

Age at Marriage and Concerns over Women's Chastity

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Abstract

This paper identifies an economic mechanism that underlies the large cross-cultural variation in women's age at marriage. I test the hypothesis that younger ages at marriage, e.g. child marriage, are particularly prevalent among descendants of historically pastoral societies, reflecting concerns over premarital chastity. I find that (i) women whose ancestors relied more on pastoralism get married earlier and are more likely to have been married around or before the onset of puberty; (ii) the effect of pastoralism on child marriage does not extend to men, providing further evidence that early marriage is an evolved response to concerns over *women's* chastity.

JEL classification: I15, N30, Z13

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1 Introduction

The age at which a woman marries is regularly considered a fundamental determinant of her decision-making power within the household, the number of children she will have, her labor market participation, and her physiological and psychological well-being (see [Jensen and Thornton \(2003\)](#) for an overview). For example, women who marry at a younger age often attain less schooling ([Field and Ambrus, 2008](#)) and their children fare worse ([Chari et al., 2017](#)). A growing literature has highlighted the role of the availability of oral contraceptives ([Goldin and Katz, 2002](#)), income fluctuations ([Hoogeeven et al., 2011](#); [Corno et al., 2020](#); [Corno and Voena, 2023](#)), employment opportunities for women ([Voigtländer and Voth, 2013](#)) and male scarcity ([Abramitzky et al., 2011](#); [Brainerd, 2017](#)) in affecting the age at which women get married.

This paper advances this literature by providing empirical evidence for the idea that age at marriage partly constitutes a historically evolved social norm for what the 'right' time for marriage is. More specifically, it asks whether age at marriage reflects historically evolved concerns over women's premarital chastity. Intuitively, the earlier a woman gets married, the shorter the time frame during which she can pursue premarital relations. A strong disapproval of women's premarital sex might therefore have led to a culture of having women marry young. Contemporary country-level data is consistent with this notion. On average, women get married earlier in countries in which survey respondents find premarital sex less justifiable. Figure 1 depicts this relationship.

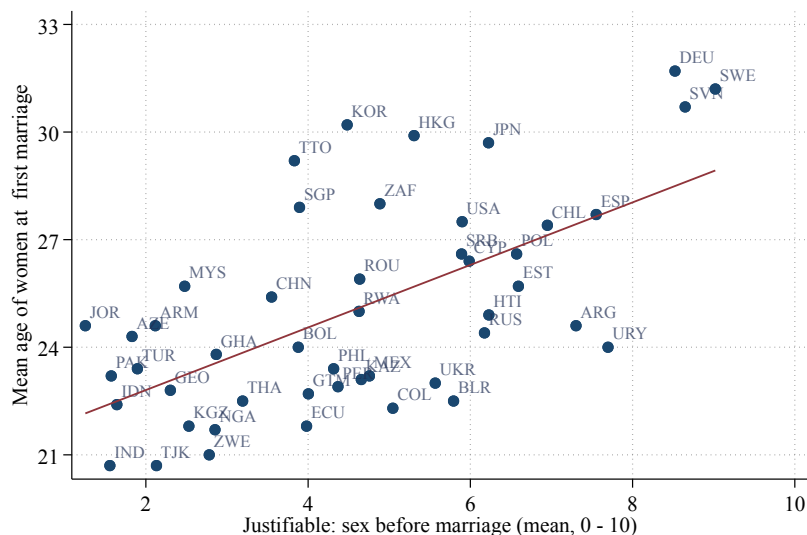


Figure 1: Data on women's age at marriage from the World Bank. Data on attitudes about premarital sex from the World Values Survey, based on the question: On a scale from 0 to 10, how justifiable is sex before marriage?

Anthropologists have frequently alluded to the idea that early marriage has the function of preventing premarital sex, especially among girls or women. For example, in their descriptions of rural Greece, [Friedl \(1962\)](#) mentions how people viewed "early marriage [as] essential,

because otherwise the girls might run wild and disgrace the family", and [Sanders \(1962\)](#) notices that girls got married early "before they have gotten into trouble". Among the Muganda, the "disgrace of an unmarried girl [becoming] pregnant" was seen as the "inevitable alternative to early marriage" ([Mair, 1965](#)). Similarly, [Geertz \(1989\)](#) notes how Javanese parents sought out early marriage for their daughter because they were "concerned that she does not build a reputation for loose morals".

To explore the empirical validity of the idea that younger ages of marriage evolved to prevent girls from having premarital sex, I test whether contemporary variation in the age at marriage of women reflects variation in how difficult it was in our ancestral environments to monitor women's behavior, giving rise to concerns over their chastity ([Becker, forthcoming](#)). More specifically, I test whether the resulting culture of heightened concerns over women's *extramarital* chastity generalized to concerns over *premarital* chastity. I use ancestral reliance on pastoralism to proxy monitoring problems of women's behavior. Because herding animals have to be taken out to pasture grounds and be protected from predators or thieves, pastoralism, unlike agriculture, usually implied frequent absences of men from the settlement which made it harder to observe women's behavior. I, hence, study whether women's age at marriage today is predicted by their ancestors' reliance on pastoralism, rather than agriculture.

For the empirical analysis, I rely on historical society-level data from the *Ethnographic Atlas* ([Murdock, 1967](#)) and on contemporary individual-level data from the *Standard Demographic and Health Surveys (DHS)*. By making use of information on their ethnicity or language spoken at home, I assign individuals in the DHS information about their ancestral ethnic group from the *Ethnographic Atlas*.¹ For each respondent, I compute their ancestral reliance on pastoralism, based on the ethnographic information on the types of animals and subsistence modes in historical societies. In total, the sample comprises of more than one million women from 51 countries.

To test the hypothesis, I regress a woman's age at marriage on her ancestral reliance on pastoralism. In all specifications, I always include country fixed effects, i.e., I only compare women who live in the same country today, but who descend from different ethnic groups. In line with the hypothesis, I find that women whose ancestors relied more on pastoralism are younger when they get married. A one standard deviation increase in a woman's ancestral reliance on pastoralism is associated with a 9.4 percent of a standard deviation decrease in her age at first marriage. This result is robust to including individual-level and society-level controls that are presumably exogenous, such as a woman's age and year of interview fixed effects at the individual level, as well as the historical use of the plow in agriculture ([Alesina et al., 2013](#)) and the year of historical data collection at the society-level.

Next, I address the empirical fact that women who descend from more pastoral societies have a larger number of siblings. This gives rise to the concern that their younger age at first marriage reflects that they and their families faced more economic pressure to reduce the number of children that need to be provided for. My results do not change in any meaningful way when

¹The matching is described in detail in the online appendix of [Bahrami-Rad et al. \(2021\)](#).

adding fixed effects for the number of siblings a woman has. Both the size and the precision of the coefficient on pastoralism remain virtually unchanged.

In the next step, I take into account the potential concern that the association between ancestral pastoralism and contemporary age at first marriage is driven by polygyny – the custom of men having multiple wives. Polygyny drives up demand for wives and is typically sustained through women getting married at a younger age than their monogamous counterparts (Tertilt, 2005). To address this alternative explanation, I add a control for polygyny at the historical society level and a control indicating whether the woman lives in a polygynous marriage. Again, the coefficient on pastoralism remains stable in size and statistical significance.

In a final specification, I add a large set of additional controls that are potentially endogenous, such as fixed effects for educational attainment and religion, and whether a respondent lives in an urban or a rural setting today. Given the endogeneity of these covariates, I view these regressions as sensitivity checks rather than a best attempt at estimating the latent true causal effect. Adding them reduces the size of the coefficient by half, plausibly reflecting the reduction in remaining variation, but the coefficient remains statistically significantly different from zero.

The second part of the analysis focuses on child marriage, presumably a particularly extreme manifestation of a preference for a young age at marriage. In analogy to the analysis on age at marriage, I find that women who descend from more pastoral societies are significantly more likely to have been married as a child. This holds regardless of whether I use the legal definition of child marriage, i.e. before the age of 18, or whether I define child marriage as getting married before the age of 15, around the onset of puberty. It also holds in all specifications outlined above.

To provide evidence for a causal relationship, i.e., that pastoralism caused the evolution of norm that makes a younger age at marriage more desirable, I use a measure of land suitability for pastoralism from Becker (forthcoming) as an instrument. For both age at marriage and child marriage, the IV estimates tend to be larger and more noisy than their OLS counterparts but, by and large, they are consistent with them.

The final part of the analysis uses data on men as a natural control group to further test the empirical plausibility of the narrative put forward in this paper: that a young age at marriage reflects concerns over *women's* chastity. Hence, we should expect that pastoralism does not predict men's age at marriage, or, that the association between pastoralism and age at marriage is stronger for women, accounting for the fact that men's age at marriage might be somewhat mechanically linked to women's age at marriage. To explore this, I rely on a smaller sample of DHS data on men. Combining the men's with the women's data, I regress my main outcome variables on ancestral reliance on pastoralism, an indicator for whether a respondent is female, and the interaction of the two terms. For age at marriage, I find that the interaction term is negative (in line with the hypothesis), but statistically not significant except in the most extensive specification. A plausible interpretation is that men's and women's age at marriage is somewhat mechanically linked, making it hard to empirically identify a gender-specific explanation. For child marriage, I find that the interaction term is positive and statistically significantly so,

showing that pastoralism predicts child marriage for women but not for men. This provides corroborating evidence for the idea that age at marriage, and in particular the custom of child marriage, reflects concerns over women's chastity which, by definition, are not present for men.

This paper most directly relates to recent work that has highlighted that pastoralism favored the evolution of restrictions on women's promiscuity, i.e., social norms and customs that make it harder or more costly for women to have extramarital sex (Becker, *forthcoming*). It shows that a culture of pronounced concerns over women's *extramarital* chastity extends to *premarital* chastity. It also directly relates to the literature on age at marriage, in particular work that studies the role of the (historical) environment (Voigtländer and Voth, 2013; Hoogeveen et al., 2011; Corno et al., 2020), shocks (Abramitzky et al., 2011; Brainerd, 2017) or the availability of technologies (Goldin and Katz, 2002) in affecting age at marriage. Moreover, it directly relates to the literature in development economics that studies age at marriage and child marriage among women and tries to identify ways through which to increase age at marriage among girls (Buchmann et al., 2023). It speaks to these literatures by highlighting the function and nature of culturally evolved and transmitted preferences and norms over age at marriage. It thereby also contributes to the important and open question of why practices like child marriage persist. More generally, it relates to the literature on the origins, functions and economic consequences of customs and institutions surrounding marriage (Anderson, 2003, 2007; Anderson and Bidner, 2015; Bau, 2021; Foerster, *forthcoming*; Khalifa, 2022).

The rest of the paper is structured as follows. In section 2, I lay out the data and empirical approach. Section 3 presents the results. In section 4 I use data on men to show that the results are mostly specific to women, further supporting the hypothesis. Section 5 concludes.

2 Data and Empirical Strategy

My main empirical strategy relies on connecting contemporary individual-level data on age at marriage with historical data on reliance on pastoralism.

The individual-level data on age at marriage comes from the *DHS*. These are extensive surveys that have been conducted in regular waves in around 90 (mostly developing) countries since as early as the 1980's. One purpose of the *DHS* is to collect data on women's and children's well-being and health. Therefore, in the main *DHS* samples, respondents are women. In many cases, the *DHS* collects data on men, too, though the samples tend to be substantially smaller.

The historical data on reliance on pastoralism comes from the *Ethnographic Atlas*, an anthropological database covering more than 1,200 societies around the world, based on information that was collected by anthropologists in the 19th and early 20th century, with a few ethnographies dating back earlier than that. For example, it contains information on subsistence, kinship organization, religious beliefs and institutions, and is thought to reflect ancestral ways of living before colonial contact and industrialization.² Combining data on the type of domesticated ani-

²Bahrami-Rad et al. (2021) provide evidence on the validity of the *Ethnographic Atlas*.

mal a society had with their reliance on animals husbandry, I generate a measure for a society's reliance on pastoralism, following [Becker \(forthcoming\)](#). The variation in reliance on pastoralism across historical societies in the *Ethnographic Atlas* is depicted in Figure 4 in section A.1 in the online appendix.

To connect the *DHS* with the *Ethnographic Atlas* I make use of information on respondents' ethnicity. In many cases, respondents are asked to report their ethnicity. Whenever this ethnicity matches a society in the *Ethnographic Atlas*, I assign the respondent that ancestral society. In other cases, respondents report the language they speak at home, from which ethnicity can often be inferred as well. Whenever a respondent reports to speak a language at home that was also historically spoken by a society in the *Ethnographic Atlas*, I assign that respondent the corresponding society.³

To test the hypothesis that women whose ancestors relied more strongly on pastoralism get married at a younger age today and are more likely to be married as a child, I estimate the following baseline regression specification:

$$y_{i,j} = \alpha + \beta \times \text{Ancestral Pastoralism}_j + \sum_c \delta_c \times \text{Country}_i^c + \epsilon_{i,j} \quad (1)$$

where $y_{i,j}$ is either a woman's age at marriage or an indicator that she has been married as a child. Put differently, I regress the age at marriage or a child marriage indicator of survey respondent i who is a descendant of society j on society j 's historical reliance on pastoralism. I always only compare individuals who live in the same country by including country fixed effects in all specifications. Standard errors are clustered at the *Ethnographic Atlas* society level.⁴ In additional specifications, I add a range of control variables both at the individual level and at the historical society level.

In total, I rely on a *DHS* sample of 1,017,406 women from 51 countries.⁵ The *DHS* asks women at which age they entered their first marriage. On average, women in my sample were 18.2 years old (± 4.3) when they got married. 49 percent of women got married before the age of 18 and 16 percent before the age of 15.⁶ The respondents in this sample descend from 487 different societies in the *Ethnographic Atlas*. On average, the ancestors of the women in my sample relied on pastoralism to about 25.5 percent (± 14.9).

³The matching procedure used here is described in [Bahrami-Rad et al. \(2021\)](#) and on dgsce.fas.harvard.edu. It closely follows the procedure employed in [Giuliano and Nunn \(2018\)](#) and [Alesina et al. \(2013\)](#).

⁴The main specifications have 487 clusters.

⁵The countries are predominantly in Asia (N=14) and Africa (N=31), with only a few in Europe (N=3) and South America (N=3).

⁶For less than 0.01 percent of my sample (N=30) the age of marriage variable takes a negative value. This could reflect that marriages were arranged before the respondent were born. None of the results presented here change noticeably when excluding these observations from the analysis.

3 Results

Now, I turn to testing the idea that descend from pastoralism – because it favored a culture of concerns over women’s chastity – partly explains the age at which women get married today.

3.1 Age at Marriage

In line with the hypothesis, women who descend from societies that historically relied more on pastoralism are younger when they get married. This effect is statistically significant and sizeable. A one standard deviation increase in historical reliance on pastoralism comes with a 10 percent standard deviation decrease in a woman’s age at first marriage, holding fixed the country in which respondents live today. This effect remains virtually unchanged when adding exogenous controls at the respondent level – age and year of interview fixed effects – and at the society level, such as the year a society was documented by an ethnographer and whether or not the plow was used in agriculture. The first two coefficients depicted in Figure 2 show these results. The corresponding regression table is relegated to section A.2 in the appendix.

In the next step I test whether this relationship merely reflects the possibility that women who descend from societies that historically relied more on pastoralism come from larger families, i.e., families with more kids. Intuitively, if a woman has more siblings there might be more pressure to get married sooner, to leave the parental household in order to reduce the number of children the family has to provide for. For a subsample of women information on the number of siblings she has is available. On average, women in my sample have 5.7 siblings (± 2.6). Moreso, women from societies that historically relied more on pastoralism have a larger number of siblings. A one standard deviation increase in historical reliance on pastoralism is associated with a 3.1 percent standard deviation increase in the number of siblings a woman has. To address the concern that the effect of historical reliance on pastoralism is driven by the size of the parental household, I add fixed effects for the number of siblings a woman has. The coefficient on pastoralism remains virtually unchanged, as illustrated in Figure 2 and in column 3 of Table 2 in the appendix. The same holds true when using fixed effects for the number of older sisters instead, as shown in column 4 of Table 2 in the appendix.

Next, I address the concern that my results might reflect historical or contemporary polygyny – the custom of men having multiple wives at the same time. Polygyny drives up demand for wives. This demand is typically met by having women enter the marriage market at younger ages relative to their monogamous counterparts. [Tertilt \(2005\)](#) provides evidence that women in countries in which polygyny is common get married much earlier, on average, than women in countries in which polygyny is not practiced or very rare. To address this concern I add a variable that indicates whether the woman descends from a society that historically practiced polygyny. Furthermore, I generate a measure for whether the respondent lives in a polygynous marriage today by making use of the number of co-wives a woman has. Controlling for historical and contemporary polygyny decreases the sample size, but leaves the coefficient on ancestral pastoralism unchanged. A one standard deviation increase in ancestral reliance on pastoralism

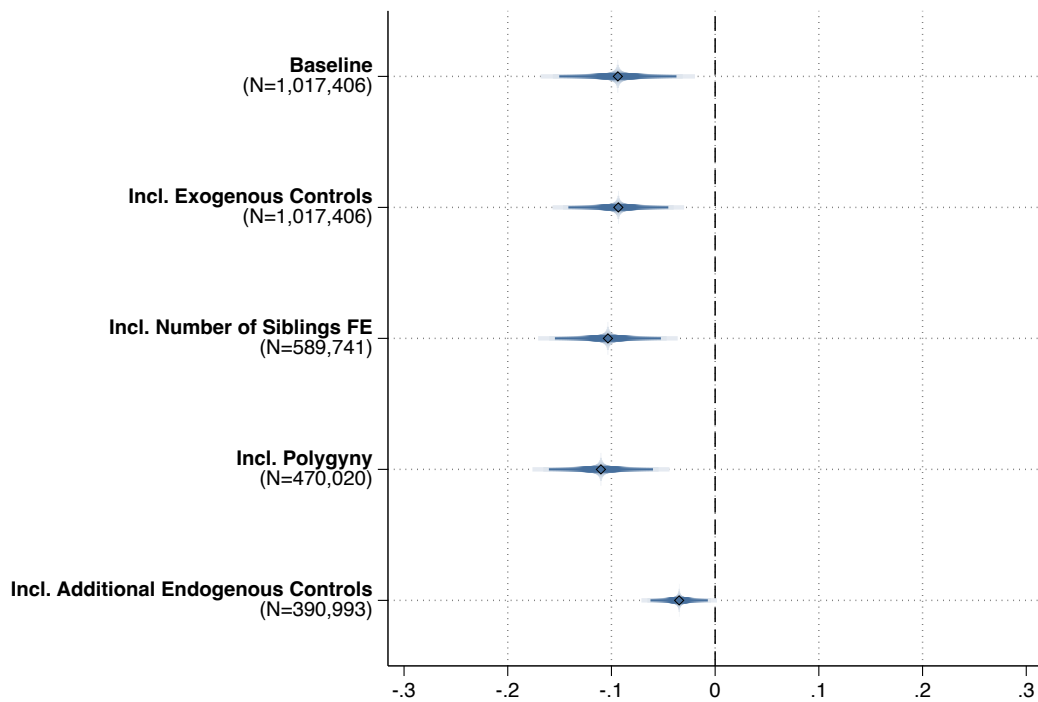


Figure 2: The dependent variable is a respondent’s age at marriage (standardized values). The blue dots represent OLS coefficients on standardized values of ancestral reliance on pastoralism, with the shaded areas representing various confidence intervals, up to the 90th percentile. The baseline specification includes the main explanatory variable (standardized ancestral reliance on pastoralism) and country fixed effects. Country fixed effects are included in all specifications. Exogenous controls in the second specification are age, year of interview fixed effects, ancestral plow use and year of observation. Additional endogenous controls in the fifth specification are fixed effects for educational attainment and religion and an indicator for whether a respondent lives in an urban area. Standard errors are clustered at the historical society level. Table 2 is the corresponding regression table in the appendix.

is associated with a 12 percent of a standard deviation decrease in a woman’s age at first marriage. The fourth coefficient in Figure 2 and column five in Table 2 in the appendix illustrate these results.

In a final specification I add fixed effects for religion, educational attainment, and living in an urban area, all of which are presumably endogenous. The coefficient decreases in size, by about half, but remains statistically significant ($p = 0.012$).

3.2 Child Marriage

I now turn to child marriage as a very specific and extreme manifestation of a custom of having daughters marry young. If the hypothesis is true that a custom of having daughters marry young evolved as a response to particularly pronounced chastity concerns, we should expect that marriages around or before the onset of puberty – the time when chastity concerns become relevant – are predicted by pastoralism.

To test this empirically I generate an indicator for whether a woman was married before the

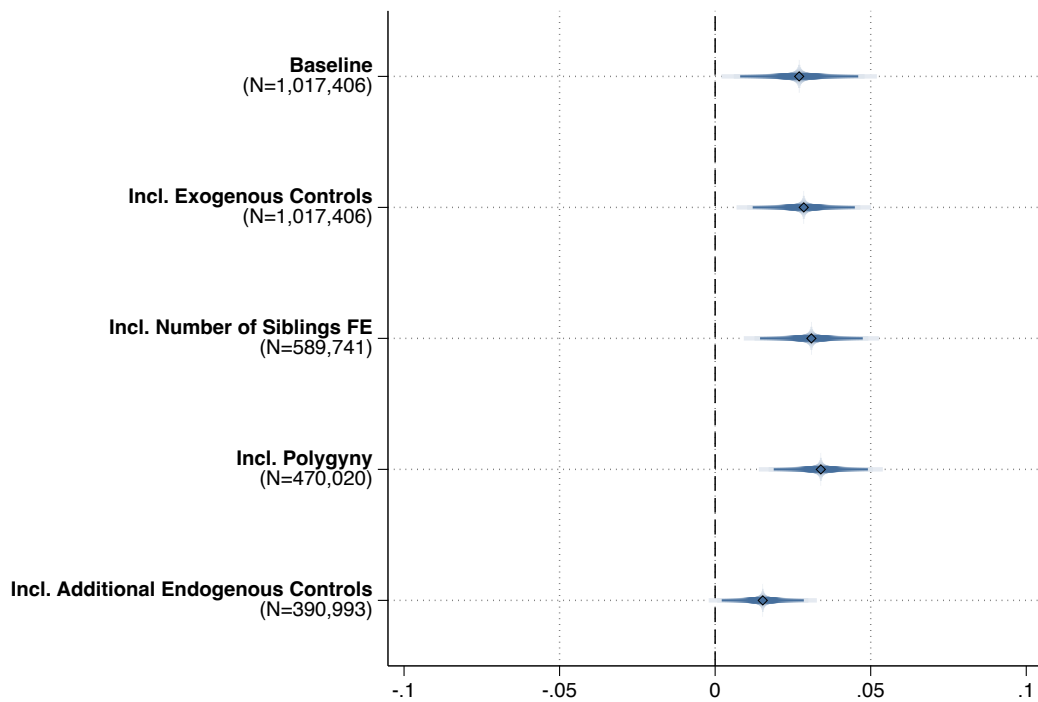


Figure 3: The dependent variable is an indicator [0/1] for whether a respondent got married before the age of 15. The blue dots represent OLS coefficients on standardized values of ancestral reliance on pastoralism, with the shaded areas representing various confidence intervals, up to the 90th percentile. The baseline specification includes the main explanatory variable (standardized ancestral reliance on pastoralism) and country fixed effects. Country fixed effects are included in all specifications. Exogenous controls in the second specification are age, year of interview fixed effects, ancestral plow use and year of observation. Additional endogenous controls in the fifth specification are fixed effects for educational attainment and religion and an indicator for whether a respondent lives in an urban area. Standard errors are clustered at the historical society level. Table 4 is the corresponding regression table in the appendix.

age of 15. In my sample, around 15 percent of women were married before the age of 15. Then, I regress this indicator on a woman’s ancestral reliance on pastoralism, using the same specifications outlined in the preceding section. All specifications yield a statistically significantly positive coefficient on ancestral reliance on pastoralism. A one standard deviation increase in ancestral reliance on pastoralism is associated with a roughly 3 percentage point increase in the likelihood of having been married before the age of 15. This corresponds to 20 percent of the baseline probability of having experienced this form of child marriage. In analogy to the previous analysis on age at marriage, this relationship is robust to the inclusion of exogenous control variables such as a respondent’s age, year of interview fixed effects, year of historical observation and historical plow use. It also remains unchanged when adding fixed effects for the number of siblings a woman has and when controlling for both historical and contemporary polygyny. Finally, it is also robust to adding a large set of controls that are presumably endogenous, such as an indicator for whether a respondent lives in an urban area, fixed effects for a respondent’s religion, and fixed effects for the level of educational attainment a respondent has.

Figure 3 displays the corresponding coefficients and table 3 in the online appendix presents the corresponding regression results.

Similar results hold if we use the legal definition of child marriage: getting married before the age of 18. Around 48 percent of respondents in my sample were married before the age of 18. As Table 4 in the appendix shows, regressing this alternative indicator for having been married as a child on a woman's ancestral ethnic group's reliance on pastoralism also yields positive but statistically often only marginally significant coefficients. The weaker results for this indicator are in line with the interpretation that the association between pastoralism and very young ages at marriage seems to be about the timing of girls' puberty.

In sum, the results illustrate that historically evolved concerns over girls' chastity might be an important driver behind parents' decision to marry their daughters off at a very young age, and behind the custom of child marriage.

3.3 Instrumental Variable Results

The degree to which people historically relied on pastoralism is largely determined by the environment, such as the suitability of the soil, the climatic conditions, the terrain, and the fauna for having animals that need to be taken out to pasture.⁷ [Becker \(forthcoming\)](#) provides a measure of land suitability for pastoralism, which in turn relies on data from [Beck and Sieber \(2010\)](#). This data is available for Europe, Africa, Asia, and Australia. More specifically, for each EA-society in Europe, Africa, Asia and Australia it captures the suitability of the land for pastoralism relative to agriculture within a 25 kilometer radius of the society's historical centroid. Figure 5 in the online appendix displays the land suitability data, with darker areas indicating a higher land suitability for pastoralism.

To provide evidence for the idea that a younger age at marriage evolved as a response to the conditions given by relying on pastoralism, I instrument my main independent variable. Using the local suitability of the land for pastoralism as an instrumental variable for ancestral reliance on pastoralism yields a coefficient that is very similar in size to its OLS counterpart. Columns (1) and (2) in Table 5 in section A.2 in the online appendix provides these results. The p -value equals 0.1 and is therefore substantially larger than the one on the OLS coefficient. This can potentially be attributed to the loss of variance in the instrumented predictor. In subsequent specifications, in analogy to the main analysis presented in the preceding section, I add controls that are exogenous, such as age, year of interview fixed effects, ancestral plow use and year of observation, as well as controls that are potentially endogenous, such as fixed effects for the number of siblings, controls for contemporary and historical polygyny, and fixed effects for a respondent's religion and educational attainment and whether she lives in an urban area. These specifications yield statistically significant IV coefficients that are somewhat larger in size than

⁷Animals that need to be taken out to pasture are horses, cattle, donkeys, sheep, goats, reindeer, camels and alpaca. Other domesticated animals, such as dogs, pigs, or poultry are not taken out to pasture but typically live within the confinements of human settlements.

their OLS counterparts, potentially due to measurement error in the variable capturing historical reliance on pastoralism.

Overall, a fairly similar picture emerges when running instrumental variable regressions with an indicator for whether a respondent was married as a child as the outcome variable. The resulting IV coefficients tend to be similar or somewhat larger in size than their OLS counterparts. The p -values are larger in all specifications, but statistically significant except for in the last specification ($p = 0.134$) potentially reflecting a loss of variance due to instrumenting combined with a large number of fixed effects.

In sum, the IV estimates provide empirical support for a causal relationship between a society's reliance on pastoralism and a preference for a younger age at marriage.

4 Pastoralism and Men's Age at Marriage

This paper argues that age at marriage partly reflects concerns over women's chastity. The empirical analysis so far has exclusively focused on women to show a systematic relationship between descent from more pastoral societies and younger ages at marriage. An immediate question concerns the relationship between descent from pastoralism and age at marriage looks like for men, and whether this relationship – in line with the narrative of this paper – is more pronounced for women.

In fact, to test the robustness of the narrative of the paper, men might seem like an ideal 'control group', because concerns over women's chastity by definition do not extend to them. In particular, we should expect that descent from pastoralism has a notably stronger effect on predicting child marriage for women – an outcome that seems to most directly reflect chastity concerns arising around the onset of puberty.

On the other hand, the previous literature has mostly disregarded studying age at marriage among men. One reason could be that the ages at which men and women get married are potentially mechanically linked, making it potentially difficult to empirically identify a women-specific explanation, and therefore, making them a less than ideal control group. Arguably, a societal norm or societal desirability of marrying young might apply to both men and women equally instead of being gender-specific, even when the functional origin of such a norm pertains to concerns over *women's* chastity alone.

To explore whether we find a more pronounced relationship between ancestral reliance on pastoralism and age at marriage for women than for men, I rely on a *DHS* sample of men that I combine with the data on women. The men sample is much smaller than the women sample because the *DHS* focuses on women's well-being and therefore primarily interviews them. Nevertheless, the sample comprises 257,315 men, who live in 44 countries and descend from 418 societies that can be matched to the *EA*. Their average age at marriage is 24.0 years (± 5.4). 8 percent of them got married before the age of 18, and 1 percent got married before the age of 15. I combine this sample of men with my main sample of women to run a difference-in-differences regression analysis. More specifically, combining the two samples allows me to

Table 1: Child Marriage (<15) and Ancestral Pastoralism: Combining Women’s and Men’s DHS Data

	<i>Dependent variable:</i> Child Marriage [0/1]			
	(1)	(2)	(3)	(4)
Female x Reliance on Pastoralism	0.18 (0.067)	0.18 (0.068)	0.18 (0.068)	0.23 (0.073)
Hist. Reliance on Pastoralism [Std.]	0.00043 (0.007)	0.000051 (0.007)	0.0013 (0.006)	-0.020 (0.007)
Female [0/1]	0.11 (0.016)	0.10 (0.016)	0.10 (0.016)	0.092 (0.018)
Country FE	Yes	Yes	Yes	Yes
Year of Interview FE	No	Yes	Yes	Yes
Age of Respondent	No	Yes	Yes	Yes
Year of Hist. Observation	No	No	Yes	Yes
Plow Use	No	No	Yes	Yes
Lives in Urban area [0/1]	No	No	No	Yes
Educ. Attainm. FE	No	No	No	Yes
Religion FE	No	No	No	Yes
Observations	1274721	1274721	1274721	977171
R^2	0.070	0.076	0.077	0.105
# of Clusters	489	489	489	409

Notes. OLS estimates, standard errors in parentheses, clustered at the historical society level. The dependent variable is an indicator that takes value 1 if the respondent got married before the age of 15, 0 otherwise. This dataset combines the DHS women’s data with the men’s data.

estimate the following specification:

$$y_{i,j} = \alpha + \beta \times \text{Pastoralism}_j \times \text{Female}_i + \gamma \times \text{Female}_i + \zeta \text{Pastoralism}_j + \sum_c \delta_c \times \text{Country}_i^c + \epsilon_{i,j} \quad (1)$$

Regressing age at marriage on a respondent’s ancestral reliance on pastoralism, an indicator for whether a respondent is male or female, and the interaction of the two I find that the coefficient on the interaction term is negative – in line with the hypothesis – but statistically significant in only the most extensive specification (see Table 8 in the online appendix).

For child marriage, regardless of whether I define it as getting married before age 15 or getting married before age 18, I find that pastoralism makes it more likely that a respondent has been married as a child if the respondent is female. The interaction term is significantly positive in all except one specification. Table 1 shows the results for child marriage before the age of 15. Table 9 in the appendix shows the results for child marriage before the age of 18.

While some of the results are potentially a bit difficult to interpret given the mechanical

spillovers between men and women in terms of their ages at first marriage, the evidence here supports the narrative of the paper: the association between pastoralism and age at marriage are particularly pronounced for women.

5 Conclusion

This paper explores the idea that the decision about when to get married partly reflects a historically evolved norm or preference that arose as a response to particularly pronounced concerns over women's chastity. Intuitively, the earlier a woman gets married the less time she has to have extramarital relations. Put differently, the earlier a woman enters marriage, the less her parents have to be concerned over her pre-marital chastity. Anthropologists have frequently alluded to this idea and this paper presents a systematic test of this hypothesis using data on more than 1 million survey respondents in over 50 countries.

The paper shows that descent from more pastoral societies predicts a younger age at marriage and a higher likelihood of getting married as a child, around or before the onset of puberty. Importantly, and unlike previous work on age at marriage, it uses data not only on women but also on men and shows that the relationship between ancestral pastoralism and age at marriage and child marriage today exists for women, but not (or less) for men. This provides corroborating evidence for the interpretation that the association between pastoralism and age at marriage reflects historically evolved concerns over women's chastity, which are not present for men.

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A Online Appendix

A.1 Figures

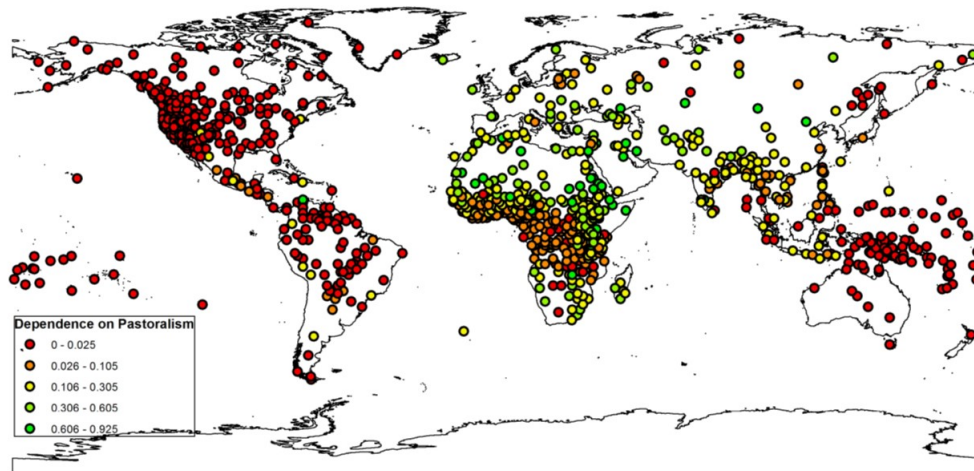


Figure 4: This figure is reproduced from [Becker \(forthcoming\)](#). Each dot represents one (historical) society. The colors indicate a society's historical reliance on pastoralism, based on data from the *Ethnographic Atlas*.

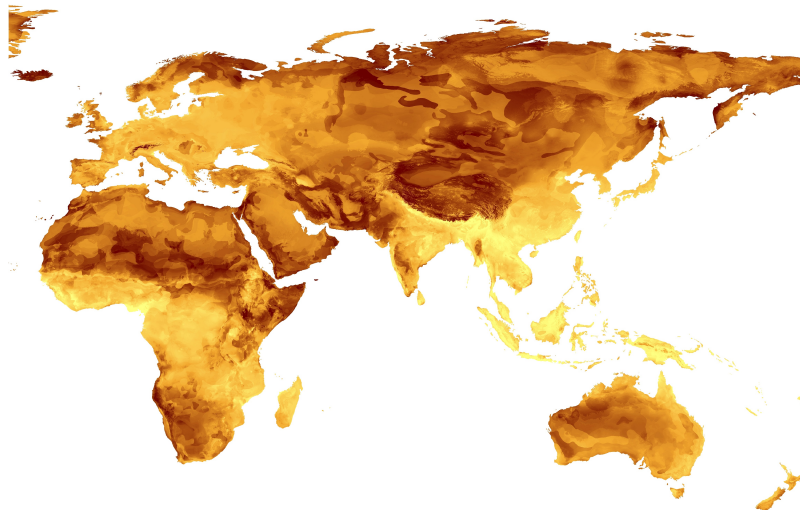


Figure 5: Land suitability for pastoralism relative to agriculture based on data from [Beck and Sieber \(2010\)](#). Darker areas indicate higher suitability. Data is available only for Africa, Europe, Asia, and Australia. This figure is reproduced from [Becker \(forthcoming\)](#).

A.2 Regression Tables

A.2.1 OLS: Age at Marriage

Table 2: Age at Marriage and Ancestral Pastoralism: Evidence from the DHS

	<i>Dependent variable:</i>					
	Age at Marriage [Std.]					
	(1)	(2)	(3)	(4)	(5)	(6)
Reliance on Pastoralism [Std.]	-0.094 (0.029)	-0.093 (0.025)	-0.10 (0.026)	-0.10 (0.026)	-0.11 (0.026)	-0.035 (0.014)
Age of Respondent		0.018 (0.002)	0.018 (0.001)	0.018 (0.001)	0.019 (0.001)	0.019 (0.001)
Year of Hist. Observation		-0.000026 (0.000)	-0.0020 (0.001)	-0.0020 (0.001)	-0.0016 (0.001)	-0.0017 (0.001)
Plow Use		-0.24 (0.089)	-0.18 (0.120)	-0.18 (0.119)	-0.18 (0.128)	-0.29 (0.110)
Lives in Urban area [0/1]						0.11 (0.012)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Interview FE	No	Yes	Yes	Yes	Yes	Yes
# of Siblings FE	No	No	Yes	No	Yes	Yes
# of Older Sisters FE	No	No	No	Yes	No	No
Hist. Polygyny	No	No	No	No	Yes	Yes
Contemp. Polygyny	No	No	No	No	Yes	Yes
Educ. Attainm. FE	No	No	No	No	No	Yes
Religion FE	No	No	No	No	No	Yes
Observations	1017406	1017406	589741	589741	470020	390993
R^2	0.096	0.136	0.119	0.118	0.121	0.229
# of Clusters	487	487	415	415	393	339

Notes. OLS estimates, standard errors in parentheses, clustered at the historical society level.

A.2.2 OLS: Child Marriage

Table 3: Child Marriage (before age 15) and Ancestral Pastoralism: Evidence from the DHS

	<i>Dependent variable:</i> Child Marriage [0/1]					
	(1)	(2)	(3)	(4)	(5)	(6)
Reliance on Pastoralism [Std.]	0.027 (0.010)	0.028 (0.008)	0.031 (0.008)	0.031 (0.008)	0.034 (0.008)	0.015 (0.007)
Age of Respondent		-0.00021 (0.000)	-0.00081 (0.000)	-0.00082 (0.000)	-0.0013 (0.000)	-0.0016 (0.000)
Year of Hist. Observation		0.000054 (0.000)	0.00087 (0.000)	0.00087 (0.000)	0.00065 (0.000)	0.00071 (0.000)
Plow Use		0.091 (0.040)	0.11 (0.054)	0.11 (0.054)	0.095 (0.054)	0.12 (0.048)
Lives in Urban Area [0/1]						-0.022 (0.005)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Interview FE	No	Yes	Yes	Yes	Yes	Yes
# of Siblings FE	No	No	Yes	No	Yes	Yes
# of Older Sisters FE	No	No	No	Yes	No	No
Hist. Polygyny	No	No	No	No	Yes	Yes
Contemp. Polygyny	No	No	No	No	Yes	Yes
Educ. Attainm. FE	No	No	No	No	No	Yes
Religion FE	No	No	No	No	No	Yes
Observations	1017406	1017406	589741	589741	470020	390993
R^2	0.048	0.055	0.055	0.055	0.059	0.094
# of Clusters	487	487	415	415	393	339

Notes. OLS estimates, standard errors in parentheses, clustered at the historical society level.

Table 4: Child Marriage (before age 18) and Ancestral Pastoralism: Evidence from the DHS

	<i>Dependent variable:</i>					
	Child Marriage [0/1]					
	(1)	(2)	(3)	(4)	(5)	(6)
Reliance on Pastoralism [Std.]	0.044 (0.013)	0.044 (0.011)	0.049 (0.012)	0.049 (0.012)	0.051 (0.011)	0.015 (0.007)
Age of Respondent		-0.0049 (0.000)	-0.0060 (0.000)	-0.0060 (0.000)	-0.0070 (0.000)	-0.0070 (0.000)
Year of Hist. Observation		0.000055 (0.000)	0.00091 (0.000)	0.00090 (0.000)	0.00074 (0.001)	0.00079 (0.000)
Plow Use		0.093 (0.042)	0.067 (0.057)	0.068 (0.056)	0.059 (0.064)	0.10 (0.051)
Lives in Urban area [0/1]						-0.054 (0.006)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Interview FE	No	Yes	Yes	Yes	Yes	Yes
# of Siblings FE	No	No	Yes	No	Yes	Yes
# of Older Sisters FE	No	No	No	Yes	No	No
Hist. Polygyny	No	No	No	No	Yes	Yes
Contemp. Polygyny	No	No	No	No	Yes	Yes
Educ. Attainm. FE	No	No	No	No	No	Yes
Religion FE	No	No	No	No	No	Yes
Observations	1017406	1017406	589741	589741	470020	390993
R^2	0.080	0.099	0.083	0.083	0.086	0.164
# of Clusters	487	487	415	415	393	339

Notes. OLS estimates, standard errors in parentheses, clustered at the historical society level.

A.2.3 IV Regressions: Age at Marriage

Table 5: Age at Marriage and Ancestral Pastoralism: Instrumental Variable Regressions

	<i>Dependent variable: Age at Marriage [Std.]</i>					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Reliance on Pastoralism [Std.]	-0.094 (0.029)	-0.23 (0.105)	-0.094 (0.024)	-0.27 (0.097)	-0.035 (0.014)	-0.30 (0.288)
Age of Respondent			0.018 (0.002)	0.017 (0.002)	0.019 (0.001)	0.018 (0.002)
Year of Hist. Observation			-0.000027 (0.000)	-0.000021 (0.000)	-0.0017 (0.001)	-0.0030 (0.002)
Plow Use			-0.27 (0.091)	-0.38 (0.182)	-0.29 (0.110)	-0.44 (0.302)
Lives in Urban area [0/1]					0.11 (0.012)	0.11 (0.015)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Interview FE	No	No	Yes	Yes	Yes	Yes
# of Siblings FE	No	No	No	No	Yes	Yes
Hist. Polygyny	No	No	No	No	Yes	Yes
Contemp. Polygyny	No	No	No	No	Yes	Yes
Educ. Attainm. FE	No	No	No	No	Yes	Yes
Religion FE	No	No	No	No	Yes	Yes
Observations	1004470	1004470	1004470	1004470	390993	390993
R^2	0.096	0.085	0.136	0.118	0.229	0.167
# of Clusters	479	479	479	479	339	339

Notes. OLS and IV estimates, standard errors in parentheses, clustered at the historical society level. Samples are slightly smaller than in the corresponding OLS table because of missing data in the instrumental variable.

A.2.4 IV Regressions: Child Marriage

Table 6: Child Marriage (<15) and Ancestral Pastoralism: Instrumental Variable Regressions

	<i>Dependent variable: Child Marriage [0/1]</i>					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Reliance on Pastoralism [Std.]	0.027 (0.010)	0.060 (0.031)	0.029 (0.008)	0.078 (0.028)	0.015 (0.007)	0.12 (0.104)
Age of Respondent			-0.00019 (0.000)	-0.000039 (0.000)	-0.0016 (0.000)	-0.0011 (0.001)
Year of Hist. Observation			0.000054 (0.000)	0.000052 (0.000)	0.00071 (0.000)	0.0012 (0.001)
Plow Use			0.098 (0.042)	0.13 (0.066)	0.12 (0.048)	0.18 (0.122)
Lives in Urban area [0/1]					-0.022 (0.005)	-0.022 (0.006)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Interview FE	No	No	Yes	Yes	Yes	Yes
# of Siblings FE	No	No	No	No	Yes	Yes
Hist. Polygyny	No	No	No	No	Yes	Yes
Contemp. Polygyny	No	No	No	No	Yes	Yes
Educ. Attainm. FE	No	No	No	No	Yes	Yes
Religion FE	No	No	No	No	Yes	Yes
Observations	1004470	1004470	1004470	1004470	390993	390993
R^2	0.048	0.043	0.056	0.045	0.094	0.042
# of Clusters	479	479	479	479	339	339

Notes. OLS and IV estimates, standard errors in parentheses, clustered at the historical society level. Samples are slightly smaller than in the corresponding OLS table because of missing data in the instrumental variable.

Table 7: Child Marriage (<18) and Ancestral Pastoralism: Instrumental Variable Regressions

	<i>Dependent variable: Child Marriage [0/1]</i>					
	OLS	IV	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
Reliance on Pastoralism [Std.]	0.044 (0.013)	0.11 (0.046)	0.045 (0.011)	0.13 (0.044)	0.015 (0.007)	0.13 (0.130)
Age of Respondent			-0.0049 (0.000)	-0.0046 (0.000)	-0.0070 (0.000)	-0.0065 (0.001)
Year of Hist. Observation			0.000056 (0.000)	0.000053 (0.000)	0.000079 (0.000)	0.0013 (0.001)
Plow Use			0.10 (0.044)	0.16 (0.085)	0.10 (0.051)	0.17 (0.140)
Lives in Urban area [0/1]					-0.054 (0.006)	-0.053 (0.007)
Country FE	Yes	Yes	Yes	Yes	Yes	Yes
Year of Interview FE	No	No	Yes	Yes	Yes	Yes
# of Siblings FE	No	No	No	No	Yes	Yes
Hist. Polygyny	No	No	No	No	Yes	Yes
Contemp. Polygyny	No	No	No	No	Yes	Yes
Educ. Attainm. FE	No	No	No	No	Yes	Yes
Religion FE	No	No	No	No	Yes	Yes
Observations	1004470	1004470	1004470	1004470	390993	390993
R^2	0.080	0.070	0.100	0.084	0.164	0.120
# of Clusters	479	479	479	479	339	339

Notes. OLS and IV estimates, standard errors in parentheses, clustered at the historical society level. Samples are slightly smaller than in the corresponding OLS table because of missing data in the instrumental variable.

A.2.5 Combined DHS Data: Men and Women

Table 8: Age at Marriage and Ancestral Pastoralism: Combining Women's and Men's DHS Data

	<i>Dependent variable:</i>			
	Age at Marriage [Std.]			
	(1)	(2)	(3)	(4)
Hist. Reliance on Pastoralism [Std.]	-0.050 (0.031)	-0.043 (0.028)	-0.046 (0.027)	0.034 (0.020)
Female [0/1]	-1.11 (0.047)	-0.97 (0.043)	-0.97 (0.043)	-0.88 (0.045)
Female x Reliance on Pastoralism	-0.21 (0.201)	-0.22 (0.184)	-0.22 (0.183)	-0.42 (0.155)
Age of Respondent		0.020 (0.001)	0.020 (0.001)	0.021 (0.002)
Hist. Year of Observation			0.000069 (0.000)	0.000021 (0.000)
Plow Use			-0.17 (0.066)	-0.20 (0.061)
Lives in Urban area [0/1]				0.087 (0.010)
Country FE	Yes	Yes	Yes	Yes
Year of Interview FE	No	Yes	Yes	Yes
Educ. Attainm. FE	No	No	No	Yes
Religion FE	No	No	No	Yes
Observations	1274721	1274721	1274721	977171
R^2	0.260	0.301	0.302	0.343
# of Clusters	489	489	489	409

Notes. OLS estimates, standard errors in parentheses, clustered at the historical society level. The dependent variable is the respondent's age at marriage, standardized values. This dataset combines the DHS women's data with the men's data.

Table 9: Child Marriage (<18) and Ancestral Pastoralism: Combining Women's and Men's DHS Data

	<i>Dependent variable:</i> Child Marriage [0/1]			
	(1)	(2)	(3)	(4)
Hist. Reliance on Pastoralism [Std.]	0.018 (0.010)	0.015 (0.010)	0.017 (0.009)	-0.021 (0.008)
Female [0/1]	0.39 (0.024)	0.35 (0.023)	0.35 (0.023)	0.33 (0.023)
Female x Reliance on Pastoralism	0.16 (0.096)	0.16 (0.093)	0.16 (0.092)	0.24 (0.081)
Age of Respondent		-0.0048 (0.000)	-0.0048 (0.000)	-0.0057 (0.000)
Year of Hist. Observation			0.000028 (0.000)	0.000031 (0.000)
Plow Use			0.071 (0.034)	0.088 (0.031)
Lives in Urban area [0/1]				-0.035 (0.005)
Country FE	Yes	Yes	Yes	Yes
Year of Interview FE	No	Yes	Yes	Yes
Educ. Attainm. FE	No	No	No	Yes
Religion FE	No	No	No	Yes
Observations	1274721	1274721	1274721	977171
R^2	0.170	0.186	0.187	0.233
# of Clusters	489	489	489	409

Notes. OLS estimates, standard errors in parentheses, clustered at the historical society level. The dependent variable is an indicator that takes value 1 if the respondent got married before the age of 18, 0 otherwise. This dataset combines the DHS women's data with the men's data.