

# The Marriage Market Value of Bride Age and Education: A Vignette Approach to Decomposing Marriage Transfers in Rural Bangladesh

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November 18, 2023

## Abstract

Data from a hypothetical survey of 750 professional matchmakers in rural Bangladesh provide evidence on how demographic characteristics of brides and grooms, including wealth, education and age, influence marriage market prices (dowry and denmeher). While a standard Hedonic approach to decomposing marriage market prices is likely to be biased by selection on unobservables, hypothetical price questions circumvent this issue. We find that parents of educated, working, and young brides can buy more denmeher (insurance) per unit of dowry (the transfer from the bride's to the husband's family at the time of marriage). We call this the *price effect*. We also find that the parents' wealth, distance between the parents' and husband's house, and the bride's age determine how much insurance parents are willing to buy. We call this the *insurance effect*. These findings are in contrast to observational data which finds no consistent return to education or labor market participation in the marriage market.

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# 1 Introduction

The marriage of a son or daughter is the largest financial transaction most parents in South Asia will undertake in their lifetime. Transactions on the marriage market both influence and are influenced by investments in human capital. Marriage in many developing countries is incompatible with continued investment in education for girls, and early marriage (which often leads to teenage childbearing) is associated with substantial health risks. The failure of the unitary household model, the desire to use marriage timing to signal unobserved traits (Buchmann et al., 2018), and a high proportion of women’s labor being unpaid imply that estimates of the return to human capital in the labor market are not necessarily the same as the returns to human capital in the marriage market. Furthermore, with only 25 percent of women aged 15 to 64 in the labor market in South Asia (Bank, 2020), the return to human capital in the marriage market is arguably a more important consideration in determining investment for many women than the return in the labor market.

Estimating the marriage market returns to human capital and other characteristics is challenging, however. The high correlation between socioeconomic status, level of education, and age of marriage makes it hard to decompose the individual values placed on these different characteristics in the market. Large, unobserved heterogeneity in quality and selection bias complicate causal inference. Finally, there are substantial challenges in measuring prices in this market. First, dowry is illegal in many countries, raising concerns about the reliability of self-reports. Second, in Islamic marriages, two market prices are agreed simultaneously: a transfer from the bride’s to the groom’s family (dowry) and a commitment by the groom’s family to transfer money to the bride in the case of divorce (denmeher). Bride characteristics can be correlated both with the probability of divorce and with a willingness to pay for insurance. Changes in dowry alone are therefore insufficient to characterize whether marriage prices have risen or fallen.

In this study, we seek to decompose the marriage market returns to different characteristics of brides in Bangladesh using novel hypothetical price data collected from marriage “matchmakers”. These matchmakers are independent agents who serve as intermediaries in marriage markets in Bangladesh and advise families on appropriate prices for their daughter (or son). Matchmakers were provided with much of the information they would typically receive about a potential match and asked to suggest a likely price. Each characteristic of the potential bride was then changed individually, holding all else equal, and a new price recorded. This approach has several advantages over observational data. First, we are able to more precisely decompose the returns to different characteristics (like age and education) that are typically highly correlated in observational data. Second, we rule out selection bias by eliciting price changes in response to exogenous shocks to observable characteristic without an implied change in unobservables (e.g. “Let’s assume that

Fatema’s aunt gives her parents additional money to pay for her education and nothing else.”). Third, by specifying that the groom does not change as bride characteristics change, we can estimate the partial derivative of each characteristic abstracting from changes in sorting. Fourth, by collecting data from experienced market intermediaries, we reduce idiosyncratic noise (while controlling for matchmaker fixed effects) and misreporting due to parents’ social desirability bias (i.e. hiding child marriage or signaling a high quality of their own daughter). Finally, by estimating responses in both denmeher and dowry to changing characteristics, we are able to disentangle changes in dowry due to change in the price the parents of a girl pay in the marriage market (i.e. the unit of denmeher per additional unit of dowry) from changes in dowry due to differences in parents’ willingness to buy additional insurance for their daughter (denmeher).

Our study builds on a large literature which uses hypothetical surveys to value difficult to measure goods (Mitchell and T., 1989; Venkatachalam, 2004). These methods are typically used for public goods such as environmental goods (Brown et al., 1996; Cummings and Taylor, 1999; Shogren, 2006; Nas, 2016), public health (Cawley, 2008; Kremer et al., 2011), or in litigation (Kling et al., 2012). Hypothetical surveys provide various elicitation tools to estimate the willingness to pay in contexts where there is social desirability bias, or cognitive dissonance (Babbie, 1992). This is particularly important in studying marriage markets where marriage under the age of 18 and payment of dowry while common are typically illegal. Several recent papers have shown that contingent valuation, if done appropriately, can provide reliable estimates for socially sensitive topics (Carson, 2012; Kling et al., 2012). In a context similar to ours, Adams-Prassl and Andrew (2019) use hypothetical vignettes to directly elicit Indian parents’ preferences over a daughter’s education and age of marriage (but do not elicit beliefs about dowry and denmeher). Yet, hypothetical surveys are arguably an underused tool for estimating returns to investment in matching markets. We argue that hypothetical surveys allow for more reliable estimates of price changes, holding matches constant, whenever there is unobserved variation in quality on both the seller and the buyer side - as is the case in both labor and marriage markets.

We find that education, labor market participation, and youth are valued in the marriage market and that parents of educated, working, and young brides can buy more denmeher for each unit of dowry. We call this the *price effect*. Increasing education from 10 to 12 years of education (secondary school), reduces the price per unit of denmeher by USD 0.1. Similarly, working in the garment sector or a skilled occupation reduces the price per unit of denmeher by USD 0.08 or USD 0.12 respectively. These findings are in contrast to observational data which finds no consistent return to education or labor market participation in the marriage market, possibly because education and labor market participation are closely correlated with age which has a negative return in our results: increasing age from 16 to 18 years increases the price per unit of denmeher by

USD 0.05.

We also find that the parents' wealth, the distance between the parents' and the groom's house, and the bride's age determine how much insurance parents are willing to buy in terms of denmeher. We call this the *insurance effect*. Parents who have 1 as opposed to 0 bighas of land will pay USD 187 in additional dowry to purchase an additional USD 289 in denmeher. We also find that parents whose daughter marries farther away and who are thus less able to monitor their marriage are purchasing additional denmeher. If the girl marries outside the union, parents are willing to pay an additional USD 106 to purchase an additional USD 75 in denmeher and if the girl marries outside the upazila, parents are willing to pay an additional USD 235 to purchase an additional USD 235 in denmeher. Finally, as older brides might have fewer outside options in case of divorce, parents are willing to pay an additional USD 42 to purchase an additional USD 64 in denmeher for a bride age 22 as compared to a bride age 16.

The remainder of the paper proceeds as follows. Section 2 describes the marriage market in Bangladesh. Section 3 describes the survey methodology and empirical strategy and section 4 presents results. Section 5 concludes.

## 2 Marriage Markets in Bangladesh

Our study takes place in rural Bangladesh in communities that are primarily Muslim, such that most marriages are governed by religious law and are fairly uniform in practices. In this setting, most marriages (89%) are arranged by third party matchmakers (Buchmann et al., 2018). Moreover, there are a large number of professional matchmakers offering this service: in our study sample, the vast majority of rural communities (95%) have a professional matchmaker with 70% having three or more (Buchmann et al., 2018).

While dowry was outlawed in Bangladesh in 1980, most marriages (85% in our sample) continue to involve dowry in the form of pre-negotiated giving of gifts (Buchmann et al., 2018). It serves as the price that equilibrates supply and demand for grooms in settings in which it is relatively more unattractive for women to stay unmarried than for men, for instance because male individual earning capacity exceeds that of females (Becker, 1981; Rao, 1993). Among those who pay it, average dowry in our sample is \$786 (Buchmann et al., 2018). Every Muslim marriage contract also specifies a *denmeher*, which in Bangladesh is treated as an amount of money to be transferred to the wife in the event of divorce, much in the style of a Western prenuptial agreement (Lindenbaum, 1981; Esteve-Volart, 2004).<sup>1</sup> Denmeher imposes an additional cost to the groom by forcing him to internalize the risk of divorce for the bride, thus the larger the denmeher

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<sup>1</sup>In other Muslim countries, *denmeher* is given to the wife at the time of marriage, or split between an amount given at marriage (prompt dower) and an amount provided upon divorce (deferred dower). See Anderson (2007) and Field and Ambrus (2008) for more details on Bangladeshi marriage contracts.

negotiated by the bride, the larger the amount of dowry will be demanded by the groom to compensate for the additional cost (Ambrus et al., 2010). In equilibrium, dowries can be decomposed into a component that compensates the groom for the denmeher specified in the marriage contract and a residual component that serves the usual price role of equilibrating the supply of brides and grooms in the market (Ambrus et al., 2010).

The amount of dowry and denmeher exchanged between families varies substantially even within villages. Dowry is often a means of maintaining a high social status by attracting a husband for the daughter of at least equal social status (Quale, 1988). As a result, the amount of dowry does not only increase with the father's wealth but also the income prospects of the groom (Quale, 1988; Rao, 1993; Botticini, 1999; Guzzetti, 2002; Esteve-Volart, 2004; Dalmia, 2004; Dalmia and Lawrence, 2005; Arunachalam and Logan, 2006). Furthermore, as higher income increases the husband's utility outside of marriage, denmeher is also increasing in the husband's income (Chowdhury, 2010). Rosenzweig and Stark (1989) show, also using village data from South Asia, that husbands who live far away from their wives' household are more desirable as female migration to longer-distance households may be a strategy to help smooth consumption for agricultural families. The husband's utility outside of marriage increases in his outside option, which is increasing in income.

Women from wealthy families are believed to be more desirable brides because a wife from a wealthy family may increase the socioeconomic status of a groom (Chowdhury, 2010). They are also believed to be high marriage market returns to social conservatism (Ortner, 1978; Goody, 1990), or adherence to traditional gender norms. However, as social conservatism is also negatively correlated with the returns to education (e.g. socially conservative women are less likely to be employed in the future), delaying marriage might be a signal of undesirable bride characteristics not perfectly observed on the market (Buchmann et al., 2018). This is in line with data from rural Bangladesh suggesting an overall preference for younger wives and showing a positive relationship between age and dowry payments (2008)<sup>2</sup>. In spite of the returns to social conservatism and young age, which are expected to be negatively correlated with education, qualitative interviews in the Rajshahi district of Bangladesh suggest that education by itself is a desirable attribute in the marriage market by serving as a form of marriage capital (Arends-Kuenning and Amin, 2001). Overall, existing research thus highlights the complexities of decomposing the individual returns to different bride characteristics in Bangladesh.

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<sup>2</sup>In spite of shown negative effects on education, health, and social outcomes (Mathur et al., 2003; Jain and Kurz, 2007; UNICEF et al., 2001; EngenderHealth, 2003; Nour, 2009; Raj, 2010; Field and Ambrus, 2008), 74% of women aged 20-49 in Bangladesh were married before age 18 (UNICEF et al., 2014).

## 3 Methods

Marriage market data was collected as part of an impact evaluation of an adolescent empowerment program implemented by the authors from 2008 to 2010 in Barisal district in the south of Bangladesh.

### 3.1 Study Design and Data

Between May 29th, 2016 and November 3rd, 2016, we surveyed matchmakers in 298 communities in three sub-districts (Bhola Sadar, Bauphal, and Patuakhali Sadar) in south central Bangladesh.<sup>3</sup> Potential respondents were identified by asking community members in each village for a list of the three most active matchmakers, which were then tracked and surveyed by enumerators.<sup>4</sup> The sample analyzed in this paper consists of 750 matchmakers from 284 communities. A random sample of 106 matchmakers were surveyed twice to test data quality.<sup>5</sup> To supplement quantitative responses and learn more about potential mechanisms, we collected in-depth qualitative data through eight interviews with matchmakers from three communities. We will also contrast the quantitative data with observational data collected as part of the original evaluation.

#### 3.1.1 Hypothetical Questionnaire

Matchmakers were asked a number of descriptive questions about their business and then provided with a detailed description of a potential husband who: resides in the matchmaker’s village, is 25 years old, has completed 10 years of education (secondary school), and works as a farmer on his family’s land which comprises two bighas (18,800 sq. feet) and is owned by the family.<sup>6</sup>

Details of a hypothetical bride were then provided who: resides in the matchmaker’s village, is 18 years old, has completed eight years of education, does not work, has one younger sister and one older brother, and whose family owns one bigha of land. She is described as plain-looking, more specifically: “Fatema is plain-looking. By plain-looking, we mean that she is neither too fair, nor too dark. She has average features and an average complexion”. Figure 1 displays the vignette that was shown to respondents.

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<sup>3</sup>These subdistricts were selected in order to use the infrastructure of an existing survey for one of the interventions implemented by the authors (see [Buchmann et al. \(2018\)](#)).

<sup>4</sup>Enumerators asked the village leader, the village elders, and teachers.

<sup>5</sup>The matchmakers’ report of whether they charge a fee for their services changed in fewer than three percent of these backcheck interviews, and the recorded gender, occupation, and number of matches arranged in the last three months changed in zero of these backcheck interviews.

<sup>6</sup>The hypothetical questions analyzed in this paper were part of a longer survey administered to matchmakers, the first part of which helped characterize the local marriage market and assess whether the girl’s empowerment program had impacted marriage markets in the area ([Buchmann et al., 2018](#)).

The information covered in the vignette was chosen to mimic the list of characteristics a matchmaker would use when describing a potential match to a family of a bride or groom. The one difference is that matchmakers would typically provide a photograph. We omitted photographs of hypothetical brides and grooms because during piloting we found considerable heterogeneity in features that matchmakers liked and disliked which created unnecessary noise in our estimate.

[Figure 1 goes here.]

Matchmakers were asked to estimate the amount of dowry a girl’s parents would be asked to pay in a hypothetical marriage (baseline dowry) as well as the amount of denmeher the girl could expect to receive from the husband’s household (baseline denmeher). The enumerators used the following script to elicit baseline dowry and denmeher:

This is Sakib [show vignette]. Sakib lives in [current village]. Sakib is 25 years old and has completed 10th class (SSC pass). Sakib’s family owns two bighas of land. His occupation is as a farmer on his family’s land.

This is Fatema [show vignette]. Fatema also lives in [current village]. Fatema is 18 years old. She does not have any education and does not perform any income generating activities. Fatema’s family owns one Bigha of land. She has one younger sister and one older brother. [Show row #1 of girl’s background information].

How much dowry does Fatema’s family have to pay when Fatema marries Sakib? How much denmeher will Fatema receive when she marries Sakib?

Following the introduction and estimation of the baseline case, enumerators varied exactly one feature of the girl in five different survey rounds: education, age, land owned by her family, distance between girl’s and inlaw’s house, and occupation. At the beginning of each section, enumerators reminded the matchmakers of the potential bride and groom’s names and characteristics and proceeded to ask the matchmaker to estimate the new dowry and denmeher with different levels of the characteristic of interest, while holding everything else constant. Table 1 sets out the different levels of education, occupation, ages, land ownership, and location covered in the survey. Note that in the analysis we combine the occupation of tutor and tailor as “skilled” as results for the two were similar.

[Table 1 goes here.]

Every time the enumerators elicited a new dowry and denmeher value, they made it

explicit that the change was exogenous and would not change any of the other characteristics of the girl.<sup>7</sup>

Answers from matchmakers were entered electronically allowing for real-time consistency checks. If matchmakers gave seemingly inconsistent answers — for example reducing dowry as education increased from x to y years but increasing dowry as education increased from y to z years — they would be asked to confirm if that was indeed what they intended. However, homogeneity was not enforced.

By identifying and naming the potential groom and keeping the groom unchanged even as bride characteristics changed, we sought to separate changes in price due to changing bride characteristics from changes in price due to a change in groom quality that usually accompanies changing bride characteristics. Similarly, by asking matchmakers to consider the same girl, but with a small change to one and only one of their characteristics, we sought to avoid an assumption that unobservables changed when we changed observable characteristics.

### 3.1.2 Qualitative Interviews

A random sample of 106 matchmakers were also asked eight open-ended qualitative questions: 1) What are the major factors influencing dowry and denmeher? 2) How does the bride’s age affect the marriage? Why do we observe denmeher increasing in age?; 3) How does the land owned by the bride’s family affect the marriage? Why do we observe denmeher increasing in land ownership?; 4) Why is denmeher increasing the farther away a girl lives from her future husband?; 5) If denmeher increases, what happens to dowry? How can parents negotiate higher denmeher for their daughters?; 6) If dowry increases, what happens to denmeher? Can parents buy higher denmeher with higher dowry? We will discuss the quantitative and qualitative results jointly below.

### 3.1.3 Observational Data

We compare the results of our hypothetical survey with observational data from a survey of the parents of 27,976 young women from the same communities collected as part of a randomized control trial examining alternative strategies to reduce child marriage and increase girls’ education (Buchmann et al., 2018). The program evaluated two different programs, i) a basic empowerment program, and ii) a conditional incentive to delay marriage, that ran between December 2007 and August 2010. In 2016-2017, we attempted to resurvey all households that were part of the original study. The sample

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<sup>7</sup>“For example, when changing education, the enumerators read the following script: Let’s assume that Fatema’s aunt gives her parents additional money to pay for Fatema’s education and nothing else (no additional money is left after paying for her school). The aunt will never give the family money again. Fatema thus completed 5th grade. She is still 18 years old. [Show row #2 of girl’s background information].”



analyzed in this paper contains responses of all parents of unmarried girls age 7-17 at program start and married at follow-up (age 15-25 at the time of survey). Parents of each married daughter were asked about her education, income-generation, and history of marriage, including a detailed module about her husband’s characteristics and marriage contract - excluding denmeher. We also asked a subset of 1,635 girls themselves about the denmeher agreed to in their marriage. This allows us to run OLS regressions adjusting for a range of individual and community characteristics that might influence the marriage contract, including village fixed-effects, girl’s and husband’s education, occupation, age at marriage, and the distance between the girl’s and husband’s house. We will contrast the hypothetical results with the observational data below.

### 3.2 Statistical Analysis

Our analysis sample includes the responses of all 750 matchmakers. The primary outcomes of the study are hypothetical dowry and denmeher. Under the assumption that matchmakers have a good understanding of the market in which they operate, provided their best estimates in response to the survey, and keep unobserved characteristics constant when observables are varied, a simple linear regression framework should reveal the value placed on different characteristics by the marriage market in our study location. Specifically, we can use a linear regression framework, to estimate the impact of education, occupation, age, land ownership, and distance between the wife and husband’s house on dowry and denmeher specified in the marriage contract using the following equation:

$$Y_{im} = \alpha + X_i'\beta + \mu_m + \epsilon_{im} \quad (1)$$

where  $Y_{im}$  is an outcome for girl  $i$  and matchmaker  $m$  and  $X_i$  a vector of indicators of girl  $i$ ’s hypothetical characteristics. All regressions include matchmaker fixed-effects to control for differences in reporting by matchmakers. Analysis excluding matchmaker fixed effects yield similar results.

Regressions contain up to five observations per matchmaker in the education section (estimates for five different education levels), up to three observations per matchmaker in the income-generating activities (IGA) section (estimates for three different IGAs), and up to four observations per matchmaker in the age, land, and distance sections (estimates for four different age, land, and distance levels).

Using the estimates of dowry and denmeher, we will calculate the price per unit of denmeher in USD.

## 4 Results

Nine percent of the matchmakers report matchmaking as their primary occupation (table 2). The number of years of matchmaking experience ranges from 1 to 57, with an average of 17.6. Matchmakers arranged an average of 0.6 matches in the previous three months, and 7.2 matches in the previous three years. The baseline girl who is 18 years old, has eight years of education, is unemployed, and whose family owns one bigha of land receives an average dowry of USD 751 and an average denmeher of USD 1,420. Results are very similar if we restrict our sample to all matchmakers who performed at least one match in the previous three months (33%).

[Table 2 goes here.]

Figures 5 to 4 graph the mean reports of dowry and denmeher for each section and table 3 shows the results of the linear regressions for each section. Results without matchmaker fixed effects are presented in appendix table 5. Table 4 shows the results of the same estimations using observational as opposed to hypothetical data.

[Table 3 goes here.]

[Table 4 goes here.]

### 4.1 Education

Dowry monotonically decreases in education while denmeher monotonically increases in education, with substantial increases for girls with lower and higher secondary school completion (grade 10 and 12 respectively) (figure 2). An increase in education increases the perceived quality of a girl without changing the perceived risk of divorce. Thus, the observed pattern can be entirely explained by the *price effect*: parents of educated girls receive more denmeher for the same unit of dowry. In fact, the price effect is sufficiently strong for parents to be able to afford more denmeher by paying less dowry.

[Figure 2 goes here.]

Parents of a girl with zero education pay an average of USD 887 in dowry, and can expect an average of USD 1,324 in denmeher (table 3), implying a price of USD 0.67 per unit of denmeher. Five years of education decrease dowry by 10% (USD 87,  $p < 0.001$ ), eight years by 15% (USD 135,  $p < 0.001$ ), 10 years by USD 20% (174,  $p < 0.001$ ), and 12 years by 29% (USD 259,  $p < 0.001$ ). In turn, five years of education decrease dowry by 4% (USD 55,  $p < 0.001$ ), eight years by 7% (USD 96,  $p < 0.001$ ), 10 years by 22% (USD 290,  $p < 0.001$ ), and 12 years by 38% (USD 501,  $p < 0.001$ ). These changes reflect price decreases

of USD 0.09, USD 0.14, USD 0.23, and USD 0.33 per unit of denmeher respectively. All coefficients are statistically different from each other.

Matchmakers reported that educated girls are very desired in the marriage market as they will be able to financially support the in-laws' household in the future through income generation and are expected to be better mothers. One matchmaker noted that an educated girl “will get more honour and will be in a good situation in her in-laws house” while another matchmaker responded that an educated girl “can help her in-laws in income generating work and can teach her children properly”. For this reason, parents of educated girls are able to afford higher denmeher at very competitive prices. This strong *price effect* even leads to dowry and denmeher moving in different directions as education increases.

By comparison, the observational data shows that parents of girls with zero education pay an average of USD 246 in dowry, and can expect an average of USD 1,126 in denmeher (table 4), implying a price of USD 0.22 per unit of denmeher. Interestingly, the observational data also shows that only the parents of girls with primary school education (5 years) pay significantly lower dowry than those of uneducated girls and that the parents of girls with above primary education pay even (insignificantly) higher dowry than those of uneducated girls. Furthermore, the coefficients on denmeher are negative and insignificant or marginally significant for all levels of education. The price per unit of denmeher is thus unchanged or decreasing in education, suggesting substantial selection effects on who is believed to get educated. For example, if the returns to being socially conservative are negatively correlated with education (because socially conservative girls are less likely to work), then educated girls might be believed to not be socially conservative (see [Buchmann et al. \(2018\)](#)).

## 4.2 Income-Generating Activity

Similarly to education, figure 3 suggests that dowry is decreasing and denmeher increasing in occupation. “Skilled” occupation is the average of working as a tutor or working as a tailor.

[Figure 3 goes here.]

Parents of girls without any occupation have to pay USD 751 in dowry, and can expect USD 1,420 in denmeher (table 3), implying a price of USD 0.53 per unit of denmeher. Working in the garment sector decreases dowry by 7% (USD 56,  $p < 0.05$ ), and in a skilled occupation by 15% (USD 115,  $p < 0.001$ ). In turn, working in the garment sector increases denmeher by 9% (USD 127,  $p < 0.001$ ), and in a skilled occupation by 9% (USD 135,  $p < 0.001$ ). These changes thus reflect price decreases of USD 0.08 and USD 0.12 per unit of denmeher respectively. The coefficients between garment and skilled are statistically different for dowry but not denmeher.

According to matchmaker reports, parents can buy denmeher at a lower price if the girl is employed at the timing of the marriage as she will be able to generate income for the in-laws' household throughout the marriage. Thus, employment changes the perceived quality of a girl, changing the price at which parents can buy additional denmeher (*price effect*). In addition, matchmakers reported that girls working in the garment sector, and thus outside the home, will often stop employment once married while girls working as tutoring and in tailoring, and mostly at home, will be allowed to continue working after marriage, making girls in skilled occupations more valuable for their in-laws households.

The observational data shows that parents of girls with no occupation pay an average of USD 507 in dowry, and can expect an average of USD 1,591 in denmeher (table 4), implying a price of USD 0.32 per unit of denmeher. As opposed to the hypothetical data, both dowry and denmeher are lower for girls with occupation than girls without occupation in the observational data (and the coefficients are statistically different for working in the garment sector). The co-movement of dowry and denmeher in the observational data could be due to match effects - i.e. working women are more likely to be matched with poorer men.

### 4.3 Age

Dowry monotonically increases in age. Denmeher is similar for girls age 16 to 19 but slightly higher for girls age 22 (figure 4). Dowry and denmeher are driven by both an *income effect* and a *price effect*.

[Figure 4 goes here.]

Parents of a girl who marries at age 16 have to pay an average of USD 683 in dowry, and can expect a denmeher of USD 1,420 (table 3), implying a price of USD 0.48 per unit of denmeher. Parents of a girl aged 18 have to pay an additional 10% (USD 69,  $p < 0.001$ ), of a girl aged 19 an additional 20% (USD 138,  $p < 0.001$ ), and of a girl aged 22 an additional 44% (USD 299,  $p < 0.001$ ). Denmeher does not differ significantly between girls aged 16, 18, and 19 but a girl aged 22 can expect an additional 5% (USD 64,  $p < 0.01$ ) in denmeher than a girl aged 16. These changes thus reflect price increases of USD 0.05, USD 0.10, USD 0.21, and USD 0.18 respectively.

As younger girls are more desired in the marriage market (they are believed to be more fertile and compliant), dowry is increasing in age (*price effect*). One matchmaker reported that potential husbands and their families will think that a girl that is still unmarried at age 20 will have a “fault” or “problem” and would thus be required to pay higher dowry (we discuss this believed signaling of underlying type of a girl in a companion paper, see [Buchmann et al. \(2018\)](#)). However, matchmakers also reported that parents of older girls often believe that their daughters are at a higher risk of divorce with a lower hazard

of remarriage. For this reason, parents of older girls favor more denmeher than parents of younger girls and buy the additional denmeher through additional dowry (*insurance effect*).

Increasing the marriage age from 16 to 18 years (the legal age of marriage in Bangladesh) increases dowry by USD 69 while increasing education from 10 years to 12 years decreases dowry by USD 211. As the authors show in another paper (Buchmann et al., 2018), one year of delayed marriage translates into approximately 11 months of increased schooling. This suggests that delaying marriage until the legal age of marriage and allowing girls to stay in school while unmarried may actually lead to decreases in dowry and not increases as feared by many parents who decide to marry their daughters early.

The observational data shows that parents of 16-year old girls pay an average of USD 650 in dowry, and can expect an average of USD 1,550 in denmeher (table 4), implying a price of USD 0.42 per unit of denmeher. Dowry is very similar for girls age 16 and girls age 18 and higher for older girls - but estimates are very noisy. Denmeher does not change with age, which could be due to poorer matches of girls who marry late. The observational data thus suggests a slight price effect and hides the insurance effect.

#### 4.4 Land

Richer families choose to purchase more insurance for their daughter, in the form of higher denmeher, through higher dowry payments. Thus both dowry and denmeher increase in land owned by the girl's parents (figure 5). Qualitative results confirm that an increase in wealth of the bride's parents (additional land) does not affect the perceived quality of the girl or risk of divorce, and thus this pattern can be entirely explained by the *insurance effect*: wealthier parents buy additional insurance through additional dowry.

[Figure 5 goes here.]

Parents with zero land have to pay an average dowry of USD 564 and can expect an average denmeher of USD 1,131 (table 3), implying a price of USD 0.48 per unit of denmeher. One bigha of land increases dowry by 33% (USD 188,  $p < 0.001$ ), two bighas by 38% (USD 214,  $p < 0.001$ ), and four bighas by 43% (USD 240,  $p < 0.001$ ). One bigha of land increases denmeher by 26% (USD 289,  $p < 0.001$ ), two bighas by 32% (USD 358,  $p < 0.001$ ), and four bighas by 46% (USD 516,  $p < 0.001$ ). The price per unit of denmeher thus does not change with land. For dowry, the coefficients on one and two, and one and four bighas of land are statistically different from each other, but not the two largest coefficients on two and four bighas of land. For denmeher, all coefficients are statistically significant from each other.

## 4.5 Distance between Parents' and Husband's House

Similarly to land ownership, both dowry and denmeher increase significantly in the distance between the parents' and the husband's house (figure 6). An increase in distance does not affect the perceived quality of the girl. However, it does increase the perceived risk to the daughter's marriage quality, as the bride's parents are too far away to monitor their daughter's life. Therefore, parents buy additional dowry through increasing denmeher in order to discipline a husband for whom divorce would be too costly. We again observe an *insurance effect*.

[Figure 6 goes here.]

Parents have to pay an average of USD 751 in dowry for a match in the same village and purchase an average denmeher of USD 1,420 (table 3). Dowry increases by 5% (USD 35,  $p < 0.01$ ) for husbands in a different village, 14% (USD 106,  $p < 0.001$ ) for husbands in a different union, and by 29% (USD 219,  $p < 0.001$ ) for husbands in a different upazila (sub-district).<sup>8</sup> Denmeher does not differ significantly between matches within or outside the village but is significantly higher for matches outside the union and outside the upazila. A match outside the union increases denmeher by 5% (USD 75,  $p < 0.01$ ), and a match outside the upazila by 17% (USD 235,  $p < 0.01$ ). All coefficients are statistically different from each other.

According to matchmaker reports, parents buy higher denmeher for far-away matches as the distance increases the risks their daughters face. Husbands who live far away will be less known by relatives and acquaintances and daughters will be less able to visit or return to their parents' houses. Therefore, parents of girls married outside their unions buy additional insurance (higher denmeher) through higher dowry to discipline the husband's behavior. Another matchmaker reported that the high denmeher works as "a security for the parents who are unable to observe the marriage and their daughters' behavior. If the denmeher is high, the husband needs to spend a lot if he wants to get divorced." In contrast to the findings in [Rosenzweig and Stark \(1989\)](#), none of the matchmakers reported that far-away matches were desired by families.

As is the case for increases in land ownership, increases in the distance between the parents' and the husband's house increase both dowry and denmeher through an insurance effect. However, whereas parents buy additional denmeher due to increased wealth in the land scenario, they buy additional denmeher to compensate for a perceived higher risk to their daughter's marriage quality in the distance scenario.

The observational data shows that parents pay an average of USD 523 in dowry for a match in the same village, and can expect an average of USD 1,689 in denmeher (table

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<sup>8</sup>The median distance between two neighboring unions is 4.3 kilometers in our sample and the median distance between two neighboring upazilas 22.3 kilometers.

4), implying a price of USD 0.31 per unit of denmeher. As is the case in the hypothetical data, dowry is significantly higher for any matches outside the village: 14% (USD 74,  $p < 0.001$ ) for matches outside the village, 27% (USD 140,  $p < 0.001$ ) for matches outside the union, and 7% (USD 34,  $p < 0.1$ ) for matches outside the upazila. However, denmeher is decreasing in denmeher (even though not significant), implying an increase in the price a girl's parents have to pay per unit of denmeher. This could be due to unobservable differences in quality of the husband, which is consistent with the positive correlation between distance and husband's education we observe in our observational data.

## 5 Conclusion

We collect a unique dataset to decompose the marriage market returns to different bride characteristics in Bangladesh's marriage market. Using carefully crafted hypothetical questions, we are able to obtain the prices of dowry and denmeher for women of different characteristics, data that cannot be directly observed and is hard to collect in direct surveys because of selection on unobservables, sorting, and social desirability bias. By analyzing hypothetical data, we circumvent the challenges of disentangling the effects of various often correlated characteristics from many unobservables in real marriage data. By keeping all unobserved qualities constant, we are able to identify causal relationships in the marriage market.

We find that education, labor market participation and youth are valued in the marriage market. These findings are in contrast to observational data that suggests only small or no returns to education and labor market participation, possibly because of the correlation between these characteristics and unobservables that are not valued in the marriage market, such as social conservatism (which we discuss in a companion paper (Buchmann et al., 2018)). Thus, when deciding whether or not to marry a young girl, parents face a trade-off between an increase in price due to the girl's age and a decrease in price due to the additional education or employment their unmarried daughter may earn. However, our results suggest that if parents delay the marriage of an underage girl, they may be able to arrange a marriage under improved terms later on - if they are able to convince potential matches that the delay was not due to potential undesirable unobservables that increase the returns to delaying marriage. We discuss how a randomly assigned financial incentive that is observed with noise could achieve this goal and reduce signaling-driven child marriage (see Buchmann et al. (2018)).

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## 6 Tables

Table 1: Combinations of bride characteristics

Characteristic	Baseline	Variations
Education	8	0
		5
		10
		12
IGA	None	Garment Tutor Tailor
Age	18	16
		19
		22
Land	1	0
		2
		4
Location	Same village	Diff. village Diff. union Diff. upazila

Table 2: Summary statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
Matchmaking main occupation	750	.09	.29	0	1
Years of matchmaking experience	750	17.56	10.4	1	57
Marriages arranged in last 3 months	750	.58	1.25	0	12
Marriages arranged in last 3 years	747	7.21	9.98	0	80
Baseline dowry (USD)	750	751.36	495.76	0	3817.24
Baseline denmeher (USD)	750	1420.17	665.94	25.45	3817.24

Table 3: Dowry and denmeher, hypothetical data, matchmaker fixed effects

	Dowry (1)	Denmeher (2)
12 years	-258.724*** (29.511)	500.695*** (34.987)
10 years	-174.185*** (23.749)	289.864*** (26.588)
8 years	-135.317*** (18.848)	96.270*** (17.571)
5 years	-86.762*** (11.648)	55.426*** (11.354)
Mean(No education, 18 yrs., 1 bigha land, same village, no IGA)	886.67206	1323.88705
Observations	3750	3750
Skilled	-115.309*** (17.946)	134.522*** (19.607)
Garment	-55.913* (26.133)	127.148*** (22.021)
Mean(No IGA, 18 yrs., 8 yrs. education, 1 bigha land, same village)	751.35512	1420.16626
Observations	2250	2250
22 years	299.463*** (23.714)	63.952* (26.812)
19 years	137.908*** (17.140)	13.997 (23.041)
18 years	68.824*** (14.695)	-0.229 (21.851)
Mean(16 years, 8 yrs. education, 1 bigha land, same village, no IGA)	682.53112	1420.39530
Observations	2998	3000
4 bighas	239.611*** (27.509)	515.648*** (32.323)
2 bighas	214.369*** (22.683)	357.845*** (24.601)
1 bigha	187.645*** (21.294)	289.355*** (24.442)
Mean(0 land, 18 yrs., 8 yrs. education, same village, no IGA)	563.70975	1130.81092
Observations	3000	3000
Different upazila	218.804*** (22.843)	234.955*** (27.814)
Different union	105.670*** (14.451)	74.835*** (15.491)
Different village	35.093** (12.170)	-4.521 (14.496)
Mean(Same village, 18 yrs., 8 yrs. education, 1 bigha land, no IGA)	751.35512	1420.16626
Observations	3000	3000

*Notes:* The table shows results from OLS regressions with Huber-White robust SEs clustered at the village level and matchmaker fixed-effects. The bottom row in each panel shows the mean in the described group, while all other rows show regression coefficients from exogenously changing the given characteristic. Significance levels are † p<0.10 , \* p<0.05, \*\* p<0.01, and \*\*\* p<0.001.

Table 4: Dowry and denmeher, observational data

	Dowry (1)	Denmeher (2)
12 years	46.767 (39.653)	-92.042 (115.807)
10 years	62.631 (50.811)	-129.799 (207.759)
8 years	14.885 (24.130)	-163.586 <sup>†</sup> (91.654)
5 years	-69.201*** (11.502)	-92.005 (73.052)
Mean(No education, 18 yrs., 1 bigha land, same village, no IGA)	245.89913	1125.59524
Observations	27884	1632
Skilled	-70.747* (29.638)	-60.810 (245.024)
Garment	-137.429*** (15.964)	-295.599* (140.723)
Mean(No IGA, 18 yrs., 8 yrs. education, 1 bigha land, same village)	507.48973	1590.95177
Observations	27854	1629
22 years	222.572 (183.711)	21.058 (176.471)
19 years	56.537* (26.229)	-15.299 (83.958)
18 years	-8.539 (23.431)	25.674 (88.063)
Mean(16 years, 8 yrs. education, 1 bigha land, same village, no IGA)	649.98063	1550.27710
Observations	27964	1635
Different upazila	33.524 <sup>†</sup> (20.057)	-86.724 (133.812)
Different union	139.883*** (17.891)	-58.524 (128.489)
Different village	74.070*** (15.865)	-94.485 (140.854)
Mean(Same village, 18 yrs., 8 yrs. education, 1 bigha land, no IGA)	522.95883	1689.18969
Observations	27835	1632

*Notes:* The table shows results from OLS regressions with Huber-White robust SEs clustered at the village level and village fixed-effects. The data comes from parents' and women's reports of dowry and denmeher of women age 22-25 in our 2016 Kishoree Kontha survey wave. The bottom row in each panel shows the mean in the described group, while all other rows show regression coefficients from observed data. All regressions control for distance between girl's and husband's house, girl's and husband's education, girl's and husband's occupation, girl's and husband's age at marriage (but omit the variable being varied in the regression). Significance levels are <sup>†</sup> p<0.10, \* p<0.05, \*\* p<0.01, and \*\*\* p<0.001.

## 6.1 Appendix

Table 5: Dowry and denmeher, hypothetical data, no matchmaker fixed effects

	Dowry (1)	Denmeher (2)
12 years	-273.207*** (48.353)	593.482*** (54.714)
10 years	-169.448*** (37.912)	344.069*** (38.882)
8 years	-142.293*** (29.344)	123.672*** (28.892)
5 years	-85.707*** (18.127)	53.069* (20.914)
Mean(No education, 18 yrs., 1 bigha land, same village, no IGA)	861.26881	1362.82760
Observations	1230	1230
Skilled	-102.456*** (25.665)	162.097*** (33.190)
Garment	-49.795 (32.048)	136.991*** (34.281)
Mean(No IGA, 18 yrs., 8 yrs. education, 1 bigha land, same village)	718.97573	1486.49973
Observations	738	738
22 years	309.734*** (34.994)	52.603 (38.255)
19 years	125.441*** (23.176)	-3.776 (35.240)
18 years	60.528** (20.730)	-6.362 (32.104)
Mean(16 years, 8 yrs. education, 1 bigha land, same village, no IGA)	658.44816	1492.86180
Observations	984	984
4 bighas	239.611*** (25.036)	515.648*** (29.416)
2 bighas	214.369*** (20.644)	357.845*** (22.389)
1 bigha	187.645*** (19.379)	289.355*** (22.244)
Mean(0 land, 18 yrs., 8 yrs. education, same village, no IGA)	563.70975	1130.81092
Observations	3000	3000
Different upazila	218.586*** (35.175)	225.621*** (39.791)
Different union	77.302*** (21.604)	52.552* (25.063)
Different village	27.595 <sup>†</sup> (15.472)	-11.431 (22.521)
Mean(Same village, 18 yrs., 8 yrs. education, 1 bigha land, no IGA)	718.97573	1486.49973
Observations	984	984

*Notes:* The table shows results from OLS regressions with Huber-White robust SEs clustered at the village level. The bottom row in each panel shows the mean in the described group, while all other rows show regression coefficients from exogenously changing the given characteristic. Significance levels are <sup>†</sup> p<0.10, \* p<0.05, \*\* p<0.01, and \*\*\* p<0.001.

## 7 Figures

















Q No		Age	Education	Profession	Land
<b>1</b>	<b>Fatema</b> 	<b>18</b>			<b>1 Bigha</b> 
<b>2</b>		<b>18</b>	<b>Class 5</b> 		<b>1 Bigha</b> 
<b>3</b>		<b>18</b>	<b>Class 8</b> 		<b>1 Bigha</b> 
<b>4</b>		<b>18</b>	<b>SSC</b> 		<b>1 Bigha</b> 
<b>5</b>		<b>18</b>	<b>HSC</b> 		<b>1 Bigha</b> 

Figure 1: Vignette for education

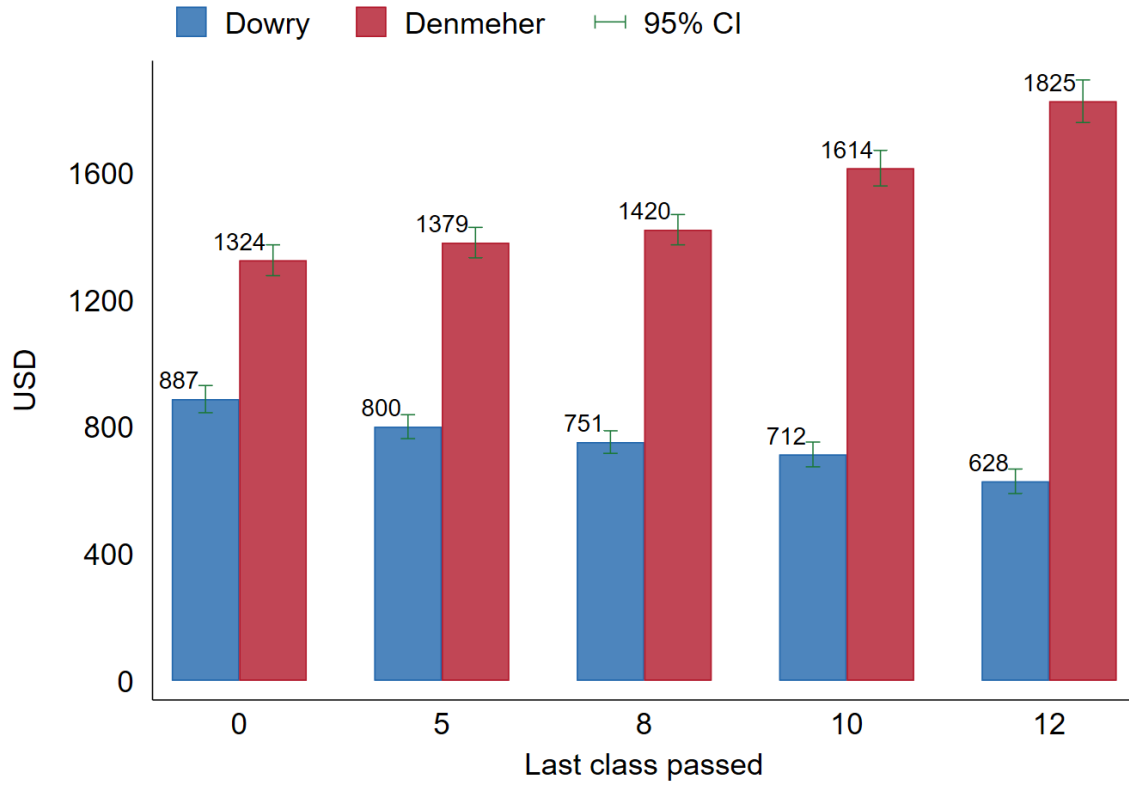


Figure 2: Dowry and denmeher, by education in years passed

*Notes:* The figure shows the means from the reported dowry and denmeher for a hypothetical girl who resides in the matchmaker’s village, is 18 years old, does not work, has one younger sister and one older brother and whose parents own 1 bigha of land.



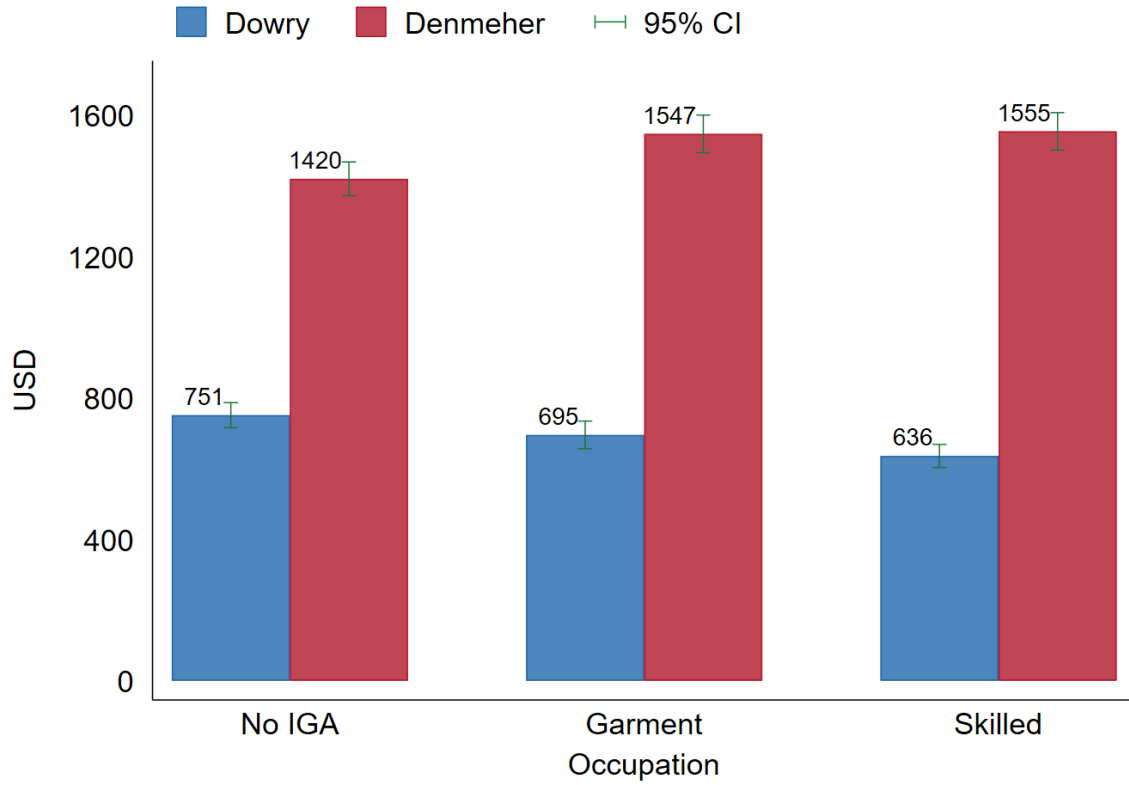


Figure 3: Dowry and denmeher, by income-generating activity

*Notes:* The figure shows the means from the reported dowry and denmeher for a hypothetical girl who resides in the matchmaker's village, is 18 years old, completed eight years of education, has one younger sister and one older brother and whose parents own 1 bigha of land.

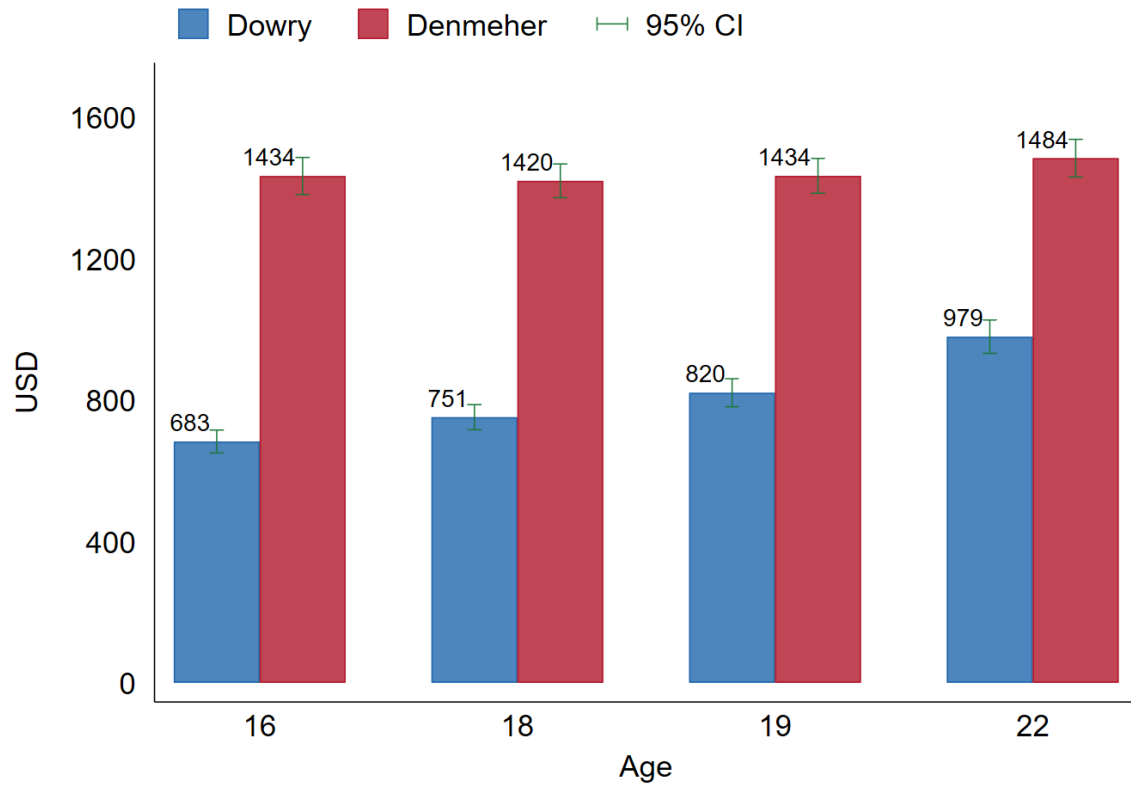


Figure 4: Dowry and denmeher, by age

*Notes:* The figure shows the means from the reported dowry and denmeher for a hypothetical girl who resides in the matchmaker's village, completed eight years of education, does not work, has one younger sister and one older brother and whose parents own 1 bigha of land.

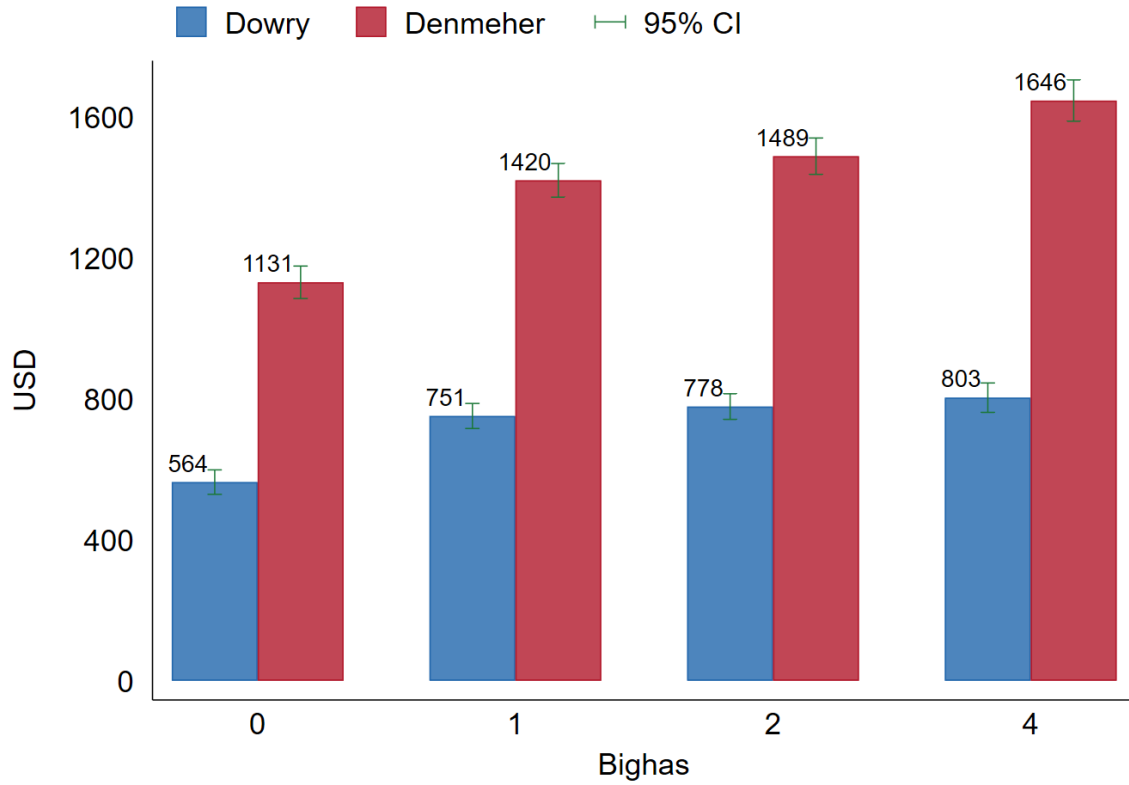


Figure 5: Dowry and denmeher, by land in number of bigha's owned

*Notes:* The figure shows the means from the reported dowry and denmeher for a hypothetical girl who resides in the matchmaker's village, is 18 years old, completed eight years of education, does not work, and has one younger sister and one older brother.

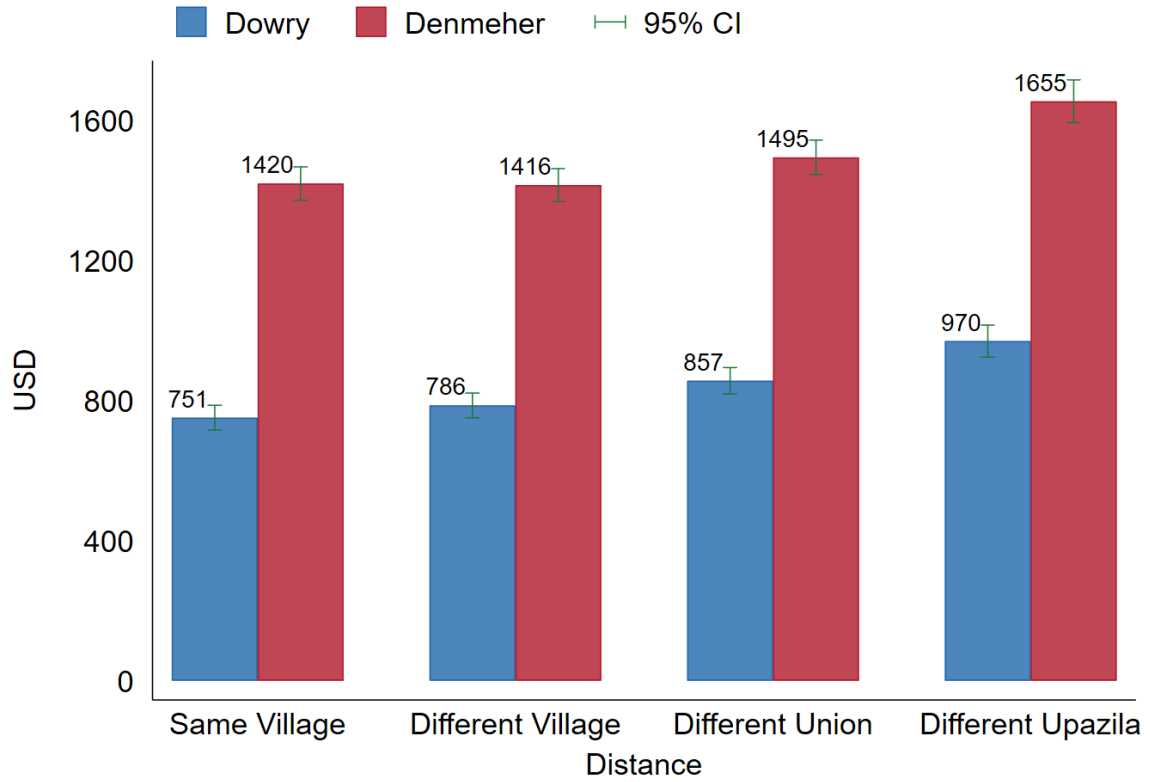


Figure 6: Dowry and denmeher, by distance between girl's, husband's house

*Notes:* The figure shows the means from the reported dowry and denmeher for a hypothetical girl who is 18 years old, completed eight years of education, does not work, has one younger sister and one older brother and whose parents own 1 bigha of land.