Women's Empowerment and the Gender Gap in Schooling in India*

Farzana Afridi
Februrary, 2010

Abstract

This paper documents the existence of a significant relationship between the gender gap in educational investments and mothers' 'empowerment' within households in India. Greater female 'empowerment', measured by women's education and autonomy, is associated with a lower gap in the schooling of their sons and daughters across and within diverse socio-economic settings. Raising both father's and mother's education increases the educational attainment of daughters more than that of sons, but raising mother's education is associated with significantly greater reduction in the gender gap in schooling. From a policy perspective, the findings highlight the importance of women's 'empowerment' for intergenerational transfers of gender equity in education.

JEL Codes: D13, J16, I21
Keywords: empowerment, education, autonomy, gender, South Asia, India

* I am grateful to Bill Axinn, Julie Cullen, David Lam, Albert Park, Rohini Somanathan and three anonymous referees for detailed comments and suggestions. This paper has also benefited from discussions with Brahima Coulibaly and Bob Willis and inputs from seminar participants at the University of Michigan, the Population Studies Center at the Institute for Social Research and participants at the Population Association of America Annual Meeting, 2005. All errors remain my own.

1 Introduction

The World Bank Policy Research Report on engendering growth (King and Mason 2001) unambiguously suggests that gender equality is essential for sustainable economic growth and reduction in poverty in developing countries. Greater female authority within households is being progressively recognized as an important policy goal for improving not just the well-being of women themselves but also for its positive impact on the outcomes of children in those households (King and Mason 2001). Research suggests that mothers are likely to allocate more household resources to children compared to fathers (Blumberg 1988; Thomas 1990; Hoddinott and Haddad 1995; Quisumbing and Maluccio 2003). Therefore, an increase in mother's decision-making ability within the family can have a positive impact on her children's welfare (Thomas 1990; Thomas et al. 2002).

Existing evidence indicates that the impact of mother's influence on household decision-making may differ by the gender of the child (Thomas 1990; Murthi et al. 1995) but the literature is not conclusive on whether it exacerbates or reduces gender differences. Thomas (1990) finds that in Brazil women's education has a significantly stronger effect on girls' health while educated fathers prefer to invest more in boys. In Java (Thomas et al. 2002) and Cote d'Ivoire (Haddad and Hoddinott 1994), on the other hand, women with greater earned income allocate more resources to sons' health. Moreover, in comparison with the large and growing evidence on the relationship between women's role within the household and the health outcomes of their children (Thomas 1990; Haddad and Hoddinot 1994; Thomas et al. 2002), less is known about its effect on children's education or on existing gender inequity in household investments in schooling. While some empirical studies suggest that mothers' *education* (in Peru: King and Bellew 1988) or *labor income* (in China: Qian 2008) has a larger positive effect on daughters'

education, others find that fathers' *education* has a greater impact on girls' schooling (Quisumbing and Maluccio 2003) in some countries. In the latter study of four developing countries (Bangladesh, Indonesia, Ethiopia and South Africa) Quisumbing and Maluccio (2003) find that relative resources controlled by women increases the share of household expenditures on children's education, but whether boys or girls benefit more differs substantially across countries. 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 since the latter may be an important source of financial security of parents in old age. Quisumbing and Maluccio (2003), therefore, conclude that the direction of parental gender preference is a function of the underlying culture and customs of a country and thereby varies across case studies.

In the study reported in this paper, the aim was to expand the literature on female 'empowerment' by analyzing its relationship with gender gap in educational attainment in India. India forms an important case study for several reasons. First, in 2005-06 school enrollment of 6 to 14 year old girls was a little over 76% compared to almost 83% for boys in the country (National Family Health Survey (NFHS) 2005-06). This gender gap is significantly wider at higher levels of schooling (almost 10 percentage points for 11 to 14 year olds) and in rural areas (less than 1 percentage point in urban areas compared to 8 percentage points in rural India for 6 to 14 year olds (NFHS 2005-06)). Assessment of the progress made since the adoption of the Millennium Development Goals adopted at the United Nations (UN) Summit in 2000 shows that South Asia, besides sub-Saharan Africa, is lagging behind in elimination of gender disparity in education and universalization of primary schooling by 2015 (Glewwe and Zhao 2006). With almost 70% of the primary school age population in the region coming from India, the country's

poor performance has been a primary driver of the slow progress made since the UN declaration (Glewwe and Zhao 2006). Second, although some studies on the impact of female 'empowerment' on children's health in India exist (Murthi et al. (1995) find that female literacy and labor force participation reduces gender bias in child survival; Maitra (2004) finds that a woman's control over household resources has a significant effect on choosing prenatal care and hospital delivery which significantly reduce the hazard of child mortality), there is paucity of rigorous evidence on its effect on educational outcomes of boys and girls and thereby gender gaps in schooling. Third, there exists wide spatial disparity in women's decision-making authority (NFHS 1998-99) in India. Typically, women in the north have less authority within the household than in south India (Dyson and Moore 1983; NFHS 1998-99; Rahman and Rao 2004). The extent of gender gap in school participation mirrors the geographical distribution of female authority in household decision-making. In the four most populated northern states (Madhya Pradesh, Rajasthan, Bihar and Uttar Pradesh) the average gender gap in school enrollment of 6 to 17 year olds varies between 6 to 20 percentage points compared to 1 to 10 percentage points in the southern states (Tamil Nadu, Andhra Pradesh, Karnataka and Kerala) (NFHS 2005-06). A natural question, therefore, arises as to whether greater say of the mother in the household has any influence on the schooling of male and female children.

In this study I took into account the multi-dimensionality of female 'empowerment' by measuring it as women's education and autonomy. Utilizing data on the response of mothers who are currently married to questions on their decision-making ability within the household, I measured four aspects of their autonomy – decision-making authority, freedom of movement, physical abuse and access to money. In order to address the estimation problem of endogenous relationship between female 'empowerment' and household outcomes, this paper undertook two

analyses. First, I estimated a family fixed effects model to account for the possibility that unobservable family characteristics could influence both female autonomy and child schooling. Second, to address the possibility that fertility affects women's empowerment and children's educational outcomes, the paper checked the robustness of results by restricting the sample to children of those families that have completed childbearing.

The empirical results suggest that households with more educated and autonomous mothers exhibit less bias against girls' schooling. An increase in both father's and mother's education is associated with a larger effect on daughter's attainment. But mother's education level has a more striking relationship with the gender gap in schooling compared to father's education. The disparity in the average schooling of sons and daughters in a family where the mother has completed primary education is lower by almost 1/3rd years of schooling, compared to a household where the mother has less than primary education. Further, a one standard deviation increase in mother's autonomy is associated with an increase in daughter's schooling by more than half a month but has no correlation with son's education. Taken together, the estimates show that the reduction in gender inequality in schooling attainment of children within households is greater when the mother's education and autonomy rises from very low levels. The conclusions are unchanged when state and primary sampling unit dummies were included in the analysis to control for the simultaneous impact of aggregate level cultural factors and returns to female education on women's 'empowerment' and gender differences in educational investments. The results are also robust to analyzing the enrollment status of the child as the outcome variable to address the possibility that children's educational attainment, cumulated over years, may impact the mother's current 'empowerment'.

The remainder of the paper is organized as follows. Section 2 defines and conceptualizes female 'empowerment' as measured in this study. The data and the empirical methodology are described in Sections 3 and 4, respectively. Section 5 presents the empirical results and Section 6 concludes.

2 Conceptual framework

A. *Female 'empowerment'*

In the existing literature, female 'empowerment' has been measured in terms of: (1) women's *ownership of economic resources*; (2) the *legal institutions* that establish divorce laws and inheritance rights (Agarwal 1994); (3) *cultural or gender norms* regarding marriage and divorce (Rahman and Rao 2004; Anderson and Eswaran 2009); and (4) *human capital* such as education that can influence mobilization of resources. Recent studies suggest that cultural and gender norms are primary determinants of both women's ownership and control over the utilization of economic resources (Jejeebhoy 1998; Anderson and Eswaran 2009). The literature on female agency, thus, is increasingly recognizing that the construction of an appropriate measure of women's authority should be guided by the institutions prevalent in a society (Quisumbing and Maluccio 2003; Anderson and Eswaran 2009).

In the study I took this into account by measuring female 'empowerment' in terms of women's 'autonomy' and education (or human capital). I defined an autonomous woman as one who has the freedom to make her own decisions, has access to resources (her own or her husband's) and is able to exercise some degree of influence in the utilization of these resources. Thus 'autonomy' signifies women's independence in decision-making and self-reliance. It is a reflection of the social and cultural institutions that govern family behavior and could also determine women's ownership of material resources. Women's educational attainment was

included as an indicator of her potential earnings in the labor market and therefore her ability to access resources outside marriage. Education, besides being correlated with 'autonomy', could have an independent effect on household expenditures allocated to children's schooling (Thomas 1990; Quisumbing and Maluccio 2003).

B. *Defining the index of female autonomy*

I used data from the National Family Health Survey of India (NFHS 1998-99) to quantify female autonomy. The NFHS is a cross-sectional, nationally representative survey of households providing detailed information on the demographic and socio-economic characteristics of sampled families including each current resident's educational status and attainment. The individual survey in the NFHS is a cross-sectional survey of over 89,000 women in the reproductive age group. All ever married women aged 15 to 49 years in the sampled households, besides being interviewed about their education and reproductive histories, were asked questions on household decision-making and position within the family. It is important to point out that these responses are indicators of women's independence relative to other household members, including the husband. They do not necessarily measure all aspects of women's autonomy but summarize women's perceptions of their existing decision-making power on several dimensions. Further, the responses are unlikely to be affected by the presence of the husband, mother-in-law or any other household member since almost 98% of the interviews were conducted with only the respondent present.

For this study, the questions asked in the survey were grouped into four categories – 'decision-making authority', 'freedom of movement', 'physical abuse' and 'access to money'. The response scales were slightly modified from the original data to ensure the same minimum

and maximum scale for each indicator of female autonomy. Thus, the scale indicates increasing degree of autonomy, 1 being low autonomy and 3 being the highest, for each question:

Decision-making authority: Who makes the following decision in your household?

(COOK) What items to cook?

(HEALTH) Obtaining health care for yourself?

(JEWELRY) Purchasing jewelry or other major household items?

(FAMILY) Your going and staying with parents and siblings?

The responses were scaled as: 1= husband or others in the household, 2= respondent jointly with husband or others in the household, 3=respondent only

Freedom of movement: Do you need permission to,

(MARKET) Go to the market?

(RELATIVE) Visit relatives or friends?

The responses were scaled as: 1=not allowed to go, 2= yes, 3= no

Physical abuse:

(BEAT) How often have you been beaten or mistreated physically in the last 12 months?

The responses were scaled as: 1=many times, 2= few times or once, 3=not beaten

90% of the women, who reported being physically abused, were beaten by their husbands. This variable, therefore, was constructed only for physical abuse by the husband

Access to money:

(MONEY) Are you allowed to have money set aside that you can use as you wish?

The responses were scaled as: 1=no, 3=yes

All eight variables have significant, although low, correlation with each other implying the existence of a factor or factors common to all the indicators of a woman's autonomy in the household. For instance, a woman who is more likely to make her own decisions regarding items to cook, purchasing health care and household items is also more likely to have freedom of movement and access to money. I used common factor analysis (Rummel 1970) to assign weights to each measure of autonomy and aggregate them into a single variable which can be interpreted as a comprehensive indicator of a woman's position within the household. Factor analysis resulted in a total of eight factors of which four had an eigenvalue (degree and direction of relationship with all eight measures of female authority) greater than zero. The first factor explained 92% of the variance in the eight autonomy variables. The factor loadings (weights attached to and correlation with each measure of female authority) on the first factor suggested that it was positively correlated with each indicator of autonomy, with higher weight assigned to visiting family, the market or relatives, decision-making authority on purchasing health care, jewelry or other household items, and having access to money. I used this first common factor obtained through factor analysis as an 'index of female autonomy' along which women were ranked. The index accounts for the multidimensionality of women's autonomy and at the same time allows for ease of interpretation of the regression results. It was standardized to mean 0 and standard deviation 1 in the analysis.

I tested the validity of the index in two ways. First, in keeping with the demography literature which suggests that in patrilineal systems in the north women have less autonomy than in the south, (Dyson and Moore 1983; for a more recent exposition of inter-regional variations see Rahman and Rao 2004), Figure 1 shows that the index reproduces the spatial diversity in women's autonomy in India. The mean values of the index in the patrilineal northern states such

as Bihar, Uttar Pradesh and Madhya Pradesh are negative and lie in the lowest quintile. The southern and north-eastern states fall in the upper quintiles and exhibit positive or higher mean values.

[Figure 1 here]

Second, I examined the importance of the social, cultural and demographic factors, considered the source of female autonomy in India, in generating this index. The index was regressed on a host of individual and household characteristics in a state fixed effects model in Table 1. The magnitudes of the coefficients are in keeping with expectations. Within a state older, more educated women (compared to women with less than primary schooling) and women who are active in the labor force exhibit higher autonomy. Muslim women have lower autonomy compared to non-Muslim women. A male first born raises the position of a woman given the bias towards sons in India while having an elder female relative (such as a mother-in-law) residing in the household reduces women's independence in decision-making. Interestingly, the positive coefficients on socio-economically deprived women (SC and ST) suggest greater autonomy relative to high caste women. This result has been found by other recent literature on female agency in India as well (Luke and Munshi 2007).

[Table 1 here]

3 Household data

For the purpose of the empirical analysis the information on mother's characteristics in the individual survey data were linked to those of her children in the household survey. The sample was then restricted to all children in the school going age group of 6 to 15 residing within the household. Since older children are more likely to move out of the household (due to early marriage, given that the median age at first marriage for girls in 16.4 years (NFHS 1998-99), or

for work) and data are not available for non-residents, this age group was selected in order to addresses potential selection bias arising due to systematic differences in the characteristics of children residing within and outside the household (Quisumbing and Maluccio 2003). The analysis was limited to currently married mothers in male-headed households with the child as the unit of observation. In the NFHS individual survey information is available on the current husband of the child's mother. I designated him the father of the child since his characteristics have greater relevance to investments in the child than the biological father's. Thus, 'father' does not necessarily imply the biological father of the child in the analysis.

The sample summary statistics are described by gender in Table 2. The sample included 64,944 children of which 48% were girls. The mean age of both girls and boys in the sample was a little over 10 years. Girls had more total number of siblings, on average. Current school enrollment of girls was 8 percentage points lower than that of boys in the sample. Highest grade completed was marginally greater for boys. Current parental ages were comparable for girls and boys. 70% of mothers had completed less than primary school or had just three years of schooling while approximately 56% of fathers had completed primary education or more. There did not appear to be any significant differences in the parental educational characteristics by child's gender. The standard of living index of the households was medium or less with more than half the children belonging to socially deprived families (SC, ST or OBC) and residing in rural areas.

[Table 2 here]

4 Empirical methodology

The baseline empirical model defines the educational outcome E of child c (or E_c) as:

$$E_c = \alpha_0 + \alpha_1 F_c + \gamma_1 \mathbf{E_c^m} + \gamma_2 F_c \mathbf{E_c^m} + \beta_1 A_c^m + \beta_2 A_c^{m2} + \beta_3 F_c A_c^m + \beta_4 F_c A_c^{m2} + \delta \mathbf{Z_c} + D_c^s + \mu_c$$

F_c is a dummy for a female child. The level of education of the child's mother (m) is represented by vector $\mathbf{E_c^m}$. It contains dummy variables for whether she has completed primary, middle or high school or more. The excluded category is less than primary schooling. A_c^m is the index of autonomy of child c's mother m. A_c^{m2} is the square of A_c^m and captures any non-linear effects of autonomy on a child's schooling. For instance, suppose mother's autonomy is beneficial for children's education but an increase in her autonomy raises the opportunity cost of her time on household activities. Then, if children's time substitutes for the mother's time on household chores the coefficient on A_c^{m2} could be negative implying a concave effect of mother's autonomy on children's schooling.

The three levels of father's education (as described for mothers) are included in $\mathbf{Z_c}$ which is a vector of child and household characteristics that could affect a child's schooling. $\mathbf{Z_c}$ includes the child's age, number of siblings, and age and sex composition of siblings. The sibling composition was included as an explanatory variable for two reasons. First, it accounts for the direct effect of family size and of younger or older, male or female siblings in the household on resources available for schooling an individual child. Second, the regression of the autonomy variable on individual and family characteristics in Table 1 suggests that the gender composition and the age of children may be correlated with the autonomy of the mother. The age of the mother and father and the household head's religion and caste are also included as controls for the socio-economic characteristics of the household in $\mathbf{Z_c}$. The NFHS dataset includes an index of the standard of living of the household, measured by households' ownership of durable and

non-durable assets. This represents permanent family income in $\mathbf{Z_c}$. Based on the results in Table 1, two variables likely to be correlated with the mother's autonomy were also included in the analysis - dummies for whether the mother's first born is a son and the presence of the mother-in-law or any other female relative elder to the child's mother.

The outcome of interest, individual educational attainment or E_c, is measured as the deviation of a child's highest completed grade from the average highest grade completed by children of the same cohort (Quisumbing and Maluccio 2003). Since schooling is likely to be incomplete for the sampled age group (6 to 15 year olds) grade attainment relative to the mean grade attained by one's age cohort is a good approximation of the educational attainment of the child. This measure takes into account delayed enrollments, drop-outs and grade repetition and tells us how a child is performing relative to her cohort. It also addresses any concern regarding variation in access to schooling across age cohorts since it informs us of a child's attainment relative to children of the same age. In order to facilitate interpretation of the results, grade deviation was standardized to mean 0 and standard deviation 1.

Estimates of the coefficients of interest could be an artifact of cultural emphasis on girls' education which varies across the country rather than representing a significant correlation with mother's 'empowerment'. For instance, in matrilineal societies, where women's autonomy is high and greater importance is also attached to girls' education, the coefficient on the index of mother's autonomy and education would be biased upwards. Further, aggregate community level autonomy factors may influence individual level autonomy as well as gender differences in educational investments of children. Thus, in order to address the confounding unobservable regional characteristics the analysis was conducted within states by including dummy variables D_c^s for state s in which child c currently resides. α_0 represents the constant and μ_c is the child

specific error term in the regression equation. Individual weights for the mother were used in the analysis to make the results nationally representative.

To sum, the coefficients of interest are γ_1 which measures the correlation between mother's education and son's schooling and $\gamma_1 + \gamma_2$ which is the relationship with the education of the female child. The marginal relationship between the index of autonomy of the mother and son's schooling is $\beta_1 + 2\ A_c^m \beta_2$, while for the girl child it is the sum of $\beta_1 + \beta_3 + 2\ A_c^m\ (\beta_2 + \beta_4)$. Evaluated at the mean of 0 (for standardized A_c^m), the estimated marginal impact of autonomy on boys and girls is β_1 and $\beta_1 + \beta_3$, respectively.

To check the robustness of results obtained from the baseline specification I also conducted the analysis within a primary sampling unit (PSU). If local employment prospects (returns to schooling) or the level of autonomy of women are relatively greater in some parts of the country or a state, there might also be more emphasis on schooling of girls in that region. This would show up as a spurious correlation between mother's empowerment and daughters' education in the analysis. Conducting a PSU fixed effect analysis enables examination of the decision-making ability of mothers within a unit that is homogeneous in terms of culture, labor market opportunities for women and also public policy aimed at empowering mothers (such as reserving jobs for women on public works).

The analysis addressed the problem of endogenous relationship between female empowerment and household outcomes in empirical estimations of household decision-making in two ways. First, the autonomy measure may be correlated with unmeasurable or unobservable family characteristics that simultaneously affect female 'empowerment' and schooling of daughters and sons. For example, suppose families in which *husbands* allow their wives more physical mobility and also put more emphasis on their children's schooling, then in the empirical

model this would show up as a correlation between female autonomy and children's schooling. However, in reality it would be the father's characteristics which are influencing both mother's 'empowerment' and children's education. To address this possibility I adopted a family fixed effects model (Quisumbing and Maluccio 2003). The family fixed effects sweep out the unobservables in the household (or father) that do not vary over the gender of the children. Since mother's 'empowerment' does not vary within a family I restricted the sample to households with heterogeneous gender composition of children (at least one son and one daughter) and interacted mother's autonomy and education with the child's gender. Thus the coefficient on the interaction between mother's empowerment (autonomy and education) and the gender of a child informs us of the difference between the effect of mother's autonomy on sons and daughters. Although the main effect of 'empowerment' cannot be estimated in a family fixed effects model, the study's objective of understanding the interaction between empowerment and gender gaps in education is achieved.

A second possibility is that the ability of a woman to assert her preferences in the household might be endogenous to her fertility decisions (Mason 1984; Jejeebhoy 1991; Abadian 1996). Decisions regarding birth of future children might impact current female autonomy and investments in schooling of children. For instance, currently pregnant women (which are likely in my sample since these women are in the reproductive age) may be more constrained and restricted to within the household and thereby have lower access to opportunities outside the household. Even if the mother is currently not pregnant but either she or the husband desires more children then in order to provide for an expanding family the mother may have to contribute to family income by working outside the home (influencing her freedom of movement) and/or the household may decide to withdraw an older child from school in the

current period.Thus the robustness of results was checked by restricting the sample to children of only those families in which the mother was currently not pregnant and either the father had been sterilized or the mother did not desire future children (data are not available on father's preferences) or the mother was infecund.

A third possibility is that the autonomy index is indicative of some unobservable household phenomenon that affects both female 'empowerment' as well as girls' and boys' education *differentially*. Household level characteristics that *equally* affect both daughters' and sons' schooling and are unobserved can be factored out by the family fixed effects model described above. However, unobservable family characteristics that differ by the children's gender cannot be accounted for by this model. For instance, more progressive husbands may *allow* their wives greater physical mobility and also attach more importance to the education of their daughters relative to sons. This issue can be addressed by using an instrument for women's 'empowerment'. But it is difficult to find a reliable instrument since data on determinants of female empowerment that are truly exogenous to household decision-making (viz., direct public transfers to women in Lundberg et al. 1997) are virtually absent for India. Using a poor instrumental variable for female empowerment will lead to spurious and unreliable results of the causal impact on gender gaps in education.

5 Results

A. *Impact of mother's 'empowerment' on grade attainment*

Table 3 presents the analysis of the relationship of mothers' 'empowerment' with children's education by gender. Columns 1 to 4 represent different empirical models while rows 1 to 18 list the variables whose regression coefficients are reported. I began the analysis by estimating the baseline state fixed effects model in column 1. The statistically significant negative coefficient

on the female child dummy (evaluated at the mean of the autonomy index) confirms the well-acknowledged fact that a girl child is likely to have lower educational attainment than a male child in India. The relationship between mother's autonomy and boys' schooling is insignificant as suggested by the insignificant coefficient on the non-interacted index term in row 2. However, mother's 'empowerment' has a significant correlation with female child's schooling shown by the significant positive coefficient on the interaction of the female dummy with the autonomy index in row 4. The total marginal effect for girls (sum of coefficients in rows 2 and 4) of a one standard deviation increase in mother's autonomy (evaluated at the mean) is almost 0.03 standard deviations higher grade attainment of daughters, as noted in row 19 of the table. At higher levels of mother's autonomy any correlation may disappear, for both sons and daughters, as reflected in the insignificant coefficient on the square of the index (row 3) and its interaction with female child (row 5).

[Table 3 here]

The positive coefficient on the interaction of mother's education, at all levels, with being a daughter (rows 9 to 11) indicates a greater correlation between mother's schooling and the educational outcomes of girls relative to boys. For instance, an increase in mother's schooling from below primary to at least primary schooling is associated with an increase in boys' grade attainment by almost 0.08 standard deviations (row 6) while girls' attainment increases by more than 0.30 standard deviations (sum of coefficients in rows 6 and 9). The gender gap, therefore, narrows as the educational attainment of the mother rises. However, this relationship is not linear. The effect of mother's education at higher levels is negative for boys (row 8) and positive but smaller in magnitude, for girls (sum of rows 7 and 10; 8 and 11). The declining magnitude of the coefficients on successively higher levels of mother's schooling

(rows 7 and 8 compared to row 6) suggests that the relationship between mother's education and the child's grade attainment is concave for both boys and girls. This may imply that the opportunity cost of time spent in child rearing and other household activities of a more educated mother is higher and children's time in daily household activities substitutes for mother's time on these chores thereby reducing their leisure or learning time or both.

The coefficient on father's education is larger than that of mother's education at all levels for boys (rows 12 to 14) and at middle and high school levels for girls (sum of rows 13 and 16 for middle schooling and sum of rows 14 and 17 for high schooling). Therefore, increasing father's education may raise the schooling levels of both boys and girls more than mother's schooling. Interestingly, the correlation between father's education and the grade attainment of a girl is also higher relative to that for a boy as shown by the positive coefficient on the interaction of the father's schooling with a female child dummy. For instance, an increase in father's education from below primary to at least primary schooling is associated with an increase in boys' grade attainment by almost 0.21 standard deviations (row 12) while girls' attainment increases by 0.27 standard deviations (sum of coefficients in rows 12 and 15). But the F tests of equality of the *differential* marginal effect of mother's and father's education on a girl child (coefficient on interaction of parental education with female child) is strongly rejected for every level of parental education as shown by the p-values in the table. This suggests that greater education of mothers has a larger association with reduction in the gender gap in schooling than an increase in fathers' schooling.

Unlike the effect of mother's education, the correlation between father's level of education and child's grade attainment increases with the former's level of schooling as suggested by the increasing magnitude of the point estimates when we move from primary to

high school education. This reinforces the earlier inference about the non-linear effect of mother's education. Fathers are more occupied in income generating activities outside the household and less likely to participate in child nurturing. Fathers' higher earning ability due to an increase in their level of education may have a pure income effect on the human capital of both boys and girls. These results for mother's empowerment and father's education were not affected when the sample was restricted to completed families as shown in column 2. Similar results were obtained when I included controls for whether the family is complete or for the mother being currently pregnant in the full sample.

To address any confounding local characteristics I conducted a primary sampling unit (PSU) fixed effects analysis within states in column 3. The total marginal effect of a one standard deviation increase in mother's autonomy (evaluated at the mean) is 0.03 standard deviations higher grade attainment of daughters, as noted in row 19, column 3. The correlation with boys' education (evaluated at the mean of the autonomy index) is insignificant as suggested by the coefficient in row 2. The relationship between mother's education and a lower gender gap in schooling continues to be significant. This is evident from the significantly positive coefficients on the interaction of a female child with the three levels of mother's schooling (rows 9 to 11). Once again, father's education has a higher correlation with the education of children of both genders compared to the mother's schooling. Although both father's and mother's education might benefit daughters more than sons, the equality of the *differential* marginal effect of mother's and father's education on a girl child (coefficient on interaction of parental education with female child) is rejected again for every level of parental education as shown by the p-values of the F tests in column 3 of the table. Restricting the sample to rural areas and conducting a within village analysis gave similar results and is not reported here for conciseness.

In column 4 of Table 3, along with PSU and state dummies, I included interactions of PSU dummies with female child. Thus, controlling the extent of gender bias in schooling (PSU x female child) and confounding cultural and economic factors at the local level (PSU and state dummies) does not change the results. As expected, controlling for the existing gender gap makes the coefficient on the female child (row 1) insignificant. The marginal effect of autonomy on the female child is again 0.028 standard deviations higher grade attainment of daughters (row 19, column 4). The results for parental education are also unaffected.

The entire sample was restricted to families with at least one daughter and one son in the 6 to 15 age group for a within family analysis in Table 4. Almost 49% of the sampled children belonging to families with only daughters or only sons in this age group were dropped from the family fixed effects analysis. In column 1 the results are similar to those obtained from Table 3. A one standard deviation increase in mother's autonomy (evaluated at the mean) is associated with 0.025 standard deviations higher grade attainment of daughters compared to boys as noted in row 2. The effect of a higher autonomy index on the female child is positive as shown by the coefficient in row 3. The equality of the *differential* marginal effect of mother's and father's education on a girl child (coefficient on interaction of parental education with female child) is strongly rejected for all levels of schooling of parents as shown by the p-values of the F tests. [Table 4 here]

In addition to the family dummies I included state dummies interacted with female child to control for the gender gap in schooling in each state in column 2. Mother's autonomy is significantly positive only at higher values of the index as shown by the insignificant coefficient on the interaction of the autonomy index with a female child dummy (row 2) and the positive coefficient on the square of the interacted index (row 3). This suggests that a rise in mother's

autonomy from low levels is more positively associated with daughter's schooling compared to son's. The marginal relationship between mother's education and daughter's schooling remains significantly higher than that of the father's, particularly for primary and middle school education, as implied by the tests of equality of coefficients. Results for the restricted sample of families that have completed childbearing were not different from the full sample results for all the empirical models discussed in Tables 3 and 4 and are therefore not reported here for conciseness.

To sum, the results indicate a robust relationship between mothers' 'empowerment' and a lower bias against girls' education. Having a more autonomous mother is associated with lower gender gap in grade attainment even when cultural variation in emphasis on girls' schooling, local heterogeneity in female labor market opportunities and unobservable household characteristics affecting educational investments in children are accounted for. Both mothers' and fathers' education has a more beneficial impact on daughters' schooling compared to sons' but mothers' education has a larger impact on reducing the gender gap in education across all the empirical models. However, the magnitude of the effect of mother's education, on both boys and girls, declines at higher levels. Using alternative categories of education levels of mothers and fathers - illiterate, less than primary, primary and more than primary – does not change these conclusions.

B. *Robustness checks*

The level of a mother's autonomy is very likely to vary over her lifetime. With the birth of children, variation in the duration of the marriage and ageing, for instance, a woman's influence on household matters might rise or decline. However, my measure of a woman's current autonomy summed up by the index is not dynamic since it is measured at only one point in her

lifetime. The measure of educational attainment used in the analysis is reflective of the educational attainment cumulated over previous years of schooling of a child. The past educational performance of children may affect this current measure of autonomy of the mother. For instance, if children perform poorly at school the mother may be expected to stay at home to take better care of them thus restricting her mobility or she might be blamed for the child's performance and be physically abused more frequently. This issue is less serious when the measure of educational outcome is the current enrollment status of children since it reflects participation more than academic progress.

[Table 5 here]

Table 5 shows the results of regressing current enrollment on mother's autonomy and level of schooling. The conclusions do not change. In column 1 I show the results of the baseline state fixed effects model. The negative coefficient on mother's autonomy in row 2 (effect on boys) and the positive coefficient on the interaction of mother's autonomy with a female child in row 4 (differential impact on girls) in column 1 again leads to the conclusion that the gender gap is narrower in households in which mothers' autonomy is higher. A one standard deviation increase in mother's autonomy (evaluated at the mean) is associated with almost 0.01 *higher* probability that daughters are currently enrolled (row 19) and 0.01 *lower* probability for boys (row 2). The results for parental education are similar to those for grade attainment.

Controlling for unobservable characteristics of the family in column 2 of the table shows that the total marginal effect of a one standard deviation increase in mother's autonomy (evaluated at the mean) is more than 0.01 higher enrollment probability for daughters compared to sons (row 4). The equality of the differential impact on father's and mother's education for daughters is rejected for primary schooling. This suggests that raising mother's education from

below to at least primary schooling can have a significant effect on reducing gender disparities in schooling.

To summarize the empirical results, in Figures 2 and 3 I traced the predicted values of grade attainment of boys and girls as mothers' 'empowerment' changes. The predicted values were based, approximately, on the mean sample characteristics (see Table 2): 11 year old girls and boys with three siblings whose mothers are 34 years old and fathers are 40. The child belongs to a Hindu, ST (scheduled tribe), rural household whose standard of living is medium. The father resides in the household and has completed middle school. The figures are based on the coefficients obtained from the state-fixed effects specification in column 1 in Table 3.

[Figure 2 here]

The results, as expected, are dramatic for mother's schooling. In Figure 2, holding the index of autonomy constant at the mean of 0 and increasing mother's schooling from less than primary schooling to at least completed primary schooling reverses the gap in grade attainment: girls attain almost half a grade or 6 months more of schooling compared to boys. Note that at higher levels of mother's schooling, the marginal impact of mother's education on grade deviation from cohort mean declines sharply for both girls and boys. The low level of schooling of women should, therefore, help in explaining the observed lower attainment levels of girls in the population in India. The picture suggests that for women with the same level of autonomy, improvements in their education can have a dramatic effect on reducing the gender gap in educational outcomes of their children.

[Figure 3 here]

Figure 3 shows the predicted values for grade deviation from cohort mean when the autonomy index varies within two standard deviations from the mean, keeping mother's

education constant at less than primary schooling. The gap in grade attainment declines as the index increases. An increase in the index of autonomy from -2 to -1 standard deviation from the mean reduces the gender gap by 20 per cent. This indicates a reduction in grade attainment gap by 0.09 grades or over a month of schooling, assuming that attainment of an additional grade implies at least one more year of schooling. However, the relationship between grade attainment and the autonomy index is concave. So a larger decline in the gender gap may occur when the autonomy index increases from values below the mean.

6 Conclusions

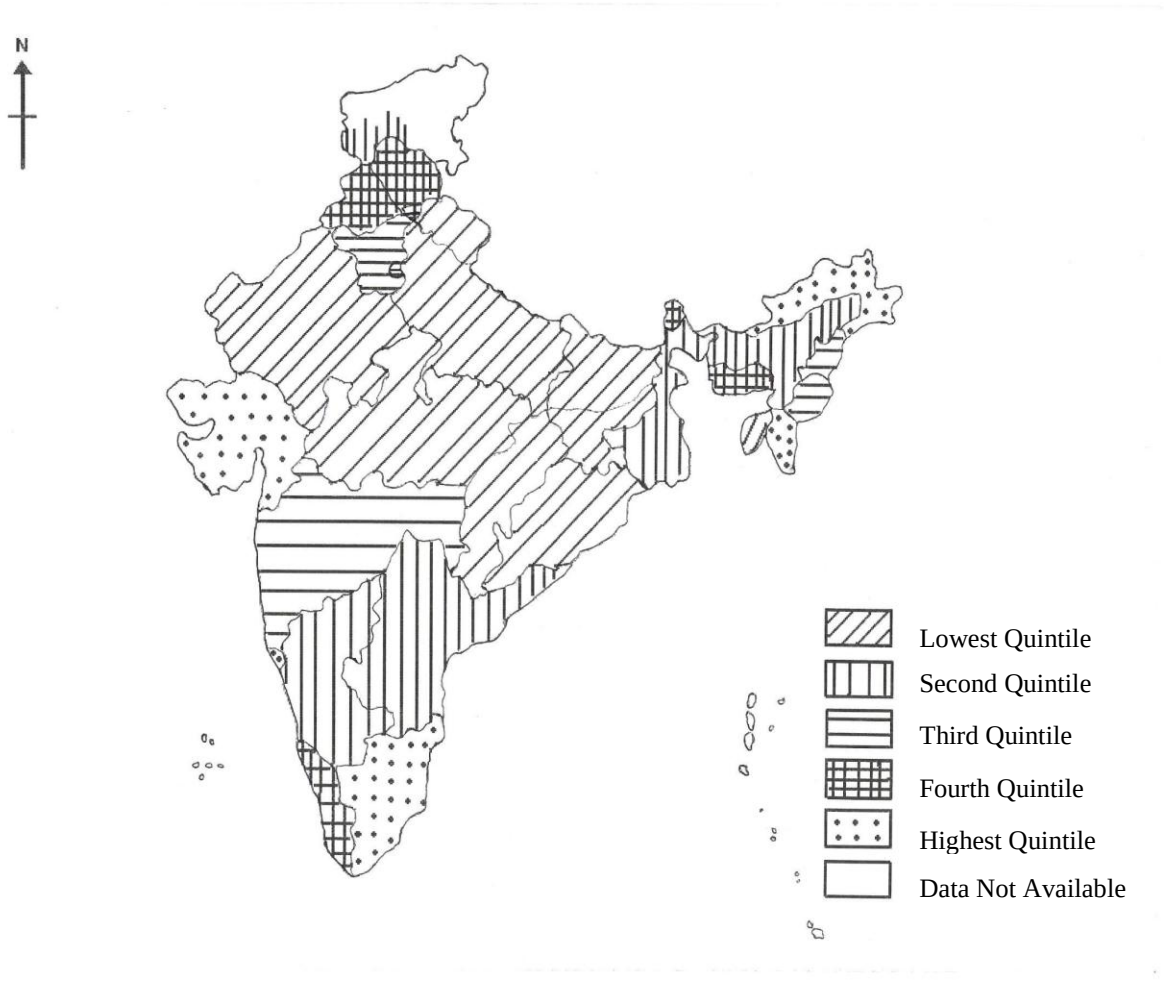
This study examined the extent to which inequality in educational investments in male and female children varies by the degree of 'empowerment' of the mother within households in India. It took into account the emphasis of recent literature on the importance of cultural and gender norms in a society to define female 'empowerment' in terms of a woman's level of education and her autonomy in decision-making within the household. While education determines women's ability to access market opportunities outside the household, her autonomy reflects the social and cultural institutions that determine her control over the utilization of resources (her own or other members') within the family.

The analysis establishes the existence of a robust, positive relationship between mothers' 'empowerment' and a lower gender gap in household investments in children's schooling in India. The results show that in India, unlike some countries, increasing *both* father's and mother's education is associated with greater educational attainment of daughters relative to sons. However, raising mother's education is associated with a significantly greater reduction in the gender gap in schooling than an increase in father's attainment. State fixed effects estimates suggest that an increase in mothers' education from below to at least primary education increases

daughters' schooling by more than 6 months or almost $2/3^{rds}$ of a year of schooling compared to $1/3^{rd}$ years for boys. Moreover, a one standard deviation increase in a mother's index of autonomy is associated with almost half a month more of schooling for girls but has no significant association with boys' educational attainment. Taken together, the results indicate that in families in which mothers are more educated and have a greater say in decision-making there is less discrimination against educational investments in daughters. This result is robust to unobservable family characteristics that *equally* affect both daughters' and sons' schooling and any possible endogenous relationship between female 'empowerment' and family size.

The study, while reinforcing the findings of previous literature on the positive impact of mothers' 'empowerment' on children's health in India (Murthi et al. 1995; Maitra 2004), highlights the significance of improving women's schooling and its potential impact on intergenerational transfers of gender equity. Policy interventions which raise awareness against restrictive social norms that hinder women's control over utilization of resources coupled with improving their access to economic opportunities could be effective in creating gender equality in both health and educational outcomes of children in India and attaining the Millennium Development goal of gender parity.

Figure 1 Spatial variation in women's index of autonomy in India, 1998-99



Notes: The index has mean 0 and standard deviation 1. Individual weights have been used to make the data nationally representative.

Source: National Family Health Survey (1998-99)

Table 1 Regression estimates of the effect of individual and household characteristics on the autonomy index of currently married women, India 1998-99

Variables	Coefficient	Standard Error
Age of woman (years)	0.022***	0.001
Muslim woman	-0.074***	0.010
Woman's schooling:		
Primary Schooling	0.076***	0.010
Middle Schooling	0.113***	0.013
High Schooling or more	0.270***	0.013
Husband's schooling:		
Primary Schooling	0.013	0.009
Middle Schooling	-0.020*	0.010
High Schooling or more	0.021**	0.010
Woman worked in last 12 months	0.058***	0.004
SC woman	0.030***	0.010
ST woman	0.096***	0.013
OBC woman	0.006	0.008
Age difference with husband (years)	0.004***	0.001
Number of children of age 5 or less	-0.024***	0.003
First born is male child	0.031***	0.006
Standard of living index of household	0.015***	0.006
Female head of household	0.332***	0.014
Husband not residing in household	0.364***	0.015
Marital duration (years)	-0.025***	0.005
Older woman residing in household	-0.248***	0.007
Rural household	-0.268***	0.008
Constant	-0.790***	0.125
State of residence fixed effect	Yes	
Observations	83,074	
Adjusted R^2	0.22	

Notes: All variables, except those measured in years, the number of children of age 5 or less and the standard of living index, are dummy variables. The standard of living index of the household is measured by the NFHS on the basis of asset ownership of households into 1=low, 2=medium, 3=high standard of living. SC (scheduled caste), ST (scheduled tribe) and OBC (Other backward castes) are socially and economically deprived section of the population.

* Significant at 10%, ** 5%, *** 1%

Source: as for Figure 1

Table 2 Summary statistics, by gender, for variables used for analyses, India 1998-99

Variable	Female (N=31,269)	Male (N=33,675)
Child's age (years)	10.14	10.17
	(2.83)	(2.84)
Number of siblings	3.12	2.84
	(1.70)	(1.68)
Number of younger male siblings	0.86	0.70
	(0.87)	(0.84)
Number of elder male siblings	0.72	0.72
	(0.95)	(0.95)
Number of younger female siblings	0.77	0.64
	(0.94)	(0.84)
Number of elder female siblings	0.77	0.78
	(1.03)	(1.03)
Current enrollment	0.77	0.85
	(0.42)	(0.35)
Highest grade attained	2.94	3.25
	(2.77)	(2.72)
Deviation of highest completed grade from cohort mean	-0.08	0.07
	(1.07)	(0.92)
Mother's age (years)	33.78	33.86
	(5.75)	(5.75)
Father's age (years)	39.79	39.77
	(7.16)	(7.05)
Mother's autonomy index	0.01	-0.01
	(1.01)	(0.99)
Mother's schooling:		
Less than primary	0.70	0.70
	(0.46)	(0.46)
Primary	0.13	0.13
	(0.33)	(0.33)
Middle	0.07	0.07
	(0.25)	(0.25)
High school or more	0.10	0.11
	(0.31)	(0.31)
Father's schooling:		
Less than primary	0.43	0.43
	(0.50)	(0.50)
Primary	0.17	0.17
	(0.38)	(0.38)
Middle	0.14	0.13
	(0.34)	(0.34)
High school or more	0.26	0.26
	(0.44)	(0.44)
Muslim head of household	0.15	0.14
	(0.36)	(0.35)
SC head of household	0.18	0.18
	(0.38)	(0.39)

ST head of household	0.13	0.13
	(0.34)	(0.13)
OBC head of household	0.28	0.29
	(0.45)	(0.45)
Standard of living of household	1.89	1.89
	(0.70)	(0.70)
Rural household	0.71	0.71
	(0.45)	(0.45)

Notes: Standard deviations in parentheses. SC (scheduled caste), ST (scheduled tribe) and OBC (Other backward castes) are socially and economically deprived section of the population. The standard of living index of the household is measured by the NFHS on the basis of asset ownership of households into 1=low, 2=medium, 3=high standard of living.

Source: as for Figure 1

Table 3 Regression estimates of the relationship between mother's empowerment and child's grade attainment, India 1998-99

Variables	Model			
	(1)	(2)	(3)	(4)
(1) Female child	-0.213***	-0.213***	-0.218***	0.219
	(0.017)	(0.018)	(0.017)	(0.348)
(2) Mother's autonomy	0.005	0.005	0.007	0.009
	(0.007)	(0.008)	(0.007)	(0.007)
(3) Mother's autonomy^2	-0.007	-0.009	-0.008	-0.009*
	(0.005)	(0.005)	(0.005)	(0.005)
(4) Mother's autonomy x female child	0.024***	0.025**	0.023**	0.019**
	(0.009)	(0.010)	(0.009)	(0.009)
(5) Mother's autonomy^2 x female child	-0.007	-0.008	-0.005	-0.003
	(0.007)	(0.007)	(0.007)	(0.007)
Mother's schooling:				
(6) Primary school complete	0.080***	0.069***	0.073***	0.076***
	(0.017)	(0.018)	(0.017)	(0.017)
(7) Middle school complete	0.031	0.020	0.024	0.026
	(0.025)	(0.026)	(0.025)	(0.025)
(8) High school complete	-0.066***	-0.072***	-0.072***	-0.064***
	(0.022)	(0.023)	(0.022)	(0.023)
(9) Primary schooling x female child	0.253***	0.266***	0.252***	0.243***
	(0.023)	(0.024)	(0.022)	(0.022)
(10) Middle schooling x female child	0.256***	0.268***	0.258***	0.249***
	(0.031)	(0.032)	(0.031)	(0.031)
(11) High schooling x female child	0.269***	0.287***	0.275***	0.262***
	(0.028)	(0.030)	(0.028)	(0.029)
Father's schooling:				
(12) Primary school complete	0.207***	0.208***	0.206***	0.207***
	(0.017)	(0.018)	(0.017)	(0.017)
(13) Middle school complete	0.300***	0.303***	0.296***	0.298***
	(0.019)	(0.020)	(0.019)	(0.019)
(14) High school complete	0.397***	0.394***	0.390***	0.387***
	(0.018)	(0.019)	(0.018)	(0.018)
(15) Primary schooling x female child	0.063***	0.067**	0.068***	0.069***
	(0.024)	(0.027)	(0.024)	(0.024)
(16) Middle schooling x female child	0.065**	0.074***	0.064***	0.058**
	(0.025)	(0.028)	(0.024)	(0.025)
(17) High schooling x female child	0.062**	0.072***	0.055**	0.07***
	(0.024)	(0.026)	(0.028)	(0.024)
(18) Constant	-0.308***	-0.503***	0.110	0.107
	(0.077)	(0.086)	(0.085)	(0.085)
(19) Marginal effect of autonomy on female child (2) + (4)	0.030***	0.030***	0.030***	0.028***
	(0.008)	(0.009)	(0.008)	(0.008)
Tests of Equality:				
(9) = (15)	0.00	0.00	0.00	0.00
(10) = (16)	0.00	0.00	0.00	0.00
(11) = (17)	0.00	0.00	0.00	0.00

State of residence fixed effect	Yes	Yes	Yes	Yes
Primary sampling unit fixed effect	No	No	Yes	Yes
Primary sampling unit x female child	No	No	No	Yes
Completed family only	No	Yes	No	No
Observations	64,944	55,950	64,944	64,944
Adjusted R^2	0.28	0.28	0.29	0.30

Notes: Standard errors corrected for clustering on the family in parentheses. Controls include number of alive younger and elder male and female siblings, total number of alive siblings squared, age of child, age of child squared, age of mother, age of father, standard of living index and dummies for whether the mother's first born is a male, Hindu head of household, Muslim head of household, SC, ST, OBC head of household, father currently not residing in household, presence of woman elder to mother in household and rural household.

Row 19 is calculated using the LINCOM command is STATA which computes point estimates, standard errors and t statistics for linear combinations of coefficients.

P-values reported for F-tests of equality of coefficients.

* Significant at 10%, ** 5%, *** 1%

Source: as for Figure 1

Table 4 Regression estimates of the relationship between mother's empowerment and child's grade attainment, India 1998-99

Variables	Model	
	(1)	(2)
(1) Female child	-0.413***	-0.061
	(0.021)	(0.400)
(2) Mother's autonomy x female child	0.025***	-0.003
	(0.009)	(0.010)
(3) Mother's autonomy^2 x female child	0.012*	0.016**
	(0.007)	(0.007)
Mother's schooling:		
(4) Primary schooling x female child	0.272***	0.21***
	(0.028)	(0.028)
(5) Middle schooling x female child	0.313***	0.244***
	(0.041)	(0.041)
(6) High schooling x female child	0.331***	0.244***
	(0.039)	(0.040)
Father's schooling:		
(7) Primary schooling x female child	0.120***	0.123***
	(0.024)	(0.024)
(8) Middle schooling x female child	0.080***	0.102***
	(0.029)	(0.029)
(9) High schooling x female child	0.079***	0.130***
	(0.026)	(0.026)
(10) Constant	0.746***	0.763***
	(0.098)	(0.097)
Tests of Equality:		
(4) = (7)	0.00	0.03
(5) = (8)	0.00	0.01
(6) = (9)	0.00	0.04
Family fixed effect	Yes	Yes
State of residence x female child	No	Yes
Observations	31,733	31,733
Adjusted R^2	0.49	0.50

Notes: see Table 3

All controls, except number of alive younger and elder male and female siblings, age of child and age of child squared, are household fixed effects and drop out of the regression.
P-values reported for F-tests of equality of coefficients.

* Significant at 10%, ** 5%, *** 1%

Source: as for Figure 1

Table 5 Regression estimates of the relationship between mother's empowerment and child's current school enrollment, India 1998-99

Variables	Model	
	(1)	(2)
(1) Female child	-0.115***	-0.182***
	(0.007)	(0.008)
(2) Mother's autonomy	-0.009***	
	(0.003)	
(3) Mother's autonomy^2	0.002	
	(0.002)	
(4) Mother's autonomy x female child	0.017***	0.012***
	(0.004)	(0.004)
(5) Mother's autonomy^2 x female child	-0.006**	-0.002
	(0.003)	(0.003)
Mother's schooling:		
(6) Primary school complete	0.017***	
	(0.006)	
(7) Middle school complete	-0.013	
	(0.008)	
(8) High school complete	-0.051***	
	(0.007)	
(9) Primary schooling x female child	0.098***	0.114***
	(0.009)	(0.012)
(10) Middle schooling x female child	0.096***	0.106***
	(0.010)	(0.018)
(11) High schooling x female child	0.089***	0.092***
	(0.009)	(0.017)
Father's schooling:		
(12) Primary school complete	0.101***	
	(0.007)	
(13) Middle school complete	0.106***	
	(0.008)	
(14) High school complete	0.131***	
	(0.007)	
(15) Primary schooling x female child	0.009	0.041***
	(0.011)	(0.010)
(16) Middle schooling x female child	0.052***	0.080***
	(0.011)	(0.012)
(17) High schooling x female child	0.052***	0.086***
	(0.010)	(0.011)
(18) Constant	0.151***	0.255***
	(0.035)	(0.033)
(19) Marginal effect of autonomy on female child (2) + (4)	0.008**	-
	(0.003)	
Tests of Equality:		
(9) = (15)	0.00	0.00
(10) = (16)	0.01	0.25
(11) = (17)	0.03	0.82

State of residence fixed effect	Yes	-
Family fixed effect	No	Yes
Observations	65,238	31,876
Adjusted R^2	0.21	0.21

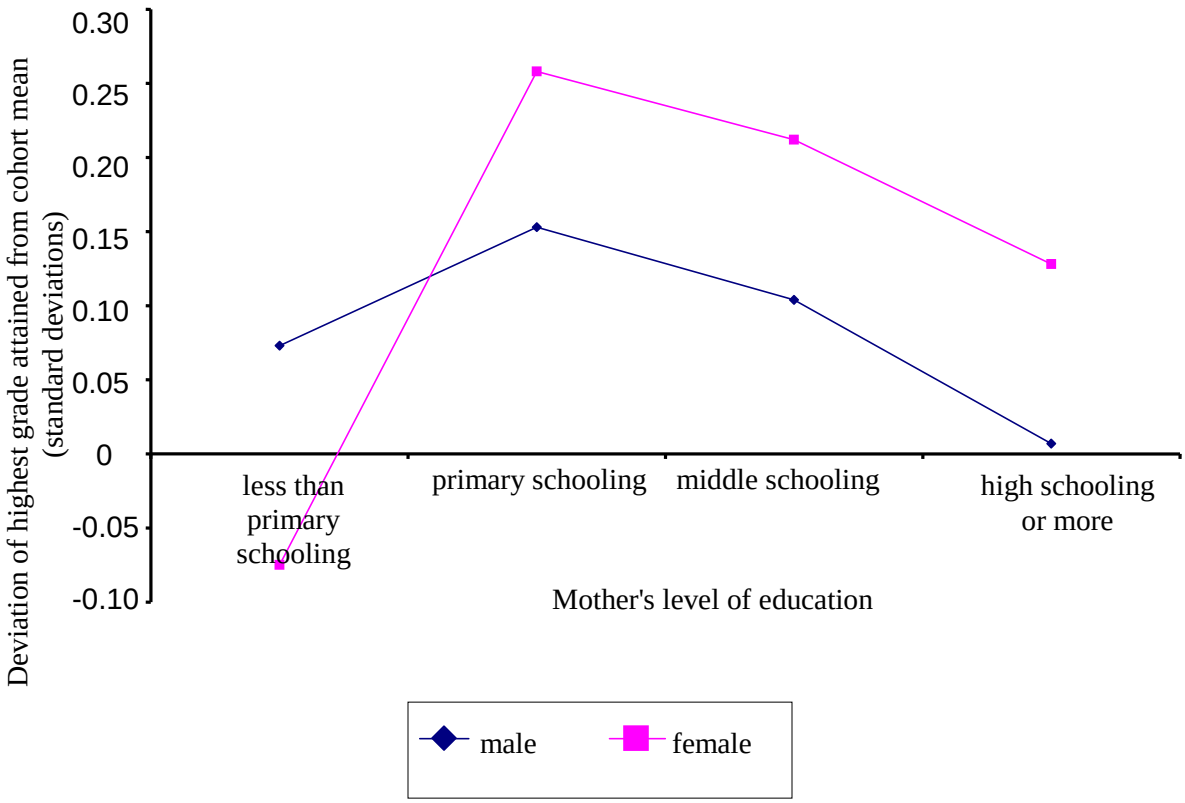
Notes: see Table 3

All controls, except number of alive younger and elder male and female siblings, age of child and age of child squared, are household fixed effects and drop out of the regression in column 2.
P-values reported for F-tests of equality of coefficients.

* Significant at 10%, ** 5%, *** 1%

Source: as for Figure 1

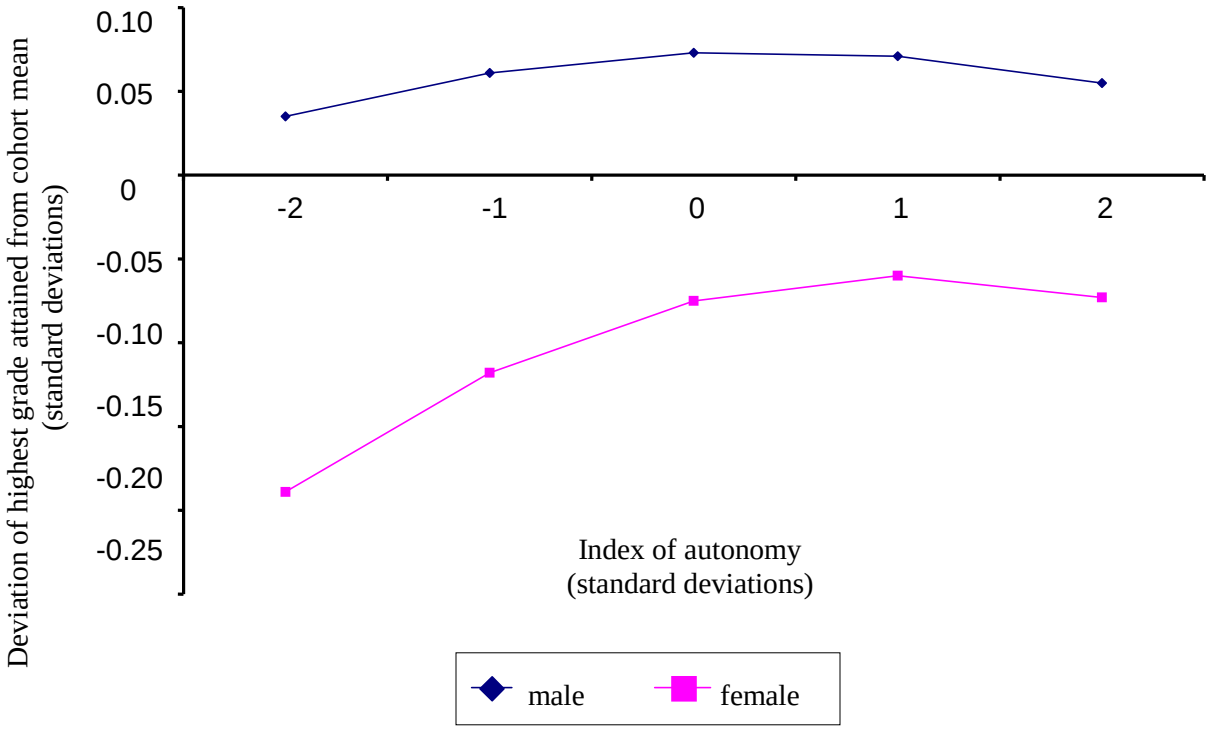
Figure 2 Impact of mother's education on child's grade attainment, India 1998-99



Notes: The predicted values are based on the mean sample characteristics and the coefficients obtained from the state-fixed effects specification in column 1 of Table 3. A positive (negative) sign on the Y axis implies that the highest grade attained by the child is higher (lower) that the mean grade attainment for her or his cohort.
Mother's index of autonomy is held constant at mean 0.

Source: as for Figure 1

Figure 3 Impact of mother's autonomy on child's grade attainment, India 1998-99



Notes: The predicted values are based on the mean sample characteristics and the coefficients obtained from the state-fixed effects specification in column 1 of Table 3. A positive (negative) sign on the Y axis implies that the highest grade attained by the child is higher (lower) that the mean grade attainment for her or his cohort.
Mother's education is held constant at less than primary schooling.

Source: as for Figure 1

References

Abadian, Sousan. 1996. Women's autonomy and its impact on fertility, *World Development* 24(2): 1793-1809.

Anderson, Siwan and Mukesh Eswaran. 2009. What determines female autonomy? evidence from Bangladesh, *Journal of Development Economics* 90(2): 179- 191.

Agarwal, Bina. 1994. *A field of one's own: gender and land rights in South Asia*. Cambridge: Cambridge University Press.

Blumberg, Rae L. 1988. Income under female versus male control: hypotheses from a theory of gender stratification and data from the third world, *Journal of Family Issues* 9(1): 51-84.

Dyson, Tim and Mick Moore.1983. On kinship structure, female autonomy and demographic behavior in India, *Population and Development Review* 9(1): 35-60.

Glewwe, Paul and Meng Zhao. 2006. Attaining universal primary completion by 2015: how much will it Cost? in J. Cohen, D. Bloom and M. Malin (eds.), *Educating All Children: A Global Agenda*. Cambridge: MIT Press.

Haddad, Lawrence and Hoddinott, John. 1994. Women's income and boy-girl anthropometric status in the Cote d'Ivoire, *World Development* 22(4): 543-553.

Hoddinot, John and Lawrence Haddad. 1995. Does female income share influence household expenditure? evidence from Cote D'Ivoire, *Oxford Bulletin of Economics and Statistics* 57(1): 77-96.

Jejeebhoy, Shireen. 1991. Women's status and fertility: successive cross-sectional evidence from Tamil Nadu, India, 1970-80, *Studies in Family Planning* (22) 4: 217-230.

Jejeebhoy, Shireen. 1998. Wife beating in rural India: a husband's right? *Economic and Political Weekly* 33(15): 855- 862.

King, Elizabeth and R. Bellew. 1988. Education policy and schooling levels in Peru. World Bank, Washington D.C. mimeo.

King, Elizabeth and Andrew Mason. 2001. Engendering development: through gender equality in rights, resources, and voice. World Bank Policy Research Report. Washington D.C.: World Bank.

Lundberg, Shelly, Robert A. Pollak, and T. Wales. 1997. Do husbands and wives pool their resources? evidence from the United Kingdom child benefit, *Journal of Human Resources* 32(3): 463-480.

Luke, Nancy and Kaivan Munshi. 2007. Women as agents of change: female income and mobility in developing countries. Brown University Working Paper.

Maitra, Pushkar. 2004. Parental bargaining, health Inputs and child mortality in India, *Journal of Health Economics* 23(2): 259-291.

Mason, Karen. 1984. *The status of women: a review of its relationships to fertility and mortality*. New York: Rockefeller Foundation.

Murthi, Mamta, Anne-Catherine Guio and Jean Drèze.1995. Mortality, fertility, and gender bias in India: a district level analysis, *Population and Development Review* 21(4): 745-782.

National Family Health Survey. 1998-99. *National Family Health Survey of India-2*. Mumbai: International Institute for Population Sciences.

National Family Health Survey. 2005-06. *National family health survey of India-3*. Mumbai: International Institute for Population Sciences.

Qian, Nancy. 2008. Missing women and the price of tea in China: the effect of income on sex imbalance, *Quarterly Journal of Economics* 123 (3): 1251–1285.

Quisumbing, Agnes and John Maluccio. 2003. Resources at marriage and intra-household allocation: evidence from Bangladesh, Ethiopia, Indonesia, and South Africa, *Oxford Bulletin of Economics and Statistics* 65(3): 283-327.

Rahman, Lupin and Vijayendra Rao. 2004. The determinants of gender equity in India: examining Dyson and Moore's thesis with new data, *Population and Development Review* 30(2): 239-268.

Rummel, Rudolph J. 1970. Applied factor analysis. Northwestern University Press, Evanston, IL.

Thomas, Duncan. 1990. Intra-household resource allocation – an inferential approach, *Journal of Human Resources* 25(4): 635-664.

Thomas, Duncan, Dante Contreras, and Elizabeth Frankenberg. 2002. Distribution of power within the household and child health. University of California, Los Angeles, Working Paper.