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Female empowerment and education of children in Nepal

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Abstract

A family survey was conducted in Nepal to investigate whether female empowerment leads to more education, in particular for girls. The relative economic power of the male and female side of the extended family was used as an instrument for female empowerment. The findings indicate, however, that both female empowerment and relative economic power affect education. There is a positive association between female empowerment and children's education for both gender, while boys are prioritized if the male side of the family is economically weak.

Aknowledgements

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1 Introduction

In a recent survey of the role of female empowerment for economic and social development in poor countries, Cheryl Doss (2013) concludes: "there is sufficient evidence from rigorous studies to conclude that women's bargaining power does affect outcomes. But in many specific instances, the quantitative evidence cannot rigorously identify causality". As she demonstrates there is by now a substantial literature that attempts to solve this causality problem, either by way of randomized controlled experiments, natural experiments, or by looking for variation in (instrumental) variables covered by household surveys that on theoretical ground are found likely to affect female empowerment and not outcomes (other than through female empowerment). The main underlying problem is that any measure of female empowerment may reflect other characteristics, norms or values of the family that are also correlated with, in our case, education.

This measurement problem is to some extent philosophical, or conceptual, as female empowerment may be considered as just another manifestation of liberal norms and values. So we may end up measuring liberal values in general, and these values may in turn lead to more education, and in particular for girls. In this case, the more objective measure that we will use below, the relative economic power of the two spouses' natal families, may be considered as the de-facto measure of female empowerment. In the empirical analysis we will investigate the role of both a subjective (self-reported influence on decisions) and an objective (relative economic power) measure of empowerment, and the interpretation of the findings may depend on how we, and the reader, judge this conceptual issue.

We thus presume a sequential nature of the decisions on education. Relative economic power of the natal families determines a woman's decision-making power within her own family, and if her preferences differ from her husband this will in turn affect the level of education of her children. With this structure one can either use instrumental variable (IV) regression and estimate both stages of the sequence, or one can estimate the (reduced form) effect of relative economic power on education. The latter is the preferred choice if one believe that female empowerment cannot be measured properly, or if one believe that it can be measured, but that relative economic power affects education through other mechanisms that we cannot control for.

This latter strategy of sidestepping the intermediate measure of female empowerment, and study empowerment by indirect means, is the most common. Some prominent examples from the literature are discussed in the survey by Doss (2013). Rangel (2006) and Deininger et. al (2010) study respectively the effect of a change in marriage and inheritance law on schooling of girls. As one can never be sure that the effect goes via female empowerment, a number of papers attempt to solve this problem by systematically comparing a number of variables that change due to the underlying exogenous variable. Qian (2008) systematically studies (exogenous) changes in sex-specific agricultural incomes, and the effects on survival rates and educational attainment of children. Quisumbing and Maluccio (2003) find that pre-marriage assets of women increase expenditure shares for education. Fafchamps, Kebede and Quisumbing (2009) find that women's pre-marriage assets affect child nutrition and education. Anderson and Eswaran (2009) use (exogenous) agricultural and health shocks as instruments for female employment and incomes and estimate the impact on household spending, while controlling for (exogenous) unearned incomes (or assets).

As said, there are not that many papers that attempt to measure female empowerment directly. The papers that do exist will normally use questions, similar to a standard set of questions in DHS surveys, on who in the household decides on a set of issues, such as household purchases, or the woman's visits to relatives (which is the measure we use). Since a number of decisions are considered, one may use an aggregate measure, either a simple average as in Li and Wu (2011), or by way of principal component analysis as in Chakraborty and De (2011). As we have already discussed, any variable that

may affect the measure of female empowerment may also influence the ultimate outcome. Li and Wu handle this by reporting both the effect of the exogenous variable (in their case the gender of the first-born) on the measure of female empowerment, as well as on the dependent variable (they have a set of health and expenditure outcomes). They then go on to estimate the IV regression (where female empowerment is the endogenous variable) more as a robustness check (realizing that the instrument may affect outcomes through other mechanisms than female empowerment).

The present paper will follow the strategy of Li and Wu (2011), although without the aggregate empowerment index as we prefer to identify one particular variable that is likely to measure empowerment and not preferences for education[1]. As indicated above, we are not the first to use assets as the presumably exogenous variable. Quisumbing and Maluccio (2003) measure assets through recall of "the assets they owned before their wedding". Anderson and Eswaran (2009) use unearned assets that were "acquired through inheritance or as a transfer at the time of marriage".

We will use a slightly different measure. In a survey that had the main focus on son-preference, birth-order, number of children and the possible effects on different economic outcomes[2], we decided to add a question on present ownership of land for all family members as well as the natal families of the two spouses. Although we ideally would like to have the history of land ownership, and in particular ownership pre and post marriage, we do believe that present ownership may affect female empowerment. In rural Nepal land is still the main asset, and we believe that if the woman's natal family is relatively more wealthy than her husband's family then she will have more say within her own family. We believe there are two main mechanisms:

First, if her natal family is wealthy she can move back (this happens in Nepal), even without the couple divorcing. Second, her husband may depend on her father or brothers for his income. It can either be that they pool resources (for example by collaborating on production and marketing of agricultural products), or that he gets financial help either directly or by way of collateral for loans. Now of course there is a marriage decision to be made at some point in time, and this is not considered empirically by us. This means that we assume a recursive model where children's education is determined by the land ownership of the extended families, but not by any variable that may affect the matching of these landholdings through marriage[3]. In the next section we present the underlying model, while Section 3 discusses estimation, Section 4 the data, and Section 5 the findings, before we conclude in Section 6.

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[1] One of the DHS questions in the Nepal survey is in fact who decides on children's education, which obviously should not be included in an index.

[2] This part of the analysis is reported in Hatlebakk (2012).

[3] The skeptical reader may for example believe that a particularly talented woman will get married into a relatively wealthy family, as compared to the wealth of her own family, and that the talented woman is able to help her children at school so that they stay longer in school. This will lead to a conservative estimate as this woman is less empowered (as measured by economic power), but may still do well on children's education.

2 Model

The model that motivates the empirical analysis is a bargaining model where the household maximizes the utility $u = \theta u_f(c,e) + (1-\theta)u_m(c,e)$, where θ measures the wife's decision-making power over the allocation of the household's income on consumption c and the children's education e. We assume that the wife has a stronger preference for education[4]. The income y is a function of their landholding, $y(k)$, and will in optimum be fully spent on c and e. With the normal concavity assumptions on the u- and y-functions we get an interior solution where education in optimum will increase in land (the budget line shifts outwards) and in female empowerment (the optimal c-e basket shifts along the budget-line),

$$e* = f(k,\theta). \tag{1}$$

As discussed, we measure female empowerment directly by way of a set of questions copied from the DHS. This is problematic, as the measure may reflect a number of correlated factors, which in turn may affect the children's education. Those include the education and jobs of both spouses, and also a number of unobservable characteristics including preferences for education. See for example Basu (2006) for a discussion of the endogeneity of female empowerment. Knowing this, it is essential to find an instrument that may affect female empowerment, but not children's education.

If we imagine that the husband is doing the optimizing above, then the weight θ he puts on his wife's preferences over c and e will probably not only depend on her characteristics: Most likely her parents (and brothers in our data) will react if her preferences are not taken into account. But whether he will take this expected reaction into account will, in turn, depend on the relative economic power of her family as compared to his family in the local community. So θ becomes a function of the relative economic power of the two families, which we will measure by their landholdings,

$$\theta = g(k_f, k_m), \tag{2}$$

where an increase in female-side land k_f will strengthen female empowerment, while an increase in male-side land will lead to a decrease in female empowerment. Inserting in (1), we get the reduced form

$$e* = h(k, k_f, k_m). \tag{3}$$

As discussed above, we will estimate the reduced form in (3), as well as (1) and (2) in a two-stage IV estimation. In this model the zero hypothesis, of no role of female empowerment, will be that neither k_f nor k_m affects children's education.

Note that the model presented this far, which allow for the IV estimation, assumes that k_f and k_m have no direct effect on education, that is, the grandparents do not invest in their children's education. We shall see below that this presumption may not apply, there may in fact be an additional income effect. If this is the case, then the interpretation of the reduced form model in (3) will change. To model this possibility we allow for a more general income function, $y(k, k_f, k_m)$, where the core household's income depends not only on own land, but also the land of the extended families (as the grandparents may help out economically, and even tie the extra income to children's education). In

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[4] We assume that c is one-dimensional to avoid the non-linearity in the optimal amount of education (or in fact child labor) that is discussed in Basu (2006).

this case (1) becomes $e^* = f(k, k_f, k_m, \theta)$. If we now linearize this equation, as well as (2), then we get the reduced form equation, $e^* = \beta_0 + \beta_1 k + \beta_2 k_f + \beta_3 k_m + \beta_4 k_f - \beta_5 k_m$, which we may write as,

$$e^* = \beta_0 + \beta_1 k + (\beta_2 + \beta_4) k_f + (\beta_3 - \beta_5) k_m. \tag{3'}$$

This is the model that will be estimated below, but with the interpretation depending on whether we believe there is an income effect. If the IV estimation indicates that k_f and k_m directly affects children's education, then the zero hypothesis is no longer that k_f and k_m have no effect on e*, but rather that β_4 and β_5 are both zero, while we allow β_2 and β_3 (the income effects) to be larger than zero. We let the combined zero hypothesis still be that the two marginal effects are the same, although now different from zero. While the main alternative hypothesis will be that k_f has a stronger marginal impact than k_m. Note that the zero hypothesis has two elements, there is no effect of female empowerment (β_4 and β_5 are zero), and male- and female-side land have the same marginal (income) effect on education ($\beta_2 = \beta_3$).

In this case we may end up wrongly rejecting a role for female empowerment if $\beta_2 < \beta_3$, as we by coincidence may have $\beta_2 + \beta_4 = \beta_3 - \beta_5$. That is, the positive male-side income effect is so much larger than the female-side income effect that it cancels out the female empowerment effect. This is a very special case where the husband does not prioritize children's education, while his parents indirectly do so. We only need, however, to consider this interpretation if the zero hypothesis is not rejected.

3 Estimation

The decision to go to school and the decision on number of years of schooling may in principle be influenced by different factors, and we would ideally like to model this as a two-stage process. We do, however, believe that the same variables will affect both, so we end up estimating two separate linear equations. In one regression, the variable e takes the values 0 if people are illiterate, and the value 1 if they have completed grade one or more, or report that they are literate. In the second regression the value 1 is replaced by years of schooling[5].

When it comes to the explanatory variables, which this far include only land variables (we add control variables later), there seems to be major discontinuities at zero for all three variables. This is not surprising. Land is a major asset in Nepal, and having no land means that your bargaining position in most social and economic interactions are weak, even compared to households with only a small plot of land. With some land you may be able to raise loans (of course with the danger of losing the land), and if you can produce some of your own food you will improve your bargaining position in the labor market (as you can say no to inferior jobs or payments). These discontinuities are modeled by adding a dummy for landlessness for each of the three types of potential owners. In a two-dimensional diagram (let us say where predicted years of schooling is depicted as a function of land) this means to allow for the predicted years of schooling at zero land to deviate from (normally with a lower value) the intercept (which in this case will be the limit as land goes towards zero).

To keep the analysis of interaction effects relatively simple (without changing the main message), for the extended family land holdings we use these dummy variables only (and their interaction with the gender of the child), while for own land we also include the amount of land[6]. With empowerment measured by landlessness, we only need to test whether female-side landlessness have a different parameter than male-side landlessness. We do however interact the two, as we expect education to be even lower if both sides are landless. The best test for female empowerment will also in this case be to compare the two cases where either only the female side or only the male side is landless.

We made sure to ask about landholdings of the full extended family, husband, wife, children, husband's and wife's brothers, mother and father, in total nine different categories. Since land markets are not well developed in the region, the most common change in land is in fact splits within family. This has escalated recently due to expectations of binding land ceilings, in particular as a result of the armed Maoist insurgency, and their raise to power at the national stage. We thus expect the three first categories to add up to the land-holdings at the time when the children received their education. So the k in equation (3) is the sum of the land of the husband, woman and their children. Similar summations are done for the female and male side extended families.

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[5] We write 11 for completed SLC (the school leaving certificate exam that is taken after 10 years of schooling), as many people have ten years of schooling but have not passed SLC. As a result we have to use 12 for completed 11 years, and 13 for completed the intermediate exam (the so-called 10+2). For BA we have assumed 16 years, and for MA or higher we have assumed 18 years. Five people out of a total sample of 1062 have a master degree or higher.

[6] In robustness checks we have also investigated whether a second-order term is needed, but that appeared not to be necessary, which is good, as it would complicate the tests for female empowerment as the marginal effects to be compared in the zero hypothesis would depend on the amount of land.

4 Data

The survey was conducted in an ethnically diverse district (Morang) in the eastern tarai (plains) of Nepal. Of the 125 caste and ethnic groups recorded in the national census of 2011, there are 110 different groups residing in Morang. The study area is north-east of the city of Biratnagar, which is located on the border with Bihar of India. Five villages (Village Development Committees, or VDCs) were randomly selected, with a probability given by the population size, among 12 VDCs that constitute a purposively selected study area. The area was selected to ensure ethnic diversity, but also because the area is a relatively peaceful one, which was essential due to the recent civil war and post-war ethnic unrest in Nepal. All villages are within 0.5-1.5 hours by bus or bicycle from Biratnagar. In the second stage, four wards from each VDC were randomly selected. The wards constitute the primary sampling units (PSUs). All estimates below will have clustered standard errors at the ward level, and we use ward fixed effects in most regressions. Then 24 women aged 40-59 years were randomly selected from each PSU, leading to 480 interviews in 20 PSUs. The age range was selected to ensure that most of the women had completed the fertility cycle.

The questionnaire, particularly the section on female empowerment, was for the most part based on the Nepal demographic and health survey (DHS), as it is a well tested and standardized questionnaire. Some topics of interests, in particular information on the land property of the extended family on the male and female side, were added to the questionnaire, and the questionnaire was pretested. Three enumerators (two female) who were all involved in the latest DHS, were deployed for the field survey. They were thus well familiar with the questionnaire and female interviewers were selected to facilitate the interviews with our female respondents. The duration of the survey was about two months, from mid-November 2011 to mid-January 2012. Rigorous field supervision was conducted by the authors as well as a supervisor from the survey agency (Kathmandu based New Era). Double entry was used to ensure the quality of data entry.

The focus of the study was on number of children, children's education and fertility decisions. Accordingly, the main target of the survey was women and children. The survey interviewed 480 women aged 38 years and older at the time of survey. Of the 480, only 462 women have live children, and we focus on children who are no longer in school and are in some kind of work, a total sample of 1062 children, born to 386 women (with 337 of them living with their husband, and the rest being widows). By children we do not mean that they are of child age, they are rather the children of the women sampled for the survey. The 445 children dropped from the analysis are 430 students and 15 with no work. Table 1 presents the basic characteristics of the sample, and by that also the variables that will be included in the regression analysis.

The first set of variables measures the social identity of the respondents. Over generations there has been migration to the plains from the hills of Nepal, as well as from India. The migrants from India, together with the indigenous population of the tarai, will constitute the "tarai origin" subsample below. The tarai origin population accounts for 81 per cent of the sample, with the remaining 19 per cent being of hill origin. We shall see that the small hill origin sample behave differently with regard to education, and will be analyzed separately, and even dropped from the final regression analysis (the sample is too small for a full separate analysis including fixed effects and clustering at the ward level). There are altogether 35 different castes and ethnic groups belonging to either the hill or the tarai category. Of them, the Tharu, a tarai ethnic group, alone constitutes about 34 per cent of the sample, followed by Bantar (14%), a tarai Dalit group. The population of Musahar, another tarai Dalit group, is 6.4 per cent, while Rajbansi, a tarai ethnic group, is 5.6 per cent. In the hill origin category, Chhetri constitutes 5.9 per cent, and is the only hill origin group with more than five per cent of the sample. Note that the "hill" sub-sample also live in our tarai (plains) study area.

Turning to the dependent variable, education is measured, as discussed, by literacy and years of schooling. Table 1 shows that 85 per cent of the sample is literate, while the average years of

schooling is 6.2 years. This means that the average person has completed the primary level of education, which is up to grade five.

Table 1: Descriptive data for sample (n=1062)

Background characteristics	Mean	Std. Dev.	Min	Max
Ethnicity				
Hill Brahmin/Chhetri	0.12	0.320	0	1
Hill ethnic groups	0.05	0.216	0	1
Hill Dalit	0.02	0.133	0	1
Tarai middle caste	0.12	0.325	0	1
Tarai ethnic groups	0.46	0.499	0	1
Tarai Dalit	0.23	0.424	0	1
Education of children				
Literacy of children	0.85	0.355	0	1
Years of schooling of children	6.19	4.296	0	18
Age of children	27.13	6.613	10	50
Sex of children (male=1)	0.51	0.500	0	1
Landholding status				
Own landless	0.53	0.499	0	1
Female-side extended family landless	0.61	0.489	0	1
Male-side extended family landless	0.67	0.470	0	1
Average area of landholding				
Own landholding in kattha (1 kattha = 0.0339 ha)	12.21	21.914	0	125
Female-side extended family landholding (kattha)	20.23	47.243	0	700
Male-side extended family landholding (kattha)	15.85	44.878	0	440
Female empowerment: visit to her relatives (n=915)				
Female decides	0.05	0.216	0	1
Male decides	0.07	0.248	0	1
Joint decision	0.88	0.319	0	1

Since we have a sample of "children" who have completed schooling, we find that the average age is as high as 27 years, with a spread from 10 to 50 years. The mothers have an average age of 52 years, ranging from 38 to 69. The gender composition is normal as there is 51 per cent males in the sample.

As discussed, land is the essential independent variable, as it is used as a determinant of female empowerment. Three categories of land are measured, landholding of the extended family of females, landholding of the extended family of males, and own landholding. The extended family includes father, mother, and brothers. "Own land" refers to the land owned by the respondent (female), or by

her husband or children. The paper intends to identify the causal relationship between these three categories of landholding and female empowerment. Table 1 shows that 53 per cent of the children live in landless households. The average landholding (including the zeroes) is 12.2 kattha (equivalent to 0.41 hectare). The proportion of landlessness among the women's extended family (61%) appears higher than for her own family. And the proportion of landless households among the extended families of the husbands (67%) is higher than for own families. There are, however, some large farms on the female side, so the average landholding is higher for the female side (20.2 kattha or 0.68 hectare), as compared to the two other categories. So the female side is better off on average than her own family, and at least as well off as the husband's family. This in fact indicates that women from families with less land marry out of our study area.

Female empowerment is measured by DHS type questions, and we will in particular use the question on who decides on visits to the woman's relatives. The question has three possible answers, whether the female alone decides, the husband alone decides, or whether they jointly decide on her visit to relatives (the questionnaire is available upon request). These questions were naturally asked only to women who are currently married, leading to a smaller sample size (915 children) for this measure. We find that an overwhelming majority of children have mothers that reported that they jointly decide on her visits to relatives (88%). Only five per cent of the females decide by themselves to visit relatives, which is less than the percentage where the husband decides on the female visiting relatives. The low share of "empowered" women, and "powerful" men, may explain why the IV-regression below has limited explanatory power, and why we at the end have to focus on the reduced form estimates where the landholdings of the extended families are the essential determinants of children's education.

5 Results

We first investigate the relation between female empowerment and education. As discussed, we measure female empowerment in terms of the decision making power of women in visiting her relatives. The measure seems to be associated with the literacy level of her children. We need to separate people of hill and tarai origin, as basically all hill origin children are literate, so there is no variation as indicated in the lower part of Table 2. For the tarai origin sample we first of all find that boys get more education than girls. The apparent lower level of literacy of boys in the "male-only-decides" group is not a significant difference. When it comes to the role of female empowerment, we find that if she makes the decision on visits to relatives by herself, then this empowered woman seems also to be able to affect the literacy level of her own children (the numbers in the first column are the highest).

Table 2: Literacy of children (%) by who decides on female visits to relatives

Gender and ethnicity of children	Female only decides	Male only decides	Female and male jointly decides (reference)
Tarai origin:			
Male child	100.0***	72.7*	92.4
Female child	93.8***	81.0	74.9
N	30	54	663
Hill origin:			
Male child	100.0	100.0	100.0
Female child	100.0	100.0	98.5
N	15	6	147

*** Significantly different from reference category at 1%-level.
** Significantly different from reference category at 5%-level.
* Significantly different from reference category at 10%-level.

Turning to years of schooling in Table 3, we again find that boys get more education than girls. The higher level for girls in the tarai "male-only-decides" group is again not significant, but the level is lower for boys in this group, as compared to the groups where the mother has some say. The difference between boys and girls in the "male-only-decides" group is, though, significant for the hill origin sample, but there is only three girls and three boys (in two families only) in this category, so a very small sample. Due to the small sub-samples within the hill origin group, we will focus on the tarai group in the analysis below.

Table 3: Education of children (mean) by who decides visit of female

Gender and ethnicity of children	Female only decides	Male only decides	Female and male jointly decides (reference)
Tarai origin:			
Male child	6.5	4.0***	6.8
Female child	5.2	4.8	4.9
N	30	54	663
Hill origin:			
Male child	9.0	9.7	9.8
Female child	7.2	11.0**	9.1
N	15	6	147

*** Significantly different from reference category at 1%-level.
** Significantly different from reference category at 5%-level.
* Significantly different from reference category at 10%-level.

We will apply regression analysis to check whether the measures of female empowerment are significant when we control for other variables, that is, ward (village), ethnicity, gender and age of children. As discussed, we expect female empowerment to be endogenous, as there are unobservable family characteristics that may explain female empowerment as well as education of children. So we first attempt to find an instrument for female empowerment that can be applied in the first stage of an IV regression. As discussed above we expect the relative landholdings of the extended families of the two spouses to apply. Below we first show the correlation between this variable and female empowerment, and then the correlation between the variable and education, as a good instrument should also affect the dependent variable in the reduced form (if both stages of the model are relevant).

Table 4 displays the correlation between female empowerment and the land of the extended families. There is no strong relation here, which suggests that the instrument is weak. The main significant finding is that in families where both extended families are landless there is a tendency that the husband decides on his wife's visit to relatives. But this is more likely to reflect that both sides are equally poor, and not an underlying empowerment of the male side.

Table 4: Female empowerment and land of extended family (tarai origin)

Who decides on female visit to her relatives	Female and male side landless	Female side landless (reference)	Male side landless	Female and male side have land
Female only decides	3.5	1.9	7.1	4.2
Male only decides	9.7**	1.9	4.8	7.0
Joint decision	86.8**	96.3	88.1	88.8*
Total	100%	100%	100%	100%
N	371	107	126	143

*** Significantly different from reference category at 1%-level.
** Significantly different from reference category at 5%-level.
* Significantly different from reference category at 10%-level.

The second criterion to judge whether the instrument is good is whether it is correlated with the dependent variable, that is, whether it has any explanatory power in the reduced form model. The first attempt to investigate this is to look at the descriptive statistics, as in tables 5 and 6.

Table 5: Literacy of children (%) by ethnicity, gender and land of extended family

Gender and ethnicity of children	Female and male side landless	Female side landless (reference)	Male side landless	Female and male side have land
Tarai origin:				
Male child	83.3	93.2	100.0	96.3
Female child	61.1***	90.3	86.5	90.9
Difference	22.2***	2.9	13.5**	5.4
Column (2) Table 8	22.6***	3.2	13.7***	6.8
Column (3) Table 8	23.3***	0.8	16.5***	7.8
N	454	121	134	159
Hill origin:				
Male child	100.0	100.0	97.6	100.0
Female child	93.8	100.0	100.0	100.0
Difference	6.2	0.0	-2.4	0.0
N	46	23	79	46

*** Difference is significantly different from zero, or level if significantly different from reference category, at 1%-level.
** Difference is significantly different from zero, or level if significantly different from reference category, at 5%-level.
* Difference is significantly different from zero, or level if significantly different from reference category, at 10%-level.

As discussed earlier we have the main focus on the larger tarai sub-sample. Female children get less education than male children if both the male and female side are landless or only the male side is landless. We shall see later (but shown here with a reference to Table 8) that this is confirmed by the regression analysis where we control for more variables. This means that male side landlessness is the essential variable. So an economically powerless male side of the extended family will still attempt to prioritize education for male children. If land on the female side was the explanation, then we should expect to find a difference in the two last columns.

Turning to years of schooling in Table 6, there seems to be no such effect of relative economic power. There is only small differences between the second and third columns. Basically all girls get less education, and if both sides of the extended family is poor then all children get less education. So for the tarai sample the relative economic power seems to matter for literacy, but not years of schooling.

For the hill sample, there is no significant difference between gender, but within the male group we find a lower level of education if the male side is landless (the first and third columns). So while relative economic power seems to matter for literacy among the tarai groups, it matters for years of schooling among hill origin males (but in this group a powerless male side is associated with *less* education for boys[7]).

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[7] We do not have a very good explanation for this, although a possible explanation may be that in the hill origin communities boys are expected to earn incomes and not waste time in school, unless the family can afford it. While the opposite difference in the tarai group was for literacy, and not years of schooling, and we may imagine that poor families may still want the boys to have some education.

Table 6: Years of schooling (mean) by ethnicity, gender and land of extended family

Gender and ethnicity of children	Female and male side landless	Female side landless (reference)	Male side landless	Female and male side have land
Tarai origin:				
Male child	5.0***	7.4	8.0	8.4
Female child	3.3***	5.8	5.7	7.0
Difference	1.7***	1.6**	2.3**	1.4
Column (2) Table 9	1.8***	1.7**	2.5***	1.5*
Column (3) Table 9	2.0***	1.3*	3.1***	1.7*
N	454	121	134	159
Hill origin:				
Male child	8.3*	10.9	7.9**	11.6
Female child	8.2	8.5	8.6	10.0
Difference	0.1	2.4	-0.7	1.7
N	46	23	79	46

*** Significantly different from zero (or from reference category) at 1%-level.
** Significantly different from zero (or from reference category) at 5%-level.
* Significantly different from zero (or from reference category) at 10%-level.

So in the search for a good instrument, it seems to work in the reduced form, but not via our measure for female empowerment. We still want to run the IV regression to see whether the instrument has some merit. We construct dummy variables for two of the outcomes on the empowerment variable, female only decides, and male only decides. Then we interact those with the gender of the child, so we have four endogenous variables. As instruments we use dummy variables for three of the four categories of extended family landlessness variable, but again interacted with gender of the child, so that we have six instruments. The first-stage regressions are reported in the first four columns of Table 7. The final IV regression is in the fifth column and the corresponding ordinary least square regression in the final column (the same regression is also found in the last column of Table 8). We control for ward fixed effects in all columns, and we cluster the standard errors at the ward level.

Table 7: IV-regression for literacy (tarai origin)

VARIABLES	First stage Female decides	First stage Male decides	First stage Male child * female decides	First stage Male child * male decides	IV Literacy	FE Literacy
Female decides					1.452	0.178***
					(1.986)	(0.034)
Male decides					-2.874	0.220***
					(1.823)	(0.073)
Male child * female decides					-2.368	0.089
					(4.705)	(0.057)
Male child * male decides					2.318	-0.132*
					(2.527)	(0.070)

Male child	-0.030*	0.042	0.025	0.089	0.121	-0.183**
	(0.017)	(0.045)	(0.031)	(0.055)	(0.293)	(0.086)
Own landlessness	-0.019	0.032	-0.016	0.020	-0.037	-0.093**
	(0.044)	(0.047)	(0.029)	(0.034)	(0.077)	(0.041)
Own land	0.000	0.000	0.000	0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)
Age of child	0.001	0.000	0.000	0.000	-0.012**	-0.010**
	(0.002)	(0.001)	(0.001)	(0.001)	(0.005)	(0.004)
Dalit	0.020	0.002	0.016	0.029	-0.229	-0.193
	(0.068)	(0.052)	(0.045)	(0.051)	(0.143)	(0.129)
Female side landless	-0.046	-0.059*	0.003	-0.009		
	(0.038)	(0.031)	(0.010)	(0.008)		
Male side landless	0.040	-0.030	0.002	-0.018		
	(0.076)	(0.047)	(0.014)	(0.014)		
Both male/female side landless	0.010	0.081	0.011	-0.009		
	(0.076)	(0.062)	(0.017)	(0.014)		
Male child * male side landless	0.008	-0.062	0.038	-0.053		
	(0.049)	(0.053)	(0.057)	(0.039)		
Male child * female side landless	0.088*	0.014	0.020	-0.038		
	(0.045)	(0.060)	(0.051)	(0.068)		
Male child * both male/female side landless	-0.066	0.024	-0.048	0.110**		
	(0.065)	(0.063)	(0.075)	(0.051)		
F-statistics	4.97***	3.39***	7.81***	2.60**	6.51***	11.60***
R-squared	0.015	0.015	0.035	0.057	-2.255	0.136
N	747	747	747	747	747	747
Number of ward (FE)	20	20	20	20	20	20

Robust cluster corrected standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1
Hansen J statistics: 1.108.

As we see, the F-statistics and the Hansen-J-statistics are all low, and the instruments are rarely significant. When we compare the IV estimates in the second last column with the non-IV regression in the last column we see that there are large differences in the coefficients. Again this reflects the problems with the IV. The predicted values of the endogenous female empowerment variables take very small values (since very few families have the value one on the underlying variable). The small values in turn seems to explain the unrealistically large coefficients for the predicted endogenous variables (we should expect those to be in the range between zero and one, as they are in the non-IV regression). So we conclude that the instruments are weak. And even more important, we shall see below in column (4) of tables 8 and 9 that the instruments (and also the assumedly endogenous female empowerment variables) are likely to directly affect education. Adding to this evidence, we also find (in tables 8 and 9) that the coefficients are for the most part in the same range whether we include

both set of variables (female empowerment and extended family land), or only one set. This indicates that the endogeneity problem when it comes to female empowerment is not serious. So we can interpret the two set of variables independently.

Column 1 of Table 8 is in fact a reproduction of the descriptive statistics in Table 2 for the tarai origin sample. We have for example that the female-male difference in literacy rates for households where both the male and the female side is landless equals 22.2 in Table 2, which is the same as the sum of the parameters 0.054+0.081-0.025+0.112=0.222 from column 1 of Table 8. The sum of these parameters is equally significantly different from zero. Similar calculations can be done for the other differences in Table 1. And for the most part the significance levels, and differences, are the same also when we add control variables including the ward fixed effects. There is some minor variation. In particular the difference between male and female children in families with male side landlessness of the extended family is now significant at the 1% level in columns 2 and 3, with the difference being 13.7 when we control for ward fixed-effects, and 14.8 when we also control for age and ethnic background of the household. We have calculated the differences between female and male children, with significance levels, based on the parameters in columns 2 and 3 in tables 8 and 9, and report them on separate lines in Table 2 and 3.

Table 8: OLS and FE estimates for literacy (tarai origin)

VARIABLES	(1) Literacy	(2) Literacy	(3) Literacy	(4) Literacy	(5) Literacy
Male child	0.054	0.068	0.078	0.070*	0.178***
	(0.047)	(0.051)	(0.049)	(0.037)	(0.034)
Female decides				0.214**	0.220***
				(0.086)	(0.073)
Male decides				0.128**	0.089
				(0.059)	(0.057)
Male child * female decides				-0.124	-0.132*
				(0.074)	(0.070)
Male child * male decides				-0.228**	-0.183**
				(0.092)	(0.086)
Male-side extended family landless	-0.044	0.003	0.001	-0.004	
	(0.066)	(0.057)	(0.058)	(0.041)	
Female-side extended family landless	-0.006	-0.017	-0.003	-0.003	
	(0.062)	(0.067)	(0.066)	(0.056)	
Male child * male-side landless	0.081	0.069	0.088	0.102*	
	(0.071)	(0.074)	(0.066)	(0.051)	
Male child * female-side landless	-0.025	-0.036	-0.070	-0.024	
	(0.070)	(0.079)	(0.077)	(0.067)	
Both male/female-side landless	-0.248***	-0.232***	-0.186**	-0.184**	
	(0.079)	(0.081)	(0.085)	(0.081)	
Male child * both male/ female-side landless	0.112	0.124	0.137	0.116	
	(0.093)	(0.088)	(0.087)	(0.073)	
Own landlessness			-0.035	-0.058	-0.093**
			(0.050)	(0.042)	(0.041)
Own land			0.001	0.001	0.001
			(0.001)	(0.001)	(0.001)
Age of child			-0.011**	-0.010**	-0.010**
			(0.004)	(0.004)	(0.004)
Dalit			-0.182	-0.171	-0.193
			(0.116)	(0.123)	(0.129)
Constant	0.909***	0.874***	1.182***	1.171***	1.115***
	(0.040)	(0.048)	(0.093)	(0.087)	(0.091)
Observations	868	868	868	747	747
R-squared	0.120	0.116	0.180	0.213	0.179
Number of ward (FE)		20	20	20	20

Robust cluster corrected standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

Turning now to the main findings starting with Table 8, we first note that the results in column 4 are not very different from columns 3 and 5. This indicates that both our subjective and objective (relative economic power) measures of female empowerment affect education. When it comes to the subjective measure we find that for female children there seems to be a U-formed relation between empowerment and literacy. Girls are less likely literate if her mother and father make joint household decisions (at least decisions on the mother's visits to relatives). For households without joint decisions, the effect of female empowerment is the strongest one. For male children, again female empowerment is correlated with literacy, while male power leads to less education. These findings correspond to the descriptive statistics in Table 2, although they were not significant there. For both gender we thus find that female empowerment appears to improve the chances of being literate.

Turning to the objective measure (the relative economic power of the extended families) we have calculated and reported the difference in estimated literacy levels for male and female children and reported those in Table 5 (where they can be compared to the simple descriptive statistics). From Table 5 we recall that if the male side is landless, then female children are less likely literate than males. This finding holds when we add control variables. So an economically powerless male side of the extended family prioritize male education. Turning now to the control variables themselves, we find as expected that "children" of older age (at the time of survey) are less likely literate.

Table 9: OLS and FE estimates for years of schooling (tarai origin)

VARIABLES	(1) Years	(2) Years	(3) Years	(4) Years	(5) Years
Male child	1.365	1.500*	1.672*	1.618*	2.054***
	(0.811)	(0.795)	(0.804)	(0.888)	(0.327)
Female decides				0.951	0.883
				(0.713)	(0.618)
Male decides				0.378	0.251
				(0.933)	(0.893)
Male child * female decides				-0.958	-0.949
				(1.293)	(1.410)
Male child * male decides				-1.974**	-1.839**
				(0.789)	(0.772)
Male-side extended family landless	-1.283	-0.968	-0.906	-1.076	
	(1.088)	(0.991)	(1.104)	(1.093)	
Female-side extended family landless	-1.255	-1.305	-0.940	-0.706	
	(0.942)	(1.018)	(0.971)	(0.877)	
Male child * male-side landless	0.855	0.964	1.422	1.380	
	(1.228)	(1.125)	(1.183)	(1.138)	
Male child * female-side landless	0.301	0.236	-0.330	-0.215	
	(1.077)	(1.101)	(1.077)	(1.146)	
Both male/female-side landless	-1.203	-0.502	0.300	0.167	
	(1.357)	(1.398)	(1.616)	(1.348)	
Male child * both male/ female-side landless	-0.792	-0.865	-0.801	-0.718	
	(1.455)	(1.439)	(1.506)	(1.470)	

Home-side landlessness			-1.267***	-1.268***	-1.700***
			(0.340)	(0.401)	(0.445)
Home-side land			0.019*	0.016*	0.016*
			(0.011)	(0.009)	(0.008)
Age of child			-0.131***	-0.128***	-0.134***
			(0.030)	(0.034)	(0.033)
Dalit			-2.355**	-2.211**	-2.384**
			(0.903)	(0.975)	(1.018)
Constant	7.013***	6.402***	10.271***	10.327***	9.675***
	(0.669)	(0.679)	(0.761)	(0.850)	(0.768)
Observations	868	868	868	747	747
R-squared	0.171	0.163	0.299	0.303	0.276
Number of ward (FE)		20	20	20	20

Robust cluster corrected standard errors in parentheses.
*** p<0.01, ** p<0.05, * p<0.1.

For years of schooling, we find that male power implies less education, but only for boys, which we also can see in the descriptive statistics of Table 3, and is also the same finding we had for literacy. Again this finding does not correspond with the effect of economic power, so there may be some unobservable characteristics that are picked up by the subjective measurement that explains this difference.

The effects of the objective measure is again calculated and reported above (now in Table 6), where we recall that the main finding is that girls get less education, independently of the economic strength of the extended families. In terms of the regression analysis in Table 9 this means that the male-child dummy on the first line is significant only, while most permutations of the land holdings of the extended families are not. The only relevant finding is that if both extended families are landless, then all children get less education.

Turning to the control variables we have a similar finding, if the core family itself is landless, then children get less education. And the more land the core family owns, the more education the children get[8]. We also find, again, that older "children" have less education. And for years of schooling we find that Dalit children get less education.

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[8] This effect seems to be only for boys (which can be documented by adding more interaction effects).

Conclusion

We find a positive association between female empowerment and children's literacy levels. For years of schooling we find that boys get less education in families where the father is the sole decision maker. The latter in particular can be explained by underlying factors that may affect boys' education as well as the father's power over the household. When we attempt to adjust for unobservable variation in an instrumental variables regression we find that our instrument, the relative economic power of the extended families, is weak. We discovered that female empowerment and the economic power measure have separate, and independent, effects on children's education. The estimates do not change much if we add or exclude one set of measures.

For relative economic power we find that if the male side of the extended family is poor, then they still attempt to give the boys some education. This finding is limited to the tarai origin subsample, as basically all children in the hill origin sample are literate. For the hill origin sample we find some support for the opposite finding, that is, boys get fewer years of schooling if the male side of the extended family is landless. So within the same villages there seems to be community specific variation in preferences.

When it comes to methodology, we have discovered complex interactions between landholdings of the extended family, the female say within the family, and the level of children's' education. And these interactions vary between social groups and with the gender of the child. Our strategy of conducting separate analysis for different social groups, separate analysis for literacy and years of schooling, and interacting both the subjective and objective female empowerment measures with the gender of the child seems to be useful in disentangling these complexities. In future analysis we would like to have a larger sample, but still with a variety of social groups with potentially different social norms, and more detailed data on the history of land transfers within the extended family.

Our findings add to the literature that attempt to disentangle the complex interactions between different measures of female empowerment. We know that strong women have other priorities than their husbands, and for the less empowered we know that programs for female empowerment may improve outcomes, in particular for their female children. The literature indicates, however, that the causal effects are not straightforward to identify. Our findings indicate heterogeneity between social groups in the weight men and women put on different levels of education for different gender of children. This indicates that any evaluation of programs that attempt to empower women should attempt to map a set of possible impacts (that in the case of children's education) vary with gender, social group and level of education.

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Education	Female autonomy
Intrahousehold	Nepal

A family survey was conducted in Nepal to investigate whether female empowerment leads to more education, in particular for girls. The relative economic power of the male and female side of the extended family was used as an instrument for female empowerment. The findings indicate, however, that both female empowerment and relative economic power affect education. There is a positive association between female empowerment and children's education for both gender, while boys are prioritized if the male side of the family is economically weak.