while, for boys, the average effect is negative. This is in accordance with some previous findings in the literature that indicate that the mother's influence has a greater (positive) impact on girls' outcomes (e.g., Qian, 2008; Thomas, 1990; Duflo, 2003).

We also estimate the same regressions by caste groups in rural and urban areas in Tables 10 and 11 respectively. In Table 7, we observed that, for upper castes in rural areas, female bargaining power was not significant at any value of θ (column 1). Upon disaggregating this by sex of the child, in the first two columns of Table 10, we find that while this bargaining power matters for girls' educational spending at values of θ exceeding 0.2, it is never significant for boys. On the other hand, among SCSTs in rural areas, we find the contrary result, i.e. female power is never an important determinant of spending on girls but it matters for boys except at intermediate values of θ. The negative relationship observed for rural OBCs in column 3 of Table 7 appears to be driven primarily by the negative effect of female bargaining power on girls' educational expenditures. In urban areas, as seen in Table 11, at most values of θ for all caste groups, female bargaining matters significantly for both boys and girls. Further, it should be noted that the average effect of female bargaining power is greater with respect to girls' educational expenditure than that for boys, for all

caste groups in urban areas. We however do not find that the translation of female power into higher educational spending for girls or boys differs along caste lines. Among OBCs in particular, while the average effect on combined girls' and boys' expenditure was positive in urban areas (Table 7), examining sex-specific expenditures shows a positive effect on girls' spending and a negative one on that for boys.

5. Conclusion

In this paper, our objective has been to assess to impact of female bargaining power - as measured by females' share of wage income in the household - on the share of educational expenditures in the household's budget. We augment the collective household model by endogenizing the female power and use a 3SLS approach to simultaneously estimate female bargaining power, per capita household expenditure and budget share of education.

In line with the literature that shows maternal autonomy to positively determine child outcomes, we find female bargaining power to positively affect the share of household budget devoted to children's education. However, this effect varies by location such that a positive (negative) effect is observed in urban (rural) areas. Exploiting the availability of educational expenditure data at the individual level, we are able to estimate sex-specific expenditure share regressions. In rural areas, we find a negative effect of female power on both boys' and girls' expenditures while, in urban areas, the effect if positive for girls and negative for boys. We further examine the effect by the households' caste affiliation and obtain that, in urban locations, the average effect of female bargaining power is greater with respect to girls' educational expenditure than that for boys, for all caste groups in urban areas. These results find support from previous literature that indicates female or maternal bargaining to reap greater returns for girls rather than boys in the household. Our results also suggest that the gender bias in favour of boys differs along caste lines, especially in urban areas where the pro-male bias is almost always significant among upper castes but is significant in fewer cases among SCSTs and OBCs.

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Table 1: Summary Statistics

Variables	All	Rural	Urban
Female wage income share	0.21	0.235	0.158
	(0.314)	(0.318)	(0.299)
Share of female education	0.386	0.364	0.426
	(0.292)	(0.31)	(0.252)
Budget share of education	0.055	0.045	0.078
	(0.077)	(0.067)	(0.091)
Budget share of education on boys	0.043	0.034	0.06
	(0.063)	(0.055)	(0.075)
Budget share of education on girls	0.035	0.027	0.052
	(0.057)	(0.048)	(0.072)
Household Size	5.566	5.623	5.449
	(2.173)	(2.184)	(2.145)
Adults	2.912	2.861	3.019
	(1.39)	(1.362)	(1.44)
Total household expenditure (Rs.)	111833.3	96655.43	143303.9
	(99582.73)	(92018.19)	(107029.8)
Per capita expenditure (Rs.)	21470.56	18156.24	28342.69
	(20313.76)	(18331.33)	(22395.54)
Male headed household	0.891	0.894	0.885
	(0.312)	(0.308)	(0.319)
Household head age	46.874	46.710	47.214
	(12.045)	(12.339)	(11.404)
Years of education of head	5.206	4.254	7.180
	(4.806)	(4.436)	(4.944)
Urban	0.325		
	(0.468)		
Hindu	0.811	0.829	0.773
	(0.392)	(0.377)	(0.419)
Scheduled Caste/Tribe	0.368	0.415	0.268
	(0.482)	(0.493)	(0.443)
Other Backward Classes	0.396	0.389	0.410
	(0.489)	(0.487)	(0.492)
Upper Caste	0.226	0.186	0.308
	(0.418)	(0.389)	(0.462)
Share: males aged 0-4	0.031	0.034	0.025
	(0.073)	(0.076)	(0.065)
Share: females aged 0-4	0.029	0.032	0.024
	(0.072)	(0.076)	(0.065)
Share: males aged 5-9	0.063	0.066	0.057
	(0.106)	(0.108)	(0.102)
Share: females aged 5-9	0.055	0.059	0.048
	(0.10)	(0.102)	(0.095)
Share: males aged 10-14	0.074	0.076	0.069
	(0.118)	(0.119)	(0.115)
Share: females aged 10-14	0.066	0.067	0.062
	(0.11)	(0.111)	(0.109)
Share: males aged 15-19	0.068	0.067	0.072
	(0.117)	(0.116)	(0.119)
Share: females aged 15-19	0.064	0.063	0.064
	(0.11)	(0.11)	(0.109)
Share: males aged 20-55	0.229	0.221	0.247
	(0.114)	(0.114)	(0.114)
Share: females aged 20-55	0.237	0.23	0.253
	(0.098)	(0.096)	(0.101)
Share: males aged over 55	0.037	0.039	0.033
	(0.076)	(0.078)	(0.073)

Share: females aged over 55	0.044 (0.082)	0.045 (0.083)	0.044 (0.081)
Number of observations	20,631	13,919	6,712

Note: Standard deviations in parentheses.

Table 2: Educational expenditure by age, location and gender

	All			**Rural**			**Urban**		
	5-9	**10-14**	**15-19**	**5-9**	**10-14**	**15-19**	**5-9**	**10-14**	**15-19**
Boys	3420.2	3972.9	6065.3	2257.4	2771.3	4451.3	6186.2	6602.8	9163.6
Girls	2758.9	3090.6	4523.1	1759.7	1936.9	3025.9	5199.6	5696.9	7586.9
Difference	661.3***	882.2***	1542.1***	497.72***	834.42***	1425.4***	986.6***	905.9***	1576.6***

Note: *** denotes significance at 1 percent level.

Table 3: 3SLS estimates of female bargaining power

	(1) **All**	(2) **Rural**	(3) **Urban**
Sh. of female education in total education	-0.195***	-0.176***	-0.289***
	(0.021)	(0.025)	(0.039)
Sh. of female education squared	0.472***	0.424***	0.629***
	(0.022)	(0.026)	(0.041)
Log (total expenditure)	0.021***	0.001	0.043***
	(0.004)	(0.006)	(0.007)
Ln (household size)	-0.097***	-0.082***	-0.108***
	(0.007)	(0.009)	(0.011)
Hindu	0.024***	0.000	0.037***
	(0.006)	(0.009)	(0.010)
SCST	0.026***	0.050***	-0.008
	(0.006)	(0.008)	(0.010)
OBC	0.009	0.029***	-0.013
	(0.006)	(0.008)	(0.009)
Age of head	0.079***	0.070***	0.102***
	(0.009)	(0.011)	(0.016)
Urban	-0.052***		
	(0.007)		
Constant	-0.334***	-0.113	-0.646***
	(0.062)	(0.078)	(0.105)
Observations	17,603	11,323	6,280
R-squared	0.180	0.194	0.179

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table 4: 3SLS Estimates of female bargaining power by castes

	(1)	(2)	(3)	(4)	(5)	(6)
		Rural			**Urban**	
	Upper Castes	SCSTs	OBCs	Upper Castes	SCSTs	OBCs
Sh. of female education in total education	-0.044	-0.172***	-0.165***	-0.276***	-0.189***	-0.301***
	(0.063)	(0.038)	(0.041)	(0.085)	(0.066)	(0.057)
Sh. of female education squared	0.279***	0.405***	0.452***	0.744***	0.476***	0.594***
	(0.064)	(0.040)	(0.043)	(0.088)	(0.071)	(0.062)
Log (total expenditure)	0.030**	0.005	-0.008	0.072***	0.026*	0.036***
	(0.013)	(0.009)	(0.009)	(0.013)	(0.013)	(0.011)
Ln (household size)	-0.088***	-0.086***	-0.082***	-0.079***	-0.116***	-0.125***
	(0.020)	(0.014)	(0.014)	(0.021)	(0.023)	(0.017)
Hindu	0.017	-0.027	0.010	0.025	0.011	0.047***
	(0.020)	(0.018)	(0.015)	(0.018)	(0.027)	(0.014)
Age of head	0.070***	0.073***	0.064***	0.094***	0.102***	0.106***
	(0.025)	(0.017)	(0.018)	(0.031)	(0.030)	(0.023)
Constant	-0.486***	-0.187	0.084	-1.041***	-0.456**	-0.640***
	(0.164)	(0.212)	(0.130)	(0.178)	(0.227)	(0.229)
Observations	2,308	4,480	4,419	1,993	1,657	2,544
R-squared	0.218	0.219	0.246	0.248	0.243	0.232

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table 5: 3SLS estimates of log per capita expenditure

	(1) **All**	(2) **Rural**	(3) **Urban**
Male head	-0.059***	-0.060***	-0.047**
	(0.013)	(0.016)	(0.020)
Age of head	0.381***	0.301***	0.458***
	(0.017)	(0.021)	(0.030)
Years of education of head	0.038***	0.028***	0.049***
	(0.001)	(0.001)	(0.001)
Hindu	0.071***	0.073***	0.035**
	(0.011)	(0.015)	(0.017)
SCST	-0.190***	-0.207***	-0.126***
	(0.011)	(0.014)	(0.018)
OBC	-0.087***	-0.079***	-0.080***
	(0.010)	(0.014)	(0.016)
Total no. of adults	-0.064***	-0.056***	-0.074***
	(0.003)	(0.004)	(0.005)
Home owner	-0.102***	-0.016	-0.109***
	(0.014)	(0.032)	(0.016)
Electricity	0.188***	0.174***	0.246***
	(0.014)	(0.015)	(0.042)
Urban	0.165***		
	(0.012)		
Constant	8.832***	9.146***	8.481***
	(0.084)	(0.104)	(0.150)
Observations	17,603	11,323	6,280
R-squared	0.424	0.362	0.408

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table 6: 3SLS estimates of budget share of educational expenditures

	(1) **All**	(2) **Rural**	(3) **Urban**
Female bargaining power	0.040***	-0.062***	0.115***
	(0.012)	(0.021)	(0.017)
Female bargaining power sq*per capita expenditure	-1.57e-07	7.58e-07*	-5.46e-07***
	(1.85e-07)	(4.37e-07)	(2.03e-07)
Male bargaining power sq*per capita expenditure	4.82e-07***	-4.29e-08	8.44e-07***
	(7.26e-08)	(1.30e-07)	(9.53e-08)
Urban	0.030***		
	(0.002)		
Log (household size)	0.013***	0.011***	0.012***
	(0.002)	(0.002)	(0.004)
Sh. of males aged 0-4	-0.081***	-0.096***	-0.062***
	(0.012)	(0.013)	(0.024)
Sh. of females aged 0-4	-0.078***	-0.083***	-0.083***
	(0.011)	(0.013)	(0.023)
Sh. of males aged 5-9	0.048***	0.017	0.109***
	(0.010)	(0.011)	(0.019)
Sh. of females aged 5-9	0.031***	0.013	0.063***
	(0.010)	(0.011)	(0.020)
Sh. of males aged 10-14	0.071***	0.050***	0.111***
	(0.009)	(0.010)	(0.018)
Sh. of females aged 10-14	0.050***	0.027***	0.098***
	(0.009)	(0.010)	(0.018)
Sh. of males aged 15-19	0.083***	0.068***	0.107***
	(0.009)	(0.011)	(0.018)
Sh. of females aged 15-19	0.062***	0.059***	0.092***
	(0.009)	(0.010)	(0.018)
Sh. of males aged 20-55	-0.058***	-0.086***	-0.040**
	(0.011)	(0.015)	(0.020)
Sh. of females aged 20-55	-0.017**	0.004	-0.044***
	(0.008)	(0.009)	(0.016)
Sh. of males aged over 55	-0.056***	-0.086***	-0.011
	(0.013)	(0.015)	(0.024)
Constant	-0.009	0.033**	-0.027
	(0.013)	(0.015)	(0.025)
Observations	17,603	11,323	6,280
R-squared	0.175	0.133	0.134
Wald test for female bargaining			
$\theta = 0$	69.24***	58.34***	78.52***
$\theta = 0.2$	34.36***	109.34***	54.93***
$\theta = 0.4$	10.71***	125.23***	52.43***
$\theta = 0.6$	28.98***	92.93***	85.31***
$\theta = 0.8$	51.65***	65.67***	110.26***
$\theta = 1$	65.83***	49.71***	121.66***
Effect of female bargaining power	0.021	-0.054	0.069

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table 7: 3SLS estimates of budget share of educational expenditures by castes

	Rural			Urban		
	Upper Castes	**SCSTs**	**OBCs**	**Upper Castes**	**SCSTs**	**OBCs**
	(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**
Female bargaining power	-0.021	0.036	-0.044	0.122***	0.129***	0.077***
	(0.041)	(0.029)	(0.029)	(0.032)	(0.024)	(0.029)
Female bargaining power sq*per capita expenditure	1.93e-07	-3.96e-07	5.11e-07	-7.63e-07*	-3.65e-07*	-6.41e-07*
	(8.41e-07)	(7.15e-07)	(5.84e-07)	(4.26e-07)	(2.21e-07)	(3.89e-07)
Male bargaining power sq*per capita expenditure	-6.33e-08	4.01e-07	-1.27e-07	7.08e-07***	8.09e-07***	4.84e-07***
	(1.58e-07)	(2.65e-07)	(2.02e-07)	(1.65e-07)	(1.82e-07)	(1.45e-07)
Log (household size)	0.011**	0.018***	0.013***	0.010	0.017**	0.013**
	(0.005)	(0.003)	(0.003)	(0.007)	(0.007)	(0.006)
Sh. of males aged 0-4	-0.046	-0.061***	-0.089***	-0.071	-0.015	-0.040
	(0.029)	(0.019)	(0.020)	(0.047)	(0.039)	(0.038)
Sh. of females aged 0-4	-0.060**	-0.041**	-0.090***	-0.133***	-0.035	-0.044
	(0.029)	(0.018)	(0.020)	(0.045)	(0.039)	(0.038)
Sh. of males aged 5-9	0.018	0.041**	0.031*	0.155***	0.132***	0.099***
	(0.025)	(0.017)	(0.017)	(0.036)	(0.035)	(0.031)
Sh. of females aged 5-9	0.048**	0.039**	0.006	0.096**	0.101***	0.042
	(0.024)	(0.017)	(0.017)	(0.037)	(0.035)	(0.030)
Sh. of males aged 10-14	0.089***	0.077***	0.044***	0.153***	0.136***	0.115***
	(0.022)	(0.015)	(0.016)	(0.033)	(0.032)	(0.029)
Sh. of females aged 10-14	0.084***	0.044***	0.013	0.112***	0.082**	0.131***
	(0.022)	(0.015)	(0.016)	(0.032)	(0.032)	(0.028)
Sh. of males aged 15-19	0.123***	0.095***	0.062***	0.167***	0.116***	0.112***
	(0.023)	(0.017)	(0.016)	(0.033)	(0.033)	(0.028)
Sh. of females aged 15-19	0.083***	0.071***	0.055***	0.123***	0.103***	0.104***
	(0.022)	(0.015)	(0.015)	(0.032)	(0.031)	(0.029)
Sh. of males aged 20-55	-0.034	-0.046**	-0.079***	-0.063*	-0.022	-0.020
	(0.029)	(0.020)	(0.022)	(0.036)	(0.034)	(0.032)
Sh. of females aged 20-55	0.013	0.009	-0.009	-0.054*	-0.039	-0.021
	(0.020)	(0.015)	(0.014)	(0.030)	(0.028)	(0.025)
Sh. of males aged over 55	-0.039	-0.071***	-0.084***	-0.006	0.046	-0.030
	(0.031)	(0.021)	(0.022)	(0.043)	(0.043)	(0.039)
Constant	-0.002	0.107**	0.034	-0.018	-0.065	-0.027
	(0.027)	(0.047)	(0.023)	(0.040)	(0.055)	(0.063)
Observations	2,308	4,480	4,419	1,993	1,657	2,544

R-squared	0.255	0.217	0.167	0.233	0.206	0.216
Wald test for female bargaining						
$\theta = 0$	0.27	2.41	8.09**	19.22***	29.61***	11.06***
$\theta = 0.2$	0.92	1.66	15.46***	14.75***	29.86***	8.39**
$\theta = 0.4$	2.28	5.01*	19.65***	19.47***	35.59***	7.18**
$\theta = 0.6$	2.63	8.8**	17.01***	33.06***	44.37***	9.08**
$\theta = 0.8$	2.49	9.95***	13.55***	39.15***	47.60***	10.89***
$\theta = 1$	2.32	10.08***	11.14***	40.43***	47.30***	11.94***
Effect of female bargaining power	-0.017	0.023	-0.036	0.074	0.091	0.05

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table 8: Difference in marginal effects between girls and boys by age, caste and location

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	All	**Rural**	**Urban**		**Rural**			**Urban**	
Age				**UCs**	**SCSTs**	**OBCs**	**UCs**	**SCSTs**	**OBCs**
5-9	-0.017**	-0.004	-0.045***	0.029	-0.002	-0.025*	-0.059**	-0.031	-0.057**
	(0.008)	(0.008)	(0.015)	(0.019)	(0.012)	(0.013)	(0.029)	(0.026)	(0.023)
10-14	-0.021***	-0.023***	-0.013	-0.005	-0.033***	-0.031**	-0.041	-0.054**	0.016
	(0.007)	(0.008)	(0.013)	(0.017)	(0.012)	(0.012)	(0.025)	(0.023)	(0.02)
15-19	-0.024***	-0.012	-0.015	-0.039**	-0.024*	-0.007	-0.044*	-0.013	-0.008
	(0.007)	(0.008)	(0.013)	(0.018)	(0.013)	(0.012)	(0.024)	(0.023)	(0.02)

Note: Difference between marginal effects is measured as female minus male such that negative values indicate pro-male bias. * significant at 10%,** significant at 5%,*** significant at 1%.

Table 9: 3SLS Estimates of budget share of educational expenditures by sex

	(1)	(2)	(3)	(4)	(5)	(6)
	All		**Rural**		**Urban**	
	Girls	Boys	Girls	Boys	Girls	Boys
Female bargaining power	0.028***	-0.007	-0.092***	-0.014	0.111***	-0.021
	(0.010)	(0.013)	(0.021)	(0.016)	(0.015)	(0.021)
Female bargaining power sq*per capita expenditure	-1.45e-07	3.13e-07	1.36e-06**	2.55e-07	-5.97e-07***	6.22e-07*
	(1.53e-07)	(2.39e-07)	(5.38e-07)	(3.42e-07)	(1.65e-07)	(3.33e-07)
Male bargaining power sq*per capita expenditure	3.19e-07***	2.67e-07***	-1.34e-07	7.52e-08	6.31e-07***	3.31e-07***
	(6.50e-08)	(7.55e-08)	(1.23e-07)	(1.20e-07)	(9.13e-08)	(9.73e-08)
Ln (household size)	0.008***	0.004**	0.005***	0.007***	0.009**	-0.000
	(0.002)	(0.002)	(0.002)	(0.002)	(0.004)	(0.004)
Constant	0.006	0.017	0.049***	0.014	-0.033	0.050*
	(0.012)	(0.013)	(0.015)	(0.014)	(0.024)	(0.027)
Observations	12,090	13,126	7,902	8,531	4,188	4,595
R-squared	0.186	0.179	0.0548	0.154	0.137	0.189
Wald test for female bargaining						
$\theta = 0$	31.77***	71.59***	86.89***	15.16***	59.94***	47.56***
$\theta = 0.2$	18.02***	54.28***	219.61***	17.19***	56.24***	35.31***
$\theta = 0.4$	7.33**	15.35***	295.90***	11.76***	66.19***	9.03**
$\theta = 0.6$	13.97***	0.37	236.70***	4.91*	85.40***	1.11
$\theta = 0.8$	23.30***	3.83	179.47***	1.97	94.19***	5.16*
$\theta = 1$	29.23***	9.72***	144.40***	1.03	95.91***	9.87***
Effect of female bargaining power	0.015	-0.014	-0.078	-0.015	0.076	-0.032

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. Age-sex composition variables and district dummy variables included.

Table 10: 3SLS Estimates of budget share of educational expenditures by sex and caste in RURAL areas

	(1)	(2)	(3)	(4)	(5)	(6)
	Upper Castes		**SCSTs**		**OBCs**	
	Girls	Boys	Girls	Boys	Girls	Boys
Female bargaining power	-0.031	0.026	0.003	0.022	-0.078***	-0.020
	(0.035)	(0.029)	(0.032)	(0.022)	(0.023)	(0.025)
Female bargaining power sq*per capita expenditure	0.000	-0.000	-0.000	-0.000	0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male bargaining power sq*per capita expenditure	-0.000	0.000	0.000	0.000*	-0.000	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln (household size)	0.008**	0.005	0.012***	0.010***	0.005*	0.007**
	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
Constant	0.018	-0.008	0.180***	0.057	0.059***	0.018
	(0.022)	(0.026)	(0.045)	(0.054)	(0.021)	(0.021)
Observations	1,569	1,718	3,176	3,367	3,084	1,569
R-squared	0.262	0.274	0.250	0.182	0.147	0.262
Wald test for female bargaining						
$\theta = 0$	0.89	1.85	0.05	5.57*	34.96***	0.73
$\theta = 0.2$	4.53	1.28	0.13	2.41	48.03***	2.17
$\theta = 0.4$	9.36***	0.81	0.95	1.31	46.41***	4.80*
$\theta = 0.6$	9.80***	1.23	1.50	4.95*	29.75***	5.99**
$\theta = 0.8$	9.11**	1.68	1.58	7.73**	19.89***	6.08**
$\theta = 1$	8.47**	1.92	1.54	9.01**	15.60***	5.87*
Effect of female bargaining power	0.015	-0.026	0.0007	0.011	-0.059	-0.016

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. Age-sex composition variables and district dummy variables included.

Table 11: 3SLS Estimates of budget share of educational expenditures by sex and caste in URBAN areas

	(1)	(2)	(3)	(4)	(5)	(6)
	Upper Castes		**SCSTs**		**OBCs**	
	Girls	Boys	Girls	Boys	Girls	Boys
Female bargaining power	0.075**	0.066**	0.092***	0.026	0.089***	-0.098**
	(0.029)	(0.033)	(0.024)	(0.029)	(0.024)	(0.046)
Female bargaining power sq*per capita expenditure	-0.000	-0.000	-0.000	0.000	-0.000***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Male bargaining power sq*per capita expenditure	0.000**	0.000***	0.000***	0.000	0.000*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Ln (household size)	0.001	0.007	0.021***	-0.003	0.005	0.000
	(0.007)	(0.008)	(0.007)	(0.006)	(0.006)	(0.006)
Constant	0.008	0.035	-0.060	0.002	-0.028	0.052
	(0.039)	(0.043)	(0.071)	(0.047)	(0.051)	(0.075)
Observations	1,273	1,425	1,145	1,209	1,715	1,273
R-squared	0.321	0.281	0.256	0.303	0.232	0.321
Wald test for female bargaining						
$\theta = 0$	7.44**	14.63***	16.17***	1.18	16.01***	13.24***
$\theta = 0.2$	6.62**	8.22**	14.85***	0.92	18.36***	27.76***
$\theta = 0.4$	10.03***	4.27	14.87***	3.61	20.65***	31.06***
$\theta = 0.6$	15.36***	11.31***	18.32***	6.28**	20.12***	23.24***
$\theta = 0.8$	16.79***	18.03***	21.71***	7.06**	18.59***	17.80***
$\theta = 1$	16.64***	21.22***	22.99***	7.12**	17.47***	14.72***
Effect of female bargaining power	0.049	0.028	0.058	0.018	0.073	-0.088

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. Age-sex composition variables and district dummy variables included.

Appendix A: OLS results

Table A.1: OLS estimates of female bargaining power

	(1) **All**	(2) **Rural**	(3) **Urban**
Sh. of female education in total education	-0.197***	-0.145***	-0.325***
	(0.021)	(0.026)	(0.040)
Sh. of female education squared	0.472***	0.397***	0.664***
	(0.023)	(0.027)	(0.042)
Log (total expenditure)	0.008*	-0.009*	0.034***
	(0.004)	(0.006)	(0.007)
Ln (household size)	-0.087***	-0.073***	-0.102***
	(0.007)	(0.009)	(0.012)
Hindu	0.025***	0.008	0.033***
	(0.006)	(0.009)	(0.010)
SCST	0.024***	0.042***	-0.003
	(0.006)	(0.008)	(0.010)
OBC	0.008	0.026***	-0.011
	(0.006)	(0.008)	(0.009)
Age of head	0.081***	0.070***	0.104***
	(0.009)	(0.011)	(0.016)
Urban	-0.048***		
	(0.007)		
Constant	-0.203***	-0.000	-0.551***
	(0.063)	(0.079)	(0.108)
Observations	17,603	11,323	6,280
R-squared	0.181	0.194	0.180

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table A.2: OLS estimates of log per capita expenditure

	(1) **All**	(2) **Rural**	(3) **Urban**
Male head	-0.050***	-0.052***	-0.040*
	(0.013)	(0.016)	(0.021)
Age of head	0.378***	0.299***	0.456***
	(0.018)	(0.021)	(0.031)
Years of education of head	0.037***	0.028***	0.047***
	(0.001)	(0.001)	(0.001)
Hindu	0.069***	0.072***	0.032*
	(0.011)	(0.015)	(0.017)
SCST	-0.187***	-0.207***	-0.120***
	(0.011)	(0.014)	(0.018)
OBC	-0.086***	-0.079***	-0.077***
	(0.011)	(0.014)	(0.016)
Total no. of adults	-0.064***	-0.056***	-0.074***
	(0.003)	(0.004)	(0.005)
Home owner	-0.103***	-0.016	-0.112***
	(0.014)	(0.033)	(0.016)
Electricity	0.186***	0.173***	0.243***
	(0.014)	(0.015)	(0.043)
Urban	0.168***		
	(0.012)		
Constant	8.845***	9.149***	8.501***
	(0.085)	(0.106)	(0.154)
Observations	17,603	11,323	6,280
R-squared	0.424	0.362	0.408

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.

Table A.3: OLS estimates of budget share of educational expenditures

	(1) **All**	(2) **Rural**	(3) **Urban**
Female bargaining power	-0.004	-0.007**	0.001
	(0.003)	(0.003)	(0.006)
Female bargaining power sq*per capita expenditure	0.000***	0.000***	0.000**
	(0.000)	(0.000)	(0.000)
Male bargaining power sq*per capita expenditure	0.000***	0.000	0.000***
	(0.000)	(0.000)	(0.000)
Urban	0.029***		
	(0.002)		
Log (household size)	0.010***	0.015***	0.004
	(0.002)	(0.002)	(0.004)
Sh. of males aged 0-4	-0.093***	-0.087***	-0.102***
	(0.011)	(0.012)	(0.023)
Sh. of females aged 0-4	-0.089***	-0.074***	-0.126***
	(0.011)	(0.012)	(0.023)
Sh. of males aged 5-9	0.039***	0.024**	0.070***
	(0.009)	(0.010)	(0.019)
Sh. of females aged 5-9	0.023**	0.021**	0.029
	(0.010)	(0.010)	(0.019)
Sh. of males aged 10-14	0.063***	0.056***	0.080***
	(0.009)	(0.010)	(0.018)
Sh. of females aged 10-14	0.044***	0.032***	0.068***
	(0.009)	(0.010)	(0.017)
Sh. of males aged 15-19	0.074***	0.076***	0.075***
	(0.009)	(0.010)	(0.017)
Sh. of females aged 15-19	0.060***	0.057***	0.071***
	(0.009)	(0.010)	(0.018)
Sh. of males aged 20-55	-0.085***	-0.067***	-0.110***
	(0.009)	(0.010)	(0.017)
Sh. of females aged 20-55	-0.015*	-0.001	-0.047***
	(0.008)	(0.009)	(0.016)
Sh. of males aged over 55	-0.071***	-0.077***	-0.058**
	(0.012)	(0.013)	(0.023)
Constant	0.017	0.015	0.045*
	(0.011)	(0.012)	(0.024)
Observations	17,603	11,323	6,280
R-squared	0.187	0.165	0.189

Note: Standard errors in parentheses. * significant at 10%,** significant at 5%,*** significant at 1%. District dummy variables included.