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Preferences and Beliefs in the Marriage Market for Young Brides

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Abstract

Rajasthani women typically leave school early and marry young. We develop a novel discrete choice methodology using hypothetical vignettes to elicit average parental preferences over a daughter's education and age of marriage, and subjective beliefs about the evolution of her marriage market prospects. We find parents have a strong preference for delaying a daughter's marriage until eighteen but no further. Conditional on a marriage match, parents place little intrinsic value on a daughter's education. However, they believe the probability of receiving a good marriage offer increases strongly with a daughter's education but deteriorates quickly with her age on leaving school.

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1 Introduction

In many developing economies, girls frequently leave school early and marry young. In rural Rajasthan, India, the area under study in this paper, conservative estimates suggest that a third of girls have dropped out of school by age sixteen and over a third of women are already married by age eighteen.[1] This is of concern to policymakers given the large body of evidence that early marriage and low education leaves women vulnerable to poverty, poor mental and physical health, low decision making power, and dependence on men (Duflo 2012; Jensen and Thornton 2003), with knock-on effects on the education and health of the next generation (Carneiro, Meghir, and Parey 2013; Grépin and Bharadwaj 2015).

Understanding the mechanisms that drive early marriage and school dropout is challenging. Schooling and marriage decisions might be made simultaneously creating an identification challenge (Field and Ambrus 2008) — early marriage may directly cut short a daughter's education, while the value of a young woman's education on the marriage market might be an important consideration in her family's schooling choices. Realised age of marriage and education outcomes, furthermore, reflect not only the preferences of the "bride's side" of the market, but also the preferences of grooms. Marriage market matching frictions and, crucially, the fact that schooling and marriage decisions are made under uncertainty over future marriage offers further attenuates the direct effect of bridal family preferences on observed outcomes. If this were not enough, many characteristics of young women, their families, their marriage partners and also their *potential* marriage partners, are unobserved to the researcher making selection bias a key concern for the identification of the structural functions of interest.[2]

In this paper, we elicit parents' preferences over the age of marriage and education of daughters, and their beliefs about the role of the marriage market return to education with a sample of over 4,500 mothers of adolescent girls living in the Dhaulpur district of Rajasthan, India. Our estimates provide new insights into the drivers of early marriage and the returns to female education in a context of strongly patriarchal gender norms. Our focus is on parents' preferences and beliefs because in our study area young women have little control over the timing of their marriage and the choice of spouse: only 12% of married adolescent girls in our survey communities had met and spoken to their husband alone before marriage (Achyut et al. 2016).[3]

We develop a novel discrete choice methodology which uses hypothetical vignettes to identify both parents'

[1] Authors' calculations from 2015/16 National Family Health Survey (NFHS-IV). Given the salience of 18 as the legal minimum age of marriage for young women, we anticipate that national survey data underestimates rates of early marriage.

[2] See Wiswall and Zafar (2018) for a discussion of closely related issues in identifying worker preferences over job attributes.

[3] Only 13% of unmarried adolescent girls expected they would meet or speak to their husband alone before marriage (Achyut et al. 2016).

average preferences over their daughter's age of marriage, completed education and marriage match quality *and* parents' subjective beliefs about how the quality of marriage offers varies with a young woman's age and education. Our approach is based on presenting respondents with a series of scenarios concerning a hypothetical daughter's marriage and education, with and without uncertainty over the realisation of her future marriage offers. In a first set of experiments, which we call "ex-post" experiments, respondents are asked to choose which option is preferred from a set of complete realised descriptions of a hypothetical daughter's age and education at marriage and groom characteristics. In these experiments, the marriage offers at future points of time, for different combinations of a daughter's age and education, are known. Choices in the ex-post experiment identify parental preferences over the age of marriage and education of daughters, and match characteristics (Wiswall and Zafar 2018; Mas and Pallais 2017).

In a second set of experiments, which we call "ex-ante" experiments, we collect state-dependent stochastic choice data (Caplin 2016). We ask respondents what the preferred option would be if hypothetical parents receive a marriage offer from a groom with a particular set of characteristics when a girls reaches a particular age and is potentially still in school. In the ex-ante experiment, there is uncertainty over the realisation of future marriage offers. Taking preferences as given, choices in this experiment identify beliefs. We term the beliefs that reconcile choices made with and without uncertainty over future marriage offers "revealed beliefs".

The use of hypothetical vignettes is a core component of our experimental design. Age of marriage is a sensitive topic in our study area and misreporting is common (Borkotoky and Unisa 2014). Social desirability bias would be a major concern if we asked respondents about their own choices regarding their own daughter's education and marriage given that high rates of early school dropout, early marriage, and payment of dowry which persist in this community despite legal reforms and widespread social and political campaigns.[4] To reduce systematic bias in reported choices and to avoid putting respondents in an uncomfortable position, we thus use a hypothetical vignette-based approach, asking respondents about the choices they think a fictional couple would make for their daughter. In addition to alleviating social desirability bias, the use of hypothetical vignettes also limits the role of unobserved characteristics in driving respondents' decisions.

As a consequence of the hypothetical framing, our method formally identifies respondents' perceptions of average preferences and average beliefs. Our focus is not on uncovering rich patterns of heterogeneity at the individual

[4]The Prohibition of Child Marriage Act, 2006 increased mechanisms to prosecute adult men who marry children, those performing a child marriage and those promoting or permitting one, including parents and guardians.

level; we pool respondents' choices in order to estimate common structural preference and belief parameters. While systematic bias in perceptions of average preferences for rare events is likely to be an important issue (Bursztyn, González, and Yanagizawa-Drott 2018),[5] we think that this is unlikely to be a first order concern in this study. In our setting, marriage is near universal[6] and the process of finding a match and the eventual marriage arrangements are public and the subject of much discussion within the community.[7] Furthermore, families usually have both daughters and sons and thus operate on both sides of the marriage market. Finally, we find no systematic differences between how respondents whose circumstances were more or less similar to those described in a given vignette answered, suggesting that partial knowledge of the true average preferences and beliefs is not a first order concern here.[8] Thus, while we allow for idiosyncratic respondent heterogeneity in perceptions of average preferences, we consider that respondents' perceptions of the average preferences and beliefs are unlikely to be systematically wrong and thus refer simply to "average preferences" and "average beliefs" throughout.

We find that parents prefer to delay a daughter's marriage until the age of eighteen but have no preference for delaying further. This suggests that parents may partially internalise the legal minimum age of marriage, which is eighteen years old for girls, into their own preferences. While parents value a daughter's education up until the end of high school, the magnitude is weak and decreasing in post-secondary education. However, we uncover a substantial expected marriage market return to education. For example, parents believe that an 18 year old daughter who is currently in college has a 60% chance of receiving a marriage offer from a high quality groom compared to a negligible chance if she only has primary education. Our revealed belief estimates indicate that parents believe that the chance of a poorly educated daughter receiving a marriage offer from a high quality groom with a government job is very low. Parents believe that this probability increases substantially with education, and particularly with college education, creating a sizeable perceived marriage market return. However, parents believe that marriage market prospects begin to worsen with age immediately after girls leave formal education.

Our findings suggest that while parents do place some intrinsic value on their daughter's schooling, a key motivation for pre-marital investment in girls' education is a substantial perceived marriage market return to

[5] For rare events, it is more likely for individuals to misperceive social norms. In Saudia Arabia where female labour force participation is currently very low, Bursztyn, González, and Yanagizawa-Drott (2018) find that men underestimate the acceptability of women working outside the home.

[6] 99.5% of women in rural Rajasthan are married by age 30 (NFHS-4).

[7] Indeed, in our study area dowries, arguably the most sensitive aspect of marital arrangements, are put on public display both before and after the marriage to guard against ex-post disputes in the amount that was given.

[8] To assess whether respondents found it difficult to answer accurately when the situation described in the vignette differed substantially from their own circumstances, we based one third of vignettes on respondents' own characteristics and term these "salient vignettes". We find no difference between how respondents answered salient and non-salient vignettes (Appendix Table A.1 and Table A.2).

education. This is especially the case when it comes to college education, which we find that bridal parents dislike perhaps due to its high costs but which they believe greatly increases the likelihood of their daughter marrying a high quality groom. This perceived marriage market return to education may be important in understanding why both female education and age of marriage in India has continued to increase while female labour force participation has fallen further from an already low base (Fletcher, Pande, and Moore 2017). Although parents have a distaste for marrying their daughter before age eighteen, the belief that a girl's marriage prospects will start to deteriorate with age as soon as she has dropped out of school implies girls who have recently left education are particularly vulnerable to a quick marriage since their perceived marriage market prospects are deteriorating rapidly. Despite being far less common that interventions targeting young women and their parents, interventions targeting the norms on the groom's side of the marriage market that ultimately create these negative marriage market returns to age might be particularly effective for reducing rates of early marriage. While this path of early school dropout leading to subsequent early marriage is undesirable to girls' parents, our study population mostly live around or below the poverty line and the quality of schooling and girls' access to school is often poor and inconsistent. Families therefore experience many shocks that might result in girls leaving school early (Ferreira and Schady 2009; Achyut et al. 2016). Our results suggest that as well as curtailing their education these shocks may also result in their early marriage.[9]

Our findings relate to three strands of literature within economics. First, our results contribute to the growing literature on the marriage market returns to education. Existing empirical work on marriage market returns has largely focused on societies with high female labour force participation and has found large and positive marriage market returns to female education (Chiappori, Dias, and Meghir 2015; Attanasio and Kaufmann 2017; Lafortune 2013). Yet there is also evidence of diminishing returns: several studies have found that men tend to avoid female partners with high levels of education and women that are more professionally ambitious than they are (Fisman, Iyengar, Kamenica, and Simonson 2006; Hitsch, Hortaçsu, and Ariely 2010), and that women respond by avoiding signalling their career ambitions to potential partners (Bursztyn, Fujiwara, and Pallais 2017). Our results suggest that a substantial marriage market return to women's education also exists in a very different context: one where women's labour force participation is very low and gender norms dictating the appropriate behaviour for women are much more stringent (Dhar, Jain, and Jayachandran 2018a). Indeed, we find that marriage market returns provide the primary motivation for investing in a daughter's college education in our context.

[9]See also Corno, Hildebrandt, and Voena (2016) for another mechanism by which economic shocks can affect early marriage rates.

Our results also provide insight into the reasons for early marriage. This is the first paper explicitly to estimate either preferences over age of marriage or the marriage market return to youth and, importantly, how this return differs by current schooling status. In so doing we build on theoretical models where the subjective value of remaining unmarried (encompassing beliefs over the distribution of future offers) varies over time (Sautmann 2017). Our results highlight the protective value of education against early marriage and lead us to identify a group of young women who are at particular risk of early marriage: those who have recently dropped out of school and whose marriage prospects are believed to be sharply declining in age. Shocks that cause young women to drop out of school, thus also create pressures for their marriage. Our results thus complement work that shows the importance of economic shocks for early marriage in contexts where marriage payments are the norm (Corno, Hildebrandt, and Voena 2016).[10]

Finally, our experimental design provides a novel method for eliciting preferences and beliefs in challenging scenarios. Our set of "ex-post" experiments relates to the literature on stated preference analysis and contingent valuation methods (Wiswall and Zafar 2018).[11] This paper is the first that we know of to adapt stated preference techniques to identify subjective beliefs.[12] Since Manski (2004), great strides have been made in developing probabilistic methods to collect subjective expectations data. Creative use of visual aids and careful survey design has allowed researchers successfully to elicit subjective probability distributions in developing country contexts (Delavande, Giné, and McKenzie 2011). However, a particular challenge in our context is that the state space is very large — a number of characteristics, many of them continuous, are relevant for an assessment of "match quality" — and eliciting beliefs over a large state space is challenging (Attanasio 2009). Furthermore, 90% of our 4,605 respondents cannot read a complete sentence. Thus, not having to ask respondents directly for a probabilistic measure but rather asking simply for a choice between two or three options in relatable scenarios is a substantial advantage of our approach. As respondents easily understood the exercise at hand, each round of our experiment took less than five minutes to implement.

We term the beliefs that reconcile choice behaviour under uncertainty to choice behaviour under certainty "revealed beliefs" and suggest that the approach is well suited for eliciting beliefs that provide meaningful insights

[10] Shocks causing a daughter to drop out of school are not necessarily linked to a family's finances.

[11] See also Banerjee, Duflo, Ghatak, and Lafortune (2013) that asks families to rank responses to matrimonial adverts to estimate the strength of caste preferences in marriage in India.

[12] See Attanasio and Kaufmann (2014), Attanasio and Kaufmann (2017), and Boneva and Rauh (2018) for recent work on direct elicitation of subjective beliefs on returns to education. Delavande and Zafar (2018) and Arcidiacono, Hotz, and Kang (2012) combine directly elicited beliefs and choice data to estimate dynamic structural models but do not make use of comparisons of choice with and without uncertainty in order to identify beliefs themselves.

on real choices. We show that our revealed beliefs are consistent with preferences on the groom's side of the marriage market and they exhibit the qualitatively same trends as results when explicitly eliciting respondents' expected marriage match. However, our revealed belief results imply probability distributions that match the national survey data on grooms far better. They are also consistent with patterns of assortative matching that we observe in national survey data.

This paper proceeds as follows. In Section 2 we describe the key features of the marriage market, and the interaction between marriage and education decisions, in rural Rajasthan. We further describe our sample recruitment procedure and give an overview of the experimental design. In Section 3 we outline our ex-post experiment, which permits the identification of bridal parents' preferences. In this section we also motivate our hypothetical discrete choice approach and describe the key characteristics that we include in our vignettes. In Section 4 we outline a simple model of preferences and choice and give our structural preference results using choice data from the ex-post experiment. In Section 5 we develop a dynamic discrete choice model, which recognises the fact that parents are make schooling and marriage decisions for their daughters' under uncertainty over future marriage offers, and outline the key features of the ex-ante experiment. We show how the combination of choice data from the ex-post and ex-ante experiment enables the identification of beliefs about the likelihood of marriage offers from high quality grooms as a function of the age and education of a young woman. In Section 6 we give our revealed belief results and show that they are consistent with patterns from directly elicited expectations over average groom quality, groom-side preferences, and patterns of assortative matching in Rajasthan. In Section 7 we perform a number of counterfactual simulation exercises to demonstrate the implications of our results for ongoing policy discussions. Section 8 concludes.

2 Context

We elicit parents' average preferences over the age of marriage and education of daughters, and their beliefs about the marriage market return to education for a sample of 4,605 female caregivers of adolescent girls who live across 120 villages in the Dhaulpur district of Rajasthan. We first describe the key features of the marriage market in our study community, before describing our sample selection and experimental set-up.

2.1 Key Features of the Marriage Market

There are several features of the marriage market in this community that are important to embed in our model and experimental design. Importantly, marriages are almost always arranged by parents or other relatives and young women have little control over either the timing of their marriage or the choice of spouse. Only 12% of married adolescent girls in our survey communities had met and spoken to their husband alone before marriage and only 13% of unmarried adolescent girls expected they would (Achyut et al. 2016). We are therefore concerned with the preferences and beliefs of parents.

Our study area is patrilocal meaning that women join their husband's natal community, and usually their natal home, upon marriage. The norm is for the husband's natal community to be at least 10km away from the bride's.[13] Parents search for potential grooms through extended family and sub-caste networks.[14] The search process can be lengthy and these frictions leave a role for uncertainty over the quality of future matches.

Although marital ties create extended family networks that can be important for risk-sharing, job search and migration (Rosenzweig and Stark 1989), married women's primary economic unit is fundamentally that of their marital household and married women have little autonomy to maintain independent economic connections with their natal family.[15] Married women's earnings, labour and expenditure thus primarily affect the marital household's budget and their children are far more integrated in their marital family than their natal family. This integration is important since it suggests that any labour market return to education does not accrue directly to a woman's parents.

That being said, the realised labour market return to female education in our setting is unclear. It is rare for younger women in our study area to work outside the home or family businesses, women typically have little control over household own assets and their travel is highly restricted. In our sample, only 37% of mothers had worked for cash in the past year (Table 1) and labour force participation is lower amongst younger women.[16] This suggests that the financial return the groom's household can expect to a bride's education may be limited. Rather any preference for a bride's education may derive from maternal education's impact on children's health and education (Rosenzweig and Wolpin 1994; Carneiro, Meghir, and Parey 2013; Grépin and Bharadwaj 2015; Behrman, Foster,

[13] Focus group respondents mentioned this distance should be at least 10km (see notes from Caregivers' Focus Group Discussion (FGD) 2, Online Appendix B).

[14] Preference for within-caste marriage is very strong however previous work has suggested that as this preference is shared by all castes it has little impact on matching across other characteristics or matching efficiency (Banerjee, Duflo, Ghatak, and Lafortune 2013).

[15] In the marital household, women's decision making and mobility is often restricted. In our sample 39% of mothers are not allowed to go to the market unaccompanied while 92% do not own any asset that they could dispose of at will. It is thus difficult for them to maintain economic connections with their natal family that are not mediated through their marital household.

[16] See 2015/16 National Family Health Survey India (NFHD-IV).

Rosenzweig, and Vashishtha 1999), status signalling (Bloch, Rao, and Desai 2004), or through the effect of women's education on domestic production.

Finally, marriage is a significant economic transaction for the households involved. Despite having been illegal since 1961, the payment of dowry remains an important feature of most marriages in this part of India. Dowry is a transfer, typically made up of cash and gold or silver jewellery along with furniture, home appliances and sometimes a vehicle,[17] from the family of the bride to the family of the groom at the time of marriage. Within our study communities, dowry is primarily viewed as a "groom price" with one focus group participant commenting that: "Dowry is directly proportional to what kind of boy one is looking (for), if one is seeking a boy who is educated, has fields and a good house and family then the dowry is always higher"[18]. This is consistent with literature showing the transition of dowry from a pre-mortem inheritance for the bride to a market clearing price for grooms (Anderson and Bidner 2015). The value of dowry is substantial relative to household wealth in our study communities. Respondents in our confidential focus groups commented that "even if one is poor minimum Rs 3 lakh is asked for and a lot of times one has to give Rs 5 lakhs"[19] and that "dowry can go up to as high as Rs 10 lakhs"[20]. This range corresponds to $4,700 to $15,600 or between 3 and 10 times current GDP per capita in Rajasthan (Researve Bank of India 2017), a ratio which is in line with previous estimates (Rao 1993; Bloch and Rao 2002).[21]

2.2 Sample

We ran our experiments as part of an endline data collection for a cluster randomised controlled trial of a community based life-skills programme for adolescent girls.[22][23] In 2015, a random sample of (then) unmarried adolescent girls aged 12-17 years was drawn from complete lists of all adolescent girls in the villages.[24] Whenever possible girls'

[17]The 1849 respondents living in rural areas of Rajasthan in the 2011-12 Indian Health and Development Survey indicated that the following items were 'usually' included in dowries in their communities: gold (84% of respondents), silver (89%), cash (43%), TV (53%), furniture (86%), pressure cooker (66%), utensils (95%), bedding/mattress (76%), watch/clock (76%), sewing machine (43%) and scooter (15%).

[18]FGD 3, Online Appendix B.

[19]FGD 3, Online Appendix B.

[20]FGD 3, Online Appendix B.

[21](2018 price level). Further, in addition to dowry transfers to the groom's family the bride's family also covers the cost of the wedding, which may be elaborate. Spending on expensive wedding celebrations may be used to signal the quality of a good match to neighbours and friends in order to increase the social standing of the bride's family (Bloch, Rao, and Desai 2004).

[22]We obtained written consent from all caregivers before proceeding to the survey and experiments. This study has received ethical approval from institutional review boards at the University of Oxford (R43389), the International Center for Research on Women (15-0001) and Sigma, New Delhi (10035/IRB/D/17-18).

[23]Since we aim to elicit perceptions of average preferences and beliefs in the population we did not anticipate treatment allocation would have any impact on how respondents answered the choice experiments. Appendix Tables A.3 and A.3 confirm that, at most, the effect of treatment is very small. We thus ignore treatment allocation for the remainder of the paper.

[24]We also included married young women aged 12-19 in the baseline sample but did not include these young women or their caregivers in the endline sample due to very low participation to the intervention.

Table 1: Sample descriptives

	Mean	Standard Deviation	N
Age in years	41.92	8.365	4464
Own age at marriage in years*	15.57	3.361	4423
Years of school*	1.492	3.267	4605
Can read complete sentence (in Hindi)*	0.104	0.305	4353
Number of sons*	2.118	1.112	4343
Number of daughters*	2.447	1.320	4343
Owns asset that can dispose of at will	0.132	0.339	4604
Can go to market unaccompanied*	0.611	0.488	4463
At least some say over when child gets married	0.963	0.190	4536
At least some say over to whom child gets married	0.952	0.213	4532
At least some say over when child leaves school	0.942	0.235	4534
Has done any work (inc. on family farm) in last year	0.595	0.491	4604
Has worked for cash in last year	0.344	0.475	4604
Has child (male or female) who is married	0.364	0.481	4576
House has dirt floor*	0.507	0.500	4603
Scheduled caste or scheduled tribe*	0.352	0.478	4581
Other Backward Caste or Economically Backward Class*	0.451	0.498	4581
Hindu*	0.968	0.177	4602

Notes: Table reports descriptives for sample of 4,605 caregivers with complete data from the choice experiments. *Variable measured in baseline survey during 2016. All other variables collected in 2017/18 endline survey.

primary female caregivers, who were almost always their mothers, were also interviewed.[25] At endline in 2017/18, we attempted to re-interview all adolescent girls and all primary caregivers. Of the 4,994 caregivers interviewed at baseline, we re-interviewed 93.4% and we have complete discrete choice experiments for 93.0% of the original sample. Our sample is thus representative of primary caregivers of unmarried (in 2015) adolescent girls in the study area.

Table 1 reports descriptives for our analysis sample. It shows that this is an economically and socially disadvantaged population. 50.7% of respondents live in houses with a dirt floor, respondents have an average of just 1.5 years of education and just 10.4% can read a complete sentence. The mean respondent married when she was fifteen. More details about the study population can be found in the baseline report (Achyut et al. 2016).

One concern with eliciting parents' preferences and beliefs only from female caregivers is that women might have less say over marriage decisions than do their husbands. However, Table 1 shows that upward of 94% of the sample reported that they had at least "some say" over when and to whom a child got married and when a child left school. For each, the majority stated that they either had a "big say" or "took the decision". This reassures us that women are sufficiently involved in these decisions to meaningfully report preferred choices of a hypothetical couple.

[25]For more details on sampling see Achyut et al. (2016).

Table 2: Overview of Experimental Set-Up

Experiment	Purpose
Ex-Post	Identification of parents' preferences
Ex-Ante	Identification of beliefs over marriage market returns
Groom-Side	Validation of belief measures
Expected Match	Validation of belief measures

2.3 Experimental Set-Up

We ran the discrete choice experiments between December 2017 and March 2018. The experiments took place in respondents' homes immediately after the caregivers' endline survey and, whenever possible, in a quiet and private environment. The experiments were run by female interviewers who had experience of working on large scale household surveys but no particular experience of running lab-in-field experiments. Interviewers were given two days training on the experiments in addition to training on general interview skills and carried out two days of field practice before the start of data collection.

In all, we ran four types of experiments. We detail each experiment in later sections but Table 2 provides a brief outline of the purpose of each design. The first two experiments, the "ex-post" bride's side experiment and the "ex-ante" bride's side experiment, are the core of our identification approach. We identify (perceptions of) average parents' preferences from choices in the ex-post experiment. Taking these preferences as given, choices in the ex-ante experiment then identify beliefs. We randomised whether respondents participated in the ex-post experiment or the ex-ante experiment since we anticipated that respondents may find doing both confusing given their apparent similarity. For each of the ex-post and ex-ante experiments we carried out three rounds with each respondent.

The purpose of the final two experiments, the "groom's side" experiment and the "expected match" experiment, was primarily to assess the validity of the revealed beliefs we identify from the ex-ante experiment. The groom's side experiment allows us to assess whether preferences of parents' of young men over potential brides are qualitatively consistent with the revealed beliefs of parents of young women under reasonable assumptions about the search process. The expected match experiment allows us to compare these revealed beliefs to measures of parental beliefs elicited in a more typical way. We carried out the groom's side and expected match experiments with all respondents and did one round of each. To test for ordering effects we randomised whether the groom's side experiment was performed before or after the bride's side experiment.[26]

[26] We found no impact of ordering on respondents' choices.

3 Preferences: Experimental Design

In this section, we describe the vignette-based instrument used to collect data for the identification and estimation of preferences. In Section 5, we do the same for beliefs.

3.1 Ex Post Experiment

We estimate parents' preferences using data from hypothetical choice scenarios, which we call the "ex post" experiment. In each round of the experiment, we described a hypothetical husband and wife and the characteristics of their twelve-year old daughter. We then presented two different options for the amount of education the daughter acquires, her age of marriage, and the characteristics of the groom she marries. Respondents were then asked which option they thought the hypothetical family would choose for their daughter. We call this the "ex post" experiment as there is no uncertainty over future marriage offers: respondents are asked to choose between *realised* paths of education, age of marriage and match characteristics. Each respondent was asked about the choices of three different hypothetical families in total (three rounds). In each round, we exogenously varied the characteristics of the hypothetical family and daughter, and the age of marriage-education-match characteristic profiles that the respondent had to choose between.

Introducing the Scenario The use of hypothetical families helps us to overcome social desirability bias and identification concerns arising from unobserved characteristics, both of which are first order concerns in this context. Hypothetical scenarios or "vignettes" are known to be a useful tool when exploring sensitive or illegal topics for which respondents may be uncomfortable or unwilling to accurately report their own opinions (Hughes 1998; Finch 1987).[27] To stress that a respondent's answers would not be used to make inferences about the choices they would make for their own children, the interviewer introduced the choice experiments with the following statement:

> "*We are going to tell you some stories about parents and marriage of their children. These stories are purely hypothetical. We will ask you some questions about how you think the parents in the story will take decision based on the given options. There are no right and wrong answers. All your answers are confidential and you are free to stop at any time.*"

[27] Vignettes have also been used to identify and correct differences in subjective response scales across individuals (Banks, Kapteyn, Smith, and Van Soest 2009; Kapteyn, Smith, and van Soest 2007; King, Murray, Salomon, and Tandon 2004) and in previous work on the direct elicitation of beliefs (Boneva and Rauh 2018).

Given that we ask respondents how they think the parents in the story would behave, formally, this method allows us to elicit respondents' *beliefs* about the average preferences of parents in the community. Given that marriage is a universal, public, and much discussed topic within the community, we do not consider the assumption that respondents have accurate perceptions of average preferences to be an incredible one.[28] We will, however, allow for idiosyncratic individual heterogeneity in perceptions of average preferences.

The Characteristics of the Hypothetical Family & Daughter In each round of the experiment, the respondent was first told about the characteristics of the hypothetical family and their twelve year old daughter. Drawing on the existing literature and focus group discussions, we specified five attributes of the hypothetical family and their daughter: (i) Wealth; (ii) Whether the mother needed extra assistance in the home; (iii) Whether the daughter was currently in school; (iv) Whether the daughter enjoyed school (for those still in school); (v) The cost of schooling (for those still in school).[29]

We include wealth given the large literature on positive assortative matching on wealth in marriage markets (Eika, Mogstad, and Zafar ; Greenwood, Guner, Kocharkov, and Santos 2014; Siow 2015; Pencavel 1998; Becker 1974). We calibrated descriptions of different wealth levels to the top, middle and bottom quintiles of an asset index estimated on this sample. The cost of schooling is an important determinant of education decisions (Duflo, Dupas, and Kremer 2015), while a girl's enjoyment of school was frequently mentioned as a key factor explaining why she is still in school or had been allowed to drop out in qualitative work.[30] Whether the mother requires help at home is specified to create variation in the value of home production.

Characteristics of the Marriage-Education Options Respondents were next told that the hypothetical family were considering when and to whom they will get their daughter married and until when they will keep her in school. They were told to imagine that there were only two options for when the daughter could leave school, and when, and to whom, she could get married.

The characteristics of the two alternative options were then outlined.[31] In each option, we specified the final

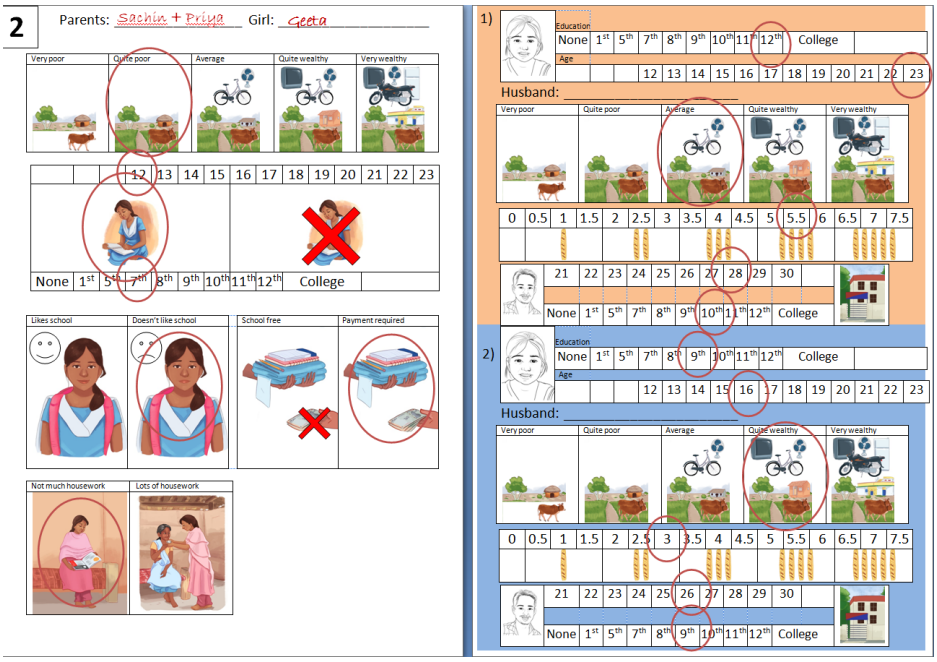
[28] For rare events, it may be more likely for individuals to misperceive social norms. In Saudi Arabia where female labour force participation is currently very low, Bursztyn, González, and Yanagizawa-Drott (2018) find that men systematically underestimate the acceptability of women working outside the home.

[29] We ensured that the description of these attributes were meaningful to respondents through prior qualitative research and piloting.

[30] See Online Appendix B for details on the focus groups.

[31] To avoid placing respondents in an uncomfortable position, we restricted scenarios such that it could not be the case that both options saw a daughter being married at 14 years old or younger. We also ensured that the combined absolute difference in completed education and age of marriage across the options in a scenario was greater than four. This was to ensure that options were sufficiently different as respondents found it confusing to choose from very similar profiles in piloting. Online Appendix A describes the option generation procedure in full and see Section 3.2 for a summary.

Figure 1: Ex Post Experiment: Visual Aid



education for a daughter (E) and her age at marriage (A), and the following five attributes for the marriage partner: (i) Completed education of groom; (ii) Age of groom; (iii) Whether groom employed in the public sector; (iv) Wealth of groom's family; (v) Minimum dowry acceptable to the groom's family.

Visual Aids As each choice scenario required the processing of a large amount of information, we only presented each respondent with three rounds in total. This enabled us to ensure a sufficient time for respondents to reflect on the components of the vignette and come to a considered choice. We also designed a set of visual aids upon which the interviewer marked the attributes specified in each scenario as they were described, enabling respondents to keep track of the features specified. Figure 1 gives an English translation of the visual aid and shows an example of a marked-up version. Figure 2 gives an English translation of an example script for a particular choice scenario, with the key elements that randomly changed between rounds underlined.

3.2 Variation in Scenarios & Choice Probabilities

Scenario Characteristics In each experimental round, for each respondent, a different hypothetical family with a different set of two marriage-education options was outlined. The family's situation and the options that they were choosing between were randomly generated along the dimensions set out in Table 3. Scenario characteristics were drawn orthogonally across respondents, rounds and options subject to three modifications. First, we ensured

Figure 2: Ex Post Experiment: Example Script

Background
Please imagine a mother and father named Ramesh and Rita, they live in a village similar to your village. Ramesh and have a daughter named Sita.

Compared to other households in the village, Ramesh and Rita's household is of average wealth. Their house has two rooms with a dung floor. They own one bigha of land and two cows. They own an electric fan and a bicycle but not a TV.

Sita's age is 12. Sita's currently studying in 7th standard. Sita is getting average grades at school and really enjoys going. At Sita's school there is a scheme that covers all the costs of Sita's education, including stationary, uniforms and transport.

Sita's mother, Rita,really struggles to take care of all the work that needs doing at home. So Sita's help with cooking, cleaning, and taking care of elderly relatives is very useful.

Ramesh and Rita are considering when and to whom they will get Sita married and until when they will keep her in education. Imagine there are two possible options, for when Sita will leave schooling and when and to whom she will get married.

Option 1

Sita completes standard 9 at school. Sita marries at age 16.

She marries Rahul. Rahul is 24 years old. Rahul attended College and has a government job.

Compared to other household in the village, Rahul's household is very wealthy. Their house has three rooms with a cement floor. They own four bighas of land and two cows. As well as an electric fan and a TV they also own a refrigerator and a motorcycle.

Rahul's parents expect at least 6 lakhs in marriage gifts.

Option 2

Sita completes standard 12 at school. Sita marries at age 19.

She marries Bharat. Bharat is 22 years old. Bharat attended school until 10th standard.

Compared to other household in the village, Bharat's household is very poor. The whole household live in one room with a dung floor and they don't own any land. They have one cow. They own very other few assets, for example, they don't own an electric fan, a TV or a bicycle.

Bharat's parents expect at least 2.5 lakhs in marriage gifts.

Choice

Which option do you think Ramesh and Rita will choose for their daughter?

1. Keep Sita in education until she has finished standard 9 and then marry her to Rahul when she is age 16

2. Keep Sita in education until she has finished standard 12 and then marry her to Bharat when she is age 19

Table 3: Characteristics in Ex-Post Experiment

Characteristic	Support	In Salient Vignette
Characteristics of the Bride and Bride's family		
Wealth	{V Poor, Average, V Wealthy}	✓
Currently in School	{In School, Out of School}	✓
Current/Highest School Grade	{None, 1, 5, 7}	✓
Likes School	{Like, Dislike}	✓
School Costs	{Free, Costly}	
Chores	{Relax, Help Needed}	
Age and Education at Marriage		
Age at Marriage (girl)	{13, 14, ..., 21, 22}	✓
School Grade at Marriage	{None, 1, 5, 7, ..., 12, College}	✓
Characteristics of the Marriage Match		
Wealth	{V Poor, Average, V Wealthy}	
Age at Marriage	{21, 22, ..., 29, 30}	
School Grade at Marriage	{None, 1, 5, 7, ..., 12, College}	
Occupation	{Government Job, No Gov Job}	
Dowry (lakh)	{0, 0.5, 1, ..., 7, 7.5}	

the two options within the same round were sufficiently different from one another in terms of the daughter's age of marriage and education at marriage so that respondents found the choice meaningful. We also ensured that respondents were never choosing between two options in the same round in which the daughter married younger than fifteen in both cases because such scenarios sometimes made respondents uncomfortable in piloting. Second, we redrew characteristics to ensure sufficient coverage of the entire support. Third, we randomly replaced certain characteristics (see Table 3) in one round with the characteristics of the respondent's own household and daughter in order to test whether the salience of a vignette affected respondents' choices. We term this round the "salient vignette".[32] Online Appendix A provides full details of the option generation procedure and histograms of the distribution of all vignette characteristics and the correlations between them.

3.3 Reduced Form Results

Identification of parental preference parameters comes from how choice probabilities vary with differences in the characteristics of options. We present reduced form evidence on the key drivers of respondent choice in the ex-post experiment before outlining our structural model of preferences. Let $Y_{ir} = 1$ if respondent i chooses the first option

[32]In Appendix Table A.1 and Table A.2 we show that when allowing for rich interactions between age and education vignette salience has no impact. We thus ignore vignette salience for the remainder of the paper. We interpret the (marginal) significance of vignette salience in the ex-post experiment when not allowing for a rich set of interactions as arising from the salient vignettes having, by construction, different joint distributions of characteristics (see the Online Appendix A for details). We note, however, that interactions between age and education are not significantly different from zero and we thus do not include them in our main specification. To ensure that interactions between education and age at marriage are not affecting our structural preference results we estimate a version of our preference and belief estimates that allows for a non-zero constant flow-payoff from years out of school (Appendix Tables A.6 and A.7) and find the parameters are near identical.

in round r of the experiment. We estimate a simple probit model of choice on differences in option characteristics:

$$Y_{ir} = 1\left(\lambda \triangle H_{ir} + \zeta_{ir} > 0\right) \tag{3.1}$$

where H_{irj} gives the characteristics of option $j = \{1, 2\}$ for respondent i in round r, $\triangle H_{ir} = H_{ir1} - H_{ir2}$, and ζ_{ir} is distributed standard normal. We allow for within-respondent correlation in the experimental error term when calculating standard errors.

Table 4 gives the ex-post experiment reduced form results. We see that while age of marriage has a strong, non-linear influence on the probability of picking an option, a daughter's completed education level has very little influence on respondent behaviour, unless a girl is described as enjoying school in which more education is weakly preferred. In terms of groom characteristics, respondents are more likely to choose younger and more educated grooms, and those who demand a lower dowry. The groom characteristic with the strongest influence on choice behaviour is whether a match has a government job. Choice probabilities are somewhat affected by whether a potential match involves a large disparity in wealth, with an option less likely to be chosen if the hypothetical parents are described as being wealthy while the potential match is poor.

4 Structural Preference Results

We estimate parent preference parameters using choice data from the ex-post experiment assuming that respondents choose the option that yields the highest utility for the hypothetical parents. We do not explicitly model the formation of these parental preferences but note that they are consistent with either unitary or collective models of household decision making (Browning, Chiappori, and Lechene 2006).

4.1 Theoretical Framework

In each period $t = \{1, ..., T\}$, parents choose whether to keep their daughter in school, whether to accept any marriage proposal she might have been received and whether, if she is currently in school, to take her out of school

Table 4: Determinants of Ex-Post Choices: Reduced Form Results

	(1)		(2)		(3)	
Ex Post Choice						
Daughter's Age at Marriage=14	0.2626**	(0.1051)	0.2626**	(0.1082)	0.2642**	(0.1085)
Daughter's Age at Marriage=15	0.3378***	(0.1043)	0.3430***	(0.1075)	0.3453***	(0.1077)
Daughter's Age at Marriage=16	0.4961***	(0.1044)	0.5062***	(0.1075)	0.5081***	(0.1078)
Daughter's Age at Marriage=17	0.6292***	(0.1068)	0.6453***	(0.1103)	0.6447***	(0.1105)
Daughter's Age at Marriage=18	0.8559***	(0.1085)	0.8869***	(0.1115)	0.8873***	(0.1116)
Daughter's Age at Marriage=19	0.8669***	(0.1067)	0.8837***	(0.1100)	0.8831***	(0.1102)
Daughter's Age at Marriage=20	0.9087***	(0.1132)	0.9498***	(0.1168)	0.9524***	(0.1170)
Daughter's Age at Marriage=21	0.9275***	(0.1142)	0.9551***	(0.1173)	0.9583***	(0.1175)
Daughter's Age at Marriage=22	0.9300***	(0.1193)	0.9604***	(0.1227)	0.9651***	(0.1228)
Daughter's Education =8	0.0079	(0.0423)	0.0117	(0.0426)	0.0068	(0.0426)
Daughter's Education =9	0.0202	(0.0464)	0.0210	(0.0470)	0.0114	(0.0475)
Daughter's Education =10	0.0557	(0.0519)	0.0558	(0.0524)	0.0440	(0.0537)
Daughter's Education =11	0.0584	(0.0581)	0.0595	(0.0586)	0.0436	(0.0609)
Daughter's Education =12	0.1199*	(0.0647)	0.1288**	(0.0653)	0.1029	(0.0694)
Daughter's Education =13	-0.0832	(0.0689)	-0.0863	(0.0694)	-0.1161	(0.0743)
Daughter Likes School*Years in School	0.0197**	(0.0096)	0.0204**	(0.0097)	0.0205**	(0.0097)
Cost of School Covered*Years in School	0.0136	(0.0095)	0.0125	(0.0096)	0.0130	(0.0096)
Help in Home*Years at Home	-0.0221**	(0.0103)	-0.0234**	(0.0103)	-0.0238**	(0.0103)
Groom's Age			-0.0095**	(0.0038)	-0.0094**	(0.0038)
Groom's Education			0.0156***	(0.0033)	0.0184***	(0.0043)
Government Job			0.2719***	(0.0335)	0.2795***	(0.0345)
Dowry			-0.0172*	(0.0090)	-0.0171*	(0.0090)
Groom's Wealth = Poor			-0.0470	(0.0324)		
Groom's Wealth = Wealthy			-0.0026	(0.0312)		
Groom's Wealth = Poor, Bride's Wealth = Poor					0.0018	(0.0532)
Groom's Wealth = Wealthy, Bride's Wealth = Poor					-0.0564	(0.0506)
Groom's Wealth = Poor, Bride's Wealth = Average					-0.0354	(0.0534)
Groom's Wealth = Wealthy, Bride's Wealth = Average					0.0272	(0.0514)
Groom's Wealth = Poor, Bride's Wealth = Wealthy					-0.1025*	(0.0525)
Groom's Wealth = Wealthy, Bride's Wealth = Wealthy					0.0170	(0.0515)
Groom Less Educated					0.0392	(0.0392)
Daughter Options	yes		yes		yes	
Match Characteristics	no		yes		yes	
Interactions	no		no		yes	
Number of Choice Experiments	6320		6320		6320	

Notes: Table presents coefficients and standard errors for a probit regression of a binary indicator of whether the respondent chose option 1 over option 2 in the ex-post experiment on differences between the option 1 and option 2 in characteristics of the hypothetical daughter, the hypothetical family and the hypothetical match. Standard errors (in parentheses) and p-values clustered at respondent level. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

to help in the home. If a daughter is currently in school the choice set is thus:

$$d_t = \begin{cases} M & \text{if the girl is married} \\ S & \text{if the girl is kept in education} \\ H & \text{if the girl is kept at home} \end{cases} \tag{4.1}$$

Once a daughter is taken out of education, she cannot re-enter at a later date and girls cannot continue in education once married. Once married, divorce is not possible. Marriage must occur at or before period T.

Parents care about the total amount of education their daughter receives, her age at marriage, and who she gets married to. These preferences will reflect a combination of altruism towards a daughter's future welfare within marriage (Jensen and Thornton 2003) or towards future grandchildren (Rosenzweig and Wolpin 1994; Carneiro, Meghir, and Parey 2013; Grépin and Bharadwaj 2015; Behrman, Foster, Rosenzweig, and Vashishtha 1999; Chari, Heath, Maertens, and Fatima 2017), social norms and psychological payoffs to one's daughter's education and marriage (Maertens 2013), economic costs of dowry and the costs of keeping a girl in school or at home (Corno and Voena 2016) and the economic value of a connection to the groom's family (Rosenzweig and Stark 1989) . Let parents' utility function over their daughter's final schooling and marriage characteristics be given as $u^M(E, A, q)$, where E gives the total schooling acquired by the daughter, A gives her age at marriage, and q is a measure of 'match quality'. In practise, we work with the utility function:

$$u^M(E, A, X) = f(E) + g(A) + h(X) \tag{4.2}$$

where X is the set of characteristics of the groom, his family, and their interactions with bridal family characteristics given in the ex-post experiment, i.e. $q = h(X)$.

When a daughter is not yet married, parents receive flow payoffs. We allow these flow payoffs to comprise of flow utility θ and to depend on three 'shifters' of the flow utilities of schooling and home production. The structure of the flow payoffs to being in school, $u^S(\cdot)$, and at home, $u^H(\cdot)$, are:

$$u^S(L, C) = \theta + L - C \tag{4.3}$$

$$u^H(B) = \theta + B \tag{4.4}$$

where L is the payoff of a daughter enjoying school, C is the cost of schooling, and B is the value of home production.

Conditional on a discount factor, β, parents discounted utility, $\mathcal{U}(\cdot)$, for a known education and marriage profile is given by discounted sum of the flow and terminal payoffs:

$$\mathcal{U}(E, A, X, Z, \theta) = \sum_{t:d_t=S} \beta^{t-1} u^S(L, C) + \sum_{t:d_t=H} \beta^{t-1} u^H(B) + \beta^{A-1} u^M(E, A, X) \tag{4.5}$$

$$= \sum_{t:d_t=S} \beta^{t-1}(L - C) + \sum_{t:d_t=H} \beta^{t-1} B + \beta^{A-1} u^M(E, A, X) + \delta\theta \tag{4.6}$$

$$= U(E, A, X, Z) + \delta\theta \tag{4.7}$$

where $Z = [L, C, B]$ and $\delta = (1 - \beta^{A-1})/(1 - \beta)$.

4.2 Experiment Choice Behaviour

In each round, $r = \{1, 2, 3\}$, of the ex-post experiment, respondents choose the option that gives the hypothetical parents the highest utility. We allow for heterogeneity in respondents' perceptions of the value of a daughter remaining in the household, θ.[33] We also allow for a random additive error, ϵ_{irj}, to reflect idiosyncratic experimental errors. Thus, for respondent i, the value of an option $j = \{1, 2\}$ in round r of the experiment is given by:

$$U\left(E_{irj}, A_{irj}, X_{irj}, Z_{ir}\right) + \delta_{irj}\theta_i + \epsilon_{irj} \equiv U_{irj} + \delta_{irj}\theta_i + \epsilon_{irj} \tag{4.8}$$

where $\epsilon_{irj} \sim IN(0, 1)$ and $\theta_i \sim IN(0, \sigma_\theta^2)$ and $\delta_{irj} = (1 - \beta^{A_{irj}-1})/(1 - \beta)$.

In each round r, respondent i picks the first option over the second ($y_{ir} = 1$) if it gives the higher utility:

$$y_{ir} = 1\left(U_{ir1} + \delta_{ir1}\theta_i + \epsilon_{ir1} \geq U_{ir2} + \delta_{ir2}\theta_i + \epsilon_{ir2}\right) \tag{4.9}$$

$$= 1\left(U_{ir1} - U_{ir2} + \nu_{ir} \geq 0\right) \tag{4.10}$$

where $\nu_{ir} \equiv (\delta_{ir1} - \delta_{ir2})\theta_i + \epsilon_{ir1} - \epsilon_{ir2}$ is the total net unobservable driving the choice of the first option over the second in round r. ν_{ir} comprises both the random errors associated with each option $(\epsilon_{ir1}, \epsilon_{ir2})$ and the respondent specific heterogeneity (θ_i) weighted by the discounted number of periods the daughter is at home in each option

[33] Our set-up allows us to identify two correlated dimensions of heterogeneity in flow payoffs for years in school and years spent in home production, under the assumption of joint-normality. We show estimates allowing for two-dimensional heterogeneity in Appendix Table A.5. We cannot reject that the correlation between these two dimensions is one and that they are equal in scale and thus one dimension of heterogeneity is sufficient.

$(\delta_{ir1}, \delta_{ir2})$.

Given our distributional assumptions, the joint distribution of the total net unobservables across the three rounds, $(\nu_{i1}, \nu_{i2}, \nu_{i3})'$ is joint trivariate normal with variance-covariance matrix Γ_i. Γ_i is identified by variation in δ_{ir1} and δ_{ir2} across rounds (see Appendix B for details). A respondent i's contribution to the likelihood is therefore:

$$L_i = \Phi_3 \left(w_{i1}(U_{i11} - U_{i12}), w_{i2}(U_{i21} - U_{i22}), w_{i3}(U_{i31} - U_{i32}) | \Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2) \right) \tag{4.11}$$

where $w_{ir} = 2y_{ir} - 1$ and $\Phi_3 \left(., ., . | \Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2_\theta) \right)$ is the trivariate normal c.d.f. with variance-covariance matrix $\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2_\theta)$. $\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2_\theta)$ is a simple transformation of Γ_i where the sign of entries in row and column r are inverted whenever $y_{ir} = 0$.[34] We estimate the model by Maximum Likelihood, allowing for a flexible set of functional form assumptions on the deterministic component of the utility function, U_{irj}.[35]

4.3 Parent Preference Estimates

Table 5 presents estimated structural preference parameters. Figure 3 graphically presents the estimated parental preferences over age and education of a daughter at marriage. We see that parents prefer to delay a daughter's marriage up until she is eighteen years of age, with their preference for delaying one extra year roughly constant up until this age. Beyond eighteen years of age, which is the legal minimum age of marriage for young women in India, parents show no preference for delaying marriage further. The discontinuity at age 18 is suggestive of parents incorporating the legal minimum age at marriage into their preferences despite evidence that the rules are often only laxly enforced (UNICEF 2011).

Preferences over education suggest that parents prefer that a daughter obtains more education up until the end of high school (12th Standard). These preferences for education appear, however, weaker than preferences over age at marriage and many of the individual dummies are not statistically significantly different from zero. However, a linear trend in education (excluding college) is statistically significant ($\widehat{\beta} = 0.053, se(\widehat{\beta}) = 0.026$). That being said, parents strictly prefer a daughter to finish high school than to complete college. This might be driven by the higher financial cost of college compared to high school.[36] Indeed, one participant in our focus group discussions remarked

[34] See Appendix B for details.

[35] Given that a potential groom's family wealth and the cost of education are insignificant in the reduced form we drop these characteristics from the structural estimates.

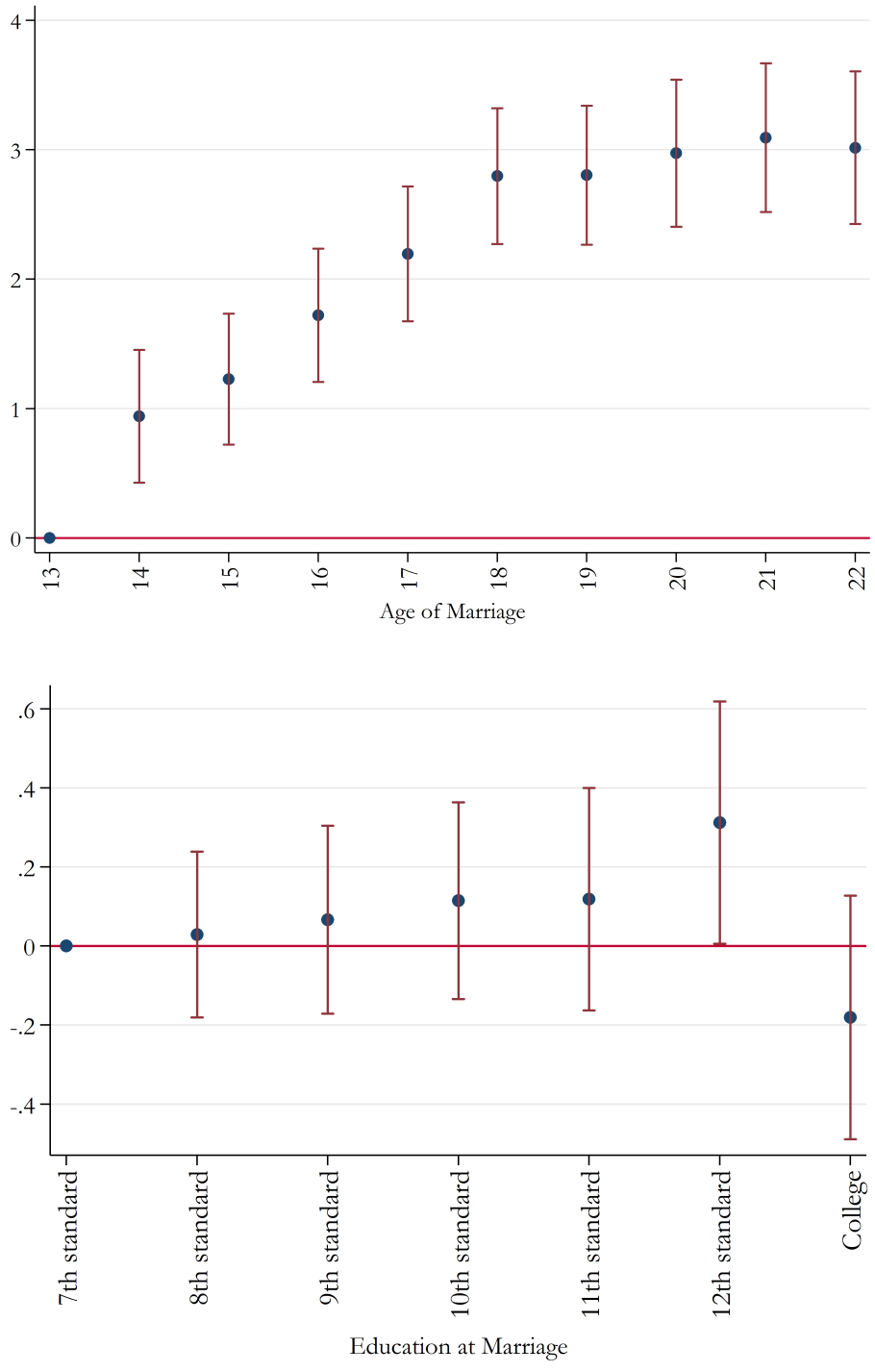
[36] Note that, as the characteristics of the groom are given, this effect is not due to concerns about 'over-education' and marriage market prospects. Nor does it derive from an aversion to brides being more educated than grooms — see Table 4.

Table 5: Structural Preference Parameters

	Coefficient	Standard Error
Terminal Utility		
Age of Daughter at Marriage		
13	0.000	.
14	0.941***	(0.262)
15	1.228***	(0.258)
16	1.722***	(0.263)
17	2.196***	(0.266)
18	2.796***	(0.268)
19	2.803***	(0.274)
20	2.973***	(0.290)
21	3.094***	(0.293)
22	3.015***	(0.301)
Education of Daughter at Marriage		
7th standard	0.000	.
8th standard	0.029	(0.107)
9th standard	0.066	(0.121)
10th standard	0.115	(0.127)
11th standard	0.119	(0.144)
12th standard	0.312**	(0.157)
College	-0.181	(0.157)
Characteristics of Groom		
Age (years)	-0.025***	(0.009)
Government Job	0.724***	(0.087)
Education (years)	0.043***	(0.009)
Dowry	-0.019	(0.017)
Shifters of Flow Payoffs		
Daughter Likes School	0.035*	(0.018)
Grandmother at Home	-0.041**	(0.019)
σ^2	0.072***	(0.009)

Notes: Table presents structural preference parameters and standard errors (in parentheses). Standard errors calculated through bootstrap, re-sampling respondents with replacement, using 500 iterations. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure 3: Coefficient plot of parental preferences over age and education of daughter at marriage



Notes: Figures plot coefficients and 95% confidence intervals of structural preference parameters (Table 5).

that "till class 12th, the expenditure is a little less but after that it is quite a lot".[37]

Coming to shifters of flow payoffs, we see that parents prefer additional years in school if a daughter "likes school". This corresponds closely to themes highlighted in our focus group discussions in which the importance of a daughter's own motivation in forming her parents' views of how long she should stay in school was stressed. For example, one participant mentioned: "If the child is hardworking and good, the parents will not have to ask him/her to study or to go to school, they themselves do".[38] Parents prefer additional years of a daughter being at home if there is *no* elderly relative to take care of. This is the opposite to what we had anticipated. While we estimate the variance of the heterogeneity in respondents' perceptions of the value of a daughter remaining in the household, σ_θ^2, to be significantly greater than zero, the magnitude of this heterogeneity relative to experimental variation is small.

In terms of a potential groom's characteristics, parents significantly prefer younger grooms, more educated grooms and, although not significantly, grooms with a lower dowry. However, it is the potential groom's occupation that is overwhelmingly important in our experiment; this variable dominates the influence of all other characteristics in a linear groom quality index.[39] This echoes the views of participants in focus group discussions, one of whom commented that "So many boys are sitting at home after doing BA and have nothing to do, there are no jobs or even if they do (get a job), they are not secure, in that case, having a government job really matters."[40]

5 Beliefs: Experimental Design

In reality, parents do not know the set of future marriage offers that will materialise for their daughter as was the case in the ex-post experiment. It takes time to find and secure a match for one's daughter.[41] In this setting it is not only parents preferences but their beliefs about their daughter's future marriage prospects that shape choice behaviour. Therefore, we extend our hypothetical choice methodology to analyse behaviour in scenarios where respondents face uncertainty over future marriage offers. Conditional on our preference results, we take a revealed preference approach to identify subjective beliefs about the quality of future marriage offers.

[37] Caregivers Focus Group 3, Online Appendix B.
[38] Caregivers Focus Group 1, Online Appendix B.
[39] In terminal utility, the overall influence of groom characteristics is $\mathbf{X}\alpha_X$, where X gives groom side characteristics and α_X are the preference parameters referenced at Table 5.
[40] Caregivers Focus Group 2, Online Appendix B.
[41] FGD 2, Online Appendix B.

5.1 Model

We base our experimental design and identification strategy around a dynamic partial equilibrium model of schooling and marriage. The framework captures the features of the marriage market as described in Section 2 and the key trade-offs that parents face when making decisions for their daughters. The key implication of the framework is that optimal choices depend not only on parents preferences regarding their daughter's age and education at marriage; they also depend on their beliefs about how the quality of marriage offers depends on the age and education of brides.

Rather than face a choice over realised education-marriage profiles as in the ex-post experiment, in *each* period $t = \{1, ..., T\}$ parents must choose whether to keep their daughter in school, whether to accept any marriage proposal that might have been received, or whether to take her out of school to help in the home, without knowing the exact offers that might be realised in the future.

Parents' preferences are as described and estimated in Sections 3 and 4. Search frictions render the set of marriage offers that parents receive for a daughter partially random. Let $\pi(E, A, q)$ give the probability that the best marriage offer received by parents of a daughter aged A with education E is from a groom of quality q.[42] Parents must account for the impact of their decisions today on their daughter's future marriage options when $\pi(\cdot)$ depends on the education and age of their daughter. While in principle our approach can allow for multiple levels of groom quality,[43] given our preference results indicate that the groom's occupation dominates all other characteristics and creates a density with a lack of support in the centre of the distribution of groom quality (see Figure A.1) we consider only two levels of groom quality: high, H, for matches with a government job and low, L, for those without a government job.[44]

Offer probabilities, $\pi(\cdot)$, depend on the preferences of grooms and the distribution of quality in the local marriage market. However, we do not put structure on the search and matching process to give micro-founded expressions for π in terms of these structural primitives. The aim of this theoretical framework is to provide a basis for the design of a set of experiments to identify average subjective beliefs over the distribution of match quality, age and education conditional on perceptions of average preferences being correct.

[42] Let $\Pi(E, A, q)$ give the cumulative probability that the best marriage offer received by parents of a daughter aged t with education E is of no better quality than q. Thus we can say that moving from education E' to E'' 'improves' the quality of marriage offers if $\Pi(E', A, q)$ stochastically dominates $\Pi(E'', A, q)$, i.e. if $\Pi(E', A, q) \leq \Pi(E'', A, q), \forall q$. The same stochastic dominance argument can be made for describing how age affects the quality of the offer distribution.

[43] See Appendix B: identification with multiple levels of groom quality requires significant variation in utility conditional on subjective beliefs about groom quality, i.e. a set of exclusion restrictions on utility and beliefs.

[44] The dominance of occupation over all other characteristics creates a density with a lack of support in the centre of the groom quality support for offered groom matches in the ex-ante and ex-post experiments.

In each period, parents make their decision (accept a marriage offer, keep daughter in school, allow daughter to drop out to work in the home) to maximise their discounted expected utility. Expected future utility conditional on choosing optimally now and in the future is given by:

$$v_i(E, A, q, Z) = \max_{d_t \in O_t(E_t)} W_i(d_t, E, A, q, Z) \tag{5.1}$$

where $W_i(\cdot)$ is the presented discounted value of choosing d_t and then choosing optimally from period $t+1$ onwards. $Z = [L, C, B]$ gives the characteristics of the household. O_t gives the set of feasible options available to parents at t. If a daughter has already been taken out of education, she cannot re-enter education and thus $O_t = \{M, H\}$. If a daughter is still in school, all options are available to choose from: $O_t = \{S, M, H\}$.

For simplicity let $W_i^d \equiv W_i(d_t, E, A, q, Z)$. Marriage is a terminal decision and so the present discounted value associated with marriage is simply the utility function over their daughter's final schooling and marriage characteristics:

$$W_i^M \equiv u^M(E, A, q) \tag{5.2}$$

The present discounted value of keeping one's daughter in school or at home depends both on any immediate flow payoffs *and* on the future payoffs that parents expect as a result of their decision:

$$W_i^S \equiv \theta_i - C + \beta \sum_{q \in \{H,L\}} \pi(E+1, A+1, q) v_i(E+1, A+1, q, Z) \tag{5.3}$$

$$W_i^H \equiv \theta_i + B + \beta \sum_{q \in \{H,L\}} \pi(E, A+1, q) v_i(E, A+1, q, Z) \tag{5.4}$$

Choice today thus depends on beliefs about the probability of receiving marriage offers from different groom quality levels in the future.

$$d_{it}^\star = \max_{d \in O_t(E_t)} W_i^d \tag{5.5}$$

5.2 Ex-Ante Experiment

To identify subjective beliefs over the quality of future matches, we designed a second set of hypothetical choice experiments. Respondents completed three rounds of this experiment. In these "ex-ante" experiments, respondents were presented with scenarios in which hypothetical families receive a marriage offer when their daughter is a specific age and is either in or out of school. Respondents had to decide whether to accept the offer or reject it in favour of keeping the daughter in school or having her help in the home. As the pattern of future offers is left unspecified, choices reflect both preferences and beliefs, π.

We exogenously varied the age of the daughter when the marriage offer was received, whether the daughter was in school and the attributes of the marriage offer, bride and bridal family. We specified the same set of attributes as in the ex post experiments with one addition (see Table 1): whether the daughter is breaks prevailing social norms of appropriate behaviour and is "friends with some boys and sometimes stays out of the house until late". In rural Rajasthan, self-reported beliefs about whether a girl should stay in school are strongly influenced by descriptions of whether the girl has male friendships (Achyut et al. 2016). We allow for this to influence beliefs over the likelihood of future matches.

Figure 4 gives the visual aid associated with the ex ante experiment and Figure 5 gives an example script read out to a respondent. After being introduced to the characteristics of the hypothetical parents and their daughter, and given the details of the marriage offer, respondents were asked what they think the hypothetical parents would choose for their daughter.

Figure 4: Ex Ante Experiment: Visual Aid

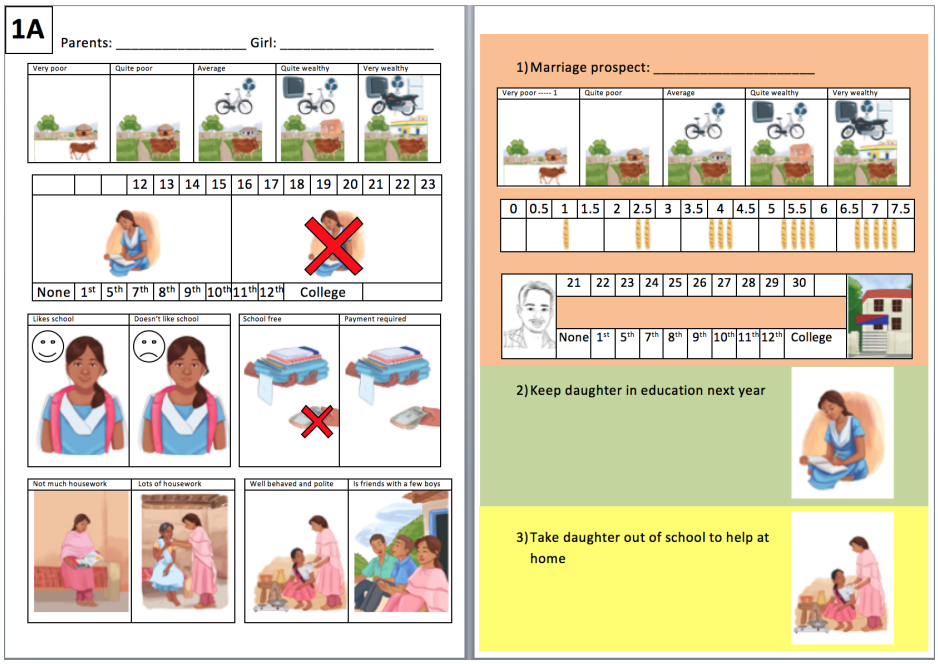


Figure 5: Ex Ante Experiment: Example Script

Background
Please imagine a mother and father named Raj Kumar and Aarti, they live in a village similar to your village. Raj Kumar and Aarti have a daughter named Jyoti.

Compared to other households in the village, Raj Kumar and Aartis household is of average wealth. Their house has two rooms with a dung floor. They own one bigha of land and two cows. They own an electric fan and a bicycle but not a TV.

Jyoti's age is 15. Jyoti is currently studying in 10th standard.

Jyoti is getting average grades at school but does not enjoy school. Jyotis parents have to pay for the full costs of Jyotis education, including stationary, uniforms and transport.

Jyotis family have no particular need for Jyoti to spend lots of time helping at home. When Jyoti is at home she spends lots of her time sitting and relaxing.

Raj Kumar and Aarti are worried about Jyoti as she is friends with some boys and sometimes stays out of the house until late.

Offer in Hand
Raj Kumar and Aarti are considering whether they will get Jyoti married in the next year, whether they will keep her in school for another year or whether Jyoti will leave school to help at her parents home.

Raj Kumar and Aarti know of a potential suitor for Jyoti, Amit.

Compared to other household in the village, Amit's household is very poor. The whole household live in one room with a dung floor and they dont own any land. They have one cow. They own very other few assets, for example, they dont own an electric fan, a TV or a bicycle.

Amits parents expect at least 4 lakhs in marriage gifts.

Amit is 24 years old. Amit attended school until 11th standard.
.

Choice
Which option do you think Raj Kumar and Aarti will choose for their daughter?

1. Marry Jyoti to Amit this year

2. Keep Jyoti in school this year

3. Take Jyoti out of school so she can help in the home this year

5.3 Choice Behaviour & Identification

In round r of the ex-ante experiment, respondent i chooses according to:

$$\max_{j \in O_{ir}} \{W_i(j, E_{ir}, A_{ir}, q_{ir}, C_{ir}, B_{ir}) + \eta_{irj}\} \tag{5.6}$$

where $\eta_{irj} \sim IN(0, \sigma_\eta^2)$, reflects idiosyncratic experimental errors. The expression for choice probabilities is complicated as both individual preference heterogeneity, θ_i, and experimental errors, η_{ijr} must be integrated over. Furthermore, respondents' choices reflect both their preferences over the different options *and* their beliefs about how the quality of offers will evolve in the future.

Using the results from our ex-post experiment, which enable the identification and estimation of preferences, we are able to disentangle the extent to which preferences versus beliefs drive choice behaviour in the ex-ante experiment using a revealed preference approach. To sketch the intuition for our identification results, consider a simplified version of the model in which identification can be proven constructively. Appendix B gives the formal details of our complete identification result and the relationship between the ex-ante results and the location-scale normalisations made on utility in the ex-post experiment.

For this simplified scenario, let only two groom quality levels be presented to respondents: high, q^H, or low, q^L, let there be only two time periods, $t \in \{1, 2\}$ and let the daughter already have left school. In the first period, parents choose between marrying their daughter and keeping her at home, and in period two, parents must marry their daughter to the best available groom. Let $u^M(t, q)$ give the utility of marriage to groom of type q in period t and π be the perceived probability of receiving an offer from a high quality groom in the final period. Faced with an offer from a groom of quality q^k, $k \in L, H$ in the first period, the parents' must weigh up the (certain) utility from accepting the marriage offer today, $\beta u^M(1, q^k)$, against the expected utility from rejecting the offer and getting married to the best available groom in the next period. From the assumption that the experimental errors associated with each option, η^H and η^M are i.i.d. normal with variance σ_η^2 we can form closed form expressions for the probabilities of accepting a high and low quality offer in the first period, p_1^H and p_1^L. These can be inverted to obtain closed form expressions for beliefs, π, and the variance of the experimental error, σ_η^2, as a function of

preference parameters (identified from the ex-post experiment) and the observed choice probabilities, p_1^H and p_1^L:

$$\sigma_\eta = \frac{\beta\left(u^M(1,q^H) - u^M(1,q^L)\right)}{\sqrt{2}\left(\Phi^{-1}(p_1^H) - \Phi^{-1}(p_1^L)\right)} \tag{5.7}$$

$$\pi = \frac{\beta\left(u^M(1,q^H) - u^M(2,q^L)\right) - \sqrt{2}\sigma\Phi^{-1}(p_1^H)}{\beta\left(u^M(2,q^H) - u^M(2,q^L)\right)} \tag{5.8}$$

When one allows for three options (marriage, home, school), closed-form expressions are not possible but identification is straightforward given the assumptions on the random variation in the experimental context. Likewise, beliefs are identified with more than two types of groom under given the existence of characteristics of the choice scenarios that affect preferences but not beliefs. See Appendix B for the full identification argument.

5.4 Estimation

To estimate beliefs over the probability of a high quality match, we place the following functional form assumptions on $\pi(t, E, H)$:

$$\pi(t, E, H) = \Phi\left(M\tau\right) \tag{5.9}$$

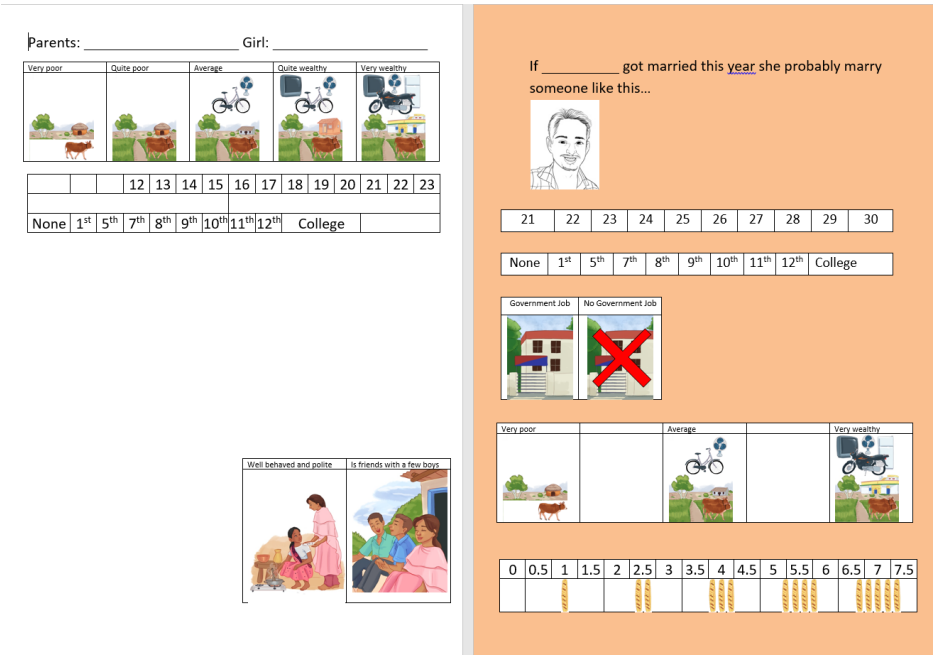
where M contains a flexible set of age and education controls. We estimate τ by Method of Simulated Moments, matching the average marriage acceptance rate within age-education-government job cells and also the average propensity to keep daughters in education for rounds in which the hypothetical daughter is still in education. Full estimation details are given in Appendix C.

5.5 Validation Measures

Given the novelty of our method, and the fact that probabilities are structurally inferred rather than measured directly, we complement the results from our ex ante experiment with two validation experiments that follow naturally from the prior literature.

Expected Match Experiment In a first validation exercise, we directly elicited how expected match quality varies with the characteristics of a potential bride. To do so, we provided respondents with information on the age, education, and wealth of a hypothetical bride and asked respondents to describe the attributes of the most

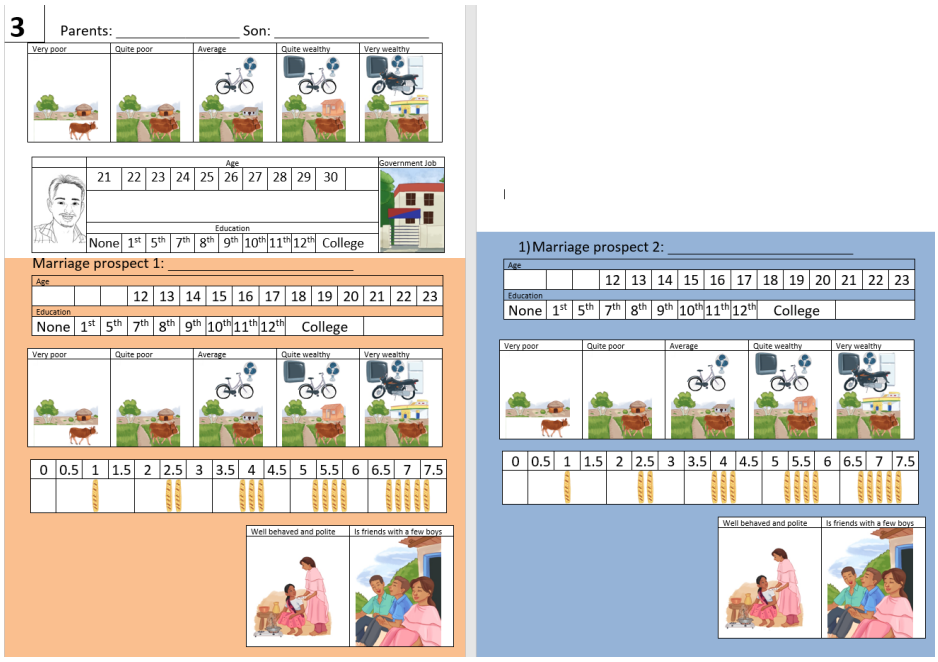
Figure 6: Validation Experiments: Expected Match Visual Aid



likely groom they believed such a girl would marry if her parents wished to marry her at this point. Respondents identified the characteristics of the groom they thought most likely for a girl with the characteristics described to marry on a visual aid (see Figure 6). Delavande, Giné, and McKenzie (2011) find a strong correlation between answers to "what do you expect" questions and the mean of elicited subjective distributions.

Groom Side Preference Experiment We also elicit "groom side" preferences over the characteristics of brides in a manner akin to our ex-post choice experiments. We present respondents with a vignette of a hypothetical family who are looking to marry their *son*, specifying the same groom side attributes as discussed in Section 3. We present two potential marriage options and ask respondents to select the one that they believe the hypothetical family would prefer. We include all verifiable bride side attributes (i.e. we do not describe whether the mother of the bride requires help at home or the attributes relating to the cost and enjoyment of schooling) and the highest dowry that the bridal family is willing to pay. This allows us to establish whether the patterns emerging from our revealed beliefs are consistent with groom side preferences over potential brides.

Figure 7: Validation Experiments: Groom Experiment Visual Aid



6 Revealed Belief Results

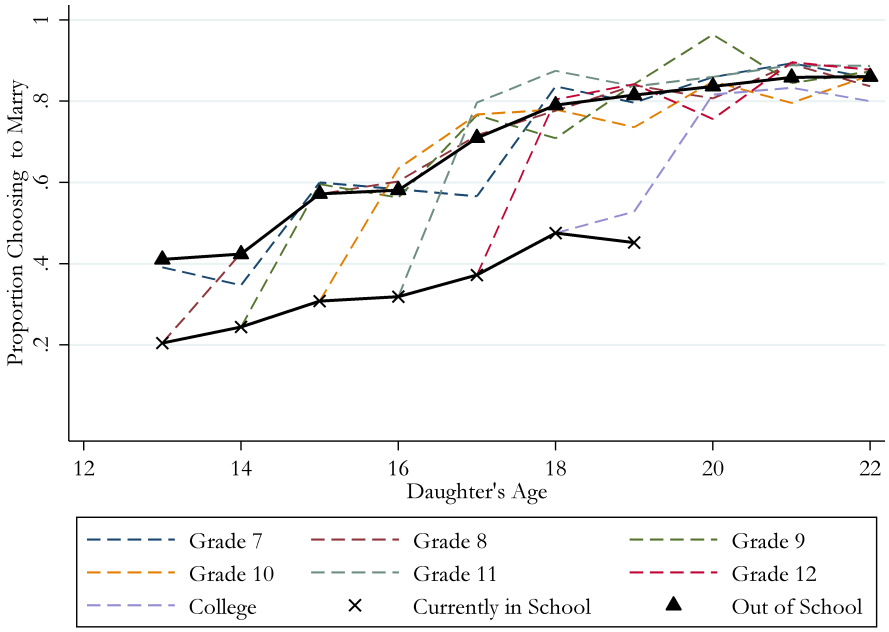
6.1 Experiment Options & Reduced Form

Online Appendix B documents the summary statistics on the characteristics of options presented to respondents. Unlike the ex-post experiment, the age of the daughter in the vignettes varies in the ex-ante experiment. The only other difference to the characteristics specified in the ex-post experiment is the inclusion of a description of whether a girl is friends with some boys.

Figure 8 gives the proportion of respondents choosing the marriage option in each age-education cell for the hypothetical daughter. It is clear that the rate of accepting a marriage offer is much lower if a girl is still in school and the rate is increasing in the daughter's age. These patterns are confirmed by a simple probit model of whether to accept a marriage offer on the characteristics of the daughter and match. Figure 9 gives the age and education coefficient plots from this exercise — full results are given at Appendix Table A.8.

The impact of being in school on the likelihood of selecting the marriage option is striking: respondents were as likely to accept the marriage offer for a 13 year old daughter who was already out of school as for a 19 year old daughter who was still in school. Respondents were twice as likely to accept the marriage offer when a 16 year old daughter was out of school compared to when she was in school. This is consistent with the views expressed in the qualitative focus groups in which it was said: "If a girl is not studying and is sitting at home, then conversations

Figure 8: Proportion Choosing Marriage by Age & Education

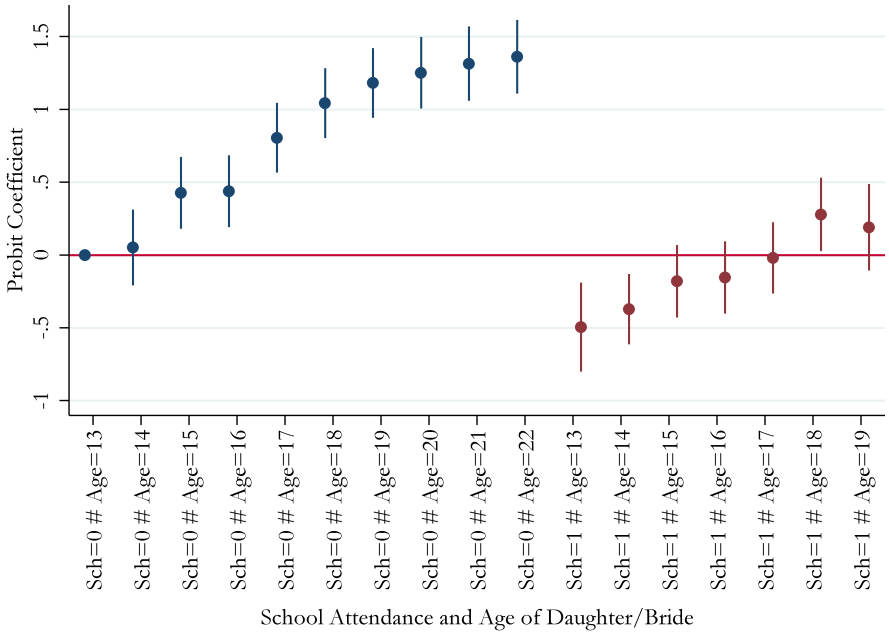


Notes: Figure plots proportion of respondents choosing marriage option in ex-ante experiment by hypothetical daughter's age and education.

around her marriage begin."[45] From these reduced form results, it is clear that attending school is a hugely protective factor against early marriage. What we cannot infer from these results alone is the extent to which the protective nature of school is driven by parental preferences for daughters' education *vs.* parental beliefs about the marriage market return to girls' education. Disentangling these two drivers is the motivation of our structural "revealed beliefs" approach.

[45] See Online Appendix B for our focus group discussions.

Figure 9: Reduced Form Probit Coefficients: Age & Education



Notes: Figure plots coefficients for age of hypothetical daughter and school status and 95% confidence intervals from reduced form probit regression of an indicator of whether the respondent chose the marriage option in the ex-ante experiment on characteristics of the hypothetical daughter, the hypothetical family and the hypothetical match. All inference clustered at the respondent level. Full set of coefficient estimates shown in Table A.8.

6.2 Revealed Beliefs

Table 6 gives our structural belief parameters. Before discussing our findings in detail, we note that we are able to reproduce the main patterns in choice behaviour in the ex-ante experiment, notably the low acceptance rates of marriage offers for girls still in school and the quickly increasing acceptance rate of offers once a girl is no longer in education. The good fit of the model with choice behaviour is apparent in the close correspondence between the empirical and simulated moments (Figure 11).

Our results show that respondents believe that there is a strong marriage market return to schooling but that a daughter's marriage prospects decline as she ages on leaving education. This is particularly apparent in Figure 10, which gives the perceived probabilities of receiving an offer from a high quality groom that are implied by our estimates. The solid lines give the probability of receiving an offer from a groom with a government job for girls who are described as being polite and well behaved. The dashed lines give the probability of receiving an offer from a groom with a government job for girls who are friends with boys. On average, respondents believe that the likelihood of an offer from a high quality groom is increasing in education and the effect of college education is particularly large and positive.

Table 6: Structural Belief Parameters

	Coefficient	Standard Error
Constant	-1.5204**	0.6190
Age	-0.6642***	0.2446
Education	0.7776***	0.2262
College	1.2629***	0.3783
In School	0.6119	0.7243
In School × Age	-0.1757*	0.1009
Good Girl	0.3526**	0.1482
σ_ν	0.1312***	0.0288

Notes: Table gives structural parameters for beliefs on likelihood of offer from a high quality groom where $\pi(t, E, GoodGirl, H) = \Phi(M\tau)$. Standard errors bootstrapped using 250 iterations, sampling with replacement. Significance of coefficients indicated by: $*$ $p < 0.10$, $**$ $p < 0.05$, $***$ $p < 0.01$.

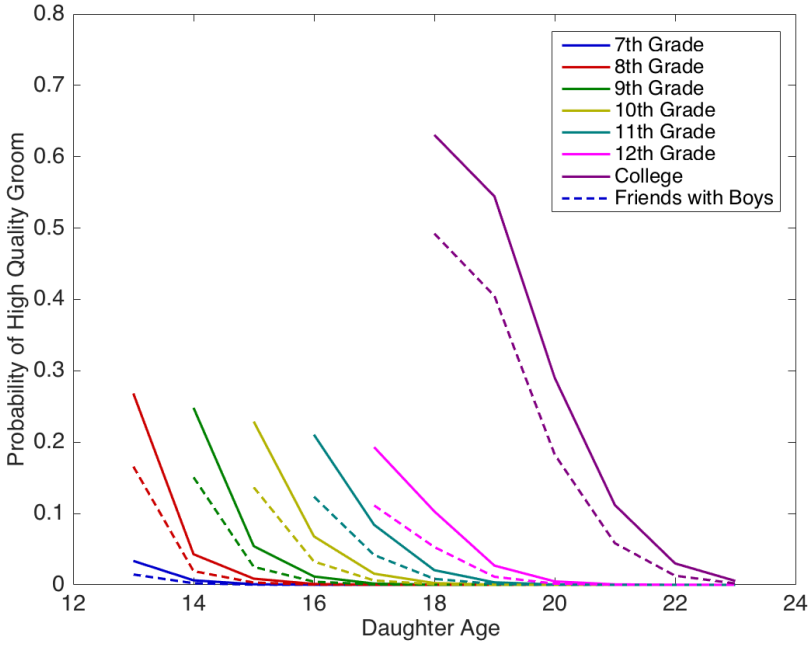
We recover a belief of a large marriage market return to education because respondents are less likely to accept marriage offers when a girl is in school in the ex-ante experiment than would be expected from the preference parameters alone. In the ex-post experiment, respondents' choices were only weakly sensitive to the education level of the daughter when the characteristics of the eventual marriage match were known and indeed parents appeared to actively dislike college education. However, choice in the ex-ante experiment is strongly dependent on whether the daughter is in education, including college. A strong expected marriage market return to education rationalises these differences.

While parents believe a daughter's marriage market prospects increase with education whilst she is enrolled, they believe that her prospects decline sharply in age once she has left school; within a few years of leaving school, the likelihood of getting an offer from a groom with a government job is perceived to be close to zero. [46] A further feature of the beliefs we estimate is that parents perceive that daughters whose behaviour brakes social norms, as described by the statement "she is friends with some boys and sometimes stays out of the house until late", will receive lower quality marriage offers than daughters who "are polite and well behaved". This result is driven by the fact that, in the ex-post experiment, respondents are more likely to accept a given marriage offer if a daughter is described as breaking social norms.

Validation Our revealed beliefs estimates are qualitatively consistent with the patterns revealed by our groom-side experiment and expected match experiment.

[46] The fact that marriage acceptance rates in the ex-ante experiment for girls newly dropped out of school rapidly converge to those for girls who dropped out years before is rationalised by a belief that marriage prospects quickly decline in age after a girl has left school.

Figure 10: Revealed Beliefs over Probability of Receiving an Offer from a High Quality Groom



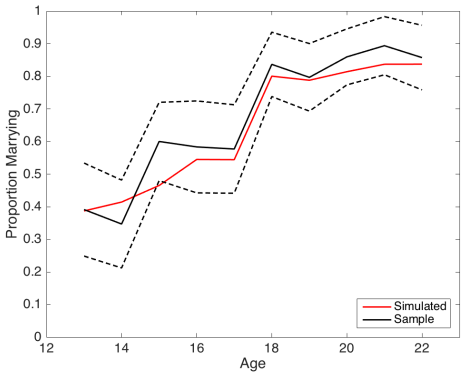
Notes: Figure gives average respondent beliefs about the likelihood of receiving a marriage offer from a high quality groom at each age-education combination. The solid lines give the results for good girls, while the dashed lines give the same for girls who are described as being friends with boys. The coefficients underlying the figure are those reported in Table 6

The likelihood of receiving a marriage offer from a high quality groom depends on the preferences of grooms over bridal characteristics. In the groom's side experiment, we elicited preferences over the characteristics of female matches by asking respondents to choose which of two bride options a hypothetical family would choose for their son. Figure 12 gives the coefficients on a set of education dummies from a probit of option choice on characteristics (see Table A.9 in Appendix A for all coefficients). There is a strong increasing preference for female education amongst grooms with a government job and the coefficient on female college education is large and highly significant for these families.[47] This is consistent with the patterns recovered in the revealed belief estimation, which also implied a much higher probability of matching with a groom with a government job if the daughter was educated to college level. Likewise, we see that families of grooms dislike potential brides who have male friends. This is consistent with our revealed beliefs estimates that these young women are perceived to be less likely to receive high quality marriage offers.

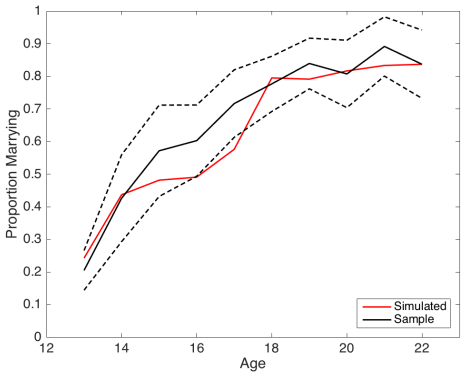
When asked to predict the characteristics of the best groom offer that girls of different characteristics would get, one observes a strong effect of education on the likelihood that a respondent predicts a match with a government

[47] We do not observe the same preference for female college education amongst families of grooms without government jobs. This might indicate that for these grooms the benefits of a highly educated wife might be outweighed by her negotiating a greater share of household resources once married (Anderson and Bidner 2015).

Figure 11: Model Fit: Revealed Beliefs



Grade 7



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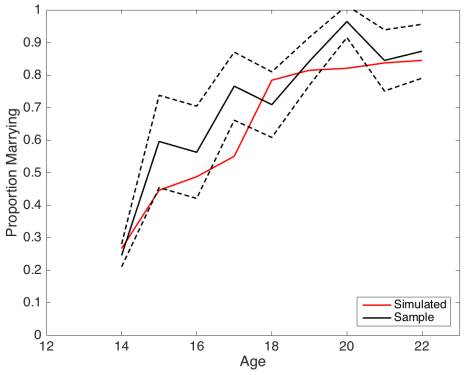
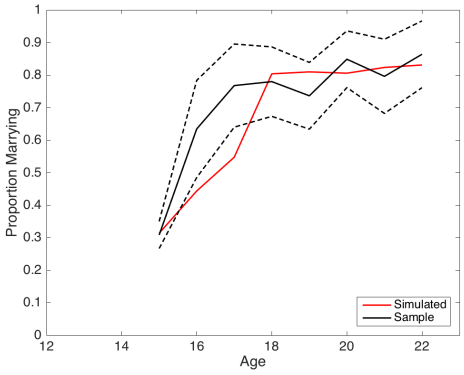
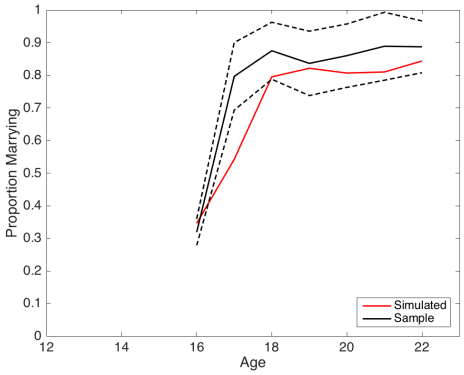


Grade 9



Grade 10



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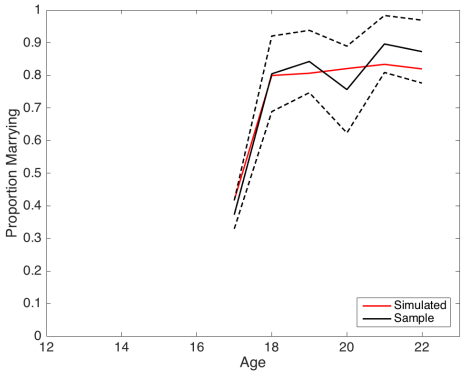
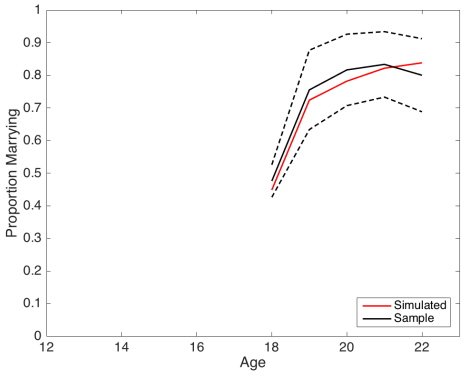


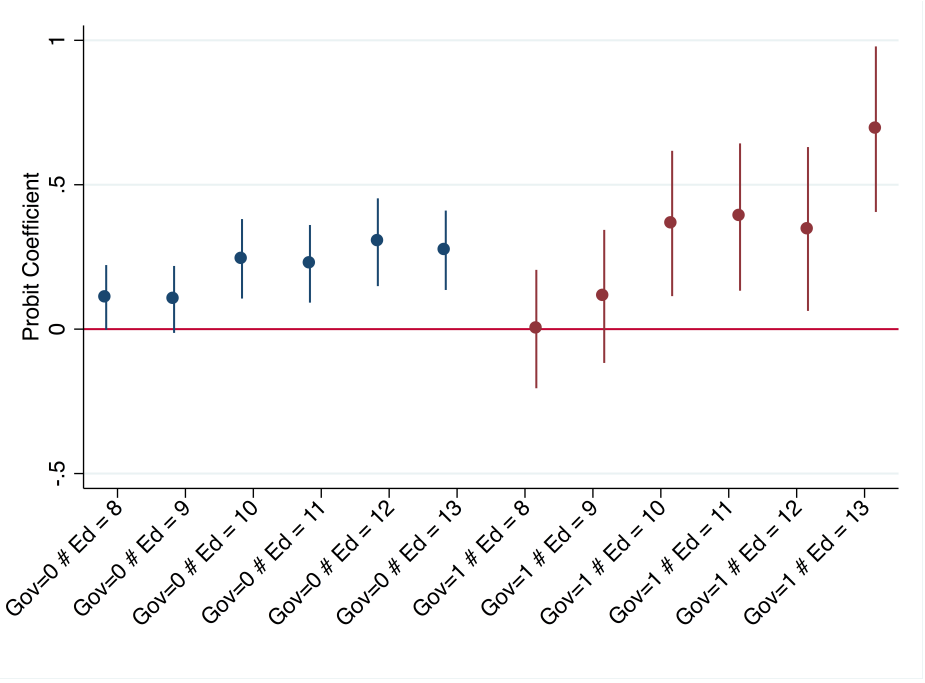
Grade 11



College

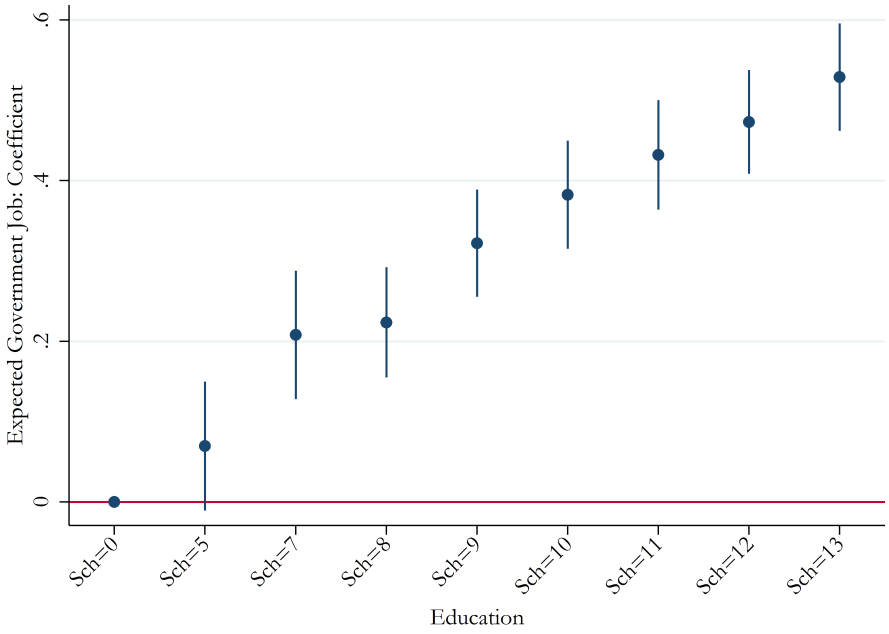
Notes: Solid black lines give the sample proportion selecting the marriage option for the hypothetical daughter at different combinations of her age and education. The black dashed lines give the 95% confidence interval. Solid red lines give the model implied proportion selecting the marriage option at our structural revealed belief estimates.

Figure 12: Groom Preferences over Age & Education



Notes: Figure plots coefficients on the education of a potential bride interacted with whether the groom has a government job and 95% confidence interval from a reduced form probit regression of whether the first option was chosen in the groom-side experiment on the characteristics of the hypothetical groom, groom's family and the potential bridal matches. Full set of coefficient tables at Table A.9.

Figure 13: Direct Expectations on Impact of Education on Likelihood of Groom with Government Job



Notes: Figure plots coefficients on the education of a hypothetical daughter and 95% confidence interval from a linear regression of whether a match with a government job was predicted in the direct expectations experiment on the characteristics of the hypothetical daughter and her family. Full set of coefficient tables at Table Table A.10.

job, while age controls (conditional on education) are insignificant. Figure 13 shows the coefficient on daughter's education for the least squares regression:

$$PredictGov_{ir} = X_r\beta + \epsilon_{ir} \tag{6.1}$$

where $PredictGov_{ir} = 1$ if a respondent expects the daughter described in round r with characteristics X_r to receive an offer from a groom with a government job and $PredictGov_{ir} = 0$ otherwise (see Table A.10 in Appendix A for all coefficients). There is a linear relationship between a daughter's education and the likelihood of predicting a match with a government job, which is broadly consistent with our revealed belief estimates.[48]

Note that the probability levels implied by our revealed belief measures are more plausible than those arising from our direct expectations experiment. While the patterns from our direct expectations experiment also imply

[48]However, we note that the two sets of results are not directly comparable: while the revealed beliefs give the average conditional probability that respondents attach to a young woman getting an offer from a high quality groom, the expected match results provide information on how whether or not a respondent "expects" that the accepted match will have a government job varies with a young woman's characteristics. We would anticipate that respondents answer that they "expect" the accepted match to have a government job if they perceive the probability to be greater than 50% although we are not aware of any research that explicitly assesses this assumption.

Table 7: Population Matching Patterns by Husband's Occupation

All India (N=15,440)	*Wife's Education*			
Husband's Occupation	No Education	Primary	Secondary	Higher
Professional/Technical/Managerial/Clerical (7.51%)	5.78%	6.21%	49.01%	39.00%
Other (92.49%)	24.17%	14.93%	52.94%	7.96%
Rajasthan (N=1,091)	*Wife's Education*			
Husband's Occupation	No Education	Primary	Secondary	Higher
Professional/Technical/Managerial/Clerical (9.53%)	8.65%	14.42%	35.58%	41.35%
Other (90.47%)	36.27%	17.53%	35.97%	10.23%

Notes: Table presents the distribution of wives' education by husband's occupation type for couples where the husband is aged 21 to 30 in both the whole of India (top panel) and Rajasthan (bottom panel) from the NFHS-IV (2015/16).

a belief in positive assortative matching, respondents in this experiment were much more likely to state that a daughter could expect a match with a government job than is plausible given the representative survey data: less than 10% of men aged between 21 and 30 have a professional job in Rajasthan but in our direct expectations experiment in 70% of rounds involving an 18 year old girl, respondents predicted a groom with a government job. This is consistent with findings in other settings in which the gradient of subjective expectations in different characteristics is more accurate than their level (Delavande and Rohwedder 2011).

Our revealed belief results are thus qualitatively consistent with representative data on matching patterns in the community and also with observations from our focus group discussions in which caregivers were optimistic that having a more educated daughter would mean that she married a more educated and better quality groom, one commenting that: "[if] a girl is educated she will go to a good house and will lead a good life".[49] Other women commented directly on the assortative nature of matching in the area: "If our daughter is a graduate, we will look for a match for her who is a graduate as well."[50] Table 7 gives the realised marriage matching patterns on education for India as a whole and Rajasthan specifically in 2015/16. We observe strong assortative matching on education with 41% of grooms with a professional job marrying a girl with higher education.

7 Counterfactual Simulations & Policy Relevance

In this section, we explore the relative quantitative significance of preferences and beliefs over age and education for choice behaviour, before turning to a final set of counterfactual simulations in order to establish the implications of our results for the the likely effects of current or potential policy initiatives. To demonstrate the relative importance

[49] FGD 2, Online Appendix B
[50] FGD 1, Online Appendix B

of the patterns we recover in preferences and beliefs, we simulate marriage acceptance rates when faced with an offer from a groom without a government job under different counterfactual scenarios.[51] Specifically, we set the different structural parameters that dictate preference and beliefs to zero, in order to highlight the sensitivity of choice behaviour to them.

Figure 14 gives the results of four such exercises. In each panel, the light grey lines give simulated choice behaviour given our estimated structural parameters. In panel (a), we turn off age effects in preferences, imposing that parents have no relative preference for marrying a daughter at any age greater than thirteen, i.e. that they have no preference for delaying marriage. In panel (b), we set education effects in preferences to zero, including the negative weight placed on College education. In panel (c), we assume that beliefs about the likelihood of a match from a high quality groom do not vary with age, and in panel (d) we impose that these beliefs are independent of the completed education of a daughter.

It is clear that the structural parameters concerning age are crucial drivers of choice in our experiment. If parents did not have any preference for delaying their daughter's marriage, then their propensity to accept marriage offers at younger ages increases markedly. With our estimated preference parameters, 32% of simulated respondents accept a marriage offer from a groom without a government job for a thirteen year old girl who is out of school. However, if parents had no preference for delaying marriage, 73% would accept the offer. Turning off the belief that a daughter's marriage prospects worsen with age on leaving school has a similarly dramatic effect on simulated behaviour. Marriage acceptance rates in all cases fall, but especially so for more educated girls. As there is now no negative age effect to diminish the positive marriage market returns to education, parents are increasingly willing to keep a daughter in education given the increased likelihood that she will receive an offer from a high quality groom.

Simulated choice behaviour is much less sensitive to eliminating the contribution of education to preferences. These changes only affect the choice behaviour of parents who's daughter is still in school and the magnitude of these effects are much less than when the influence of age is turned off. Setting parents preferences over education to zero highlights that the negative weight placed on College leads to a greater propensity to accept marriage offers for daughters in 12th Grade than would otherwise occur; if parents did not dislike College education, they would be more likely to keep her in school such that she could continue to College and be more likely to receive an offer

[51] We simulate choice behaviour for 100 individuals at each age-education combination in the ex-ante experiment when faced with an offer from a groom without a government job. These individuals are otherwise identical except for their draws of preference heterogeneity and experimental errors. In all cases, the daughter is described as being polite and well-behaved ($GoodGirl = 1$), the hypothetical mother does not require help at home ($HelpinHome = 0$), and the daughter does not particularly enjoy school ($LikeSchool = 0$).

from a high quality groom.

However, our results highlight that a belief in a strong marriage market return to education does markedly reduce the propensity of parents to accept marriage offers for 'older' daughters (17-18 years old) who are still in school. If parents did not believe in any marriage market return to education, then for an 18-year old currently enrolled in College, 71% of our simulated respondents would accept a marriage offer from a groom without a government job compared to 32.4% with our baseline estimates.

7.1 Policy Relevance

While our results present only a snapshot of average preferences and beliefs at the current moment in time, they are suggestive about the likely effects, or lack thereof, of current or potential policy initiatives.

Education Our results highlight the protective value of schooling against early marriage in our context, especially for women aged 17-19 years old: there are large differences in the propensity of representative parents to accept a marriage offer according to whether a daughter is currently in school or not. This suggests that current and future efforts to improve girls' access to education are likely to have knock-on reductions on rates of early marriage (Kremer, Brannen, and Glennerster 2013).

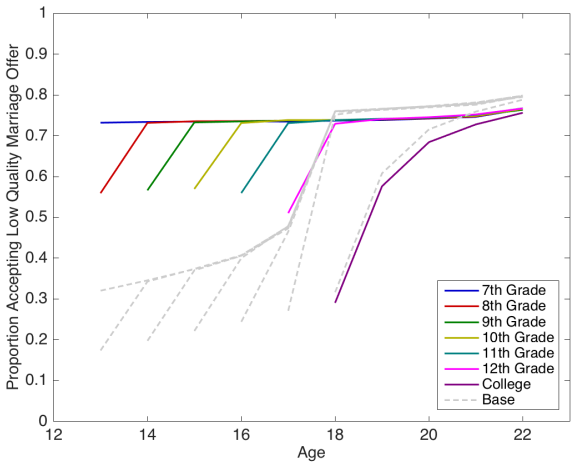
This finding also implies that girls who have recently dropped out of school are particularly vulnerable to early marriage. Although we find that average preferences and beliefs are such that a representative set of parents will favour keeping a daughter in education, in reality a multitude of idiosyncratic shocks from income shocks to family illness to school transport disruption that might cause girls to dropout of school are commonplace (Ferreira and Schady 2009; Achyut et al. 2016). Provision of improved insurance mechanisms that help mitigate the impact of such shocks on girls' education, and strengthening opportunities for adolescents to return to formal education if their studies are interrupted,[52] could thus improve schooling outcomes and reduce early marriage.

A belief in a strong marriage market return to College is more important than parents' intrinsic preferences for education in explaining the schooling decisions of families in our choice experiments. The strength of these marriage market returns is linked to beliefs about the preferences of the groom-side of the market. While all levels of education are believed to contribute positively to a young woman's marriage market prospects, College is particularly salient for attaining a high quality match. There could thus be some scope for policies that increase

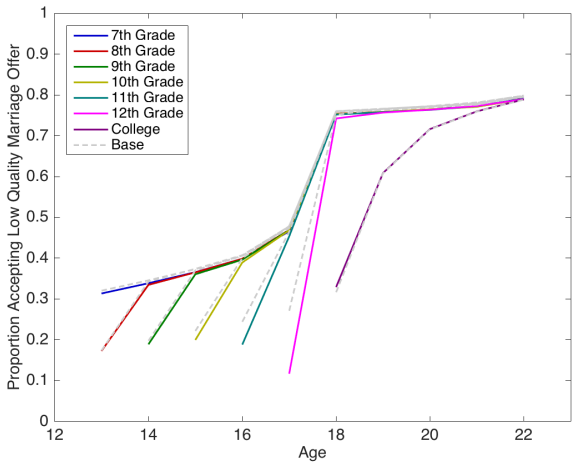
[52] Few opportunities to return to formal education currently exist (Pratham Education Foundation).

Figure 14: Ex Ante Choice Behaviour: Eliminating Channels

Preferences

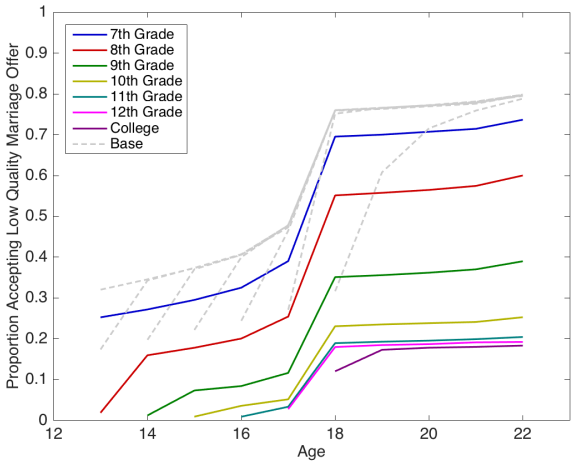


(a) No Age Effects

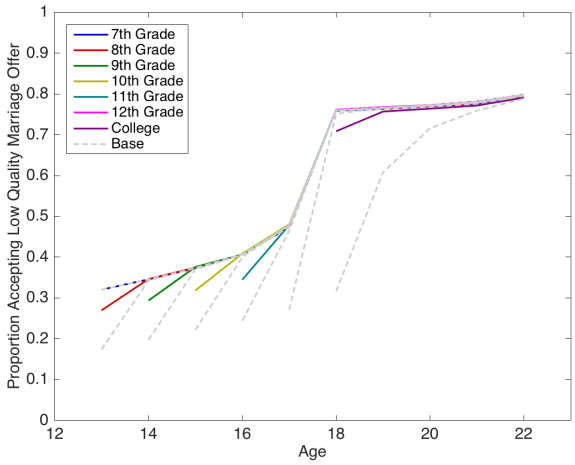


(b) No Education Effects

Beliefs



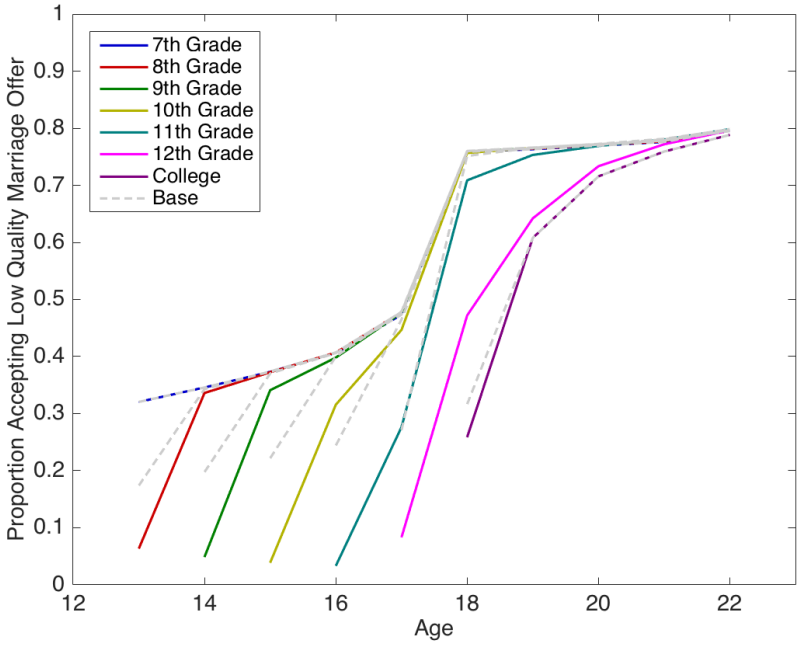
(c) No Age Effects



(d) No Education Effects

Notes: Figure plots proportion choosing marriage option in ex-ante experiment by hypothetical daughter's age and education for 100 simulated respondents within each age-education cell. The grey lines give behaviour implied by our structurally estimated parameters given at Table 5 and Table 6. In panel (a), all age effects in preferences are set to zero. In panel (b), all education effects in preferences are set to zero. In panel (c), the effect of age and age while in school on beliefs is set to zero. In panel (d), the effect of education and being currently in school on beliefs is set to zero.

Figure 15: Counterfactual Simulation: Increasing Subjective Marriage Market Return to Non-College Education



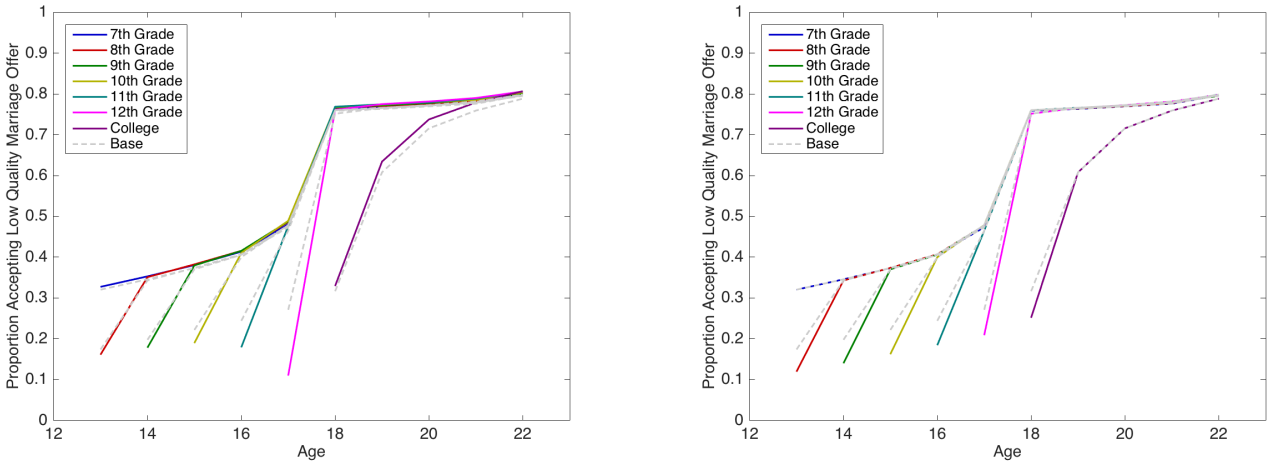
Notes: Figure plots proportion choosing marriage option in ex-ante experiment by hypothetical daughter's age and education for 100 simulated respondents within each age-education cell. The grey lines give behaviour implied by our structurally estimated parameters given at Table 5 and Table 6. The new counterfactual is created by increasing the coefficient on education in beliefs by 50% while keeping the weight on College education constant.

groom-side preferences for completing high-school and intermediate levels of schooling to further raise education retention rate. To explore the effectiveness of such policies, we simulate behaviour in which beliefs about the return to non-college education are 50% higher than our baseline estimates (given our partial equilibrium setting). Figure 15 shows that this has a sizeable impact on the propensity of parents to accept marriage offers while a girl is still in school, and that this can also reduce marriage rates for girls who have recently dropped out of school.

Finally, we note that our results suggest that average bride-side parental preferences for education would need to change significantly for these to cause any appreciable difference in choice behaviour. Eliminating the penalty to College education and doubling preferences for non-College education (Figure 16 (a)), and doubling the weight placed on whether a daughter enjoys school (Figure 16 (b)),[53] have relatively small impacts on simulated behaviour. Many attitudinal programmes and policies primarily target either girls' enthusiasm for remaining in education or how parents value a daughters education. Our findings provide one explanation for why such approaches might be less effective at increasing girls' education in South Asia than, for example, conditional transfers directed at

[53]Given the quality of schooling in rural India is often poor (ASER Centre 2019) increasing girls' enjoyment of school through improvements to school quality, for example through targeted pedagogical programmes (Kremer, Brannen, and Glennerster 2013), may increase enrolment.

Figure 16: Counterfactual Simulations: Preferences over Education



(a) Boost Education

(b) Boost Enjoyment of School

Notes: Figure plots proportion choosing marriage option in ex-ante experiment by hypothetical daughter's age and education for 100 simulated respondents within each age-education cell. The grey lines give behaviour implied by our structurally estimated parameters given at Table 5 and Table 6. Panel (a) is created by doubling the education coefficients and setting the return to College education equal to zero. Panel (b) is created by doubling the coefficient on *LikeSchool* in the flow utilities.

parents (Buchmann, Field, Glennerster, Nazneen, Pimkina, and Sen 2017), or than focusing on preferences for girls' education on the groom's side of the marriage market (Figure 15).[54] More work is required to understand the underlying causes of the relatively low magnitude of parental preferences over education. These might include: a lack of labour market returns to education, risks to schooling (such as violence on the way to school), and wider factors that limit parents' internalisation of the benefits of schooling on young women's welfare will all likely be relevant.[55]

Age of Marriage Preferences concerning a daughter's age of marriage, and beliefs about how her marriage market potential varies with age, are very important for characterising choice behaviour in our setting. As Figure 10 highlights, parents believe that the expected quality of a marriage offer quickly deteriorates once a girl has dropped out of school. This is likely to be driven in part by the groom's side of the marriage market having a distaste for young women spending time at home but out of school. Figure 14 (c) shows the significance of

[54]Nevertheless, such programmes may help young women secure a more equitable allocation of labour and consumption within the natal and marital home (Dhar, Jain, and Jayachandran 2018a). Further, the impacts of such programmes might be very different in sub-Saharan Africa where marriage markets operate very differently (Corno, Hildebrandt, and Voena 2016) and where young women's involvement in decision making is far greater. Likewise, programmes that bundle attitudinal interventions with the provision of hard skills have very different effects (Buchmann, Field, Glennerster, Nazneen, Pimkina, and Sen 2017; Bandiera, Buehren, Burgess, Goldstein, Gulesci, Rasul, and Sulaiman 2017). And programmes that specifically target young women's negotiation skills may increase girls' education and delay marriage through moving the household closer to the efficient frontier (Ashraf, Bau, Low, and McGinn 2018).

[55]Despite parents being the final decision makers over a daughter's education and marriage, few studies have investigated the impact of targeting such attitudes of parents of daughters and no government programs target their attitudes (Jejeebhoy 2017). We note that the extent to which household decision making reflects a daughter's preferences is likely affected by her negotiation skills which have been shown to be malleable through training (Ashraf, Bau, Low, and McGinn 2018).

this channel for choice behaviour in our experiment. Insights from Achyut et al. (2016) and our focus group discussions,[56] suggest that this might be driven by a perception that years spent out of school before marriage are associated with risks that affect a young woman's perceived suitability to be a good wife, and which are difficult to verify by the groom's side. These risks include a girl being a victim of sexual harassment or assault, engaging in consensual romantic relationships or friendships with boys, or her becoming being loud and opinionated. Adverse selection might provide a further pressure for early marriage if the groom's side infer that young women who are still not married several years after leaving school have undesirable qualities. Ultimately, such preferences and inferences likely derive from tightly prescribed ideals of young womens' behaviour. Our findings highlight the potential of interventions or campaigns designed to alter attitudes about the characteristics of the ideal wife or daughter in law on the groom's side of the marriage market.[57]

Parents preferences over the age of marriage of their daughter are a key determinant of their propensity to accept an early marriage offer. There is a sharp discontinuity in average preferences over age of marriage at 18: parents prefer to delay marriage until 18 this point have no preference for delaying further. This suggests that the legal minimum age of marriage, which is 18 for girls, might be an important determinant of parental preferences. Figure 17 (b) simulates behaviour if the focal point/legal age of marriage was instead sixteen years old, highlighting that marriage rates would be much higher for sixteen and seventeen year old girls if this was the case and thus that the legislation might be effective at protecting this group of young women.[58] The salience of the legal age of marriage is striking given the loose enforcement of age-of-marriage legislation. Despite conservative estimates (NFHS-IV) suggesting that 9% of 17 year old girls in India, totalling over 10 million individuals,[59] were already married in 2015, only 293 charges were brought under the Prohibition of Child Marriage Act in that year (National Crime Records Bureau 2016). The impact of the legislation could thus derive from the role of the law in signalling socially desirable actions or creating social norms (Posner 1997), or of parents overestimating the probability of facing legal penalties for child marriage.

If parents preferences were such that they continued to prefer marriage past eighteen, our results suggest that rates of early marriage for women in their late teenage years and early twenties would fall. Figure 17 (a) simulates behaviour assuming that preferences over age of marriage do not plateau at the legal age of marriage but instead

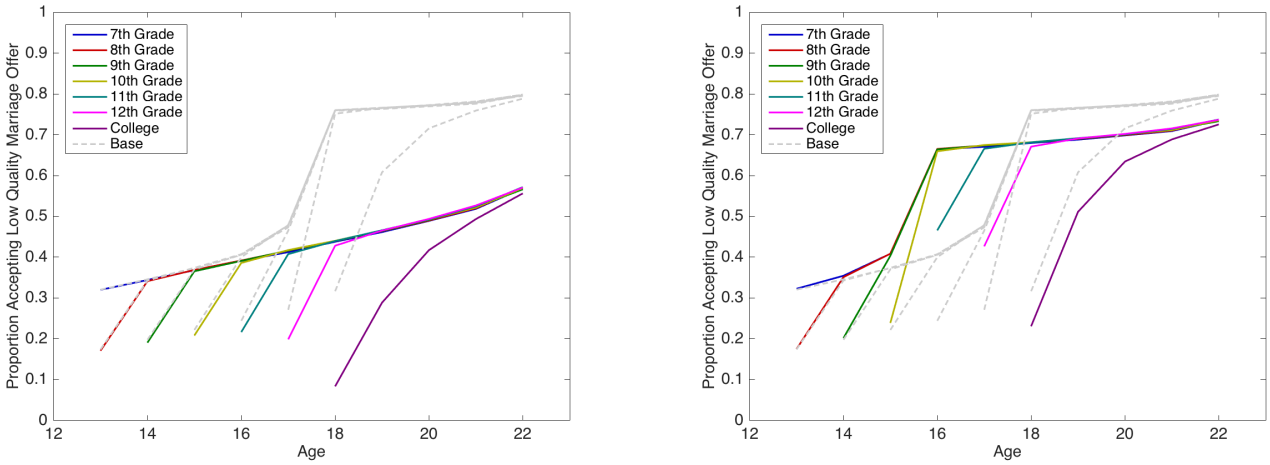
[56] See Online Appendix B.

[57] The vast majority of attitudinal campaigns directly target young women and their parents. An exception is (Dhar, Jain, and Jayachandran 2018b).

[58] Other aspects of choice behaviour are affected because of changes in the relative value of marriage induced by how we have changed the focal point in preferences.

[59] Estimated using age-specific population estimates from United Nation's World Population Prospects

Figure 17: Counterfactual Simulations: Preferences over Age



(a) No Diminishing Returns to Age

(b) Focal Age = 16

Notes: Figure plots proportion choosing marriage option in ex-ante experiment by hypothetical daughter's age and education for 100 simulated respondents within each age-education cell. The grey lines give behaviour implied by our structurally estimated parameters given at Table 5 and Table 6. Panel (a) is created by extrapolating the linear trend on age up to age 18 up until the maximum age. Panel (b) is created by moving the 'kink' point in preferences to age 16 and allowing preferences from age 16 onwards to grow at the rate from age 18 onwards that was estimated in baseline preferences.

continue increasing at the pre-age 18 rate. This suggests a potential benefit in increasing the minimum age of marriage for women up to that for men, age-21, and calls for more work on the effectiveness of policies which target the attitudes of parents (Jejeebhoy 2017).

8 Conclusion

In this paper we developed a novel methodology to identify parents' preferences over female education and age at marriage and subjective beliefs over the marriage market return to girls' schooling and age using a set of discrete choice experiments based on hypothetical vignettes. We administered our experiments with 4,605 female caregivers living in 120 villages in rural Rajasthan, a context where adolescent girls frequently marry young, drop out of school early, and are subject to rigid patriarchal gender norms.

Drawing on the growing use of hypothetical choice experiments in economics to identify preferences, we offered respondents choices between randomly drawn options to identify average parental preferences over a daughter's age of marriage, education and marriage match characteristics in the absence of uncertainty over future marriage offers. We then extended the hypothetical choice approach by also offering respondents choices over whether or not to accept a given marriage offer in situations where there was uncertainty about which future offers would be received. Within a standard dynamic choice framework, these choices identify subjective beliefs' over the joint distribution of

age of marriage, education and match quality. Our structural approach enables us to identify "revealed beliefs" that reconcile choices made with and without uncertainty, without directly eliciting probabilities from respondents.[60] This was an important benefit given our respondents had very low levels of literacy and numeracy and the experiments were carried out by non-specialist enumerators in a large field survey. Furthermore, the approach is well suited to eliciting beliefs over continuous and multi-dimensional objects which is often challenging with existing approaches. Our revealed belief estimates are qualitatively consistent with estimates of groom-side preferences, directly elicited expected matches, and assortative matching patterns in observational data.

Our results suggest that the perceived marriage market return to education is the primary driver of female secondary schooling in our context. While parents place intrinsic value daughter's education up until the end of high school, this preference is small in magnitude and decreasing in post-secondary education. However, our revealed belief estimates indicate that parents believe that the likelihood of a daughter receiving an offer from a high quality groom increases substantially with education, particularly so with college education. This creates a sizeable perceived marriage market return to a daughter's education. This perceived marriage market return to education may be important in understanding why female education in India has continued to increase while female labour force participation has fallen further from an already low base (Fletcher, Pande, and Moore 2017).

Although parents have a strong distaste for marrying a daughter before age eighteen, a belief that a girl's marriage prospects will start to deteriorate when she drops out of school can, however, create a mechanism for early marriage. Indeed, our respondents were twice as likely to accept a marriage offer for a 16 year old daughter if the girl was not in school, and were equally likely to accept a given marriage offer made to a 13 year old girl out of school as for a 19 year old girl who was still in school. The beliefs we identify suggest that policies that ensure girls have safe and affordable access to high quality schooling and those that insulate adolescent girls from shocks that might otherwise cause premature school dropout will be fundamental in reducing rates of early marriage.

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[60] In future work we will experimentally validate our belief measures in a more simple and controlled environment in which we can compare our structurally derived measures with those gained through more standard elicitation methods.

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A Additional Results

Table A.1: Importance of Vignette Salience in Ex-Post Experiment

	(1)		(2)	
Ex Post Choice				
Option is Like Respondent's Daughter	0.0716*	(0.0387)	0.0273	(0.0486)
Daughter's Age at Marriage=14	0.2298**	(0.1093)	0.2035*	(0.1225)
Daughter's Age at Marriage=15	0.3336***	(0.1077)	0.2827**	(0.1201)
Daughter's Age at Marriage=16	0.4992***	(0.1077)	0.5699***	(0.1339)
Daughter's Age at Marriage=17	0.6388***	(0.1104)	0.6900***	(0.1453)
Daughter's Age at Marriage=18	0.8870***	(0.1117)	0.9424***	(0.1370)
Daughter's Age at Marriage=19	0.8889***	(0.1101)	0.9389***	(0.1407)
Daughter's Age at Marriage=20	0.9785***	(0.1170)	0.9945***	(0.1754)
Daughter's Age at Marriage=21	0.9851***	(0.1176)	0.9139***	(0.1756)
Daughter's Age at Marriage=22	0.9885***	(0.1229)	1.0505***	(0.1977)
Daughter's Education =8	-0.0019	(0.0431)	-0.1363	(0.2211)
Daughter's Education =9	0.0024	(0.0475)	-0.0240	(0.2149)
Daughter's Education =10	0.0277	(0.0536)	0.1773	(0.2038)
Daughter's Education =11	0.0288	(0.0605)	-0.0455	(0.2035)
Daughter's Education =12	0.0982	(0.0671)	-0.0514	(0.2036)
Daughter's Education =13	-0.1248*	(0.0710)	-0.2225	(0.1890)
Daughter Likes School*Years in School	0.0206**	(0.0097)	0.0212**	(0.0098)
Cost of School Covered*Years in School	0.0123	(0.0096)	0.0115	(0.0096)
Help in Home*Years at Home	-0.0233**	(0.0103)	-0.0233**	(0.0104)
Groom's Age	-0.0095**	(0.0038)	-0.0095**	(0.0038)
Groom's Education	0.0158***	(0.0033)	0.0162***	(0.0033)
Government Job	0.2731***	(0.0335)	0.2725***	(0.0337)
Dowry	-0.0172*	(0.0090)	-0.0179**	(0.0090)
Groom's Wealth = Poor	-0.0456	(0.0324)	-0.0422	(0.0325)
Groom's Wealth = Wealthy	-0.0024	(0.0312)	0.0050	(0.0314)
Age=14 X Ed=8			0.2126	(0.2426)
Age=15 X Ed=8			0.1476	(0.2429)
Age=15 X Ed=9			0.1894	(0.2366)
Age=16 X Ed=8			0.0371	(0.2505)
Age=16 X Ed=9			0.0215	(0.2435)
Age=16 X Ed=10			-0.2113	(0.2301)
Age=17 X Ed=8			0.1905	(0.2597)
Age=17 X Ed=9			-0.2423	(0.2535)
Age=17 X Ed=10			-0.2403	(0.2411)
Age=17 X Ed=11			0.1260	(0.2348)
Age=18 X Ed=8			0.0738	(0.2611)
Age=18 X Ed=9			0.0493	(0.2577)
Age=18 X Ed=10			-0.3380	(0.2475)
Age=18 X Ed=11			-0.0843	(0.2402)
Age=18 X Ed=12			0.2080	(0.2280)
Age=19 X Ed=8			0.2299	(0.2601)
Age=19 X Ed=9			-0.1148	(0.2601)
Age=19 X Ed=10			-0.1021	(0.2513)
Age=19 X Ed=11			-0.0200	(0.2426)
Age=19 X Ed=12			0.1152	(0.2357)
Age=19 X Ed=13			0.0225	(0.2305)
Age=20 X Ed=8			0.0831	(0.2911)
Age=20 X Ed=9			-0.0755	(0.2787)
Age=20 X Ed=10			-0.2154	(0.2810)
Age=20 X Ed=11			0.1090	(0.2681)
Age=20 X Ed=12			0.0121	(0.2608)
Age=20 X Ed=13			0.1570	(0.2367)
Age=21 X Ed=8			0.1318	(0.2960)
Age=21 X Ed=9			0.1309	(0.2846)
Age=21 X Ed=10			0.1223	(0.2724)
Age=21 X Ed=11			0.1809	(0.2675)
Age=21 X Ed=12			0.2084	(0.2672)
Age=21 X Ed=13			0.1613	(0.2392)
Daughter Options	yes		yes	
Match Characteristics	yes		yes	
Interactions	no		no	
Number of Choice Experiments	6320		6320	

Notes: Table presents analogous coefficients and standard errors to those presented in table 4 but including a dummy indicating whether the first option had characteristics like the respondent's daughter. We present the specification most similar to that used in structural estimation and a fully interacted specification. All inference clustered at the respondent level. Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.2: Importance of Vignette Salience in Ex-Ante Experiment

	(1)		(2)		(3)	
.						
Scenario Characteristics like Respondent's Daughter	0.0109	(0.0397)	0.0091	(0.0399)	0.0079	(0.0399)
Currently in School=0 × Daughter's Age=13	0.0000	(.)	0.0000	(.)	0.0000	(.)
Currently in School=0 × Daughter's Age=14	0.0524	(0.1315)	0.0498	(0.1329)	0.0518	(0.1329)
Currently in School=0 × Daughter's Age=15	0.4044***	(0.1244)	0.4259***	(0.1260)	0.4272***	(0.1260)
Currently in School=0 × Daughter's Age=16	0.4273***	(0.1248)	0.4363***	(0.1261)	0.4372***	(0.1262)
Currently in School=0 × Daughter's Age=17	0.7782***	(0.1214)	0.8026***	(0.1226)	0.8029***	(0.1227)
Currently in School=0 × Daughter's Age=18	1.0185***	(0.1217)	1.0404***	(0.1231)	1.0409***	(0.1231)
Currently in School=0 × Daughter's Age=19	1.1429***	(0.1215)	1.1792***	(0.1222)	1.1783***	(0.1222)
Currently in School=0 × Daughter's Age=20	1.2292***	(0.1245)	1.2513***	(0.1254)	1.2482***	(0.1254)
Currently in School=0 × Daughter's Age=21	1.3034***	(0.1287)	1.3136***	(0.1300)	1.3128***	(0.1300)
Currently in School=0 × Daughter's Age=22	1.3254***	(0.1275)	1.3611***	(0.1292)	1.3594***	(0.1292)
Currently in School=1 × Daughter's Age=13	-0.5088***	(0.1544)	-0.4957***	(0.1558)	-0.5382***	(0.1628)
Currently in School=1 × Daughter's Age=14	-0.3958***	(0.1272)	-0.3792***	(0.1283)	-0.4178***	(0.1346)
Currently in School=1 × Daughter's Age=15	-0.1918	(0.1285)	-0.1862	(0.1304)	-0.2208	(0.1352)
Currently in School=1 × Daughter's Age=16	-0.1772	(0.1288)	-0.1604	(0.1302)	-0.1860	(0.1333)
Currently in School=1 × Daughter's Age=17	-0.0323	(0.1267)	-0.0251	(0.1279)	-0.0445	(0.1293)
Currently in School=1 × Daughter's Age=18	0.2512*	(0.1304)	0.2728**	(0.1319)	0.2673**	(0.1320)
Currently in School=1 × Daughter's Age=19	0.1755	(0.1573)	0.1814	(0.1587)	0.1744	(0.1588)
Own Wealth = Poor	-0.0009	(0.0408)	-0.0076	(0.0412)	0.0104	(0.0434)
Own Wealth = Wealthy	-0.0640	(0.0408)	-0.0680*	(0.0410)	-0.0499	(0.0440)
Cost of School Covered	0.0406	(0.0503)	0.0431	(0.0504)	0.0431	(0.0504)
Daughter Likes School	-0.1986***	(0.0504)	-0.2043***	(0.0507)	-0.2032***	(0.0506)
Help in Home	0.0108	(0.0334)	0.0126	(0.0336)	0.0125	(0.0336)
Daughter has Male Friends	0.0995***	(0.0359)	0.0988***	(0.0362)	0.0998***	(0.0361)
Groom's Age			-0.0174***	(0.0065)	-0.0173***	(0.0065)
Groom's Education			0.0208***	(0.0052)	0.0188***	(0.0057)
Government Job			0.2773***	(0.0476)	0.2723***	(0.0479)
Dowry			-0.0079	(0.0120)	-0.0108	(0.0093)
Groom's Wealth = Poor			0.0053	(0.0439)		
Groom's Wealth = Wealthy			-0.0147	(0.0437)		
Wealth Disparity					-0.0538	(0.0432)
Groom Less Educated					-0.0573	(0.0653)
Constant	-0.2879**	(0.1126)	-0.0647	(0.2109)	0.0153	(0.2271)
Daughter Options	yes		yes		yes	
Match Characteristics	no		yes		yes	
Interactions	no		no		yes	
Number of Choice Experiments	6836		6836		6836	

Notes: Table presents coefficients and standard errors for a probit regression of a binary indicator of whether the respondent choose the marriage option in the ex-ante experiment on characteristics of the hypothetical daughter, the hypothetical family, the hypothetical match and whether or not the option was based on the characteristics of the respondents' own daughter. All inference clustered at the respondent level. Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.3: Effect of RCT Treatment Status on Ex-Ante Experiment

	(1)	
Ex Post Choice		
Daughter's Age at Marriage=14	0.3285*	(0.1881)
Daughter's Age at Marriage=15	0.2964	(0.1833)
Daughter's Age at Marriage=16	0.4985***	(0.1833)
Daughter's Age at Marriage=17	0.5730***	(0.1883)
Daughter's Age at Marriage=18	0.9805***	(0.1892)
Daughter's Age at Marriage=19	0.9313***	(0.1866)
Daughter's Age at Marriage=20	0.9532***	(0.1971)
Daughter's Age at Marriage=21	1.1362***	(0.2012)
Daughter's Age at Marriage=22	1.0606***	(0.2090)
Daughter's Education =8	0.0092	(0.0724)
Daughter's Education =9	0.0716	(0.0789)
Daughter's Education =10	0.1197	(0.0890)
Daughter's Education =11	0.1572	(0.0990)
Daughter's Education =12	0.1398	(0.1117)
Daughter's Education =13	-0.0649	(0.1186)
Daughter Likes School*Years in School	0.0057	(0.0168)
Cost of School Covered*Years in School	0.0006	(0.0164)
Help in Home*Years at Home	-0.0104	(0.0176)
Government Job	0.4533***	(0.0516)
Girl Only × Daughter's Age at Marriage=14	-0.1436	(0.2587)
Integrated × Daughter's Age at Marriage=14	-0.0690	(0.2725)
Girl Only × Daughter's Age at Marriage=15	0.0523	(0.2559)
Integrated × Daughter's Age at Marriage=15	0.0856	(0.2678)
Girl Only × Daughter's Age at Marriage=16	-0.0349	(0.2563)
Integrated × Daughter's Age at Marriage=16	0.0464	(0.2682)
Girl Only × Daughter's Age at Marriage=17	0.0770	(0.2635)
Integrated × Daughter's Age at Marriage=17	0.1482	(0.2736)
Girl Only × Daughter's Age at Marriage=18	-0.1479	(0.2629)
Integrated × Daughter's Age at Marriage=18	-0.1396	(0.2793)
Girl Only × Daughter's Age at Marriage=19	0.0087	(0.2630)
Integrated × Daughter's Age at Marriage=19	-0.1517	(0.2723)
Girl Only × Daughter's Age at Marriage=20	0.1741	(0.2774)
Integrated × Daughter's Age at Marriage=20	-0.1475	(0.2881)
Girl Only × Daughter's Age at Marriage=21	-0.1691	(0.2809)
Integrated × Daughter's Age at Marriage=21	-0.3384	(0.2903)
Girl Only × Daughter's Age at Marriage=22	-0.0538	(0.2956)
Integrated × Daughter's Age at Marriage=22	-0.1734	(0.3022)
Girl Only × Daughter's Education =8	-0.0781	(0.1067)
Integrated × Daughter's Education =8	0.0552	(0.1021)
Girl Only × Daughter's Education =9	-0.1943*	(0.1175)
Integrated × Daughter's Education =9	-0.0147	(0.1112)
Girl Only × Daughter's Education =10	-0.2137	(0.1313)
Integrated × Daughter's Education =10	-0.0338	(0.1257)
Girl Only × Daughter's Education =11	-0.2835*	(0.1457)
Integrated × Daughter's Education =11	-0.0459	(0.1409)
Girl Only × Daughter's Education =12	-0.0536	(0.1631)
Integrated × Daughter's Education =12	-0.0200	(0.1568)
Girl Only × Daughter's Education =13	-0.2280	(0.1732)
Integrated × Daughter's Education =13	0.0869	(0.1677)
Girl Only × Daughter Likes School*Years in School	0.0318	(0.0242)
Integrated × Daughter Likes School*Years in School	0.0198	(0.0237)
Girl Only × Cost of School Covered*Years in School	0.0211	(0.0236)
Integrated × Cost of School Covered*Years in School	0.0186	(0.0232)
Girl Only × Help in Home*Years at Home	-0.0347	(0.0254)
Integrated × Help in Home*Years at Home	-0.0083	(0.0251)
Girl Only × Government Job	-0.1268*	(0.0737)
Integrated × Government Job	-0.1734**	(0.0731)
Daughter Options	yes	
Match Characteristics	yes	
Interactions	no	
Number of Choice Experiments	6320	

Notes: Table presents analogous coefficients and standard errors to those presented in table 4 but with all option characteristics interacted with RCT treatment status. RCT treatment arms include: control, girl only (life skills and knowledge for adolescent girls) and integrated (with additional community component). Details of intervention given in (Achyut, Andrew, Das, Gautam, Huepe, Krutikova, Kumar, Sharma, Soni, Verma, and Verma 2016) Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.4: Effect of RCT Treatment Status on Ex-Ante Experiment

	(1)		(2)		(3)	
.						
Control	0.0000	(.)	0.0000	(.)	0.0000	(.)
Girl Only	-0.0075	(0.0479)	-0.0083	(0.0483)	-0.0092	(0.0482)
Integrated	0.0969**	(0.0465)	0.0983**	(0.0469)	0.0976**	(0.0469)
Currently in School=0 × Daughter's Age=13	0.0000	(.)	0.0000	(.)	0.0000	(.)
Currently in School=0 × Daughter's Age=14	0.0490	(0.1318)	0.0457	(0.1329)	0.0472	(0.1330)
Currently in School=0 × Daughter's Age=15	0.3969***	(0.1246)	0.4174***	(0.1259)	0.4188***	(0.1260)
Currently in School=0 × Daughter's Age=16	0.4244***	(0.1248)	0.4323***	(0.1260)	0.4331***	(0.1261)
Currently in School=0 × Daughter's Age=17	0.7751***	(0.1213)	0.7983***	(0.1223)	0.7993***	(0.1224)
Currently in School=0 × Daughter's Age=18	1.0177***	(0.1211)	1.0386***	(0.1224)	1.0399***	(0.1225)
Currently in School=0 × Daughter's Age=19	1.1368***	(0.1216)	1.1723***	(0.1222)	1.1717***	(0.1223)
Currently in School=0 × Daughter's Age=20	1.2213***	(0.1249)	1.2427***	(0.1256)	1.2406***	(0.1257)
Currently in School=0 × Daughter's Age=21	1.2995***	(0.1288)	1.3094***	(0.1300)	1.3085***	(0.1301)
Currently in School=0 × Daughter's Age=22	1.3207***	(0.1277)	1.3555***	(0.1292)	1.3542***	(0.1293)
Currently in School=1 × Daughter's Age=13	-0.5237***	(0.1544)	-0.5123***	(0.1556)	-0.5498***	(0.1629)
Currently in School=1 × Daughter's Age=14	-0.3897***	(0.1222)	-0.3752***	(0.1232)	-0.4114***	(0.1300)
Currently in School=1 × Daughter's Age=15	-0.1915	(0.1255)	-0.1878	(0.1272)	-0.2199*	(0.1323)
Currently in School=1 × Daughter's Age=16	-0.1767	(0.1254)	-0.1618	(0.1268)	-0.1851	(0.1301)
Currently in School=1 × Daughter's Age=17	-0.0349	(0.1241)	-0.0294	(0.1252)	-0.0482	(0.1267)
Currently in School=1 × Daughter's Age=18	0.2458*	(0.1277)	0.2653**	(0.1291)	0.2610**	(0.1293)
Currently in School=1 × Daughter's Age=19	0.1742	(0.1507)	0.1780	(0.1519)	0.1710	(0.1520)
Cost of School Covered	0.0403	(0.0504)	0.0429	(0.0505)	0.0431	(0.0505)
Daughter Likes School	-0.1992***	(0.0504)	-0.2047***	(0.0507)	-0.2045***	(0.0506)
Help in Home	0.0094	(0.0334)	0.0112	(0.0336)	0.0114	(0.0336)
Daughter has Male Friends	0.1005***	(0.0359)	0.0997***	(0.0362)	0.1011***	(0.0361)
Groom's Age			-0.0177***	(0.0065)	-0.0176***	(0.0065)
Groom's Education			0.0209***	(0.0052)	0.0190***	(0.0057)
Government Job			0.2770***	(0.0476)	0.2730***	(0.0480)
Dowry			-0.0081	(0.0120)	-0.0105	(0.0093)
Groom's Wealth = Poor			0.0051	(0.0438)		
Groom's Wealth = Wealthy			-0.0114	(0.0437)		
Wealth Disparity					-0.0629	(0.0400)
Groom Less Educated					-0.0527	(0.0651)
Constant	-0.3306***	(0.1133)	-0.1034	(0.2108)	-0.0155	(0.2264)
Daughter Options	yes		yes		yes	
Match Characteristics	no		yes		yes	
Interactions	no		no		yes	
Number of Choice Experiments	6836		6836		6836	

Notes: Table presents analogous coefficients and standard errors to those presented in table A.8 but with indicators of RCT treatment status. RCT treatment arms include: control, girl only (life skills and knowledge for adolescent girls) and integrated (with additional community component). Details of intervention given in (Achyut, Andrew, Das, Gautam, Huepe, Krutikova, Kumar, Sharma, Soni, Verma, and Verma 2016) Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.5: Structural Preference Parameters Allowing for 2-Dimensional, Correlated Preference Heterogeneity

	Coefficient	Standard Error
Terminal Utility		
Age of Daughter at Marriage		
13	0.000	.
14	0.937***	(0.261)
15	1.218***	(0.258)
16	1.711***	(0.262)
17	2.180***	(0.267)
18	2.785***	(0.268)
19	2.788***	(0.274)
20	2.956***	(0.290)
21	3.072***	(0.293)
22	2.996***	(0.301)
Education of Daughter at Marriage		
7th standard	0.000	.
8th standard	0.033	(0.108)
9th standard	0.077	(0.122)
10th standard	0.128	(0.129)
11th standard	0.135	(0.146)
12th standard	0.330**	(0.158)
College	-0.157	(0.160)
Characteristics of Groom		
Age (years)	-0.025***	(0.009)
Government Job	0.727***	(0.087)
Education (years)	0.043***	(0.009)
Dowry	-0.018	(0.017)
Shifters of Flow Payoffs		
Daughter Likes School	0.035*	(0.019)
Grandmother at Home	-0.040**	(0.018)
Variance-Covariance of Unobserved Flow Payoff Heterogeneity		
L_{11}	0.278***	(0.019)
L_{22}	0.002	(0.024)
L_{12}	0.256***	(0.020)
Implied correlation between θ_s and θ_h	1.000	

Notes: Table replicates results in Table 5 but allows for two-dimensional and correlated heterogeneity in flow payoffs. In particular, let flow payoffs from years in school and at home be, respectively, $u^S(L) = \theta_S + L$ and $u^H(B) = \theta_H + B$ with $\begin{pmatrix} \theta_S \\ \theta_H \end{pmatrix} \backsim N\left(\begin{pmatrix} 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \sigma_S^2 & \sigma_{SH} \\ \sigma_{SH} & \sigma_H^2 \end{pmatrix}\right)$. To ensure positive semi-definiteness of the covariance matrix we parameterise using the following Cholesky decomposition: $\begin{pmatrix} \rho^{S2} & \rho^{SH} \\ \rho^{SH} & \rho^{H2} \end{pmatrix} = \begin{pmatrix} L_{11} & 0 \\ L_{12} & L_{22} \end{pmatrix}\begin{pmatrix} L_{11} & 0 \\ L_{12} & L_{22} \end{pmatrix}^T$. Standard errors calculated through bootstrap, re-sampling respondents with replacement, using 500 iterations. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.6: Structural Preference Parameters Allowing for Non-Zero Constant in Flow Utility for Years at Home

	Coefficient	Standard Error
Terminal Utility		
Age of Daughter at Marriage		
13	0.000	.
14	0.908***	(0.262)
15	1.182***	(0.259)
16	1.644***	(0.264)
17	2.081***	(0.269)
18	2.662***	(0.274)
19	2.661***	(0.279)
20	2.854***	(0.293)
21	2.963***	(0.297)
22	2.877***	(0.305)
Education of Daughter at Marriage		
7th standard	0.000	.
8th standard	0.049	(0.107)
9th standard	0.118	(0.125)
10th standard	0.187	(0.130)
11th standard	0.229	(0.149)
12th standard	0.438***	(0.164)
College	-0.065	(0.164)
Characteristics of Groom		
Age (years)	-0.025***	(0.009)
Government Job	0.725***	(0.087)
Education (years)	0.043***	(0.009)
Dowry	-0.019	(0.017)
Shifters of Flow Payoffs		
Daughter Likes School	0.035*	(0.018)
Grandmother at Home	-0.041**	(0.019)
Constant Home Flow Payoff	0.036***	(0.012)
σ^2	0.072	(0.009)

Notes: Table replicates results in Table 5 but allows for flow payoffs associated with daughter being at home to have a non-zero constant: $u^H(B) = \theta_H + B + Constant$. Standard errors calculated through bootstrap, re-sampling respondents with replacement, using 500 iterations. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.7: Structural Belief Parameters Allowing for Non-Zero Constant in Flow Utility for Years at Home

	Main Specification Coefficient	Main Specification Standard Error	Alternative Specification
Constant	-1.5204**	0.6190	-1.4668
Age	-0.6642***	0.2446	-0.6402
Education	0.7776***	0.2262	0.7647
College	1.2629***	0.3783	1.2259
In School	0.6119	0.7243	0.6059
In School × Age	-0.1757*	0.1009	-0.1865
Good Girl	0.3526**	0.1482	0.3545
σ_ν	0.1312***	0.0288	0.0814

Notes: Table gives structural parameters for beliefs on likelihood of offer from a high quality groom where $\pi(t, E, GoodGirl, H) = \Phi(M\tau)$. Columns 1 and 2 replicates results in Table 6. Column 3 allows for flow payoffs associated with daughter being at home to have a non-zero constant: $u^H(B) = \theta_H + B + Constant$. Standard errors bootstrapped using 250 iterations, sampling with replacement. Significance of coefficients indicated by: $* \; p < 0.10$, $** \; p < 0.05$, $*** \; p < 0.01$.

Table A.8: Ex-Ante Experiment - Reduced Form

	(1)		(2)		(3)	
.						
Currently in School=0 × Daughter's Age=13	0.0000	(.)	0.0000	(.)	0.0000	(.)
Currently in School=0 × Daughter's Age=14	0.0541	(0.1314)	0.0513	(0.1327)	0.0531	(0.1327)
Currently in School=0 × Daughter's Age=15	0.4055***	(0.1244)	0.4268***	(0.1259)	0.4280***	(0.1259)
Currently in School=0 × Daughter's Age=16	0.4293***	(0.1245)	0.4379***	(0.1259)	0.4387***	(0.1259)
Currently in School=0 × Daughter's Age=17	0.7810***	(0.1209)	0.8049***	(0.1221)	0.8049***	(0.1222)
Currently in School=0 × Daughter's Age=18	1.0215***	(0.1209)	1.0429***	(0.1223)	1.0431***	(0.1223)
Currently in School=0 × Daughter's Age=19	1.1454***	(0.1213)	1.1814***	(0.1221)	1.1801***	(0.1221)
Currently in School=0 × Daughter's Age=20	1.2292***	(0.1245)	1.2514***	(0.1254)	1.2483***	(0.1254)
Currently in School=0 × Daughter's Age=21	1.3034***	(0.1287)	1.3136***	(0.1300)	1.3128***	(0.1300)
Currently in School=0 × Daughter's Age=22	1.3254***	(0.1275)	1.3611***	(0.1292)	1.3594***	(0.1292)
Currently in School=1 × Daughter's Age=13	-0.5087***	(0.1544)	-0.4956***	(0.1558)	-0.5381***	(0.1629)
Currently in School=1 × Daughter's Age=14	-0.3874***	(0.1220)	-0.3721***	(0.1231)	-0.4117***	(0.1299)
Currently in School=1 × Daughter's Age=15	-0.1850	(0.1251)	-0.1805	(0.1269)	-0.2159	(0.1320)
Currently in School=1 × Daughter's Age=16	-0.1703	(0.1250)	-0.1546	(0.1265)	-0.1810	(0.1298)
Currently in School=1 × Daughter's Age=17	-0.0254	(0.1237)	-0.0193	(0.1249)	-0.0396	(0.1264)
Currently in School=1 × Daughter's Age=18	0.2578**	(0.1274)	0.2783**	(0.1288)	0.2720**	(0.1289)
Currently in School=1 × Daughter's Age=19	0.1865	(0.1503)	0.1906	(0.1516)	0.1823	(0.1517)
Own Wealth = Poor	-0.0009	(0.0408)	-0.0075	(0.0412)	0.0104	(0.0434)
Own Wealth = Wealthy	-0.0641	(0.0408)	-0.0681*	(0.0410)	-0.0499	(0.0440)
Cost of School Covered	0.0404	(0.0503)	0.0429	(0.0504)	0.0430	(0.0504)
Daughter Likes School	-0.1987***	(0.0504)	-0.2044***	(0.0507)	-0.2033***	(0.0506)
Help in Home	0.0108	(0.0334)	0.0125	(0.0336)	0.0124	(0.0336)
Daughter has Male Friends	0.0996***	(0.0359)	0.0988***	(0.0362)	0.0999***	(0.0361)
Groom's Age			-0.0174***	(0.0065)	-0.0173***	(0.0065)
Groom's Education			0.0208***	(0.0052)	0.0188***	(0.0057)
Government Job			0.2773***	(0.0476)	0.2723***	(0.0479)
Dowry			-0.0079	(0.0120)	-0.0108	(0.0093)
Groom's Wealth = Poor			0.0055	(0.0439)		
Groom's Wealth = Wealthy			-0.0145	(0.0437)		
Wealth Disparity					-0.0539	(0.0432)
Groom Less Educated					-0.0574	(0.0653)
Constant	-0.2878**	(0.1126)	-0.0646	(0.2108)	0.0155	(0.2271)
Daughter Options	yes		yes		yes	
Match Characteristics	no		yes		yes	
Interactions	no		no		yes	
Number of Choice Experiments	6836		6836		6836	

Notes: Table presents coefficients and standard errors for a probit regression of a binary indicator of whether the respondent choose the marriage option in the ex-ante experiment on characteristics of the hypothetical daughter, the hypothetical family and the hypothetical match. All inference clustered at the respondent level. Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Table A.9: Determinants of Groom Choices: Reduced Form Probit

	(1)		(2)		(3)	
Bride's Age at Marriage=14	0.1021	(0.0765)	0.1173	(0.0769)	0.1429*	(0.0866)
Bride's Age at Marriage=15	0.2030***	(0.0710)	0.2191***	(0.0715)	0.2410***	(0.0813)
Bride's Age at Marriage=16	0.2563***	(0.0717)	0.2755***	(0.0722)	0.3329***	(0.0815)
Bride's Age at Marriage=17	0.2581***	(0.0716)	0.2678***	(0.0721)	0.3117***	(0.0810)
Bride's Age at Marriage=18	0.5207***	(0.0700)	0.5345***	(0.0704)	0.5976***	(0.0793)
Bride's Age at Marriage=19	0.5871***	(0.0750)	0.6062***	(0.0753)	0.6620***	(0.0851)
Bride's Age at Marriage=20	0.5850***	(0.0726)	0.6042***	(0.0731)	0.6790***	(0.0823)
Bride's Age at Marriage=21	0.5789***	(0.0697)	0.5933***	(0.0702)	0.6685***	(0.0793)
Bride's Age at Marriage=22	0.6506***	(0.0754)	0.6625***	(0.0759)	0.7612***	(0.0863)
Bride's Education =8	0.0854*	(0.0491)	0.0917*	(0.0499)	0.1098*	(0.0572)
Bride's Education =9	0.1023**	(0.0501)	0.1165**	(0.0521)	0.1028*	(0.0591)
Bride's Education =10	0.2611***	(0.0579)	0.2829***	(0.0607)	0.2435***	(0.0702)
Bride's Education =11	0.2456***	(0.0556)	0.2715***	(0.0596)	0.2261***	(0.0686)
Bride's Education =12	0.2876***	(0.0622)	0.3168***	(0.0678)	0.3009***	(0.0776)
Bride's Education =13	0.3117***	(0.0514)	0.3532***	(0.0621)	0.2731***	(0.0701)
Bride has Male Friends	-0.3283***	(0.0306)	-0.3248***	(0.0307)	-0.3343***	(0.0344)
Dowry	0.0598***	(0.0103)	0.0591***	(0.0103)	0.0552***	(0.0117)
Bride's Wealth = Poor	0.0071	(0.0374)				
Bride's Wealth = Wealthy	-0.0192	(0.0365)				
Bride's Wealth = Poor, Groom's Wealth = Poor			-0.0361	(0.0634)	0.0177	(0.0716)
Bride's Wealth = Wealthy, Groom's Wealth = Poor			-0.2571***	(0.0602)	-0.2509***	(0.0682)
Bride's Wealth = Poor, Groom's Wealth = Average			-0.0209	(0.0600)	-0.0138	(0.0663)
Bride's Wealth = Wealthy, Groom's Wealth = Average			0.0101	(0.0609)	0.0342	(0.0671)
Bride's Wealth = Poor, Groom's Wealth = Wealthy			0.0875	(0.0601)	0.0531	(0.0682)
Bride's Wealth = Wealthy, Groom's Wealth = Wealthy			0.2262***	(0.0624)	0.2246***	(0.0713)
Bride More Educated			-0.0483	(0.0428)	-0.0229	(0.0477)
Gov = 1 & Bride's Age = 14					-0.1068	(0.1914)
Gov = 1 & Bride's Age = 15					-0.0608	(0.1738)
Gov = 1 & Bride's Age = 16					-0.2081	(0.1798)
Gov = 1 & Bride's Age = 17					-0.1923	(0.1810)
Gov = 1 & Bride's Age = 18					-0.2279	(0.1763)
Gov = 1 & Bride's Age = 19					-0.2037	(0.1865)
Gov = 1 & Bride's Age = 20					-0.3089*	(0.1841)
Gov = 1 & Bride's Age = 21					-0.3137*	(0.1745)
Gov = 1 & Bride's Age = 22					-0.4170**	(0.1852)
Gov = 1 & Bride's Ed = 8					-0.1095	(0.1192)
Gov = 1 & Bride's Ed = 9					0.0105	(0.1316)
Gov = 1 & Bride's Ed = 10					0.1224	(0.1463)
Gov = 1 & Bride's Ed = 11					0.1619	(0.1471)
Gov = 1 & Bride's Ed = 12					0.0459	(0.1642)
Gov = 1 & Bride's Ed = 13					0.4192***	(0.1622)
Gov = 1 & Bride has Male Friends					0.0486	(0.0773)
Gov = 1 & Dowry					0.0195	(0.0252)
Gov = 1 & Bride's Wealth = Poor, Groom's Wealth = Poor					-0.2537	(0.1584)
Gov = 1 & Bride's Wealth = Wealthy, Groom's Wealth = Poor					-0.0231	(0.1473)
Gov = 1 & Bride's Wealth = Poor, Groom's Wealth = Average					-0.0616	(0.1585)
Gov = 1 & Bride's Wealth = Wealthy, Groom's Wealth = Average					-0.0917	(0.1625)
Gov = 1 & Bride's Wealth = Poor, Groom's Wealth = Wealthy					0.1683	(0.1465)
Gov = 1 & Bride's Wealth = Wealthy, Groom's Wealth = Wealthy					0.0181	(0.1493)
Gov = 1 & Bride More Educated					-0.2075	(0.1351)
Daughter Options	yes		yes		yes	
Match Characteristics	no		yes		yes	
Interactions	no		no		yes	
Number of Choice Experiments	4596		4596		4596	

Notes: Table presents coefficients and standard errors for a probit regression of the following form: $Y_{ir} = 1(\lambda \triangle H_{ir} + \zeta_{ir} > 0)$ where Y_{ir} is equal to 1 if the respondent chose option 1 over option 2 in the groom's side experiment and where $\triangle H_{ir} = H_{ir1} - H_{ir2}$ and H_{irj} gives the characteristics of option $j = \{1, 2\}$ and $\zeta_{ir} \sim IN(0, 1)$. Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

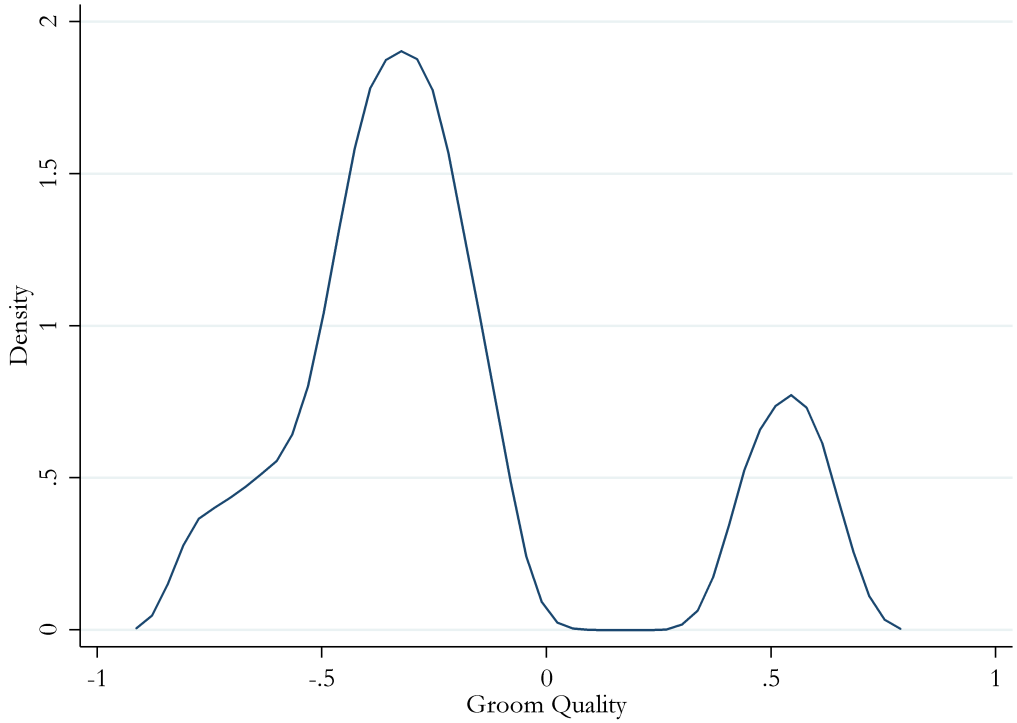
Table A.10: Determinants of Expected Match

	(1) Education		(2) Government Job		(3) Wealth		(4) Dowry		(5) Dowry		(6) Quality	
Age=13	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)
Age=14	0.3276	(0.3188)	0.0586	(0.0724)	0.0379	(0.0728)	-0.3232	(0.2188)	-0.3900*	(0.2013)	0.0274	(0.0221)
Age=15	0.1562	(0.2912)	-0.0435	(0.0622)	0.0302	(0.0663)	-0.1468	(0.1939)	-0.1670	(0.1788)	-0.0075	(0.0190)
Age=16	0.3952	(0.2838)	-0.0134	(0.0611)	0.0053	(0.0655)	-0.1423	(0.1906)	-0.1693	(0.1754)	0.0059	(0.0187)
Age=17	0.3439	(0.2838)	0.0469	(0.0594)	-0.0001	(0.0640)	-0.0449	(0.1851)	-0.0931	(0.1700)	0.0183	(0.0182)
Age=18	0.3358	(0.2822)	0.0575	(0.0583)	0.0156	(0.0627)	-0.0190	(0.1830)	-0.1010	(0.1678)	0.0168	(0.0179)
Age=19	0.2987	(0.2827)	0.0034	(0.0586)	0.0074	(0.0629)	0.0717	(0.1831)	-0.0082	(0.1682)	-0.0043	(0.0180)
Age=20	0.4383	(0.2779)	0.0636	(0.0579)	0.0324	(0.0624)	-0.0165	(0.1827)	-0.1755	(0.1693)	0.0090	(0.0178)
Age=21	0.4442	(0.2801)	0.0626	(0.0578)	0.0508	(0.0627)	-0.0641	(0.1824)	-0.2701	(0.1727)	0.0029	(0.0178)
Age=22	0.4067	(0.2792)	0.0641	(0.0579)	0.0253	(0.0627)	0.0326	(0.1815)	-0.1837	(0.1726)	-0.0042	(0.0178)
Sch=0	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)
Sch=5	1.1546***	(0.2305)	0.0696*	(0.0409)	0.0317	(0.0419)	-0.0099	(0.1262)	-0.1286	(0.1242)	0.0417***	(0.0135)
Sch=7	1.7528***	(0.2235)	0.2080***	(0.0408)	0.0799*	(0.0436)	0.2600**	(0.1262)	0.0295	(0.1263)	0.0870***	(0.0132)
Sch=8	1.9991***	(0.2174)	0.2235***	(0.0350)	0.0582	(0.0367)	0.1408	(0.1055)	-0.1032	(0.1085)	0.0972***	(0.0117)
Sch=9	2.4154***	(0.2164)	0.3220***	(0.0341)	0.1136***	(0.0362)	0.3333***	(0.1060)	-0.0011	(0.1117)	0.1296***	(0.0114)
Sch=10	2.7225***	(0.2167)	0.3823***	(0.0343)	0.1112***	(0.0376)	0.4146***	(0.1095)	0.0390	(0.1178)	0.1501***	(0.0115)
Sch=11	3.0420***	(0.2160)	0.4320***	(0.0347)	0.1183***	(0.0395)	0.5162***	(0.1144)	0.0918	(0.1239)	0.1679***	(0.0116)
Sch=12	3.2783***	(0.2150)	0.4730***	(0.0330)	0.1435***	(0.0374)	0.5835***	(0.1087)	0.1117	(0.1202)	0.1817***	(0.0112)
Sch=13	3.3834***	(0.2156)	0.5287***	(0.0342)	0.1797***	(0.0423)	0.7177***	(0.1278)	0.2034	(0.1382)	0.2005***	(0.0115)
Wealth of Bride's family=1	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)	0.0000	(.)
Wealth of Bride's family=2	0.0148	(0.0488)	0.0716***	(0.0162)	0.2441***	(0.0185)	1.1221***	(0.0515)	0.9465***	(0.0514)	0.0011	(0.0048)
Wealth of Bride's family=3	0.1573***	(0.0478)	0.1571***	(0.0155)	0.6446***	(0.0194)	2.5414***	(0.0570)	2.0778***	(0.0645)	0.0028	(0.0047)
Daughter Has Male Friends	0.0113	(0.0416)	0.0119	(0.0138)	0.0095	(0.0162)	-0.0381	(0.0504)	-0.0532	(0.0488)	0.0032	(0.0041)
Expect Match with Gov Job									0.2849***	(0.0504)		
Expected Age of Match									0.0491***	(0.0147)		
Expected Education of Match									0.0723***	(0.0172)		
Expected Wealth of Match									0.6260***	(0.0474)		
Constant	8.9729***	(0.3287)	0.2369***	(0.0579)	1.8411***	(0.0638)	1.3460***	(0.1784)	-1.5747***	(0.3817)	0.0074	(0.0183)
Observations	4599		4599		4599		4599		4599		4599	

Standard errors in parentheses
* $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$

Notes: Table presents coefficients and standard errors for OLS regressions of characteristics of the 'expected match' given by respondent on characteristics of hypothetical daughter. Standard errors in parentheses. Significance of coefficients indicated by: * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

Figure A.1: Kernal density plot of groom quality



Notes: Figure plots kernal density of estimated groom quality index, $\mathbf{X}_{irj}\alpha$, over the potential grooms that we presented to respondents in the ex-post experiments.

B Identification & Estimation

B.1 Ex Post Experiment

Conditional on a discount factor, β, parents discounted utility, $\mathcal{U}$, for a known education and marriage profile is given by discounted sum of the flow and terminal payoffs:

$$\mathcal{U}(E, A, \mathbf{X}, \mathbf{Z}, \theta) = \sum_{t:d_t=S} \beta^{t-1} u^S(C) + \sum_{t:d_t=H} \beta^{t-1} u^H(B) + \beta^{A-1} u^M(E, A, \mathbf{X}) \tag{B.1}$$

$$= \sum_{t:d_t=S} \beta^{t-1}(L - C) + \sum_{t:d_t=H} \beta^{t-1} B + \beta^{A-1} u^M(E, A, \mathbf{X}) + \delta\theta \tag{B.2}$$

$$= U(E, A, \mathbf{X}, \mathbf{Z}) + \delta\theta \tag{B.3}$$

where $\mathbf{Z} = [L, C, B]$ and $\delta = (1 - \beta^{A-1})/(1 - \beta)$.

For ease of discussing the assumptions required to avoid perfect multicollinearity, assume $\beta = 1$ for the present discussion (we will use $\beta = .95$ in estimation but do not want our identification results dependent on this). In our

set-up: L is captured by a binary variable $LikeSchool$; C is captured by a binary variable $SchoolCost$; B captured by a binary variable $HelpHome$.

The empirical specification we consider for the deterministic component of preferences is:

$$U(E_{irj}, A_{irj}, \mathbf{X}_{irj}, \mathbf{Z}_{ir}) = \alpha_L LikeSchool_{ir} \times (E_{irj} - 7) + \alpha_S SchoolCost_{ir} \times (E_{irj} - 7) + \alpha_H HelpHome_{ir} \times D_{irj} \tag{B.4}$$

$$+ \sum_a \alpha_a 1(A_{irj} = a) + \sum_e \alpha_e 1(E_{irj} = r) + \mathbf{X}_{irj}\alpha_X \tag{B.5}$$

$$= \mathbf{V}_{irj}\alpha \tag{B.6}$$

where D gives the years out of school before marriage and $E_{irj} - 7$ gives the years in school before marriage.

Note that one cannot include a constant in the flow payoffs to school and being at home as this would introduce multicollinearity with the age of marriage and education dummies in the terminal payoff. Furthermore any fixed payoff to marriage cannot be identified by our framework. Only utility differences are identified and as all options involve a daughter marrying there is no variation in the fixed marriage payoff within a round.

Experimental Error Assumption: The experimental error term is distributed standard normal and is independently and identically distributed across options, rounds and respondents: $\epsilon_{irj} \sim N(0, 1)$.

Heterogeneity Assumption: The heterogeneity in respondents' perceptions of the value of a daughter remaining in the household is distributed standard normal across respondents but is constant across options and rounds for a given respondent: $\theta_i \sim N(0, \sigma_\theta^2)$.

In each round r, respondent i picks the first option over the second ($Y_{ir} = 1$) if it gives her higher utility:

$$Y_{ir} = 1\left(U_{ir1} + \delta_{ir1}\theta_i + \epsilon_{ir1} \geq U_{ir2} + \delta_{ir2}\theta_i + \epsilon_{ir2}\right) \tag{B.7}$$

$$= 1\left(U_{ir1} - U_{ir2} + \nu_{ir} \geq 0\right) \tag{B.8}$$

$$= 1((\mathbf{V}_{i11} - \mathbf{V}_{i12})\alpha + \nu_{ir} \geq 0) \tag{B.9}$$

where $\nu_{ir} \equiv \theta_i(\delta_{ir1} - \delta_{ir2}) + \epsilon_{ir1} - \epsilon_{ir2}$ is the total net unobservable driving the choice of the first option over the second in round r. ν_{ir} comprises both of the random errors associated with each option $(\epsilon_{ir1}, \epsilon_{ir2})$ and the respondent specific heterogeneity (θ_i) weighted by the discounted number of periods the daughter is at home in each option $(\delta_{ir1}, \delta_{ir2})$.

Given our distributional assumptions, the joint distribution of the total net unobservables across the three rounds, $(\nu_{i1}, \nu_{i2}, \nu_{i3})'$ is joint trivariate normal with zero mean and, given the variance of the unobserved heterogeneity σ^2_θ, a variance-covariance matrix Γ_i identified by variation in δ_{ir1} and δ_{ir2} :

$$\begin{pmatrix} \nu_{i1} \\ \nu_{i2} \\ \nu_{i3} \end{pmatrix} \backsim N\left(\begin{pmatrix} 0 \\ 0 \\ 0 \end{pmatrix}, \begin{pmatrix} \gamma_i^{11} & \gamma_i^{12} & \gamma_i^{13} \\ \gamma_i^{12} & \gamma_i^{22} & \gamma_i^{23} \\ \gamma_i^{13} & \gamma_i^{23} & \gamma_i^{33} \end{pmatrix} \right) \tag{B.10}$$

where:

$$\gamma_{rr} = \sigma^2_\theta(\delta_{ir1} - \delta_{ir2})^2 + 2, \qquad r = 1, 2, 3 \tag{B.11}$$

$$\gamma_{rr'} = \sigma^2_\theta(\delta_{ir1} - \delta_{ir2})(\delta_{ir'1} - \delta_{ir'2}), \qquad r \neq r' = 1, 2, 3 \tag{B.12}$$

Thus the variance of the respondent specific heterogeneity, σ^2_θ, the variance-covariance matrix Γ_i of the distribution of the total net unobservables across rounds for each respondent is known. Hence, given characteristics $\mathbf{v_i}$ and parameters α, σ^2_θ the probability that a respondent i makes choices y_{i1}, y_{i2}, y_{i3} is:

$$Pr(y_{i1}, y_{i2}, y_{i3}|\mathbf{v}_i; \alpha, \sigma^2) = \Phi_3\left(w_{i1}(U_{i11} - U_{i12}),\, w_{i2}(U_{i21} - U_{i22}),\, w_{i3}(U_{i31} - U_{i32})|\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2_\theta)\right) \tag{B.13}$$

$$= \Phi_3\left(w_{i1}(\mathbf{v}_{i11} - \mathbf{v}_{i12})\alpha,\, w_{i2}(\mathbf{v}_{i11} - \mathbf{v}_{i12})\alpha,\, w_{i3}(\mathbf{v}_{i11} - \mathbf{v}_{i12})\alpha|\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2_\theta)\right) \tag{B.14}$$

where $w_{ir} = 2y_{ir} - 1$ and $\Phi_3\left(.,\, .,\, .|\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma^2_\theta)\right)$ is the trivariate normal c.d.f. with variance-covariance

matrix $\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3})$ defined as:

$$\Lambda(\Gamma_i, y_{i1}, y_{i2}, y_{i3}; \sigma_\theta^2) \equiv \Gamma_i \circ \begin{pmatrix} 2y_{i1}-1 \\ 2y_{i2}-1 \\ 2y_{i3}-1 \end{pmatrix} \begin{pmatrix} 2y_{i1}-1 & 2y_{i2}-1 & 2y_{i3}-1 \end{pmatrix} \tag{B.15}$$

Across all individuals we can thus define the sample log-likelihood as:

$$log\mathcal{L} = \sum_i log(Pr(y_{i1}, y_{i2}, y_{i3}|\mathbf{v}_i; \alpha, \sigma_\theta^2)) \tag{B.16}$$

We estimate the model by Maximum Likelihood. In doing so we evaluate the c.d.f. of the trivariate normal for each respondent through adaptive quadrature, setting the maximum absolute error on each evaluation to 0.01.

B.2 Ex Ante Experiment

We will here treat preference parameters as known and demonstrate robustness to differences in the location and scale normalisations imposed in the ex post experiment. To build intuition, first ignore the presence of unobserved heterogeneity, $\theta_i \sim N(0, \sigma_\theta^2)$, the distribution of which is identified from the ex-post experiment.

In period $T-1$, all daughters are out of education and thus respondents face a binary decision of whether to accept/reject the marriage offer from a groom of quality $q = \{L, H\}$. The probability of selecting the marriage offer at age $T-1$ with education E, $p_M(T-1, E, q) \equiv p_{T-1}^M(E, q)$, is:

$$p_{T-1}^M(E,q) = Pr\left(\beta u_{T-1}^M(E,q) + \eta_{im} > B + \beta\left[\pi_T(E)u_T^M(E,H) + (1-\pi_T(E))u_T^M(E,L)\right] + \eta_{ih}\right) \tag{B.17}$$

$$= \Phi\left(\frac{\beta(u_{T-1}^M(E,q) - u_T^M(E,L)) - \beta\pi_T(E)\left(u_T^M(E,H) - u_T^M(E,L)\right) - B}{\sqrt{2}\sigma_\eta}\right) \tag{B.18}$$

Thus, inverting the normal distribution function gives:

$$\Phi^{-1}(p_{T-1}^M(E,q)) = \frac{\beta(u_{T-1}^M(E,q) - u_T^M(E,L)) - \beta\pi_T(E)\left(u_T^M(E,H) - u_T^M(E,L)\right) - B}{\sqrt{2}\sigma_\eta} \tag{B.19}$$

Solving for σ_η and $\pi_T(E)$ simultaneously gives:

$$\sigma_\eta = \frac{\beta(u^M_{T-1}(E,H) - u^M_{T-1}(E,L))}{\sqrt{2}\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} \tag{B.20}$$

$$\pi_T(E) = \frac{\beta(u^M_{T-1}(E,H) - u^M_T(E,L)) - \beta(u^M_{T-1}(E,H) - u^M_{T-1}(E,L))\frac{\Phi^{-1}(p^M_{T-1}(E,H))}{\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} - B}{\beta\left(u^M_T(E,H) - u^M_T(E,L)\right)} \tag{B.21}$$

The robustness of our identification results on beliefs to assumptions about the location and scale of the ex-post utilities is clear: any additional separable payoff to marriage always cancels out as only utility differences rather than levels matter. Consider, for example, a fixed payoff to marriage, m:

$$\begin{aligned}\frac{\beta(u^M_{T-1}(E,H) + m - u^M_{T-1}(E,L) - m)}{\sqrt{2}\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} &= \frac{\beta(u^M_{T-1}(E,H) - u^M_{T-1}(E,L))}{\sqrt{2}\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} \\ &= \sigma_\eta\end{aligned} \tag{B.22}$$

$$\begin{aligned}\frac{\beta(u^M_{T-1}(E,H) + m - u^M_T(E,L) - m) - \beta(u^M_{T-1}(E,H) + m - u^M_{T-1}(E,L) - m)\frac{\Phi^{-1}(p^M_{T-1}(E,H))}{\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} - B}{\beta\left(u^M_T(E,H) + m - u^M_T(E,L) - m\right)} &= \\ \frac{\beta(u^M_{T-1}(E,H) - u^M_T(E,L)) - \beta(u^M_{T-1}(E,H) - u^M_{T-1}(E,L))\frac{\Phi^{-1}(p^M_{T-1}(E,H))}{\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} - H}{\beta\left(u^M_T(E,H) - u^M_T(E,L)\right)} &= \\ = \pi_T(E)\end{aligned} \tag{B.23}$$

Further, changing the scale of the ex-post utilities by δ only affects the variance of the experimental error of the ex-ante experiment:

$$\begin{aligned}\frac{\beta(\delta u^M_{T-1}(E,H) - \delta u^M_{T-1}(E,L))}{\sqrt{2}\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} &= \delta\frac{\beta(u^M_{T-1}(E,H) - u^M_{T-1}(E,L))}{\sqrt{2}\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} \\ &= \delta\sigma_\eta\end{aligned} \tag{B.24}$$

$$\frac{\beta(\delta u^M_{T-1}(E,H) - \delta u^M_T(E,L)) - \beta(\delta u^M_{T-1}(E,H) - \delta u^M_{T-1}(E,L))\frac{\Phi^{-1}(p^M_{T-1}(E,H))}{\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} - \delta B}{\beta\left(\delta u^M_T(E,H) - \delta u^M_T(E,L)\right)} =$$

$$\frac{\delta\beta(u^M_{T-1}(E,H) - u^M_T(E,L)) - \delta\beta(u^M_{T-1}(E,H) - u^M_{T-1}(E,L))\frac{\Phi^{-1}(p^M_{T-1}(E,H))}{\left(\Phi^{-1}(p^M_{T-1}(E,H)) - \Phi^{-1}(p^M_{T-1}(E,L))\right)} - \delta B}{\delta\beta\left(u^M_T(E,H) - u^M_T(E,L)\right)} =$$

$$= \pi_T(E) \tag{B.25}$$

We can thus construct the $T-1$ value function as:

$$v_{T-1}(E,q) = \max\left\{ \begin{array}{l} u^M_{T-1}(E,q), \\ \\ B + \beta\left[\pi_T(E)u^M_T(E,H) + (1-\pi_T(E))u^M_T(E,L)\right] \end{array} \right\} \tag{B.26}$$

From above, all elements of $v_{T-1}(E,q)$ are known from choice data. Taking one year further back, $T-2=21$, parents still only have two options: accept a marriage offer or decline and keep the daughter at home. The value function in $T-2$ is defined as follows:

$$v_{T-2}(E,q) = \max\left\{ \begin{array}{l} u^M_{T-2}(E,q), \\ \\ B + \beta\left[\pi_{T-1}(E)v_{T-1}(E,H) + (1-\pi_{T-1}(E))v_{T-1}(E,L)\right] \end{array} \right\} \tag{B.27}$$

Choice probabilities in the ex-ante experiment then take the following form:

$$p^M_{T-2}(E,q) = Pr\left(\beta u^M_{T-2}(E,q) + \eta_{im} > B + \beta\left[\pi_{T-1}(E)v_{T-1}(E,H) + (1-\pi_{T-1}(E))v_{T-1}(E,L)\right] + \eta_{ih}\right) \tag{B.28}$$

As we assume that the distribution of η_{ij} stays constant over time, the only structural function of interest from an identification perspective is $\pi_{T-1}(E)$. Identification follows from the arguments above.

Now consider the final period in which schooling is possible. $v_{t+1}(\cdot)$ is identified and treated as known by the

arguments above. For daughters still in school, choice probabilities then take the form:

$$p_t^M(E,q) = Pr\left(\begin{array}{l} u_t^M(E,q) + \eta_{im} > B + \beta\left[\pi_{t+1}(E)v_{t+1}(E,H) + (1-\pi_{t+1}(E))v_{t+1}(E,L)\right] + \eta_{ih}, \\ u_t^M(E,L) + \eta_{im} > (Like - C) + \beta\left[\pi_{t+1}(E+1)v_{t+1}(E+1,H) + (1-\pi_{t+1}(E+1))v_{t+1}(E+1,L)\right] + \eta_{is} \end{array} \right) \tag{B.29}$$

$$= Pr\left(\begin{array}{l} D_t^{MH}(E,q,Z) - \beta\pi_{t+1}(E)(v_{t+1}(E,H) - v_{t+1}(E,L)) > \eta_{ih} - \eta_{im}, \\ D_t^{MS}(E,q,Z) - \beta\pi_{t+1}(E)(v_{t+1}(E+1,H) - v_{t+1}(E+1,L)) > \eta_{is} - \eta_{im} \end{array} \right) \tag{B.30}$$

$$= \Phi_2\left(\begin{array}{l} D_t^{MH}(E,q,Z) - \beta\pi_{t+1}(E)(v_{t+1}(E,H) - v_{t+1}(E,L)), \\ D_t^{MS}(E,q,Z) - \beta\pi_{t+1}(E)(v_{t+1}(E+1,H) - v_{t+1}(E+1,L)) \end{array} \right) \tag{B.31}$$

where $D_t^{MH} = u_t^M(E,q) - B$ and $D_t^{MS} = u_t^M(E,q) - Like + C$. The bivariate normal has known covariance matrix Σ given prior identification of the variance of the experimental error terms:

$$\Sigma = \left[\begin{array}{cc} 2\sigma_\eta^2 & \sigma_\eta^2 \\ \sigma_\eta^2 & 2\sigma_\eta^2 \end{array} \right] \tag{B.32}$$

The probability of remaining in school is similarly given by:

$$p_t^S(E,q) = Pr\left(\begin{array}{l} D_t^{SM}(E,q,Z) > \eta_{im} - \eta_{is}, \\ Like - C - B + \beta\pi_{t+1}(E+1)(v_{t+1}(E+1,H) - v_{t+1}(E+1,L)) \\ \qquad -\beta\pi_{t+1}(E)(v_{t+1}(E,H) - v_{t+1}(E,L)) > \eta_{ih} - \eta_{is} \end{array} \right) \tag{B.33}$$

$$= \Phi_2\left(\begin{array}{l} D_t^{SM}(E,q,Z), \\ Like - C - B + \beta\pi_{t+1}(E+1)(v_{t+1}(E+1,H) - v_{t+1}(E+1,L)) \\ \qquad -\beta\pi_{t+1}(E)(v_{t+1}(E,H) - v_{t+1}(E,L)) \end{array} \right) \tag{B.34}$$

with covariance matrix as defined above.

Introducing Heterogeneity Again consider period $T-1$, in which all daughters are out of education and thus respondents face a binary decision of whether to accept/reject the marriage offer from a groom of quality $q = \{L, H\}$. The probability of selecting the marriage offer at age $T-1$ with education E, $p_M(T-1,E,q) \equiv p_{T-1}^M(E,q)$, when

beliefs about average preferences are heterogeneous is:

$$p^M_{T-1}(E,q) = Pr\left(\beta u^M_{T-1}(E,q) + \eta_{im} > B + \theta_i + \beta\left[\pi_T(E)u^M_T(E,H) + (1-\pi_T(E))u^M_T(E,L)\right] + \eta_{ih}\right) \tag{B.35}$$

$$= \Phi\left(\frac{\beta(u^M_{T-1}(E,q) - u^M_T(E,L)) - \beta\pi_T(E)\left(u^M_T(E,H) - u^M_T(E,L)\right) - B}{\sqrt{2\sigma^2_\eta + \sigma^2_\theta}}\right) \tag{B.36}$$

Thus, inverting the normal distribution function gives:

$$\Phi^{-1}(p^M_{T-1}(E,q)) = \frac{\beta(u^M_{T-1}(E,q) - u^M_T(E,L)) - \beta\pi_T(E)\left(u^M_T(E,H) - u^M_T(E,L)\right) - B}{\sqrt{2\sigma^2_\eta + \sigma^2_\theta}} \tag{B.37}$$

One can again solve for for σ_η and $\pi_T(E)$ simultaneously from $\Phi^{-1}(p^M_{T-1}(E,H))$ and $\Phi^{-1}(p^M_{T-1}(E,L))$ given that σ^2_θ is identified from the ex-post experiment.

C Structural Estimation of Revealed Beliefs

To estimate beliefs over the probability of a high quality match, we place the following functional form assumptions on $\pi(t,E)$:

$$\pi(t,E) = \Phi\left(M\tau\right) \tag{C.1}$$

where M contains a flexible set of age and education controls.

Taking preference parameters from the ex-ante experiment as given, we estimate τ by Method of Simulated Moments, which extends Minimum Distance Estimation to situations in which there is no closed-form solution to the model of interest.

C.1 Simulation Procedure & Estimation

There are two sources of stochastic variation in our empirical framework. First, we allow for heterogeneity in an individual's perception of average parental preferences, $\theta_i \sim IN(0,\sigma^2_\theta)$. The variance of this error term is estimated from the ex-post experiment (relative to the standard normal experimental error). Second, we allow for an i.i.d experimental error in the ex-ante experiment with unknown variance, $\nu_{ijr} \sim IN(0,\sigma^2_\nu)$. We thus first generate 250

draws from the distribution of heterogeneity in perceptions of average preferences, $\widetilde{\theta}_k \sim IN(0, \sigma_\theta^2)$, and 250 draws from the standard normal distribution for each individual, round and option in the experiment, $e_{ijrd} \sim IN(0,1)$. These draws remain fixed throughout the solution procedure.

For each potential parameter vector $[\gamma, \sigma_\nu]$, we solve the dynamic discrete choice problem outlined in Section 5 conditional on a particular draw of $\widetilde{\theta}$ (i.e. we solve the model 250 times). We solve the model by backwards induction from the maximum age in the model, $T = 23$. As we assume that all daughters must be married in the final period, the age-T value function is found easily. To solve for the value function at younger ages, we discretize groom quality into two, $q = \{H, L\}$, corresponding to whether a potential marriage market match has a government job.

We use the resulting value functions and optimal choice rules to simulate the choices in each round of the experiment for each individual in our sample conditional on a particular draw of heterogeneity, $\widetilde{\theta}_k$. We update our simulated draws of the experimental error to reflect the particular value of σ_ν and then, for each of the $D = 250$ draws of experimental error, we simulate individual choice behaviour as:

$$d_{irks} = \max_{j \in O_{ir}(E_{ir})} \left\{ W(j, E_{ir}, A_{ir}, q_{ir}, Z_{ir}, \widetilde{\theta}_s) + \sigma_\nu e_{ijrs} \right\} \tag{C.2}$$

We then use the resulting simulated data to calculate the simulated moments by averaging over the experimental and perception errors, using the same procedure as is used to calculate the empirical moments.

The procedure for estimating $[\gamma, \sigma_\nu]$ is to select them such that the moments in the data are as close as possible to the similarly defined simulated moments. We target the average marriage acceptance rate within age of marriage-education-government job cells and also the average propensity to keep daughters in education for rounds in which the hypothetical daughter is still in education. Define $\mathbf{m}$ as the vector giving the difference between the empirical and simulated moments. Define $\mathbf{C}$ as a diagonal matrix containing the variances of each of the moments. We do not the 'optimal' weighting matrix, the full variance-covariance matrix of $\mathbf{m}$, as this has been shown to have poor small sample properties (Altonji and Segal 1996). Our structural belief parameters are chosen to minimise the objective function:

$$\min_{\gamma, \sigma_\nu} \mathbf{m}(\gamma, \sigma_\nu) \mathbf{C}^{-1} \mathbf{m}(\gamma, \sigma_\nu) \tag{C.3}$$

This minimisation is carried out using the Nelder-Mead simplex algorithm given that the objective function is discontinuous in parameters and thus a gradient-based search method would perform poorly.

To generate standard errors on the parameters, we bootstrap the whole procedure. We draw respondents (not rounds) with replacement 250 times, recalculating the empirical moments at each iteration.

D Online Appendices

Online Appendix A contains full details of the option generation process and the distribution of characteristics in our discrete choice experiments.Online Appendix B gives the details and transcripts of our qualitative focus group discussions that were used to inform the design of our vignettes and experiments.