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The Anticipation Effect of Marriage on Female Education: Theory and Evidence from Nepal

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Abstract

We study the impact of planned age at marriage on female education. We first develop a theoretical framework for jointly determining age at marriage and education. The framework hypothesises that due to a household division of labour that allocates relatively greater responsibility for housework on wives, parents discount their daughters' schooling, with the discount increasing the earlier the planned age of marriage. We then test for this effect using household data from Nepal. We control for potential endogeneity by exploiting variations in cultural norms regarding dowry and differences in average age of female marriage among ethnicities and regions as instrumental variables. The econometric results validate our hypothesis that female education is negatively affected by cultural practices that favour early marriage.

Key words: Education, Marriage, Gender.

JEL Classification : I20, J12, J16

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1 Introduction

Despite a considerable number of socio-economic benefits that have been attributed to female education (Bayisenge, 2010), females fall behind males in educational attainment in many parts of the world, with the gap increasing in the level of education. The problem is particularly severe in South Asia, where the Gender Parity Index (GPI), which measures the female to male ratio in education, is significantly low. In this region, the GPI for pre-primary, primary, secondary and upper secondary level enrollment is, respectively, .98, .86, .83 and .75 whereas the global average for the same measures stands at .99, .93 , .93 and .92, respectively. All countries in this region, apart from Sri Lanka and Maldives, lag far behind the global average of girl's school enrollment and this gap increases with levels of schooling (see Table 1).

Existing empirical studies on the gender gap in education can be divided into two strands. The first focuses on household characteristics, such as economic status and parental education, and how these influence gender preferences in schooling. In general these studies find that poverty, lack of social security, credit markets and low levels of parental education all contribute to gender biases in education.[1] The second strand takes into account gender differences in labor market outcomes, especially with respect

[1] See, *e.g.*, Jacoby and Skoufias (1997), Cameron and Worswick (2001), Sawada (1997).

to returns to education.[2]

An important unexplored dimension of the gender gap in education is marriage. In Asian (particularly South Asian) cultures parents consider a daughter's marriage to be one of the family's main milestones and start planning for it years in advance.[3] Not much attention has been paid to how parental plans regarding a daughter's marriage might influence their decisions regarding her education. On the theoretical side, some papers have argued that the prospect of marriage alone biases parents against educating their daughters. Lahiri and Self (2007) analyse the impact of patrilocality in post-marital living arrangements on female education. Patrilocality, which is especially widespread in South Asian countries, leads to the anticipation that a daughter's future earnings will accrue to her in-laws' household rather than her natal household and this discourages investment in her education. Jafarey (2011) argues that due to gender wage inequality in labour markets, the marital division of labor will encourage lead to female's shouldering a larger share of responsibility for housework and the anticipation of this

[2]The seminal paper of this strand is Rosenzweig and Schultz (1982). However, the literature has produced mixed results on the pure returns to female education. While, *e.g.* Kingdom (1998) found on the basis of data from Uttar Pradesh, India that girls face lower economic rate of returns to education, Aslam (2009), Behrman and Deolalikar (1995), Asadullah (2006) found the opposite for, respectively, Pakistan, Indonesia and Bangladesh. Moreover, Munshi and Rosenzweig (2006) found that traditional caste restrictions on occupational mobility can restrict boys' occupational choices and therefore the quality of their education more than that of girls. Thus labour market outcomes do not present an unambiguous explanation for the gender gaps in female education that are observed at the national level in South Asian countries.

[3]A common metaphor in Urdu, the main language of Pakistan, for someone being sound asleep is "he/she is sleeping like he/she has just married off all his/her daughters".

effect will discontinuously lower the value of her education relative to her hypothetical single self.

Following Becker's seminal work (Becker, 1973) an empirical literature has developed in which marital decisions are treated as endogenous and their determinants studied. However, to our knowledge, few empirical papers, Brien and Lillard (1994), citeMenschSinghCasterline06 and Field and Ambrus (2008), have so far studied the interaction between marriage and female education. The first study uses empirical evidence from Malaysia to study the role of education and enrollment in delaying marriage and first conception, and the role of marriage in delayed first conception and dropping out of school. The second of these evaluates the effect of schooling on age at first marriage. Looking at evidence from 73 developing countries, Mensch, Singh, and Casterline (2006) found that the expansion of schooling has led to a proportional increase in the age at first marriage for females but did not find a similar result for males. The paper, however, did not consider the reverse effect from age at marriage to education. Field and Ambrus (2008) looked at the effect of early marriage on female schooling and other adult outcomes in Bangladesh. They argue that in impoverished and culturally traditional societies parents have an incentive to marry their daughters young as a form of protection against economic vulnerability. The age of menarche imposes a constraint on how early girls can be married. The authors use the timing of menarche as an instrument in identifying the im-

pact of early marriage on female schooling. They find that early marriage significantly lowers female schooling and that each year's delay in marriage would increase female schooling by 0.22 years.

Although an important step in isolating the effects of age at marriage on female education, the relevance of menarche as an instrumental variable to determine the age at marriage is limited to social settings in which child marriage is prevalent. While this might be true of Bangladesh, it is not necessarily true of other South Asian countries.[4] Moreover, while child marriage *directly* hinders a female's schooling by imposing household duties at a young age, our concern is with the *indirect* disincentive to female education that marriage exerts, via its implied division of labour, and this applies even to females who marry post-childhood. Once a woman gets married, her burden of household duties increases. Thus, even if a female gets married after the normal age for a particular level of schooling, the sooner she plans to marry after reaching that age, the less likely that she will attain that level in the first place.

Our paper contributes to the analysis of the above effect by first outlining a theoretical framework for jointly determining female education and planned age at marriage. The framework is based on Jafarey (2011), in

[4]A report published by the United Nations Children's Fund (UNICEF) shows that Bangladesh has a considerably higher ratio of females marrying below the age of 15 years than the other countries in this region. While in Bangladesh, approximately 30% of married females from the age group 20-24 were married below the age of 15, in India the corresponding figure was 18%. The same measure stood at less than 10% in Nepal, Pakistan and Sri Lanka (Asadullah, 2011).

which gender wage inequality is shown to lead to both a direct discount on female education and an indirect one following from the marital division of labour which allocates women to spend relatively more time in housework and men in market work. We show that the indirect discount decreases with the anticipated age of marriage of a female. We further show that the age at marriage can itself depend on individual and cultural factors, such as a female's ability to benefit from schooling and/or cultural expectations regarding an ideal age for her to marry.

We then study the causal effect of age at marriage on female education using data from a household survey in Nepal. Since our theoretical framework suggests that females may select into early marriage on the basis of idiosyncratic and unobservable differences in ability, it cautions us that least-squares estimates will be potentially biased. We thus use an instrumental variables strategy using household data from Nepal.

Nepal is well suited for our study because it has considerable variation in age at first marriage across ethnic groups and regions. In particular, members of the Maithili community, which is concentrated in the regions bordering India, have been identified by ethnographers as practicing an exceptionally strict version of dowry culture. Their particular dowry practice, locally known as *Tilak Pratha*, is effectively a groom price that increases with the educational qualification and social standing of the groom (Das, 2009). One reason for the strong adherence of the Maithilis to this practice is their

geographical and cultural proximity to India, where groom price dowries are more prevalent than amongst other communities of Nepal. Empirical findings from India also suggest a positive correlation between the size of the dowry and the socioeconomic standing of the prospective husband (Jejeebhoy and Halli, 2006). The result of *Tilak Pratha* is that parents try to get their daughters married as soon as possible because older girls are more likely to match with more mature and well-educated boys, putting upward pressure on the amount of dowry.

One of our instruments is therefore a dummy variable indicating membership of the Maithili community. Our own data show that 63% of Maithili girls were married by the age of 16, compared with 41% of non-Maithali girls (see Table 4). These differences are significant even at the 1% level, and are *prime facie* evidence that *Tilak Pratha* influences marital behavior in Nepal within the Maithali community. Our second instrument is the average age at marriage of the region and ethnicity which the married woman belongs to. The instruments are only valid if, conditional on all other covariates, they affect age of marriage but do not have other direct effect on education, such as a particular attitude towards female education. We argue that the set of conditioning covariates, and in particular mother's education, contains a coarser set of information regarding family level attitudes towards education, and both the Maithili community dummy variable and the region-ethnicity average are valid instrumental variables. This is especially true in the South

Asian region where marriage predominantly happens within communities.

The rest of the paper is organized as follows. Section 2 describes the theoretical framework. Section 3 describes the data. Section 4 explains the econometric model. Section 5 reports the empirical results. The last section concludes.

2 Theoretical framework

In this section we outline a framework for jointly determining a female's education and her planned age at marriage. Suppose that a female, indexed by i, is poised to enter adulthood. She has already gone through a period of childhood, in which she has received a level of education, e_i, which for theoretical purposes, is a non-negative, continuous variable. Suppose that her childhood education affects only her adult welfare. In other words, any costs (either explicit or in terms of foregone opportunities) or benefits from education have no effect on her as a child.

Suppose that her time in adulthood is continuous and normalised to the unit interval and that within this interval, she goes through two sub-intervals, single and married. Let $t_i < 1$ be the point of time when she marries, thus it is also the length of time she spends as single and $1 - t_i$ is the length of time she is married.[5]

Following from the above, assume that adult utility can be described by

[5]We rule out alternating stages of matrimonial status as could happen with divorce or widowhood.

an indirect utility function, V, that varies with each sub-interval of adult life:

$$V_i^j = V(e_i, X_i^j, Z_i),$$

where V_i^j is her utility in each stage j, $j = (s, m)$, s = single and m = married; e_i is her educational level, X_i^j is a set of household, community and environmental characteristics specific to stage j in i's life, and Z_i is a set of factors that are common to both stages in i's adulthood. Z_i could index her ability to benefit from education and convert it into market earnings as well as the innate attitudes of her family and community towards her marriage age and her education. Note that since e_i is determined before reaching adulthood, it is not indexed by j. We assume that V_i^j is increasing in e_i at $e_i = 0$, concave in e_i, and reaches a maximum at some stage-specific level of education, $\bar{e}_i^j > 0$. We also assume that $\bar{e}_i^s > \bar{e}_i^m$ for all i.[6] The last two assumptions are needed to ensure an interior optimum for e_i.

In addition, we assume that there exists a social norm regarding the ideal age of marriage. Let this be denoted by t^*, which applies to all females.[7]

[6] We base these assumption on Jafarey (2011) where childhood time is explicitly modelled as a choice between developing labour market skills and household skills. While the former requires only schooling time as an input, the latter requires an optimal mix of time in school and time spent at home acquiring domestic training. Too much or too little schooling can result in sub-optimal levels of household skill and this in turn leads to a inverted U-shaped relationship between V^j and e. Since we assume, also based on Jafarey (2011), that a female's burden of housework increases after marriage, this leads to the implication that $\bar{e}^s . \bar{e}^m$.

[7] In order to economise on notation, we have left implicit an additional feature of our framework which will be used in the empirical part. That is that each female belongs to some reference group, which determines her own ideal age at marriage. But this ideal might vary from group to group.

Marrying sooner or later than this ideal imposes utility costs in the form of 'loss of face'. There is a long-standing literature in both demography and sociology that have investigated the existence of social and cultural norms regarding age at marriage. While sociologists such as Settersten and Hagestad (1996) and Neugarten, Moore, and Lowe (1965) were interested in the broader issue of age norms for various "life-course" transitions, demographers are specifically interested in age at marriage and the length of the reproductive cycle in women (see Billari, Prskawetz, and Furnkranz, 2002) . Both Neugarten, Moore, and Lowe (1965) and Billari, Prskawetz, and Furnkranz (2002) discuss survey evidence on the existence of popular perceptions regarding ideal ages and/or age limits for marriage, the latter from 1960's USA and the former from 1990's Italy. [8]

With this added assumption, her indirect utility can be expressed as

$$V_i = t_i V_i^s(e_i, X_i^s, Z_i) + (1 - t_i)V_i^m(e_i, X_i^m, Z_i) - \delta(t_i - t^*)^2,$$

which is maximised by the appropriate choice of e_i and t_i.

Her educational choice is characterised by the following first order condi-

[8] According to the data cited by Billari, Prskawetz, and Furnkranz (2002), older women perceived age limits for marriage more frequently than younger ones and all age groups believed more strongly in a minimum age than a maximum. For example, 11% of women born between 1945-1947 believed in an upper age limit but only 5% of women born in 1973 did so. These are results from modern Europe. Casual evidence suggests that such culturally influenced age limits are far stronger in traditional South Asian ones than in modern European ones. Unfortunately we are not aware of similar survey evidence from Asia but even in the 1960s survey data from the USA, Neugarten, Moore, and Lowe (1965) reported that 80% of male and 90% of female respondents believed that men should marry between the ages of 20-25 and 85% of male and 90% of women set the analogous age range for women between 19-24.

tion (from hereon we drop the agent i subscripts, unless needed for clarity):

$$t\left[\frac{\partial V^s}{\partial e} - \frac{\partial V^m}{\partial e}\right] + \frac{\partial V^m}{\partial e} = 0,$$

while that for t is

$$V^s - V^m - 2\delta(t - t^*) = 0.$$

Let

$$\Lambda = \frac{\partial V^s}{\partial e} - \frac{\partial V^m}{\partial e}.$$

For the first order condition for e to hold, it must be the case that $\partial V^m/\partial e < 0$ and that $\partial V^s/\partial e > 0$. Thus the optimal level of e lies between $\bar{e}^m$ and $\bar{e}^s$. Note that at the optimal choice of e, $\Lambda > 0$.

To study the mutual dependence of e and t, totally differentiate the first-order condition for e:

$$\left.\frac{\partial e}{\partial t}\right|_t = -\frac{\Lambda}{\Gamma} > 0,$$

where

$$\Gamma = t\frac{\partial^2 V^s}{\partial e^2} + (1-t)\frac{\partial^2 V^m}{\partial e^2} < 0.$$

Since $\Lambda > 0$ at the point of optimality, e will increase with t.

Turning to the choice of t, it can be solved explicitly from the first-order condition.

$$t = t^* + \frac{V^s - V^m}{2\delta},$$

which implies that

$$\begin{array}{c} > \\ V^s = V^m \\ < \end{array} \implies \begin{array}{c} > \\ t = t^*. \\ < \end{array}$$

In other words, a female delays getting married if her utility from remaining single exceeds utility from being married and expedites marriage otherwise.

By totally differentiating the first-order condition for t,

$$\left.\frac{\partial t}{\partial e}\right|_{e} = \frac{\Lambda}{2\delta} > 0.$$

Thus t depends positively on e.[9]

3 Data

This paper employs data from the 2003 National Living Standard Survey of Nepal, carried out by its Central Bureau of Statistics with the technical support of the World Bank and UK Department of International Development. The survey follows the World Bank's Living Standard Measurement Survey Strategy and applies a two-step stratified sampling scheme. It took place over 269 Primary Sampling Units, covering 73 out of a total of 75 districts in Nepal and comprises information related to demography, education and literacy, health and maternity, and other information at the household and individual levels. A total of 5240 households and 28110 individuals were included in the sample, and 5028 married females. The data cover the five

[9]The above analysis is based on separation of decision making: the educational level is determined taking age at marriage as given; while age at marriage is determined taking education as given. Theoretically an alternative formulation could be to have the educational decision made prior to the age-at-marriage one and taking into account the dependence of the latter on the former. This alternative is unlikely to affect the qualitative predictions of the model and besides it makes more sense in the context of most South Asian countries to assume a separation of authority between mothers, who might exert greater influence on marital decisions and fathers, who might control the allocation of household resources over children's education.

administrative regions of Nepal: Eastern, Central, Western, Mid-Western and Far-Western, and an additional category of Abroad for those who were not residing in Nepal at the time of the survey (mostly in India).

The inclusion of all married females to estimate the effect of age at marriage on education may lead to the sample selection bias since unmarried females will be systematically excluded. Table 2 reports females' marital status for different age groups. The table shows that the likelihood of marriage increases monotonically until 30 years old at which less than 2.5% will remain unmarried. We thus consider two sub-samples, $Sample2549$ and $Sample3049$, for the age range of 25-49 and 30-49 years old, in order to consider a sample where potential selection bias because of marriage is minor. Our sub-samples thus contain married, divorced, separated and widows in those age ranges. The upper limit of 49 is arbitrarily imposed to exclude potential selection bias because of mortality. It should be noted that the former sub-sample is considerably larger than the latter, and this may have a significant impact on the statistical significance of the regression models.

The survey contains two types of educational information on individuals: (1) the highest level of completed schooling, and (2) a categorical question about whether the individual (i) never attended school, (ii) attended in the past and (iii) is currently attending school. Only 28% (from the $Sample2549$ sub-sample) answered question (1). For those respondents who did not answer question (1) but answered question (2-i), we imputed their educational

level as zero. This increased the sample size considerably from 1079 to 3670 for $Sample2549$ and from 684 to 2818 for $Sample3049$. We define the measure of educational achievement derived from question (1) as $Educ1$, and the measure derived by adding to $Educ1$ the imputed values for those who answered question (2-i), as $Educ2$.

The variables used in the econometric analysis are presented in Table 3 (See the Appendix for the complete list of variables and their definitions). The average school attainment for married women was 7.51 years using $Educ1$ and fell dramatically to 2.16 years when $Educ2$ is used. Geographically the distribution of married women was 22%, 34%, 25%, 7% , 4% and 8% from the Eastern, Central, Western, Mid-western, Far-western regions and Abroad, respectively, and 80% live in rural areas. They belong to fifteen different ethnicities.

The upper part of Table 4 shows the distribution of marriage age across the sample: 45% were married at or before the age of 16 years. Another 39% were married between 17 and 20. Only 2% of the sample got married after the age of 27 years. There is also a considerably lower age at marriage within the Maithili community as compared to the non-Maithili communities. The lower part of Table 4 presents details of the educational background of married females. The majority of married women, 71%, do not appear to have any formal schooling. Of the remainder, only 10% attained primary school, 4% secondary school, 7% high school and 8% received higher education.

4 Econometric model and instrumental variables

Establishing a *causal* relationship between female age at marriage and female schooling is not straightforward because of potential endogeneity. In the context of traditional South Asian cultures, there are two potential sources of endogeneity, both arising from the fact that both schooling and marital decisions are effectively in the hands of the girls' parents.

The first is the girl's own ability to benefit from education. Parents invest in a daughter's education according to her expected future labor market earnings, which in turn depends on labor market conditions for female employment and her individual ability to acquire and use human capital. As our theoretical model suggests, if a girl's parent judge her to be of relatively low ability, they may decide both not to school her much, to make better use of her time, and to marry her at an early age compared to other girls within her community.

The second is the possibility that in traditional South Asian societies, parents are heavily influenced by social norms that favor early marriage and disfavor schooling of females. Thus social norms could induce a positive relationship between the two variables.

For both reasons, there is a possibility of bi-directional causality between these two variables. Longitudinal data that span enough years could account for such anticipation effects, but are unfortunately not available; we

only observe *ex-post* decisions regarding education and the age at marriage. Given these limitations, OLS estimates of the effects of age at marriage on education are likely to be biased and to be unreliable for this reason.

We address these issues using instrumental variables (IVs) to predict a female's age at marriage on the basis of her own, her household's and her community's characteristics. Our hypothesis, as reflected in the theoretical model, is that those social norms of the ethnic community to which a female belongs that are important in influencing her marital outcome do not directly influence her education. This does not preclude community-level norms that also directly affect education, such as a particular community's bias against female education which are controlled for by ethnicity dummies. Indeed, there is evidence from attitudinal surveys that even in communities which have very low rates of female education, all else equal, parents would like to have their daughters receive at least high school-level education.(Keiko and Yoshinori, 2006)

We use two IVs. The first, taken from ethnographic studies, is the influence of the dowry culture. As stated in the Introduction, the practice of dowry is not only stricter in the Maithili community than in other Nepalese communities, the Maithili custom of linking the value of the dowry to the grooms' economic status encourages parents to marry their daughters young. Thus membership of the Maithili community is used as a dummy variable in the age at marriage regression with the expected sign being negative.

Note that the survey does not contain information about the dowry paid by the females' parents in the past. Looking at expenses in the current year, Table 6 shows that Maithili households report higher dowry and wedding expenses (the latter together with other ceremonies) as a proportion of wealth (proxied by land holding) and income.

However, in using a single community, this instrument could suffer from the potential bias that Maithilis both marry their daughters young and have especially strong unobservable biases against educating their daughters. There is also the possibility of an income effect from large dowries, as argued by Dhital (2012), whereby faced with the choice of paying for their daughters' education or saving up for their dowry, parent choose the latter. By contrast, Dalmia and Lawrence (2005) argue that dowry size is a function of differences in individual and household characteristics between grooms and brides. This suggests that the lower the gap in such characteristics, the smaller will be the dowry payment. This would actually encourage investment in daughters' education. These possibilities have received some attention in the literature and from the limited number of empirical studies on it, the results are mixed.

Dalmia and Lawrence (2005) employ household survey data from the Indian states of Uttar Pradesh and Karnataka, and find that, contrary to their own argument, brides' human capital was positively correlated with the amount of dowry. The authors themselves pointed to two types of possible

confounding biases in their data. First, in a polygamous marriage market, a relatively large number of women might have been competing for a limited number of eligible men, and both the educational level of women and the dowry might have reflected this asymmetry between men and women. Second, both variables might have been positively correlated with household wealth.

Another study carried out by Anderson (2004) estimated the effects of brides' education on dowry payments (parental characteristics and distance to school were used as IVs in the education regression). Employing data from Pakistan this study found a positive relationship between the brides' education and dowry size. However, when the average level of education was controlled for, the estimated coefficient on bride's education became statistically insignificant. These studies make it appear that dowry size might not directly discourage female schooling. Nonetheless in light of this and the possibility of a Maithili-specific bias, we employ a second IV.

The second instrument is the average age of marriage for the respondent's reference group. We define this group as the intersection of the ethnic and regional community to which she belongs. Our assumption is that the average age of marriage of females in the reference group proxies for the culturally derived ideal age of marriage to which the respondent is expected to aspire. To the extent that there is regional variation in this variable within the same ethnic group, we hypothesise that this reflects peer-group effects on expected

age at marriage but that the innate cultural attitudes towards female education, which might be present within her ethnic group as a whole, have been washed out by this variation. We are assuming that there is no systematic correlation between a particular ethno-regional community's (unobservable) cultural norms towards an appropriate age of female marriage and an appropriate level of girls' schooling, apart from how the former might influence the latter. Note also that, unlike cultural norms regarding age-at-marraige. we are not aware of any literature which suggests the existence of cultural norms regarding an appropriate level of female schooling, even in cultures that might be generally biased against it.

A strong point for the exogoneity of both IVs in our model is the inclusion of mother's education as an additional covariate which captures any plausible community specific bias on female education. In other words, if a particular community has negative attitudes toward their daughters' education this effect should have already been reflected in their mothers' education. This is especially true in the South Asian region where marriage predominantly happens within communities. Our results show that the coefficients for mother education is significant only in second stage, but not in first stage, which implies that it is specifically capturing the effect of mother's education on daughter's education. The validity of the Maithili community and average age of marriage IVs should thus be considered as conditional on mother's education.

We use three different IVs models. The three different models use as instruments: (1) IV1: a Maithili-community binary variable, (2) IV2: average age of females within the ethnic-regional grouping to which the respondent belongs, and (3) Two IVs: both. In the first-stage of each regression, age at marriage is regressed on the appropriate IV(s) (and other control variables), and in the second-stage, educational attainment as measured by $Educ1$ and $Educ2$ is regressed on the predicted age at marriage and other control variables.

The two stage regression model can be expressed as,

$$Educ_i = \beta_0 + \beta_1 Mage_i + \beta_2 X_i + u_i, \tag{1}$$

$$Mage_i = \delta_0 + \delta_1 Z_i + \delta_2 X_i + v_i, \tag{2}$$

where $Educ$ is years of schooling and $Mage$ is age at marriage associated with female i. X comprises a set of exogenous covariates, representing individual as well as household characteristics such as age, age square, father's education, household wealth proxied by the value of landholding, household size, number of siblings, ethnic dummies as well as regional dummies. See the Appendix for the complete list of variables and their definition. Z is the IV set (IV1, IV2 or Two IVs). u and v are the idiosyncratic error terms associated with female i.

5 Results

5.1 Baseline model

Tables 7 and 9 present the first-stage and Tables 8 and 10 second-stage baseline regressions, for each sub-sample, respectively. White robust standard errors are reported. Regional and ethnicity dummy variables are included but coefficients not reported. Education is measured, as explained in Section 3, by both $Educ1$ and $Educ2$. In the discussions below, the results following from each of these two different measures are analogously identified as the $Educ1$ and $Educ2$ samples, respectively. In order to save space, coefficients are not reported for all the explanatory variables that were used in the regressions, but they are available upon request.

We next consider the three IV models, again for both the $Educ1$ and $Educ2$ samples. IV1 uses only the Maithili dummy as an instrument; IV2 uses only the average age at marriage by ethnicity and region; and Two IVs uses both instruments together. As expected in IV1, due to the presumed effect of a strong dowry culture, membership to the Maithili community has a significant and negative relationship with age at marriage. The estimated coefficient for the $Educ1$ sample is -1.7 for the sample of 25-49 years old, and -1.6 for the sample of 30-49 years old. A coefficient of -.89 and -1.13 correspond to the $Educ2$ sample, for 25-49 and 30-49 years old, respectively.

The first-stage IV2 model shows positive and statistically significant co-

efficients of *Avmage*. When both IVs are used together the Maithili coefficients are slightly reduced but they maintain they statistical significance. The calculated F-statistics (reported in Tables 8 and 10) are no less than 11 for the largest 25-49 years old sample indicating strong joint significance of the estimated coefficients, but the same statistic is smaller when the smaller sub-sample of 30-49 years old is used. When both IVs are used, the Sargan over-identifying restriction test p-values (reported in Tables 8 and 10) cannot reject the null hypothesis of validity of the IVs.

Regarding the other explanatory variables, a quick overview shows that the results in the first-stage regression are more or less as expected. Father's education, landholding, household income and living in urban areas increase age at marriage. Mother's education is not statistically significant in any first-stage specification.

Turning to the second-stage results, the first column in Tables 8 and 10 shows the OLS coefficients. They imply that increasing age at marriage by 1 year is likely to increase female's educational level by .315 years using $Educ1$ and .193 years using $Educ2$ for the sample of 25-49 years-old and .269 years using $Educ1$ and .159 years using $Educ2$ for the sample of 30-49 years-old.

Each of the IVs models shows a positive impact of delaying age at marriage ($Mage$) on education although the level of significance varies across models and samples. For the 25-49 years old sample, $Educ1$ IV1 model shows a coefficient of age at marriage on education of .335 (not significant),

IV2 .456, and Two IVs model .411 (significant at the 5% level). For $Educ2$, $Mage$ also has a positive (statistically significant at 1% level) effect in all models: .564, .324 and .561 for IV1, IV2 and Two IV models, respectively. For the 30-49 years old sample, $Educ1$ model, the coefficients of $Mage$ are not statistically significant. However, for $Educ2$, $Mage$ has a positive effect in all models: .346 (at 5%), .175 (at 10%) and .212 (at 5%) for IV1, IV2 and Two IV models, respectively. These estimates are roughly in line with but slightly higher than that found by Field and Ambrus (2008) for Bangladesh where increasing age at marriage by one year increases education by 0.22 years.

In all second-stage specifications mother's and father's education are positive and statistically significant. Moreover, as expected, there are significant differences between urban and rural areas.

Overall, the IV models show similar effect of marriage age on education than the OLS models. The standard errors also increase considerably, which determine less precise estimates and thus greater variance in significance levels.

5.2 Robustness and validity of the estimated results

In this section, we consider potential sources of bias in our estimates and outline our attempts to address them. We present results for the sub-sample of 25-49 years old females only.

First, there is the possibility that poverty drives parents both to keep their daughters out of school and to marry them young so that the burden of maintenance falls on their husbands and in-laws. Moreover, poor parents could be more susceptible to trading off girls' education for the sake of accumulating a sufficient dowry, even in communities that do not practice dowry culture as strictly as Maithilis do.

Second, a potential detrimental effect of early marriage on female education may arise because, unlike our theoretical model in which marriage happens only after the age of schooling has passed, a significant proportion of Nepalese girls get married during childhood and could therefore be obliged to abandon schooling and take up household duties. Both of these sources of bias could affect both our IVs.

A third possible source of bias, affecting only the Maithili instrument, is that this might reflect regional variations in marriage practice, especially regarding age at marriage, rather than an effect of dowry culture specific to Maithilis. This possibility arises because Maithilis are concentrated in certain regions of Nepal that border India; to be precise in four of the six regions of our survey data: Eastern, Central, Western and Abroad. Since cultural practices in Nepal do vary by region and the concomitant degree of urbanization, this could arise as a source of bias.

We start first by looking at the possibility that poverty underlies the observed relationship between female education and age at marriage. We

address this by running our regressions on a restricted sub-sample of households that belong to the upper half of the wealth distribution (proxied by land holding). The results appear in Tables 11 and 12. We shall discuss separately the cases of $Educ1$ and $Educ2$. For $Educ1$, the first-stage coefficients of the instruments increased in value and remain significant at the 1% level across all IV models. In the second-stage regression the coefficient of age at marriage increased for IV1 and dropped in value and/or significance for IV2 and Two Ivs models. For $Educ2$, a marginal decrease is observed in the second-stage regression in the three IV models. The p-value of the Sargan tests and the F-statistics confirm the validity of the instruments in this sub-sample. The important point is that by and large our qualitative results continue to hold at similar levels of significance, especially in the larger sample.

Second, we look at the possibility that the detrimental effect of early marriage on female education arises because of child marriages. To filter out this effect, we run regressions on the sub-sample of females who married above the age of 15. The reasons for these cutoff ages are, respectively, 15 is the age set by the International Labor Organization (ILO) convention as the minimum age of employment and one reason for this is that it is the age by which most children will have completed secondary school, while 16 is age at which childhood ends according to Nepal's Children Act, 1992. If child marriage is the main driving force behind low female education we

would expect insignificant effects of age at marriage on education in these sub-samples. The results for the first sub-sample appear in Tables 13 and 14. Overall the results are similar in magnitide and significance to the corresponding baseline regression models, showing a positive effect of age of marriage on education. The Sargan test rejects the exogeneity of IVs in the $Educ2$ case.

The third potential source of bias is that the Maithili instrument might reflect regional variations in marriage practice rather than the effect of Maithili dowry culture. Maithilis are concentrated in regions of Nepal that border India and we know that cultural practices in Nepal vary by region and the concomitant degree of urbanization. We addressed this possibility by estimating our models on a sub-sample that comes from regions in which the Maithali community are concentrated. This sub-sample includes the Eastern, Central, Western and Abroad regions but excludes the Mid-Western and Far Western regions. The results appear in Tables 15 and 16. The estimates reported in Table 16 are similar to the corresponding baseline models.

6 Conclusions

We investigated the impact of planned age at marriage on female education on the basis of a theoretical framework for jointly determining both variables which we then tested using household data from Nepal. In light of the

framework, we developed instruments that could control for the potential endogeneity of our main explanatory variable and then employed an instrumental variables procedure for identifying its impact on female education.

Our results suggest that a strict adherence to dowry practices, as in the Maithili community, lowers age at marriage while the average age of marriage of one's ethno-regional group increases it. We then found that marital behaviours that favour early marriage significantly reduce female educational attainment. While the results differed across our different instrumental variables and samples, the estimates indicate that each year's delay in marriage increases female education from 0.2 to 0.5 years. This figure is roughly in line with but slightly higher than that found by Field and Ambrus (2008) for Bangladesh.

We also tested all our models on sub-samples of the data in order to control for potential bias. These were the possibilities that (i) the positive association of female education with age at marriage could reflect the results of a coping mechanism amongst the poorest households; (ii) the high incidence of child marriage in Nepal could have induced our estimated coefficients through a more direct *ex post* mechanism rather than the more indirect *ex ante* mechanism stressed by the theory; (iii) the concentration of Maithilis in certain regions of Nepal could have led to results which reflect regional variations rather than the dowry culture of Maithilis. Overall our robustness results continue to suggest a negative impact of early marriage

on female education.

The implied causality effects has important policy implications. Policies that increase marriage age might increase parent's incentives to spend on girls' education.

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Appendix: Variables definition.

*Educ*1	Years of schooling (highest level completed).
*Educ*2	Years of schooling imputed as 0 for those who did not report highest level completed but reported as they never attended school.
Age:25-29	Taking value 1 if an individual's age was reported between 25-29 years; 0 otherwise.
Age:30-34	Taking value 1 if an individual's age was reported between 30-34 years; 0 otherwise.
Age:35-39	Taking value 1 if an individual's age was reported between 35-39 years; 0 otherwise.
Age:40-44	Taking value 1 if an individual's age was reported between 40-44 years; 0 otherwise.
Age:45-49	Taking value 1 if an individual's age was reported between 45-49 years; 0 otherwise.
Urban	Taking value 1 if respondent was born in urban area; 0 otherwise.
Mage	Age at marriage.
Feduc	Father's the highest level of education.
Meduc	Mother's the highest level of education.
Lnholding	Price of land holdings by a household.
Hincome	Household gross income calculated as farm-earning plus earning from sale of livestocks plus income from non-farm enterprises plus remittance received .
Maithili	Taking value 1 if an individual's language was reported as Maithili; 0 otherwise.
Avmage	Average age at marriage derived from the interaction term between ethnicity and region.
Brahman	Taking value 1 if a respondent's ethnicity was reported as Brahman; 0 otherwise.
Chhetri	Taking value 1 if a respondent's ethnicity was reported as Chhetri; 0 otherwise.
Newar	Taking value 1 if a respondent's ethnicity was reported as Newar; 0 otherwise.
Magar	Taking value 1 if a respondent's ethnicity was reported as Magar; 0 otherwise.
Tharu	Taking value 1 if a respondent's ethnicity was reported as Tharu; 0 otherwise.
Tamang	Taking value 1 if a respondent's ethnicity was reported as Tamang; 0 otherwise.
Kami	Taking value 1 if a respondent's ethnicity was reported as Kami; 0 otherwise.
Yadav	Taking value 1 if a respondent's ethnicity was reported as Yadav; 0 otherwise.
Muslim	Taking value 1 if a respondent's ethnicity was reported as Muslim; 0 otherwise.
Rai	Taking value 1 if a respondent's ethnicity was reported as Rai; 0 otherwise.
Gurung	Taking value 1 if a respondent's ethnicity was reported as Gurung; 0 otherwise.
Limbu	Taking value 1 if a respondent's ethnicity was reported as Limbu; 0 otherwise.
Sarki	Taking value 1 if a respondent's ethnicity was reported as Sarki; 0 otherwise.
Other	Taking value 1 if a respondent's ethnicity was reported as Other; 0 otherwise.
Eastern	Taking value 1 if an individual was residing in eastern development region; 0 otherwise.
Central	Taking value 1 if an individual was residing in central development region; 0 otherwise.
Western	Taking value 1 if an individual was residing in western development region; 0 otherwise.
Mid-western	Taking value 1 if an individual was residing in mid-western development region; 0 otherwise.
Far-western	Taking value 1 if an individual was residing in far-western development region; 0 otherwise.
Abroad	Taking value 1 if an individual was residing in abroad; 0 otherwise.

Table 1: Gender Parity Index (GPI) on educational enrollment in South Asia: 2002

Country/region	Pre-primary	Primary	Secondary	Upper secondary
World	.99	.93	.93	.92
SAARC	.98	.86	.82	.76
Bangladesh	1	-	1.21	.93
Bhutan	-	.92	92	.74
India	1.03	.87	.78.69	-
Maldives	.99	.96	1.17	.88
Nepal	.85	.86	.78	.68
Pakistan	-	.68	-	-
Sri Lanka	-	.99**	1.01**	1.14

Source: Institute for statistics, UNESCO.
Notes: - Indicates data not available and ** indicates GPI based on previous year.

Table 2: Females' marital status by age group (in %)

Age group	Married	Divorced	Separated	Widow	Unmarried
<= 15	2.76	0.10	-	0.05	97.09
16-20	42.98	0.19	0.51	0.13	56.20
21-24	76.08	0.10	0.52	0.21	23.09
25-29	90.76	-	0.84	0.65	7.74
30-34	93.74	-	1.76	2.09	2.41
35-39	93.35	0.18	0.72	3.60	2.16
40-44	89.49	0.26	2.37	5.78	2.10
45-49	83.22	0.34	2.37	12.37	1.69
Total*	59.51	0.14	1.15	8.91	30.29

Notes: * all ages, including age> 49.

Table 3: Descriptive statistics

Variable	*Sample2549*	*Sample3049*
*Educ*1	7.51(.106)	7.37(.136)
*Educ*2	2.16(.063)	1.78(.068)
Feduc	2.75(.138)	2.75(.175)
Meduc	.649(.070)	.611(.087)
Urban	.202(.012)	.219(.015)
Lnholding('00000)	3.008(.469)	3.11(.536)
Hincome('00000)	177.54(41.98)	141.93(38.88)
Mage	19.00(.107)	18.97(.144)
Age dummies		
25-29	.366(.014)	-
30-34	.217(.012)	.342(.018)
35-49	.220(.012)	.346(.018)
40-44	.108(.008)	.178(.014)
45-49	.084(.008)	.133(.012)
Ethnic dummies		
Brahman	.255(.013)	.271(.017)
Chettri	.155(.011)	.160(.014)
Newar	.253(.013)	.276(.017)
Magar	.046(.006)	.042(.007)
Tharu	.022(.004)	.017(.005)
Tamang	.021(.004)	.014(.004)
Kami	.012(.003)	.010(.003)
Yadav	.010(.003)	.005(.002)
Muslim	.012(.003)	.010(.003)
Rai	.024(.004)	.016(.004)
Gurung	.032(.005)	.035(.007)
Damai	.010(.003)	.004(.002)
Limbu	.012(.003)	.010(.003)
Sarki	.001(.001)	-
Others	.142(.010)	.124(.012)
Regional dummies		
Eastern	.216(.012)	.192(.015)
Central	.335(.014)	.365(.018)
Western	.253(.013)	.248(.016)
Mid-western	.072(.007)	.077(.010)
Far-western	.033(.005)	.030(.006)
Abroad	.076(.008)	.071(.009)

Notes: Standard deviations in parentheses.

Table 4: Comparison of age at marriage and educational distribution

	Sample2549			*Sample3049*		
Variable	All	Non-Maithili	Maithili	All	Non-Maithili	Maithili
			Age at marriage			
Average	17.44(.059)	17.71(.064)	15.78(.127)	17.34(.078)	17.61(.077)	15.48(.157)
Married ≤16	.45(.008)	.42(.008)	.65(.021)	.47(.009)	.44(.009)	.69(.024)
Married 17-18	.25(.007)	.25(.007)	.22(.018)	.24(.008)	.25(.008)	.20(.021)
Married 19-20	.14(.005)	.15(.006)	.09(.012)	.14(.006)	.15(.007)	.08(.014)
Married 21-22	.07(.004)	.08(.004)	.02(.006)	.07(.004)	.07(.005)	.02(.006)
Married 23-24	.04(.003)	.04(.003)	.01(.0050	.03(.003)	.03(.003)	.005(.002)
Married 25-26	.03(.002)	.03(.003)	.005(.002)	.03(.003)	.03(.003)	.005(.002)
Married ≥27	.02(.002)	.02(.002)	.005(.002)	.02(.002)	.03(.003)	.005(.002)
			Education			
No formal schooling	.71(.007)	.69(.008)	.87(.014)	.76(.008)	.73(.008)	.92(.014)
Primary [1-5]	.10(.004)	.11(.005)	.06(.010)	.09(.005)	.10(.005)	.04(.009)
Secondary [6-7]	.04(.003)	.03(.003)	.03(.007)	.03(.003)	.03(.003)	.01(.006)
High school [8-10]	.07(.004)	.08(.004)	.02(.006)	.06(.004)	.07(.005)	.01(.005)
Higher education [≥11]	.08(.004)	.09(.004)	.02(.006)	.06(.004)	.07(.007)	.02(.007)
Obs.	3760	3244	516	2818	2460	358

Notes: Grades corresponding to each educational level from variable *Educ*2 are presented in brackets. Standard deviations in parentheses.

Table 5: Distribution of the Maithili community

Ethnicity	*Sample2549*	*Sample3049*
	Ethnic distribution	
Bramhin	.02(.005)	.02(.007)
Yadav	.16(.016)	.17(.019)
Muslim	.14(.014)	.13(.017)
Sarki	.03(.007)	.02(.007)
Tharu	.04(.008)	.03(.009)
Other	.61(.018)	.63(.025)
	Regional distribution	
Eastern	.38(.021)	.38(.025)
Central	.36(.021)	.36(.025)
Western	.01(.003)	.01(.004)
Mid-western	-	-
Far-western	-	-
Abroad(India)	.25(.018)	.25(.015)
Obs.	516	358

Notes: Standard deviations in parentheses.

Table 6: Wedding expenses: Current year (in '000)

	Maithili			*Non-Maithili*		
	Total	*Rural*	*Urban*	*Total*	*Rural*	*Urban*
D-cost	19.39(38.13)	20.84(39.92)	7.04(11.86)	5.66(26.70)	5.55(28.7)	5.99(21.90)
Obs.	57	48	9	764	582	182
Wed-exp	7.62(20.96)	7.75(21.41)	5.38(11.10)	8.41(32.37)	6.43(16.15)	19.31(72.50)
Obs.	232	220	12	1776	1503	273
D-cost/Lnholding	.219	.251	0.060	.020	.029	.015
D-cost/Hincome	.005	.015	.0004	.0005	.0005	.0005
Wed-exp/Lnholding	.088	.092	.041	.044	.040	.054
Wed-exp/Hincome	.004	.004	.003	.001	.001	.0007

Note: D-cost=dowry paid, Wed-exp= marriage, birth and other ceremonies expenses. These figures represent aggregate household data. Standard deviations in parentheses.

Table 7: First-stage regression results: Baseline model (*Sample2549*)

Variable	**IV1**	**IV2**	**Two IVs**
	Dep.var. Mage, sub-sample for *Educ1*		
Avmage	-	.737***(.167)	.705***(.167)
Maithili	-1.70***(.503)	-	-1.58***(.500)
Age:30-34	-.169(.272)	-.083(.270)	-.164(.270)
Age:35-39	-.295(.269)	-.259(.268)	-.305(.267)
Age:40-44	-.135(.341)	-.115(.339)	-.145(.338)
Age:45-49	-.722*(.381)	-.683*(.379)	-.747*(.378)
Feduc	.094***(.025)	.090***(.025)	.094***(.025)
Meduc	-.046(.049)	-.034(.049)	-.039(.049)
Urban	1.22***(.311)	1.09***(.312)	1.05***(.311)
Lnholding	1.33*(.792)	1.28*(.788)	1.26*(.783)
Hincome	.011(.009)	.011(.009)	.011(.009)
Obs.	1079	1079	1079
R^2	.1644	.1704	.1775
	Dep.var. Mage, sub-sample for *Educ2*		
Avmage	-	.997***(.099)	.976***(.099)
Maithili	-.890***(.200)	-	-.790***(.198)
Age:30-34	-.083(.165)	-.108(.163)	-.127(.163)
Age:35-39	-.235*(.154)	-.253*(.152)	-.278*(.152)
Age:40-44	-.439***(.165)	-.446***(.163)	-.478***(.163)
Age:45-49	-.818**(.182)	-.847***(.180)	-.861***(.180)
Feduc	.115***(.021)	.114***(.020)	.115***(.020)
Meduc	-.006(.046)	.002(.045)	-.003(.045)
Urban	1.64***(.238)	1.44***(.237)	1.42***(.236)
Lnholding	1.33**(.673)	1.26*(.669)	1.24*(.665)
Hincome	.014(.011)	.013(.011)	.013(.010)
Obs.	3760	3760	3760
R^2	.1921	.2031	.2063

Notes: Sample of 25-49 years old. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 8: Second-stage regression results: Baseline model (*Sample2549*)

Variable	**OLS**	**IV1**	**IV2**	**Two IVs**
		Dep.var. *Educ1*		
Mage	.315***(.028)	.335(.254)	.456**(.199)	.411**(.161)
Age:30-34	-.348*(.236)	-.347*(.235)	-.337(.237)	-.340(.236)
Age:35-39	-.437*(.233)	-.432*(.240)	-.402*(.240)	-.413*(.236)
Age:40-44	-.551*(.297)	-.549*(.295)	-.537*(.298)	-.541*(.296)
Age:45-49	-1.19***(.372)	-1.18***(.368)	-1.10***(.357)	-1.13***(.346)
Feduc	.184***(.020)	.183***(.031)	.172***(.028)	.176***(.026)
Meduc	.091***(.031)	.092**(.044)	.097**(.044)	.095**(.043)
Urban	1.86***(.279)	1.83***(.419)	1.68***(.371)	1.73***(.338)
Lnholding	-.534(.679)	-.563(.729)	-.730(.647)	-.668(.641)
Hincome	.001(.003)	.001(.003)	.001(.003)	.001(.003)
IVs F-statistic		[11.52]	[19.30]	[14.72]
Sargan test p-value				{.7023}
R^2	.3625	.3621	.3458	.3546
		Dep.var. *Educ2*		
Mage	.193***(.017)	.564***(.213)	.324***(.088)	.361***(.083)
Age:30-34	-.649***(.156)	-.627***(.157)	-.641***(.146)	-.639***(.147)
Age:35-39	-1.14***(.141)	-1.07***(.152)	-1.12***(.137)	-1.11***(.137)
Age:40-44	-1.61***(.145)	-1.46***(.179)	-1.56***(.150)	-1.54***(.151)
Age:45-49	-1.64***(.156)	-1.34***(.243)	-1.54***(.176)	-1.51***(.175)
Feduc	.385***(.023)	.343***(.031)	.371***(.021)	.366***(.020)
Meduc	.211***(.041)	.211***(.043)	.211***(.040)	.211***(.040)
Urban	2.64***(.291)	2.02***(.424)	2.42***(.258)	2.36***(.254)
Lnholding	1.06(.807)	.560(.713)	.886(.758)	.836(.742)
Hincome	.010(.010)	.005(.007)	.008(.009)	.008(.009)
IVs F-statistic		[19.76]	[101.17]	[26.43]
Sargan test p-value				{.1419}
R^2	.4314	.2105	.2224	.4282

Notes: Sample of 25-49 years old. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 9: First-stage regression results: Baseline model (*Sample3049*)

Variable	**IV1**	**IV2**	**Two IVs**
	Dep.var. Mage, sub-sample for *Educ1*		
Avmage	-	.822***(.203)	.785***(.207)
Maithili	-1.60*(.803)	-	-1.30*(.794)
Age:35-39	-.151(.327)	-.191(.322)	-.162(.323)
Age:40-44	.021(.396)	-.048(.392)	.001(.397)
Age:45-49	-.545(.424)	-.583(.411)	-.567(.415)
Feduc	.108***(.031)	.106***(.031)	.108***(.031)
Meduc	-.063(.065)	-.045(.064)	-.048(.064)
Urban	1.51***(.447)	1.39***(.445)	1.37***(.450)
Lnholding	.720(1.01)	.672(.999)	.651(.995)
Hincome	.029***(.003)	.028***(.003)	.027***(.003)
Obs.	684	684	684
R^2	.1650	.2113	.2148
	Dep.var. Mage, sub-sample for *Educ2*		
Avmage	-	1.00***(.111)	.974***(.111)
Maithili	-1.13***(.221)	-	-1.01***(.219)
Age:35-39	-.145(.162)	-.136(.161)	-.144(.160)
Age:40-44	-.370**(.183)	-.345*(.181)	-.362**(.180)
Age:45-49	-.750***(.209)	-.751***(.207)	-.746***(.206)
Feduc	.112***(.026)	.113***(.026)	.113***(.026)
Meduc	-.024(.060)	-.011(.059)	-.017(.060)
Urban	1.96***(.352)	1.78***(.356)	1.75***(.356)
Lnholding	.719(.789)	.649(.785)	.623(.774)
Hincome	.036***(.003)	.035***(.004)	.035***(.003)
Obs.	2818	2818	2818
R^2	.1956	.2104	.2071

Notes: Sample of 30-49 years old. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. IV1: Maithili. IV2: Avmage. Age:30-34 as base category. Regional and ethnicity dummies are included but not reported.

Table 10: Second-stage regression results: Baseline model (*Sample3049*)

Variable	**OLS**	**IV1**	**IV2**	**Two IVs**
		Dep.var. *Educ1*		
Mage	.269***(.034)	-.054(.446)	.169(.169)	.125(.161)
Age:35-39	-.140(.268)	-.200(.294)	-.158(.268)	-.167(.269)
Age:40-44	-.264(.324)	-.277(.343)	-.268(.320)	-.270(.323)
Age:45-49	-.990**(.392)	-1.17**(.482)	-1.04***(.401)	-1.07***(.402)
Feduc	.203***(.026)	.238***(.056)	.214***(.031)	.219***(.031)
Meduc	.106***(.040)	.086*(.048)	.100***(.039)	.097***(.039)
Urban	1.81***(.371)	2.31***(.794)	1.97***(.443)	2.03***(.441)
Lnholding	-1.24(.729)	-1.01(1.01)	-1.17*(.794)	-1.14(.825)
Hincome	.006(.005)	.016(.013)	.009(.007)	.011*(.007)
IVs F-statistic		[3.98]	[16.38]	[9.35]
Sargan test p-value				{.6029}
R^2	.2739	.3594		
		Dep.var. *Educ2*		
Mage	.159***(.018)	.346**(.148)	.175*(.098)	.212**(.083)
Age:35-39	-.500***(.149)	-.475***(.152)	-.498***(.149)	-.493***(.149)
Age:40-44	-.964***(.152)	-.898***(.163)	-.959***(.156)	-.946***(.154)
Age:45-49	-1.00***(.162)	.862***(.202)	-.991***(.179)	-.963***(.175)
Feduc	.390***(.029)	.369***(.033)	.388***(.032)	.384***(.031)
Meduc	.233***(.053)	.236***(.052)	.233***(.052)	.234***(.052)
Urban	2.64***(.353)	2.26***(.862)	2.60***(.392)	2.53***(.381)
Lnholding	.936(1.27)	.796(1.19)	.924(1.26)	.897(1.25)
Hincome	.029*(.015)	.023*(.015)	.029*(.015)	.028*(.015)
IVs F-statistic		[26.30]	[80.37]	[51.70]
Sargan test p-value				{.3055}
R^2	.4256	.3939	.4253	.4230

Notes: Sample of 30-49 years old. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:30-34 as base category. Regional and ethnicity dummies are included but not reported.

Table 11: First-stage regression results: Upper wealth households

Variable	**IV1**	**IV2**	**Two IVs**
	Dep.var. Mage, sub-sample for *Educ1*		
Avmage	-	.964***(.181)	.940***(.184)
Maithili	-2.08***(.581)	-	-1.79***(.586)
Age:30-34	-.223(.374)	-.145(.364)	-.218(.361)
Age:35-39	-.633*(.372)	-.528(.367)	-.598*(.365)
Age:40-44	-.544(.501)	-.676(.496)	-.633(.494)
Age:45-49	-.963*(.569)	-1.13**(.536)	-1.21**(.532)
Feduc	.064(.039)	.066*(.038)	.074(.038)
Meduc	.001(.084)	-.006(.083)	.000(.082)
Urban	1.58***(.578)	1.35***(.595)	1.31***(.593)
Lnholding	1.07(.806)	1.00(.795)	.929(.787)
Hincome	-.003(.003)	-.003(.003)	-.003(.003)
Obs.	530	530	530
R^2	.2036	.2271	.2553
	Dep.var. Mage, sub-sample for *Educ2*		
Avmage	-	.960***(.117)	.927***(.119)
Maithili	-1.22***(.260)	-	-1.09***(.258)
Age:30-34	-.139(.212)	-.177(.209)	-.185(.208)
Age:35-39	-.618***(.192)	-.654***(.189)	-.682***(.189)
Age:40-44	-.671***(.239)	-.706***(.236)	-.727***(.202)
Age:45-49	-1.10***(.272)	-1.14***(.268)	-1.16***(.266)
Feduc	.091***(.031)	.097***(.030)	.100***(.030)
Meduc	.043(.074)	.038(.073)	.038(.072)
Urban	1.96***(.604)	1.77***(.013)	1.70***(.613)
Lnholding	1.45**(.738)	1.27*(.720)	1.26*(.713)
Hincome	-.006(.005)	-.006(.005)	-.006(.005)
Obs.	1877	1877	1877
R^2	.1975	.1997	.2052

Notes: Sample of 25-49 years old. Top 50% households in terms of land holding. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 12: Second-stage regression results: Upper wealth households

Variable	**OLS**	**IV1**	**IV2**	**Two IVs**
		Dep.var. *Educ1*		
Mage	.300***(.046)	.500**(.246)	.335**(.157)	.364***(.140)
Age:30-34	-.428(.356)	-.399(.358)	-.435(.347)	-.431(.347)
Age:35-39	-.576*(.339)	-.465(.357)	-.540*(.331)	-.526*(.329)
Age:40-44	-1.03***(.432)	-.916*(.473)	-1.01**(.429)	-.996**(.432)
Age:45-49	-2.02***(.496)	-1.85***(.532)	-2.08***(.492)	-.198***(.492)
Feduc	.174***(.035)	.163***(.036)	.175***(.035)	.173***(.035)
Meduc	.122***(.063)	.124*(.067)	.120*(.062)	.120*(.063)
Urban	1.89***(.553)	1.55**(.699)	1.94***(.577)	1.89***(.569)
Lnholding	-.260(.743)	-.159(.850)	-.316(.724)	-.272(.739)
Hincome	-.005*(.003)	-.005*(.003)	-.005*(.003)	-.005*(.003)
IVs F-statistic	-	[12.90]	[28.31]	[17.31]
Sargan test p-value				{.6935}
R^2	.3622	.3315	.3647	.3628
		Dep.var. *Educ2*		
Mage	.182***(.025)	.384**(.185)	.313***(.118)	.330***(.103)
Age:30-34	-.926***(.238)	-.900***(.239)	-.910***(.236)	-.907***(.236)
Age:35-39	-1.44***(.211)	-1.32***(.235)	-1.36***(.215)	-1.35***(.213)
Age:40-44	-2.09***(.207)	-.196***(.245)	-2.01(.202)	-2.00(.217)
Age:45-49	-2.09***(.216)	-1.88(.298)	-1.95***(.244)	-1.93***(.238)
Feduc	.371***(.037)	.353***(.039)	.359***(.038)	.358***(.037)
Meduc	.272***(.074)	.263***(.074)	.267***(.073)	.266***(.074)
Urban	1.70***(.555)	1.28*(.705)	1.43**(.605)	1.39**(.602)
Lnholding	1.98*(1.02)	1.81*(1.00)	1.75*(.958)	1.76*(.958)
Hincome	-.005(.007)	-.004(.007)	-.004(.006)	-.004(.006)
IVs F-statistic		[22.19]	[66.38]	[40.73]
Sargan test p-value				{.7318}
R^2	.3786	.3464	.3650	.3613

Notes: Sample of 25-49 years old. Top 50% households in terms of land holding. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 13: First-stage regression results : Adult marriage (Mage $\geq$ 15)

Variable	**IV1**	**IV2**	**Two IVs**
	Dep.var. Mage, sub-sample for *Educ1*		
Avmage	-	.720***(.171)	.712***(.173)
Maithili	-.895*(.522)	-	-.825*(.524)
Age:30-34	-.001(.259)	.028(.255)	-.006(.258)
Age:35-39	-.145(.269)	-.145(.267)	-.172(.264)
Age:40-44	-.235(.256)	-.244(.356)	-.267(.356)
Age:45-49	-.371(.393)	-.376(.367)	-.410(.372)
Feduc	.078***(.023)	.078***(.023)	.079***(.023)
Meduc	-.016(.045)	-.006(.045)	-.008(.045)
Urban	1.32***(.315)	1.18***(.318)	1.17***(.319)
Lnholding	1.10*(.743)	1.03(.734)	1.02(.732)
Hincome	.009(.009)	.008(.009)	.008(.009)
Obs.	1003	1003	1003
R^2	İ293	.1442	.1456
	Dep.var. Mage, sub-sample for *Educ2*		
Avmage	-	.770***(.095)	.751***(.096)
Maithili	-.752***(.166)	-	-.656***(.165)
Age:30-34	.116(.144)	.098(.141)	.082(.141)
Age:35-39	-.057(.138)	-.072(.138)	-.092(.137)
Age:40-44	.038(.164)	.039(.162)	.009(.162)
Age:45-49	-.032(.200)	-.069(.199)	-.091(.198)
Feduc	.085***(.020)	.086***(.020)	.086***(.019)
Meduc	.014(.043)	.022(.044)	.017(.043)
Urban	1.56***(.269)	1.39***(.272)	1.38***(.271)
Lnholding	1.19*(.705)	1.10*(.699)	1.09*(.696)
Hincome	.010(.011)	.010(.010)	.010(.010)
Obs.	3128	3128	3128
R^2	.1512	.1725	.1672

Notes: Sample of 25-49 years old with age of marriage above or equal to 15 years old. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 14: Second-stage regression results: Adult marriage (Mage $\geq$ 15)

Variable	**OLS**	**IV1**	**IV2**	**Two IVs**
		Dep.var. *Educ1*		
Mage	.294***(.031)	.365(.486)	.416*(.217)	.410**(.199)
Age:30-34	-.459*(.245)	-.462*(.243)	-.464*(.243)	-.464*(.343)
Age:35-39	-.498**(.242)	-.490*(.245)	-.484*(.243)	-.485**(.242)
Age:40-44	-.632**(.307)	-.617*(.320)	-.606*(.313)	-.607**(.312)
Age:45-49	-1.26***(.410)	-1.24***(.436)	-1.22***(.413)	-1.22***(.411)
Feduc	.187***(.021)	.181***(.043)	.178***(.026)	.178***(.025)
Meduc	.081**(.032)	.082**(.033)	.083**(.033)	.083**(.033)
Urban	1.88***(2.88)	1.79**(.714)	1.72***(.404)	1.73***(.389)
Lnholding	-.606(.603)	-.687(.818)	-.750(.624)	-.742(.620)
Hincome	.001(.003)	.001(.005)	.001(.003)	.001(.002)
IVs F-statistic	-	[2.93]	[17.61]	[10.01]
Sargan test p-value				{.9232}
R^2	.3479	.3441	.3368	.3379
		Dep.var. *Educ2*		
Mage	.198***(.023)	1.01***(.300)	.366***(.129)	.468***(.120)
Age:30-34	-.765***(.175)	-.875***(.210)	-.787***(.176)	-.801***(.178)
Age:35-39	-1.27***(.158)	-1.24***(.189)	1.26***(.158)	-1.26***(.160)
Age:40-44	-1.76***(.168)	-1.82***(.216)	-1.77***(.170)	-1.78***(.174)
Age:45-49	-1.81(.185)	-1.80(.256)	1.81***(.190)	-1.81***(.196)
Feduc	.400(.025)	.330***(.024)	.385***(.027)	.377(.026)
Meduc	.190***(.046)	.174***(.055)	.187***(.045)	.185***(.046)
Urban	2.71***(.310)	1.42**(.593)	2.44***(.367)	2.28***(.360)
Lnholding	1.12(.870)	.139(.771)	.922(.814)	.798(.777)
Hincome	.008(.010)	.001(.006)	.007(.008)	.006(.008)
IVs F-statistic		[20.45]	[64.39]	[38.99]
Sargan test p-value				{.0193}
R^2	.4465	.0997	.4318	.4086

Notes: Sample of 25-49 years old with age of marriage above or equal to 15 years old. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 15: First-stage regression results : Four regions

Variable	**IV1**	**IV2**	**Two IVs**
	Dep.var. Mage, sub-sample for *Educ1*		
Avmage	-	.665***(.186)	.660***(.185)
Maithili	-1.55***(.518)	-	1.53***(.515)
Age:30-34	-.065(.295)	.024(.293)	-.063(.294)
Age:35-39	-.281(.289)	-.233(.289)	-.272(.288)
Age:40-44	-.107(.359)	-.060(.358)	-.086(.356)
Age:45-49	-.708(.413)	-.657*(.412)	-.728(.411)
Feduc	.093***(.027)	.089***(.027)	.094***(.026)
Meduc	-.033(.051)	-.019(.051)	-.023(.051)
Urban	1.15***(.324)	1.05***(.325)	1.01***(.324)
Lnholding	1.23*(.660)	1.18*(.659)	1.14*(.657)
Hincome	.011*(.007)	.011*(.007)	.010*(.007)
Obs.	960	960	960
R^2	.1896	.1928	.2005
	Dep.var. Mage, sub-sample for *Educ2*		
Avmage	-	.921***(.127)	.951***(.127)
Maithili	-.747***(.211)	-	-.838***(.209)
Age:30-34	-.087(.188)	-.077(.186)	-.104(.186)
Age:35-39	-.327*(.176)	-.318*(.174)	-.344*(.174)
Age:40-44	-.467**(.188)	-.452**(.187)	-.489**(.187)
Age:45-49	-.916***(.206)	-.912***(.205)	-.927***(.204)
Feduc	.118***(.022)	.119***(.022)	.120***(.022)
Meduc	-.006(.048)	.006(.048)	.001(.047)
Urban	1.62***(.250)	1.45***(.250)	1.41***(.250)
Lnholding	1.28**(.649)	1.16**(.645)	1.14*(.644)
Hincome	.013*(.007)	.012*(.007)	.012*(.007)
Obs.	3063	3063	3063
R^2	.2067	.2170	.2211

Notes: Sample of 25-49 years old and Eastern, Central, Western and Abroad only. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.

Table 16: Second-stage regression results: Four regions

Variable	**OLS**	**IV1**	**IV2**	**Two IVs**
		Dep.var. *Educ1*		
Mage	.316***(.030)	.422*(.287)	.503**(.245)	.469**(.187)
Age:30-34	-.472*(.253)	-.474*(.253)	-.476*(.257)	-.475*(.255)
Age:35-39	-.519**(.249)	-.493*(.258)	-.473*(.260)	-.481*(.255)
Age:40-44	-.522*(.310)	-.513(.310)	-.507*(.314)	-.510*(.312)
Age:45-49	-1.40***(.407)	-1.34***(.400)	-1.28***(.393)	-1.31***(.378)
Feduc	.194***(.021)	.185***(.034)	.178***(.032)	181***(.028)
Meduc	.073**(.031)	.076*(.045)	.078*(.045)	.077*(.045)
Urban	1.86***(.290)	1.73***(.443)	1.64***(.408)	1.68***(.360)
Lnholding	-.639(.656)	-.779(.678)	-.876(.656)	-.837(.621)
Hincome	.001(.003)	.001(.007)	-.001(.007)	-.001(.006)
IVs F-statistic	-	[9.00]	[12.76]	[10.90]
Sargan test p-value				{.8301}
R^2	.3674	.3578	.3377	.3474
		Dep.var. *Educ2*		
Mage	.194***(.019)	.575**(.272)	.316**(.124)	.370***(.109)
Age:30-34	-.845***(.178)	-.820***(.181)	-.837***(.168)	-.833***(.169)
Age:35-39	-1.38***(.164)	-1.27***(.188)	-1.34***(.161)	-1.33***(.162)
Age:40-44	-1.79***(.170)	-1.62***(.216)	-1.74***(.176)	-1.71***(.176)
Age:45-49	-1.94***(.179)	-1.60***(.316)	-1.83***(.216)	-1.78***(.211)
Feduc	.387***(.025)	.342***(.038)	.372***(.025)	.366***(.024)
Meduc	.195***(.042)	.196***(.046)	.196***(.043)	.196***(.043)
Urban	2.64***(.301)	2.01***(.511)	2.44***(.303)	2.35***(.290)
Lnholding	.900(.761)	.400(.724)	.754(.600)	.681(.601)
Hincome	.010(.010)	.005(.008)	.008(.006)	.008(.006)
IVs F-statistic		[12.49]	[52.49]	[34.36]
Sargan test p-value				{.3740}
R^2	.4545	.3538	.4441	.4329

Notes: Sample of 25-49 years old and Eastern, Central, Western and Abroad only. Robust standard errors in parentheses. *** significant at 1%, ** significant 5%, * significant at 10% level. Mage is treated as endogenous. IV1: Maithili. IV2: Avmage. Age:25-49 as base category. Regional and ethnicity dummies are included but not reported.