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Abstract

We investigate whether female early marriage is a conduit for the transmission of social norms, specifically norms relating to gender roles and rights within the household. We exploit differences in the age of onset of menarche between sisters as an exogenous source of variation in marriage age. This approach allows us to control for beliefs and attitudes that are transmitted from parents to children. We find that early marriage increases agreement with statements supportive of gender bias in the allocation of resources and traditional gender roles. The woman's own schooling, her husband's schooling, and her social network together account for, at most, one-third of the estimated effect, suggesting that the major pathway for norm transmission is the experience of early marriage itself.

JEL Codes: J12, J16, Z10

Keywords: Gender Roles, Social Norms, Schooling, Household Decision-Making

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Non-Technical Summary

A third of women in developing countries around the world marry before the age of 18, and about one in nine before the age of 15. A large literature argues that early marriage disrupts the accumulation of human capital among adolescent girls due to early school drop-out, withdrawal from labour markets and adverse effects on health from early childbearing. International development agencies, national governments and NGO's have made concerted efforts in recent years to lower the incidence of early marriage through new legislation on child marriage, improved enforcement of existing laws and interventions aimed at adolescents.

In this paper we investigate whether female early marriage is a conduit for the transmission of social norms, specifically norms relating to gender roles and rights within the household (henceforth called 'gender norms'). Gender norms are believed to play an important role in perpetuating gender inequalities in child survival, education, control over assets and economic participation in a wide range of developing countries.

The challenge for empirical research on the consequences of early marriage is that girls who marry early tend to be poorer, have less educated parents, and to be born in rural areas; but these background characteristics can have a direct effect on their opportunities and subsequent life choices (such as schooling, fertility and employment). A recent set of studies have used variation in the timing of menarche across women to estimate the impact of early marriage on future outcomes.

To investigate the effects of early marriage on gender norms, we introduce an innovation to this approach by making use of a unique dataset with first-hand information on the age of onset of menarche and marriage timing of sisters in rural Bangladesh. Specifically we use the age of menarche as a source of exogenous variation in marriage timing between sisters. To the extent that sisters are raised within the same household by the same parents, this allows us to control for beliefs and attitudes that are transmitted from parents to children, and identify the effects of the social consequences of reaching menarche and early marriage.

We provide evidence that early marriage affects a woman's attitudes towards traditional gender norms and the characteristics of her social network. In particular, early marriage reduces the likelihood that a woman in her social network has made a non-traditional life choice (completed secondary school, used contraception before the birth of her first child, engaged in an income-generating activity) and increases her agreement with statements supportive of gender bias in the allocation of resources and traditional gender roles.

We find that the woman's own schooling, her husband's schooling, and her social network account for, at most, one-third of the estimated effect of early marriage on gender norms. Furthermore, using a sample of adolescents, we find no evidence that early onset of menarche directly leads to increased agreement with traditional gender norms. Taken together, the evidence suggests that the key pathway of norm transmission is early marriage itself or, more specifically, the socialisation of young girls within the marital household.

1 Introduction

A third of women in developing countries around the world marry before the age of 18, and about one in nine before the age of 15. In some parts of the world, these proportions are substantially higher. For example, among women aged 20-24, 66% in Bangladesh, 47% in India, 72% in Chad and 63% in Guinea were married before the age of 18 (UNFPA 2012). A large literature argues that early marriage disrupts the accumulation of human capital among adolescent girls due to early school drop-out, withdrawal from labour markets and adverse effects on health from early childbearing (literature reviewed by Jensen and Thornton 2003; UNFPA 2012; UNICEF 2001). For example, Field and Ambrus (2008) estimate, for Bangladeshi women, that each year of marriage postponement leads to 0.22 years of additional schooling; Sekhi and Debnath (2014) find, in the case of Indian women, postponing marriage leads to improved reading and numeracy skills for their children; while Glick, Handy and Sahn (2015) estimate that the age of first birth is delayed by 0.5 years for each year of marriage postponement among young women in Madagascar.

In line with this evidence, international development agencies, national governments and NGO's have made concerted efforts in recent years to lower the incidence of early marriage through new legislation on child marriage, improved enforcement of existing laws and interventions aimed at adolescents. In 2015, 'ending child marriage' was made one of the targets of the Sustainable Development Goals.

In this paper we investigate whether female early marriage is a conduit for the transmission of social norms, specifically norms relating to gender roles and rights within the household (which we henceforth call 'gender norms'). Gender norms are believed to play an important role in perpetuating gender inequalities in child survival, education, control over assets and economic participation in a wide range of developing countries (see World Bank 2006 and Eriksson 2015 for reviews of this literature)¹. And changes in norms and attitudes are believed to be important for changing the process whereby individuals in a society are allocated to tasks, which is itself an integral part of economic development (Fafchamps 2011). Female early marriage in developing countries, as noted above, typically involves the early termination of schooling to take on a new role within the marital household. These changes occur at an age when beliefs and attitudes may be more susceptible to new encounters and experiences than in the case of older brides and, thus, early marriage can potentially play an important role in the transmission of social norms.

The challenge for empirical research on the consequences of early marriage is that girls who marry early tend to be poorer, have less educated parents, and to be born in rural

¹Recent research on this topic includes Mabsout and Staveren (2010), who provide evidence that gender norms within a group mediate the effects of standard bargaining power variables on various outcomes; and Maertens (2013) who finds that "perceptions of the ideal age of marriage significantly constrain the education that parents aspire to have for their daughters, but not their sons."

areas; but these background characteristics can have a direct effect on their opportunities and subsequent life choices (such as schooling, fertility and employment). A recent set of studies have used variation in the timing of menarche across women to estimate the impact of early marriage on future outcomes. The rationale for this approach is that, in patriarchal societies, women face strong social pressures to marry from the onset of menarche (Ortner 1978, Dube 1997); while the timing of menarche – it has been argued – has limited correlation with women’s background characteristics that may directly impact upon subsequent outcomes. This approach was pioneered by Field and Ambrus (2008), mentioned above, and subsequently used by Sekhri and Debnath (2014). More recently, Sunder (2015) and Hicks and Hicks (2015) have adopted the same approach to investigate the consequences of female early marriage for Uganda and Western Kenya respectively.

Nevertheless, if the age of menarche is correlated with socio-economic background, then it would not satisfy the exclusion restriction for instrumental variables and the corresponding IV estimates would be biased. To investigate the effects of early marriage on gender norms, we introduce an innovation to the identification strategy described above by making use of a unique dataset with first-hand information on the age of menarche and marriage timing of sisters. Specifically, following the existing literature, we use the age of menarche as an instrument for marriage timing but exploit only the variation in age of menarche *between sisters*. To the extent that sisters are raised within the same household by the same parents, this approach allows us to abstract away from variation in the age of menarche that is due to environmental and socio-economic factors. In addition, it provides a plausible identification strategy for estimating the effects of marriage timing on beliefs and attitudes towards norms, which are typically transmitted from parents to children: there is little reason why a sister who reaches menarche at an earlier age should differ in social attitudes and beliefs other than the social consequences of reaching menarche.

Using a first-stage equation similar to those used in previous studies, we estimate that a one-year delay in the onset of menarche delays marriage by 0.412 years. An alternative model with family fixed-effects yields broadly similar results. However, the inclusion of family fixed-effects reduces the second-stage estimates of the effects of marriage timing on schooling by about one-third (from 0.646 years to 0.485 years). This suggests that the estimated relationship between the age of marriage and female schooling without family fixed-effects is biased by unobservable socio-economic characteristics that influence both the onset of menarche and subsequent outcomes.

Using the timing of the onset of menarche as an instrument, and family fixed-effects to capture the respondent’s unobserved socio-economic characteristics, we provide evidence that early marriage affects a woman’s attitudes towards traditional gender norms and the characteristics of her social network. In particular, early marriage reduces the likelihood that a woman in her social network has made a non-traditional life choice (completed secondary

school, used contraception before the birth of her first child, engaged in an income-generating activity) and increases her agreement with statements supportive of gender bias in the allocation of resources and traditional gender roles.

To investigate the pathways through which early marriage affects gender norms, we control for the woman’s own schooling, her husband’s schooling, and her social network in the same specification. These variables account for, at most, one-third of the estimated effect on gender norms. Using a sample of female adolescents we find that, controlling for the timing of menarche, the incidence of marriage is associated with more traditional beliefs regarding gender norms. Taken together, the evidence suggests that women who experience early marriage have more traditional beliefs not because of lower schooling, or the specific characteristics of their marital households but due to the timing of marriage itself.

The remainder of the paper is organised as follows. In the next section, we present the conceptual framework for investigating the marriage timing decision used in this paper. Section 3 presents the econometric specification used. In Section 4, we describe the survey on women’s schooling and marriage on which the analysis is based. Descriptive statistics and the construction of variables are discussed in Section 5. The estimations are reported in Section 6. Conclusions are presented in Section 8.

2 Conceptual Framework for Marriage Timing Decision

In this section we describe the conceptual framework which guides the empirical analysis in this paper. We model the timing of marriage for a woman as the solution to an optimisation problem subject to a set of constraints. The key constraint is that, for our specific social context, girls cannot marry before the age of menarche. The objective function may be based on either the expected utility of the girl or her parents, or a weighted sum of the two – we do not specify which as the main insight discussed below would apply in all these cases. The girl (or her parents) may derive utility directly from postponing marriage, but doing so may also affect the set of available partners, the terms of the marriage and other socio-economic consequences, which has to be taken into account in the optimisation problem.

Consider the marriage-timing decision for a individual j . The marriage decision involves a choice of a (age), \mathbf{h} (vector of partner attributes) and $\boldsymbol{\tau}$ (terms of the marriage, e.g. whether a dowry is involved, etc.) We denote by $\boldsymbol{\Omega}(\mathbf{X}_j, a)$ the choice set of potential marriages (including marriage terms & partner attributes) for a girl with family characteristics \mathbf{X}_j opting to marry at age a ; and by $\mathbf{e}(a, \mathbf{X}_j)$ a vector of other outcomes of the brides which results from the decision to marry at age a . The optimisation problem can be written as

$$\max_{\mathbf{h}, \boldsymbol{\tau}, a} U_j(\mathbf{h}, \boldsymbol{\tau}, \mathbf{e}(a, \mathbf{X}_j), a; \mathbf{X}_j)$$

subject to

$$\begin{aligned} (\mathbf{h}, \boldsymbol{\tau}) &\in \boldsymbol{\Omega}(\mathbf{X}_i, a) \\ a &\geq \underline{a}_j \end{aligned}$$

where $U_j(\cdot)$ is the individual or family-specific objective function, and \underline{a}_j is an individual-specific age constraint. In the present context, \underline{a}_j is given by the girl's age of menarche. In our empirical analysis, our goal is to estimate $\frac{\partial \mathbf{e}}{\partial a}$ at $a = \underline{a}_j$; i.e. how, for individuals for whom the age of menarche is a binding constraint, an increase in the age of marriage affects the socio-economic outcomes for the bride. In addition, we aim to estimate $\frac{\partial \mathbf{h}}{\partial a}$ and $\frac{\partial \boldsymbol{\tau}}{\partial a}$, which represent the (reduced-form) effects of the social constraint on marriage timing on the characteristics of the groom and the terms of marriage.

3 Econometric Specification

We estimate the effect of marriage timing on a number of outcomes for the bride – e.g. schooling, child-birth, beliefs, etc. – using 2SLS-FE. We use the age of menarche as an instrumental variable, and fixed-effects are introduced for sisters. The first-stage and second-stage equations are as follows:

$$\text{First-Stage : } a_{ji} = \alpha_0 + \mathbf{X}_i \boldsymbol{\beta} + \mathbf{I}_{ji} \boldsymbol{\gamma} + \zeta m_{ji} + \delta_{d(ji)} + \theta_i + \varepsilon_{ji} \quad (1)$$

$$\text{Second-Stage: } y_{ji} = \alpha_0 + \mathbf{X}_i \boldsymbol{\beta} + \mathbf{I}_{ji} \boldsymbol{\gamma} + \lambda a_{ji} + \delta_{d(ji)} + \theta_i + \varepsilon_{ji} \quad (2)$$

where a_{ji} is age of marriage for individual j from family i ; \mathbf{X}_i is a vector of family characteristics – parental education, occupation, assets, religion; \mathbf{I}_{ji} is a vector of individual characteristics – year-of-birth and sibling-birth-order; θ_i are sibling fixed-effects, $\delta_{d(ji)}$ are district-of-birth dummies; and y_{ji} is the outcome variable – schooling, partner attributes, etc.

It is reasonable to suppose that the marriage timing decision and the choice of husband are made concurrently rather than sequentially. Therefore, it is unclear how 2SLS estimates for the effect of marriage age on groom characteristics and terms of marriage should be interpreted. However, it is meaningful to ask how social constraints on marriage timing due to the age-of-menarche rule affects these outcomes. Therefore, we also provide reduced-form estimates for the groom characteristics and the terms of marriage as follows:

$$\text{Reduced-Form: } g_{ji} = \alpha_0 + \mathbf{X}_i \boldsymbol{\beta} + \mathbf{I}_{ji} \boldsymbol{\gamma} + \zeta m_{ji} + \delta_{d(ji)} + \theta_i + \varepsilon_{ji} \quad (3)$$

where g_{ji} standards for the groom's education, occupation, parental assets, amount of dowry paid, etc.

Any variation in the timing of menarche due to differences in socio-economic or environmental characteristics ought to be subsumed in the sister fixed-effects, who would - almost without exception - be raised in the same household. Sisters may experience different levels of health investments associated with their birth-order and, therefore, we examine whether the age of menarche is correlated with birth-order in Section 5.

Our second-stage dependent variables include, among other outcomes, the extent of the respondent's social network and their attitudes towards traditional gender norms. As shown in the subsequent analysis, parental background has a strong influence on these outcomes, and this would normally make it difficult to identify the effects of early marriage. However, the use of sister fixed-effects in the second-stage estimation allows us to control for the parental influence, such that the estimated effects can be plausibly associated with differences in marriage timing between sisters, driven by differences in their age of menarche.

4 Description of the Survey Data

The analysis in this paper is based on a nationwide survey of rural and urban households in Bangladesh, including individual interviews with women in the age group 20-39 years.² The first phase of survey, conducted between May and July 2014, was based on a sample consisting of (i) all rural households in the 2010 Bangladesh Household Income and Expenditures Survey (HIES) which had at least one female household member in the age-group 16-35 years; (ii) a random 50% of rural households in the 2010 HIES which did not have women in this age group; (iii) a stratified sample of urban households based on a census carried out in 87 non-metropolitan urban primary sampling units throughout the country.³ This procedure yielded a sample of 7,974 households (1,436 in urban areas) and 6,293 individual interviews with women in the age group 20-39 years (1,557 in urban areas).

The first phase of the survey also included basic information and contact details on sisters of respondents to the individual interviews. A random sample of 1,500 sisters aged 20-39 years, stratified by region, was drawn up based on this information. They were traced and interviewed between November 2014 and January 2015. Of the original sample, 1,471 sisters were successfully traced, and 26 more were added from a reserve list to replace those who could not be located. This process led to 1,495 individual interviews with sisters of the first

²The official name of the survey is the Bangladesh WiLCAS 2014 (Women's Life Choices and Attitudes Survey), and it is funded by an ADRAS (Australian Development Research Awards Scheme) grant on female education.

³About 15% of the original HIES rural households could not be traced and these were replaced with randomly selected households with comparable demographic characteristics within the same primary sampling unit.

phase respondents.⁴ For our main analysis, we require groups of two or more sisters who are all married. Combining data from the first and the second phase, we obtain 1,033 pairs of married sisters, 153 cases of 3 married sisters and 12 cases of 4 married sisters.

The questionnaire for the individual interviews with women included modules on their personal background (place and date of birth, parental characteristics), education (enrolment history, highest level of education completed, performance on national examinations), child-related information (childbirth, school enrolment, educational expenditures, and other investments in education and health), and employment and marriage history.

5 Descriptive Statistics

In Table 1, we provide summary statistics on key variables for the survey respondents. The first column is based on the full sample of respondents interviewed during the first phase of the survey, which was designed to be nationally representative. The mean female age of marriage is 16.4 years, and mean years of schooling is 5.2 years. The second column is based on the first phase respondents for whom one or more sisters were chosen to be interviewed in phase 2. Although these respondents were chosen at random, those with one or more sisters were, by design, more likely to be selected and therefore, we check the extent to which they are representative of the population. We find that, for most parental background variables, the difference in mean between the full sample and sub-sample is not statistically significant. There is a statistically significant difference in mean age (1 year), mean mother's education (0.18 years) and mean of father's landholdings (0.073 acres) but the absolute differences are relatively small. There is also no statistically significant difference in the number of brothers but, as we would expect, we find relatively large differences in the number of sisters (0.82 years). Due to these differences, we report results for both the full sample of respondents and the sub-sample of sister-groups in the subsequent analysis.

Next, we investigate whether and to what extent the age of menarche varies by parental and individual characteristics of the respondents. Figure 1 shows that respondents whose mothers attended school have a significantly higher age of menarche compared to those whose mothers had no schooling. The same applies in the case of father's schooling and father's occupation. Although the actual differences are small, this evidence suggests that the age of menarche, as a potential instrument for marriage age, may not satisfy the exclusion restriction if parental characteristics are not controlled for.

Figure 2 shows the variation in the age of menarche by the respondent's birth order in the family and the respondent's year of birth. The differences by birth order are small and the 95% confidence intervals are overlapping for every birth-order. In the case of birth, we

⁴Two sisters who were traced during the second phase were unable to complete the interviews because of disabilities.

find that the variation is limited to a narrow band around 12.6 years. The most extreme cases occur for the 1981 cohort (12.5 years) and the 1993 cohort (12.8 years). Given these patterns, it is unlikely that the variation in the timing of menarche between sisters – which we use for identification in the following analysis – is driven by differences in birth order or birth cohort.

Figure 3 shows, for our full sample of respondents, the distribution of the difference between age of marriage and onset of menarche. We find that less than 2% of women were married before puberty, and more than one-third were married within 3 years of reaching puberty. The pattern is consistent with the idea that the onset of menarche is a necessary condition for entering the marriage market and also that the timing of the onset of menarche was a binding constraint for a significant fraction of women in our sample.

5.0.1 Measuring Attitudes towards Gender Norms and the Quality of Social Networks

Two important variables in the subsequent analysis are our measure of the respondents' attitudes towards traditional gender norms, and the quality of their social network and therefore we describe at some length how these were constructed and the patterns in the data.

The survey respondents were read out 10 statements regarding gender roles and the appropriate allocation of resources across genders; for example "Boys require more nutrition than girls to be strong and healthy", and "When a woman is engaged in work outside of the home, her children suffer because they are deprived of their mother's attention." The full set of statements are provided in the appendix. For each they were asked whether they 'strongly agreed', 'somewhat agreed', 'somewhat disagreed', 'strongly disagreed' or 'didn't know'. Figure 2 shows the distribution of responses to these questions. We constructed a measure of attitudes towards traditional gender norms using the number of statements out of 10 with which the respondent 'strongly agreed' or 'somewhat agreed'.

The survey respondents were also asked to list women within their social network who had (i) completed secondary school, (ii) remained unmarried till the completion of secondary school, (iii) used contraception before the birth of her first child; or (iv) engaged in an income-generating activity, either paid employment or an entrepreneurial activity (independently or with another family member). We defined the social network to include (a) members of her immediate or extended-family; (b) school friends, and women and girls in the neighbourhood where she grew up; (c) any other women from whom she sought advice on personal matters, or would consider as a role model when making important life-changing decisions. This information was intended to capture the extent to which the respondent's social network could provide her with information or examples of non-traditional choices regarding important personal decisions. Descriptive statistics regarding their responses are provided in Table 3.

In the following analysis, we investigate whether the respondents' timing of marriage affects the probability that women in social network categories (b) and (c) who had experienced any of the choices/outcomes (i)-(iv) above.

6 Results

First-Stage Estimates: Estimates of the first-stage equation in (1) are reported in Table 4. Columns (1) and (2) shows the estimates for the full sample and the sample of sisters respectively, including controls for parental education, landholdings, occupation, religion and number of siblings. In column (3), we provide estimates for the first-stage equation using sister fixed-effects removing parental characteristics from the equation. According to the full sample estimates, a one year delay in the onset of menarche postpones marriage, on average, by 0.412 years (with a standard error of 0.034). In comparison, the corresponding estimate obtained by Field and Ambrus (2008), using the 1996 Matlab Health and Socioeconomic Survey for Bangladesh, is 0.74 years. The weaker effect obtained for the 2014 WiLCAS may be due to the fact that incidence of marriage around the age of puberty has diminished in Bangladesh in the past two decades such that the onset of menarche is less likely to be a binding constraint for the respondents in our sample.

Although the full sample, by design, is more representative than the sisters' sample, a comparison between the estimates in columns (2) and (3) gives an indication whether the estimated relation between the timing of marriage and onset of menarche is being driven by unobserved socio-economic characteristics. In fact, we find that the estimated effect using sister fixed-effects (0.522 years) is broadly similar to that obtained for the same sample controlling for observable parental characteristics (0.572 years) and the difference between them is not statistically significant. This suggests that the observed relationship between age of marriage and the onset of menarche is not being driven by unobserved socio-economic characteristics – which the sister fixed-effects would absorb.

An F-test for the null hypothesis that the coefficient of the age of menarche is equal to zero yields F-statistics of 144.7, 90 and 51.4 for the full sample, sister sample, and sister FE estimates, indicating that all three would provide a strong 'first-stage' to investigate the effects of marriage timing on other outcomes.

Effect of Early Marriage on Schooling and Age of First Childbirth: Table 5 shows the 2SLS and 2SLS-FE estimates of the effect of marriage age on years of schooling and the age of first childbirth. According to the full sample estimates, a one-year postponement in marriage increases schooling by 0.692 years and postpones childbirth by 0.908 years. The Cragg-Donald Wald F statistics for the estimates are 156.72 and 145.34 respectively, indicating that weak identification is not an issue with the 2SLS estimates. The effect of schooling is more than three-fold larger than that obtained by Field and Ambrus (2008)

(0.22 years). Here again, the younger cohorts in our sample may make a crucial difference. A number of government initiatives on tuition and stipend programmes since the early 1990's has significantly improved female access to secondary schooling and in Bangladesh (Schurmann 2009, Asadullah and Chaudhury 2009) and the proportion of adolescent girls enrolled in secondary school has risen three-fold over a 20-year period.⁵ Therefore, the postponement of marriage – due to exogenous factors – may have a much larger effect on female secondary schooling for more recent cohorts compared to its effects on previous cohorts.

The 2SLS effects obtained using the sisters' sample are broadly similar to those obtained using the full sample (0.646 years of increased schooling, and 0.825 years' delay in the birth of the first child; the corresponding Cragg-Donald Wald F statistics are 105.49 and 85.74). Introducing sister fixed-effects to the specification – in lieu of observable parental characteristics – makes little difference in the case of childbirth but reduces the estimated effect on schooling by one-quarter (to 0.485 years; the Cragg-Donald Wald F statistic is 54.45). This suggests that there are unobserved parental characteristics that are correlated with both the timing of the onset of menarche and schooling attainment, causing the 2SLS estimates to be biased. This highlights the importance of using sister fixed-effects to estimate the effects of the age of marriage on other outcomes.

Onset of Menarche and Groom Characteristics: Next, we investigate the relationship between the timing of the onset of menarche and the characteristics of the husband. More specifically, the characteristics refer to those of the groom in the respondent's *first* marriage, at the time of marriage, because subsequent marriages and outcomes are endogenous to decisions regarding the first marriage. It is reasonable to suppose that the marriage timing decision and the choice of husband are made concurrently rather than sequentially, and therefore it is unclear how the 2SLS estimates should be interpreted. On the other hand, the reduced-form effects of the age of the onset of menarche on the husband's characteristics, if any, have a clear interpretation: they would show whether social constraints regarding the timing of marriage affects what type of husband is chosen for her (or she chooses herself). Therefore, we focus on the reduced-form estimates which are presented in Table 6.

The full sample OLS estimates, shown in column (1) in the table indicate that women who experienced the onset of menarche at an older age married men with more schooling, who were less likely to be in a low-earning occupation (either a day-labourer or an artisan) and whose fathers had more land. The OLS and FE estimates for the sisters' sample are shown in columns (2) and (3) respectively. Introducing fixed-effects shifts each of the estimated effects of the timing of onset of menarche towards zero, which suggests that the OLS estimates are biased due to unobserved parental characteristics. In particular, using the FE

⁵According to the Bangladesh Demographic and Health Survey 2011, 60.2% of women aged 20-24 had at least some secondary-schooling, compared to 20.8% of women aged 40-44 (NIPORT 2013).

estimates, there is little evidence that the timing of the onset of menarche affects the groom’s characteristics.

Effect of Early Marriage on Social Networks and Gender Norms: Table 7 shows the 2SLS and 2SLS-FE estimates of the effect of marriage age on our measure of the respondent’s social network and agreement with traditional gender norms. According to the full sample 2SLS estimates, a one-year delay in marriage increases the probability that a woman in the respondent’s social network has made or experienced one or more of the ‘progressive’ choices/outcomes (described in Section 5.0.1) by 4.6 percentage points (significant at the 1% level), and reduces her agreement with statements expressing traditional gender norms (significant at the 5% level). The 2SLS-FE estimates are smaller in magnitude than the 2SLS estimates for the sisters’ sample, but the differences between them are not statistically significant. Thus, we find some evidence that early marriage adversely affects a woman’s social network and also results in more traditional views regarding gender norms.

To test whether the estimated effects on social networks may be picking up correlations with socio-economic status, we also check whether the respondent’s timing of marriage affects the probability that a woman in the respondent’s *extended family* (excluding her relatives by marriage) made or experienced the ‘progressive’ choices/outcomes. As the respondent’s timing of marriage has no direct impact on her family network, this last effect should be close to zero. The estimates are reported in the last row of Table 7. We find, as expected, that the estimates are close to zero and statistically insignificant.

Pathways of Impact on Attitudes Towards Gender Norms: There are a number of pathways through which early marriage could affect the respondent’s attitudes towards gender norms. These attitudes may be shaped at school and women who marry early due to the early onset of menarche have less schooling, as per the results obtained by Field and Ambrus (2008), as well as the estimates above. Second, given that the majority of women marry relatively early – before the age of 18 – attitudes may be shaped *after* marriage, within the marital household and influenced by the attitudes of their husbands and in-laws. Third, girls who are expected to marry early – due to the early onset of menarche – may be ‘trained’ differently within the parental household. We explore the first two hypotheses by controlling for the respondent’s schooling and characteristics of her marital household in the equations discussed above. We explore the third hypothesis in the next section using a different survey on adolescents

In Table 6, we report estimated coefficients for the 2SLS-FE estimates for gender norms, where we control, one at a time, for the woman’s own schooling, husband’s schooling, father-in-law’s land holdings and our measure of the woman’s social network (friends, neighbours and role models). In each case, the estimated coefficient for ‘age of marriage’ becomes smaller compared to the base equation but the changes are small - no more than one quarter of the original coefficient. In the last column of Table 6, we provide estimates controlling

for all the hypothesized channels mentioned above: the estimated effect of age of marriage on 'agreement with traditional gender norms' declines by one-third (from -0.292 to -0.198) and remains statistically significant at the 10% level. We conduct a similar exercise with the 2SLS estimates for the full sample and obtain very similar patterns (reported in Table A1 in the appendix). Therefore, it appears that schooling, characteristics of the marital household, and the social network can account for, at most, a part of the effect of early marriage on agreement with traditional gender norms.

7 Adolescent Attitudes towards Gender Norms and Timing of Onset of Menarche

In this section we address the question whether the timing of the onset of menarche has a direct effect on women's attitudes towards traditional gender norms. This may occur if parents begin to socialise their daughters for marriage when they attain puberty; this process may involve inculcating them with traditional views regarding gender roles within the household, and younger girls may be more susceptible to it. If this hypothesis holds true, then the 2SLS and 2SLS-FE estimates of age of marriage on attitudes towards gender norms reported in the previous section would be picking up the direct effects of the onset of menarche and the exclusion restriction on the instrumental variable would be violated.

We can test this hypothesis by investigating the relationship between the timing of onset of menarche and attitudes towards gender norms for a sample of adolescent girls who have not yet reached the typical age of marriage. The 2014 WiLCAS, used in the preceding analysis, included female respondents only between the ages 20 and 39; about 90% of them had experienced marriage by the time of the survey and, therefore, the sample is not suitable for such an investigation. Therefore, we make use of a different survey for this purpose, namely the Bangladesh Adolescent Survey (BAS) conducted by the Population Council in 2005.

The 2005 BAS was designed as a nationally representative survey of adolescents with information on their family background, environment, schooling, time use, as well as beliefs and attitudes. Gani (2007) provided a detailed description of the survey. The sample is based on 361 randomly selected clusters from 1,000 primary sampling units used by the Bangladesh Bureau of Statistics to generate district-level statistics. From each cluster, 60 households were selected for the survey, and one adolescent aged 10-24 chosen from each household with one or more adolescents. The final sample included 21,656 households and 14,942 adolescents. By 2014, these adolescents were aged between 19 and 33 – thus, there is considerable overlap with the cohorts sampled for the WiLCAS.

The adolescent respondents in the 2005 BAS were asked questions regarding their attitudes towards gender roles, similar to those included in the 2014 WiLCAS. We construct a measure of gender norm attitudes on the basis of six questions for which descriptive statistics

are provided in Table 9. The survey included limited parental information but as most of the adolescents were unmarried and living with parents at the time of the survey, we are able to use characteristics of their *current* household to control for socio-economic background.

In Table 10, column 1, we report estimates on the effect of the onset of the age of menarche on attitudes towards gender roles for the subset of adolescent girls who had reached puberty by the time of the survey. We include controls for their age, number of brothers and sisters, mother’s education, household landholdings, self-reported economic condition of the household, and a dummy for whether the respondent was married at the time of the survey. The estimates indicate that delayed onset of menarche *increases* the adolescent’s agreement with statements representing traditional gender norms. Furthermore, married adolescents are more in agreement with such statements. In Table 10, column 2, we include all adolescent girls in the sample and replace the age of the onset of menarche variable with a dummy indicating whether the adolescent had reached puberty by the time of the survey. The estimates indicate that the onset of menarche *decreases* agreement with statements representing traditional gender roles. Married girls, as before, are more in agreement with such statements.

The estimates in Table 10 contradict the hypothesis that girls are taught traditional views regarding gender roles from the time of the onset of menarche. Rather, it appears that the onset of menarche *decreases* agreement with these views. This suggests that our estimated effects of early marriage on attitudes towards gender norms are biased towards zero. However, these effects are an order of magnitude smaller than the estimated effects of marriage age and, therefore, the bias is likely to be small.

8 Conclusion

In this paper, we investigated whether female early marriage is a conduit for the transmission of social norms, specifically norms relating to gender roles and rights within the household. To the extent that these norms can shape decision-making and resource allocation within the household, they can have important consequences for household members including investment in children and economic participation of adults. We find that early marriage increases agreement with statements supportive of gender bias in the allocation of resources and traditional gender roles. This type of agreement may reflect a shift in beliefs or expectations as a consequence of early marriage.

To identify the effect of early marriage on gender norms, we exploit variation in the age of onset of menarche between sisters as an exogenous source of variation in marriage age. This is possible thanks to a unique survey of Bangladeshi women which included tracking of and interviews of sisters of a subset of respondents. This approach allows us to control for beliefs and attitudes that are transmitted from parents to children.

The onset of menarche is an important life event in the lives of Bangladeshi women and its timing can potentially impact upon beliefs and expectations through the number of channels – including schooling, social networks, characteristics of the match, and, potentially, socialisation within the parental household (from the time of onset of menarche). We investigate these channels by adding controls in our base equation, as well as estimating an equivalent equation for the sample of adolescents (a subset of whom have not experienced marriage yet). The analysis indicates that schooling, social networks or the characteristics of the match explain, at most, a third of the total estimated effect on marriage norms. And we find no evidence that early onset of menarche directly leads to increased agreement with traditional gender norms. Taken together, the evidence suggests that the key pathway of norm transmission is early marriage itself or, more specifically, the socialisation of young girls within the marital household.

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Figure 1: Age of Menarche and Parental Background

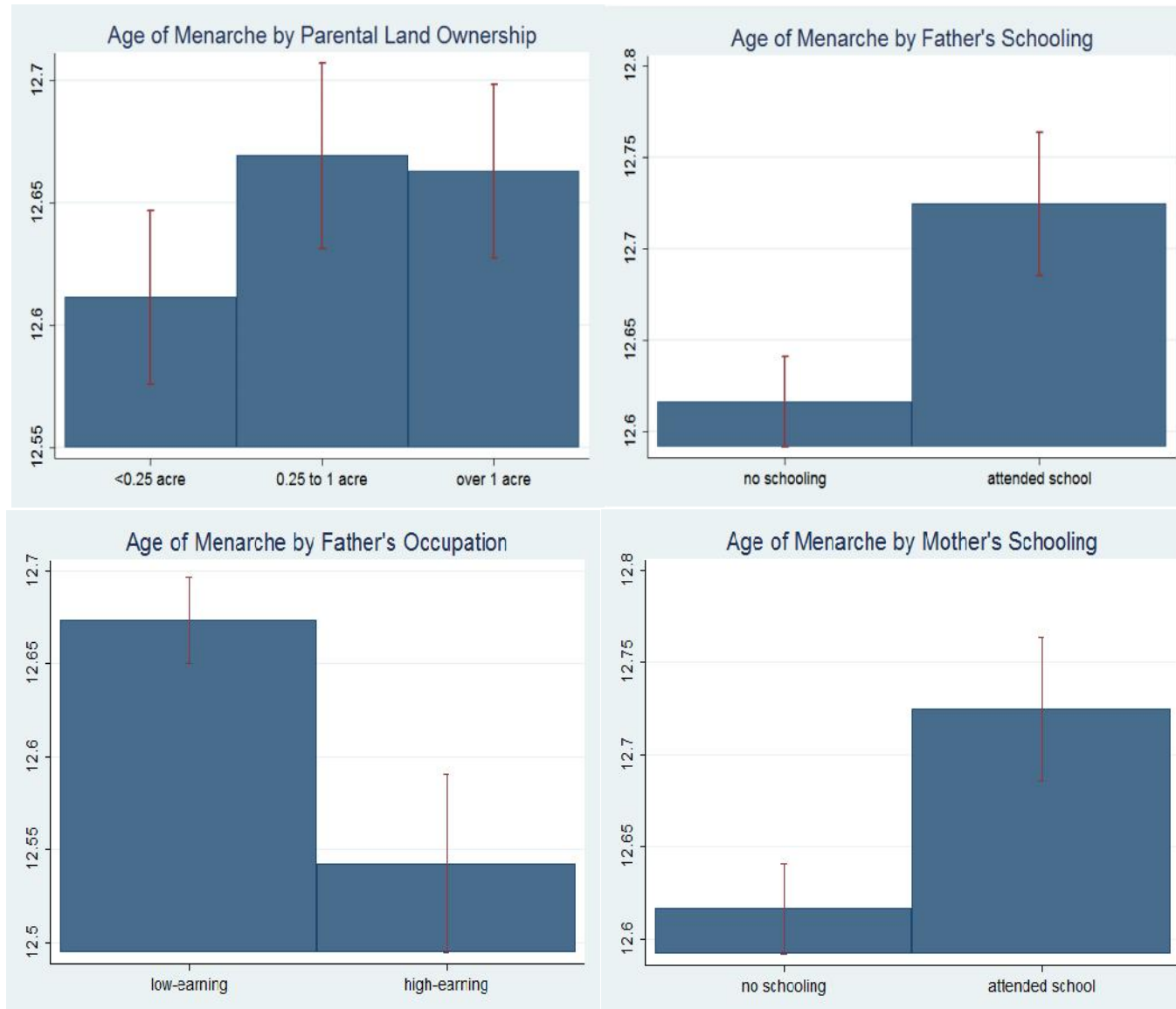


Figure 2: Age of Menarche and Individual Characteristics

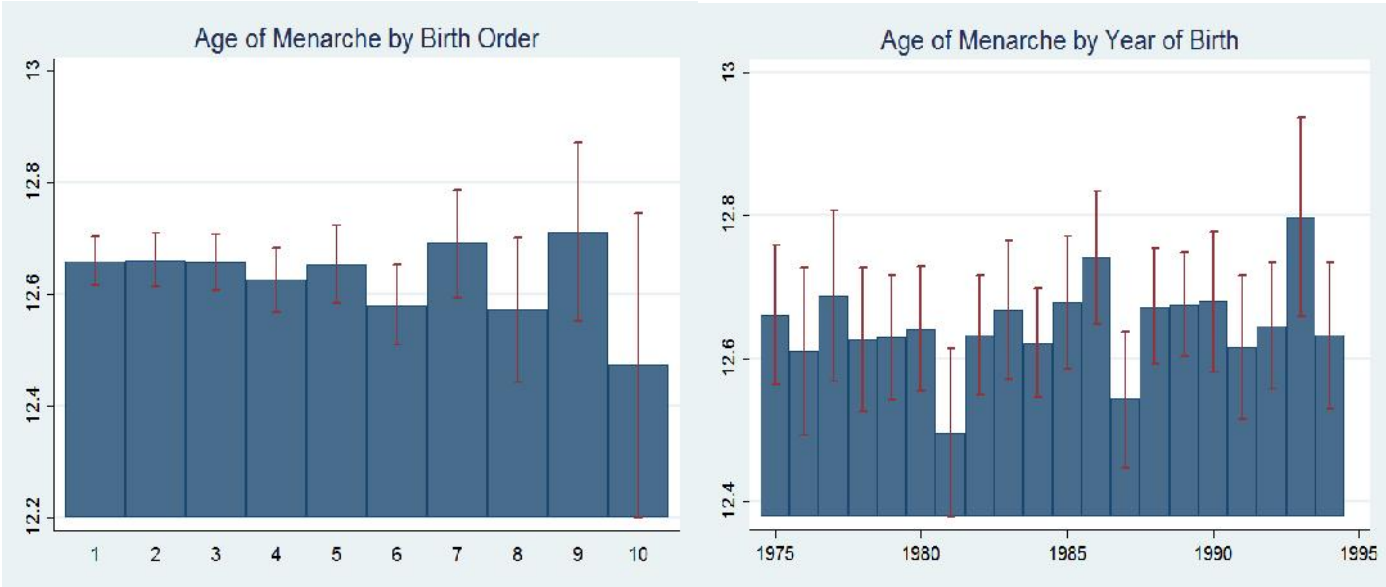
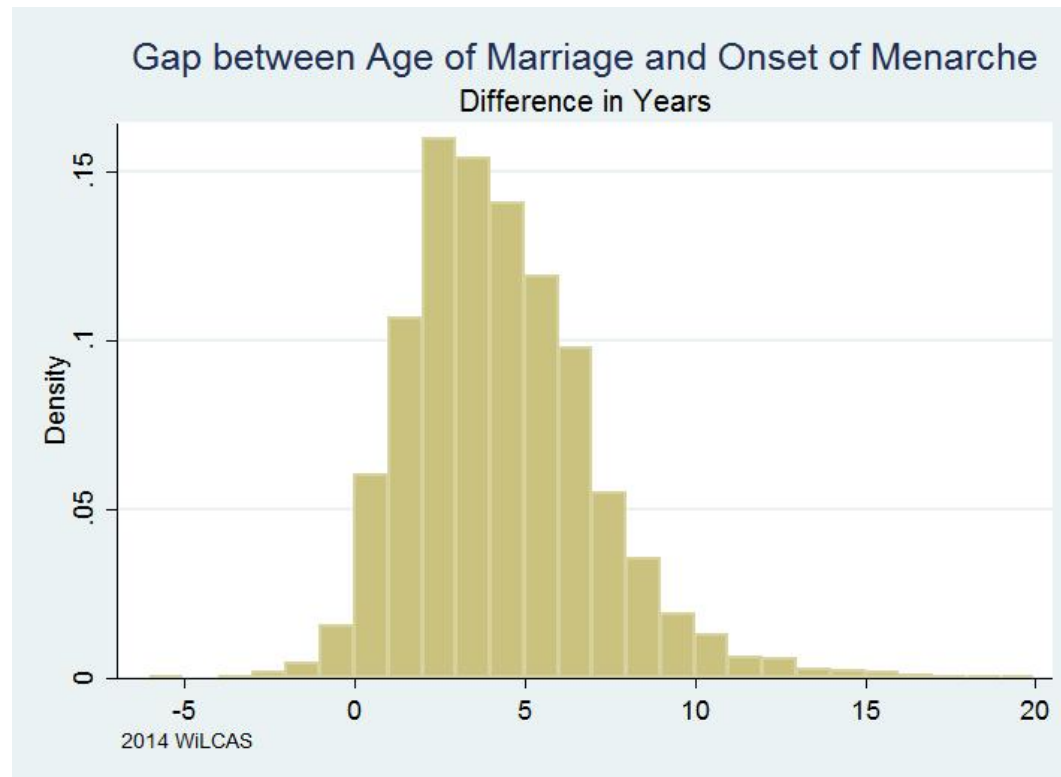


Figure 3: Onset of Menarche and Age of Marriage



**Table 1: Summary Statistics for Phase 1 Respondents
Full Sample and Sample with Phase 2 Sisters**

	Full Sample	Sample with Phase 2 Sisters	Difference	p-value
Father's Education	2.943 (0.048)	2.892 (0.111)	0.050	0.676
Mother's education	1.620 (0.035)	1.440 (0.171)	0.180	0.038*
Mother's Education	0.211 (0.005)	0.217 (0.011)	-0.006	0.638
Father employed in a low-paying activity	0.999 (0.010)	1.072 (0.024)	-0.073	0.005**
Father's Landholdings	29.09 (0.071)	30.037 (0.152)	-0.947	0.000***
Respondent's Age	5.233 (0.047)	5.074 (0.128)	0.159	0.183
Respondent's Years of Education	16.427 (0.034)	16.335 (0.078)	0.092	0.277
Respondent's Age of marriage	5.283 (0.027)	6.083 (0.060)	-0.800	0.000***
# of Siblings	3.097 (0.019)	3.916 (0.040)	-0.818	0.000***
# of Sisters	2.185 (0.018)	2.167 (0.043)	0.018	0.695
Observations	6,292	1,192		

Table 2: Agreement with Statements Reflecting Traditional Gender Norms

	% strongly agree	% strongly or somewhat agree
Boys require more nutrition than girls to be strong and healthy.	24.1%	40.2%
School education is more important for boys than for girls.	19.5%	37.0%
University education is more important for boys than for girls.	23.7%	46.1%
(Disagree with ...) Outdoor sports are important for the health and well-being of adolescent girls just as it is for boys.	26.4%	44.9%
A wife ought to be less educated than her husband.	31.0%	55.2%
When a woman is engaged in work out side of the home, her children suffer because they deprived of their mother's attention.	62.8%	87.2%
A woman should not earn more than her husband as this can cause tensions within the household.	30.9%	65.5%
A husband should have final say in all important family matters.	16.0%	39.1%
There are some circumstances in which a husband is justified in using physical violence against his wife.	7.1%	27.7%
(Disagree with ...)There are some circumstances in which a woman is right to ask divorce from her husband.	30.8%	42.4%

Source: 2014 WilCAS and Authors' Calculations

Table 3: Characteristics of Respondents' Social Network

	Friends, Neighbours, Role Models		Extended Family ¹	
	% with none	mean	% with none	mean
<i>Individuals in Respondents' Social</i>				
- completed secondary school	55.60	0.749 (1.09)	52.32	0.713 (0.956)
- remained unmarried till completion of sec. school	59.06	0.685 (1.06)	55.95	0.656 (0.931)
- used contraception before birth of first child	73.44	0.383 (0.741)	75.54	0.314 (0.630)
- engaged in an income-generating activity	76.18	0.33 (0.697)	77.73	0.28 (0.589)
- made at least one of the above choices	45.49	0.959 (1.18)	45.07	0.834 (0.994)

Standard errors shown in parantheses.

¹ The category 'extended family' excludes the respondents' relatives by marriage.

Table 4: First-Stage Equation for Age of Marriage

	Dependent Variable: Age of Marriage		
	Full Sample (1)	Sister Sample (2)	Sister Sample (3)
Year of Birth	0.0422 *** (0.0053)	0.0354 *** (0.0851)	0.0430 *** (0.0133)
Age of Menarche	0.412 *** (0.034)	0.572 *** (0.060)	0.522 *** (0.0717)
Younger Sister within 4 yrs	-0.308 *** (0.0578)	-0.372 *** (0.0821)	-0.339 *** (0.1062)
Older Sister within 4 yrs	0.140 ** (0.0666)	0.099 (0.0939)	0.369 ** (0.0117)
Father's Education	0.0215 ** (0.001)	0.006 (0.0164)	--
Mother's Education	0.0986 *** (0.0143)	0.119 *** (0.0257)	--
Sister Fixed Effects	--	No	Yes
Observations	7414	2573	2573
F-Test (Coefficient of Menarche Age = 0)	144.66	89.98	51.42

Columns (1) and (2) also include controls for parental landholdings, father's occupation, religions and total number of siblings and sisters. All specifications include district-of-birth dummies. Errors are clustered at the subdistrict-level. Statistical significance is denoted by ** (5% level) and *** (1% level)

Table 5: Estimated Effects of Marriage Postponement on Schooling, Child Birth

	OLS (1)	2SLS (2)	2SLS Sister Sample (3)	2SLS Sister FE (4)
Schooling	0.303*** (0.148)	0.692*** (0.093)	0.646*** (0.108)	0.485*** (0.014)
Age of First Childbirth	0.309*** (0.016)	0.908*** (0.132)	0.825*** (0.156)	0.844*** (0.186)

Note: Each regression includes controls for family background, birth order and district of birth. Family background variables are excluded when specification includes sister fixed-effects. Statistical significance is denoted by ** (5% level) and *** (1% level)

Table 6: Reduced Form Estimates of Age of Menarche on Husband's Characteristics

	Full Sample (1)	Sister Sample (2)	Sister Sample (FE) (3)
Husband's Schooling	0.307*** (0.0489)	0.363*** (0.0798)	0.200** (0.0917)
Husband in low-earning Occupation	-0.0086* (0.005)	-0.0174** (0.008)	-0.0022 (0.011)
Father-in-law Landholdings	0.0518** (0.0215)	0.0405 (0.0500)	-0.0376 (0.0635)

Note: Each regression includes controls for family background, birth order and district of birth. Family background variables are excluded when specification includes sister fixed-effects. Statistical significance is denoted by * (10% level) ** (5% level) and *** (1% level)

Table 7: Estimated Effect of Marriage Postponement on Gender Norms and Social Networks

	2SLS (1)	2SLS Sister Sample (2)	2SLS Sister FE (3)
Agreement with Traditional Gender Norms	-0.174** (0.061)	-0.341** (0.069)	-0.292** (0.109)
Social Network (Friends, Neighbours, Role Models)	0.0462*** (0.0146)	0.0415** (0.0163)	0.0337 (0.0256)
Social Network (Extended Family)	0.0130 (0.0155)	-0.0073 (0.0194)	-0.0015 (0.0567)

Note: Each regression includes controls for family background, birth order and district of birth. Family background variables are excluded when specification includes sister fixed-effects. Statistical significance is denoted by ** (5% level) and *** (1% level)

Table 8: Estimated Effect of Marriage Postponement on Gender Norms with Controls

	2SLS-FE Estimates for Sisters' Sample					
	(1)	(2)	(3)	(4)	(5)	(6)
Age of Marriage	-0.292** (0.109)	-0.244** (0.121)	-0.245** (0.111)	-0.217** (0.111)	-0.232** (0.108)	-0.198* (0.122)
Respondent's Schooling		-0.005 (0.036)				-0.005 (0.035)
Husband's Schooling			-0.005 (0.018)			-0.002 (0.018)
Log of Father-in-law's farmland				-0.151 (0.111)		-0.144 (0.111)
Social Network (Friends, Neighbours, Role Models)					-0.445*** (0.122)	-0.491*** (0.124)

Note: Each regression includes controls for family background, birth order and district of birth. Statistical significance is denoted by * (10% level) ** (5% level) and *** (1% level)

Table 9: Agreement with Statements Reflecting Traditional Gender Norms for Adolescents

	%
Should there be any differences between sons and daughters enjoying facilities at home? (% Yes)	17.6%
Who makes a greater contribution to the economic development of the family? (% Son)	55.7%
According to you, which job is more important? (% Income-generating work)	31.5%
Who needs more food among household members? (% Males or Boys)	49.5%
Who needs more education between sons and daughters? (% sons)	19.7%
It is difficult for a woman to have a good relationship with her husband if she works outside (% agree)	39.8%

Source: 2005 Bangladesh Adolescent Survey and Authors' Calculations

Table 10: Estimated Effect of Onset of Menarche and Marriage on Adolescents Attitudes Towards Gender Norms

	(1)	(2)
Age of Onset of Menarche	0.053*** (0.020)	
Onset of Menarche Dummy		-0.220*** (0.0489)
Married	0.321*** (0.0155)	0.325*** (0.0565)
Sample	Experienced Onset of Menarche	All Adolescent Girls

Note: Each regression includes controls for family background and district of residence. Statistical significance is denoted by ** (5% level) and *** (1% level)

Data Source: 2005 Bangladesh Adolescent Survey and Estimates by Authors

Table A1: Estimated Effect of Marriage Postponement on Gender Norms with Controls

	2SLS Estimates for Full Sample					
	(1)	(2)	(3)	(4)	(5)	(6)
Age of Marriage	-0.174** (0.061)	-0.135* (0.069)	-0.150** (0.066)	-0.163*** (0.066)	-0.156*** (0.060)	-0.116* (0.070)
Respondent's Schooling		-0.056*** (0.016)				-0.040** (0.0139)
Husband's Schooling			-0.033*** (0.010)			-0.013* (0.008)
Log of Father-in-law's farmland				-0.175*** (0.048)		-0.089* (0.046)
Social Network (Friends, Neighbours, Role Models)					-0.354*** (0.053)	-0.310*** (0.053)

Note: Each regression includes controls for family background, birth order and district of birth. Statistical significance is denoted by * (10% level) ** (5% level) and *** (1% level)

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