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Marriage markets and the rise of dowry in India☆

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ABSTRACT

Dowry payments are common in many marriage markets. This paper uses data on over 74,000 marriages in rural India over the last century to explain why the institution of dowry emerges and how it evolves over time. We find that the proportion of Indian marriages including dowry payments doubled between 1930 and 1975, and the average real value of payments tripled. We empirically test whether four prominent theories of dowry can explain this rise, and find support for only one: increased differentiation in groom quality as a result of modernization. We also find a decline in the average real value of dowry payments after 1975 and demonstrate that this could be rationalized within a search model of marriage markets.

1. Introduction

One of the most significant economic transactions for households across the world occurs at the time of marriage. Dowry, a transfer of wealth from the household of a bride to that of her groom, has historically been a part of marriages across much of Europe and Asia. It is now most commonly practiced in South Asia, where over 80 percent of marriages in Bangladesh, India, and Pakistan include dowry payments (Anderson, 2007a). Dowry payments are typically quite large, with the value of a single dowry typically in excess of a year of earnings. In India alone, we estimate that the total value of dowry payments between 1950 and 1999 was nearly a quarter of a trillion dollars.

Policymakers have frequently attempted to eliminate dowry through legislative measures, but most of these measures proven ineffective. These attempts are in line with previous research documenting numerous negative consequences of dowry, such as encouraging sex-selection (Alfano, 2017; Borker et al., 2017; Bhalotra et al., 2020) and violence against women (Bloch and Rao, 2002; Sekhri and Storeygard, 2014), although some recent research has pointed out that anti-dowry policies could actually make the situation worse (Calvi and Keskar, 2021b,a). Regardless of the intent, any policy-making around dowry is made more difficult by the fact that there is still significant disagreement over why dowry exists and what factors can shift dowry practices: the economics and sociology literature contain numerous plausible and conflicting theories, with little empirical evidence on their validity. In order to design appropriate and effective policy responses to combat dowry, it is critical to understand the underlying determinants of dowry.

In this paper, we use data on over 74,000 marriages in rural India over the twentieth century to explain why dowry emerges and what factors influence its evolution over time. The Indian context is particularly well suited to study the emergence of dowry, both due to the large population affected, and the relatively recent emergence of dowry as a dominant institution in the country. In our data, we observe that dowry was only paid in around 38 percent of observed marriages in the 1920s. By 1975, this figure had increased to 88 percent and has remained at that level since. Between 1945 and 1975, the average size of dowry payments more than tripled, a phenomenon termed as "dowry inflation" (Caldwell et al., 1983; Rao, 1993). We observe that dowry payments were initially driven by an increasing proportion of high value dowry payments, followed by a rightward shift of the distribution of dowry payments itself. The conventional wisdom remains that the magnitude of dowry payments has continued to increase through the present day (Deolalikar and Rao, 1995; Anderson, 2003, 2007a; Bhaskar, 2016), but this is not what our data show. Instead, there appears to have been a decline in large payments between 1975 and 1999, with little movement in other parts of the distribution, meaning that the mean dowry value falls.

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A natural question to ask is what factors cause the emergence and evolution of dowry? While there is a rich theoretical literature on dowry, empirical work has been constrained by the limited availability of data on dowry outside of small or geographically limited samples (Anderson, 2007a). In this paper, we leverage a large and geographically comprehensive data set to examine four prominent theoretical models of dowry and test which, if any, can explain the rise of dowry in India. Each theory has either been cited extensively in the dowry literature (Srinivas, 1956, 1984) and/or published in a "top-five" general interest journal in economics (Rao, 1993; Botticini and Siow, 2003; Anderson, 2003; Anderson and Bidner, 2015).

First, one well-known explanation for increases in the prevalence of dowry in India is the 'Sanskritization' hypothesis (Srinivas, 1984). This theory proposes that dowry was traditionally practiced among upper caste households and spread as lower castes emulated upper caste practices in an attempt to increase their social status (or *'Sanskritize'*). We show that this theory cannot explain the wide-scale adoption of dowry since adoption began at around the same time among both low and high caste groups.

Second, a number of papers link changes in dowry prevalence and size to how population growth affects marriage market sex ratios (e.g. Caldwell et al. 1983, Rao 1993, Billig 1991, 1992, Dalmia and Lawrence 2005, Sautmann 2011). Since men marry at older ages than women, population growth will generate a surplus of women on the marriage market. In the resulting "marriage squeeze", competition over scarce grooms could cause increases in dowry prevalence and payments. Rao (1993) observes a relationship between sex ratios and increased dowry size, but with data from fewer than 200 marriages across 6 villages. We find that changes in marriage market sex ratio do not explain the large changes in the prevalence or size of dowry over the study period. Instead, "marriage squeeze" pressures appear to be relieved by decreasing age gaps between men and women at the time of marriage, as predicted theoretically in Anderson (2007b).

Third, Anderson (2003) proposes a matching model in which dowry inflation results from the process of modernization in a caste-based society. In this model, dowry is an equilibrium payment to match with a groom of a particular value on the marriage market. Brides prefer to marry wealthier and higher caste men, while men only care about dowry. As modernization leads to increased dispersion in wealth, there is a corresponding widening in the distribution of dowry payments. The pressure placed on dowry payments within a particular caste grouping by brides competing from lower castes leads to dowry inflation. We empirically test the key model predictions, but do not find supporting evidence; this is likely due to strong preferences against marrying across caste boundaries (Banerjee et al., 2013).

Finally, we provide evidence that changes in groom characteristics are a major driver of the rise of dowry prevalence and size (Caldwell et al., 1983); this is similar to the mechanism in Anderson (2003), but without cross-caste competition. If dowry is modeled as an equilibrium price to match with a higher quality groom, higher earning grooms will command higher dowries. During the 1930s and 1940s, there was an expansion in educational and economic opportunities for Indian men, which increased the number of high quality grooms. Aggregate dowry payments will then rise as the number of such men on the market increases, consistent with the theoretical frameworks in Anderson (2004) and Anderson and Bidner (2015).[1]

Our data contain information on multiple marriages within the interviewed households. We use this variation to test this specific theory and the broader framework of dowry as groom price under very demanding regression specifications. Specifically, we take advantage of the variation in dowry payments between immediate family members of the same household on the marriage market within the same five-year time period, to show that higher quality grooms, as measured by their educational attainment, receive substantially larger dowry payments. Taking advantage of the caste-based segmentation in Indian marriage markets, we demonstrate that this is not due to a groom's "rank" relative to other grooms on the marriage market, but their absolute level of quality . This implies that dowry inflation will occur as the pool of high quality grooms expands, supporting this explanation. To benchmark the extent to which this theory can explain the observed changes in dowry, we estimate the returns to groom education with regards to dowry amount in five year intervals from 1930 to 1980. Multiplying those returns by the changes in average groom educational attainment over each of those periods, we find that changes in the groom educational distribution can explain over two-thirds of the observed rise in dowry amounts.

One remaining puzzle is trying to understand the decline in high value dowry payments after 1975. We consider how the presence of search frictions can produce such a trend as compared to standard matching models. In such a search model, potential grooms and brides are randomly matched and bargain over dowry. Grooms are differentiated on quality, and marriages between a bride and a high quality groom produce a greater marital surplus. If a matched potential bride and groom agree on a dowry, they marry, and if not, they are randomly re-matched to other unmatched individuals. A bride is willing to pay a higher dowry to marry a high quality groom rather than re-match with a potentially lower quality groom and so high quality grooms receive larger dowries. However, as the proportion of higher quality grooms on the marriage market increases, there is a higher probability of a bride meeting a high quality groom if she rematches, and the dowries commanded by higher quality grooms decrease. We find this exact pattern in the data: as the pool of educated grooms in a marriage market increases, there is a decrease in the dowry premium that more educated grooms receive. We investigate other potential explanations for the pattern, such as the growth of female educational attainment over this period, but our estimates suggest that this does not drive the results. While other factors may also be responsible, and female educational attainment is likely increasingly important in more recent years, the search mechanism appear to be at least one factor in the evolution of dowry payments between 1975 and 1999.

Our paper makes a number of contributions to the literature. First, we provide novel facts on how dowry in India has evolved throughout the twentieth century. These complement, but also often contrast with the small empirical literature on historical dowry in India, which has been based on data sets that are either relatively small, do not span all of India, or do not cover the period of dowry inflation. To the best of our knowledge, this is the first paper to quantitatively document the adoption of dowry (as opposed to changes in the size of dowry among those paying dowry) and how the distribution of dowry payments has changed over time.[2] Dowry has been shown to affect a wide range of

[1] We do not formally test one other theory, from Botticini and Siow (2003), which argues dowry is a bequest to daughters from parents. This is because it is hard for bequest motives to rationalize the rapid and massive increase in the size of dowry in India: such an increase would have to come either from increases in family wealth, which are small over that period, or the desire to provide daughters with a greater share of the inheritance, which is inconsistent with other family investment decisions. See Online Appendix Section E.6 for further discussion of why this theory is unlikely to explain the observed patterns here (Chiplunkar and Weaver, 2023).

[2] Rao (1993) and Edlund (2000) use a data set of less than 200 observations from six villages to examine average dowry size. Sautmann (2011) uses data on 375 marriages from one state, while Arunachalam and Logan (2014) uses the same data set as Rao (1993) and Edlund (2000), as well as data from two other states that focus on the period after the rise of dowry. Dalmia (2004) uses data from two states, with data from mostly after the period of dowry inflation. Anukriti et al. (2022) use the 2008 round of the REDS data to document trends in the average size of dowry payments across India between 1986 and 2007, after the period of dowry inflation. Other papers have used the 1999 REDS data to study aspects of dowry other than historical trends, such as how it is affected by related legislation (e.g. Roy, 2015; Alfano, 2017; Calvi and Keskar, 2021b) and trade liberalization (Chakraborty, 2015).

economic activities and behaviors (Bloch and Rao, 2002; Sekhri and Storeygard, 2014; Borker et al., 2017; Bhalotra et al., 2020; Anukriti et al., 2022), and so a better understanding of the evolution of dowry in India can help explain historical shifts in practices such as sex selection. It also may inform understanding of other economic phenomena for which there has been less work on the direct role of dowry, such as relative investments in female and male children.

Second, due to the paucity of data on dowry payments and marriage patterns, much of the economics literature on the causes of dowry has been theoretical, particularly in the case of India (Anderson, 2003, 2007b; Anderson and Bidner, 2015; Bhaskar, 2016). Our paper helps explain the emergence of dowry in India, similar to how Ambrus et al. (2010) demonstrate that legal changes in marriage contracts explain the emergence of dowry in Bangladesh.[3] We show that the mechanism underlying the matching model of Anderson and Bidner (2015) can explain the rise of dowry, and augmenting the model with search dynamics provides additional insights on explaining the evolution of dowry post 1975. More generally however, understanding the theoretical underpinnings of dowry matters for the design of anti-dowry policies: for example, if we had found that dowry emerged for social signaling reasons (Sanskritization), then a policy recommendation for anti-dowry campaigns would be to focus on changing norms among higher status individuals. Instead, the economic logic of dowry as groom price suggests that the many existing campaigns to change norms around dowry may be less effective. It is also informative as to why policies to ban dowry may have negative unintended consequences (Calvi and Keskar, 2021b,a).[4]

The remainder of the paper is organized as follows. Section 2 discusses the data, while Section 3 uses the data to document stylized facts on the evolution of marriage markets in rural India since 1930. Section 4 provides tests of existing theories of dowry, as well as testing a new competitive search model of Indian marriage markets. Section 5 offers a short conclusion.

2. Data

2.1. Data on dowries

Our analysis is primarily based on data from the Rural Economic and Demographic Survey (REDS), a detailed panel survey of rural households conducted by the National Council of Applied Economic Research (NCAER) across the 17 most populous states in India.[5] The 1999 round of the survey collected detailed retrospective information on the marriages of the household head, their parents, brothers and sisters, and their sons and daughters, which we combine to generate a data set of over 74,000 marriages.[6]

The REDS data reports the nominal value of gifts and cash transfers from the household of the bride to that of the groom at the time of marriage, as well as from the household of the groom to that of the bride.[7] As is standard in the literature (e.g. Rao 1993, Edlund 2006), we define the value of dowry as the *net value* of gifts/payments, i.e. the value of transfers made to the household of the groom minus the value of transfers made to the household of the bride.[8] We use the wholesale price index to convert these into *real* values and therefore, study the evolution of the ***net real value*** of dowry over time.[9] The REDS data also contain information on marriages for deceased family members, avoiding mortality-related attrition. Lastly, while the 2008 round of the REDS survey collected similar data on dowry, this paper will primarily use data from the 1999 wave for reasons described in Online Appendix C.[10]

The REDS data have substantial advantages relative to data sources used in earlier empirical work on dowry in India. Most empirical articles on dowry in India have been based on data collected in 1983 by the International Crops Research Institute for Semi-arid Tropics or ICRISAT (e.g. Behrman et al. 1999b, Deolalikar and Rao 1995, Edlund 2000, 2006, Rao 1993, Rosenzweig and Stark 1989). These data contain fewer than 200 observations of dowry between 1923 and 1978 from six villages in South India (see Edlund 2006 for descriptive statistics). These may not be representative of larger trends across the country given India's cultural and regional heterogeneity. Another source of data was collected from two Indian states by the NCAER in 1995 (Anderson, 2007a; Dalmia, 2004; Dalmia and Lawrence, 2005; Sautmann, 2011). We also do not use this data given its limited geographic and temporal coverage before 1970, when most of the changes in dowry practices occur. Online Appendix Section C.1 provides detailed information on these data as well as others that we do not consider given the scope of this paper.

Despite significant advantages, there are some limitations of using the REDS that we discuss below. First, there were inconsistencies in how the 1999 REDS surveyors administered questions related to dowry in five states (Andhra Pradesh, Gujarat, Maharashtra, Orissa and Tamil

[3] Ambrus et al. (2010) show that the emergence of dowry in Bangladesh is the result of legal changes around the *mehr*, which governs transfers at the time of divorce in Muslim marriages. This legal shift did not occur in India, and most Indians are Hindu, so other factors must explain the rise of dowry in India.

[4] We omit discussion of a few theories in the paper for brevity, but discuss them in Online Appendix Section E.6 (Chiplunkar and Weaver, 2023). For example, dowry may spread if it is adopted as a cultural norm from which deviation is socially costly. We show that within-household patterns in dowry payment are inconsistent with such a norm. Dowry payments may also track the price of commodities typically given as part of dowry, such as gold. However, gold prices were almost completely stable between 1945 and 1967, so could not have influenced the rise of dowry in the 1950s and 1960s (World Gold Council, 2019).

[5] Data was collected in 1969–1971, 1982, 1999 and 2008. The original sample of villages was drawn in the first round and was meant to be representative of the rural population in India in those states. All households (including splits) were followed over time and information was collected on all their deceased members. The 17 surveyed states contain roughly 96% of the population of India. Since this is a rural sample, our results may not extend to urban areas. However, over 85% of the observed marriages are from a period before the Indian urbanization rate was at even a quarter, so this describes most of the population.

[6] Table B1 provides a detailed breakdown of all marriages by decade and state.

[7] Dowry typically includes cash payments and physical items. The 1994 Survey of Women and Fertility (SWAF) asked couples about whether particular items were given as dowry in their marriage. Nearly all had given jewelry (91%), kitchen utensils (94.5%), and clothing (95%), while other relatively common items include furniture (49%), radios (33%), and bicycles (32%). Land is almost never part of dowry (1.2%).

[8] This is as opposed to the *gross value* of the transfers from the bride's household to that of the groom, which does not subtract the value of transfers made by the groom's household to the bride. Using either gross or net dowry has little effect on the results since the value of transfers from the bride's household to the groom are much larger than those from the groom to the bride. In online Appendix Section C.5, we show that the temporal patterns between gross and net dowry are virtually identical, and all of our results are robust to using gross dowry.

[9] We prefer the wholesale price index since it incorporates many relevant goods and has a long, consistently measured time series. Some other papers have used price indices based on gold (Rao, 1993) and rice (Arunachalam and Logan, 2014). There is a large spike in the price of gold in 1980, so it is hard to compare before and after 1980 with a gold-based price index. For 1900–1950, we use wholesale price index data from pg 685 of Singh (1965). For the period 1939–1950, we cross-check this with data from other sources and find it to be consistent. For 1950 to 1970, we use data from the Office of the Economic Advisor, and for 1970–2013, from the Reserve Bank of India.

[10] The 2008 wave is sometimes referred to as the 2006 round of the REDS survey, but 84% of responses are from 2008, so we refer to it as the 2008 round in this paper.

Nadu; see Online Appendix C.2 for details). In those states, we can observe *whether* dowry was paid, but do not consistently observe the *amount* of the payment. In the main tables of the paper, we use data from these five states when examining whether dowry was paid in a marriage, but drop them in any analysis on the size of dowry payments. For the remaining states (which account for almost 70 percent of India's population), we consistently observe both whether dowry was given and the amount. Online Appendix C.3 replicates all of our main results with two alternative approaches: first, we re-run our analysis using data on dowry from the 2008 round of the REDS survey to replace the 1999 data for those five states. Second, we drop these five states from all of the analysis. Neither approach significantly changes our findings, indicating that this should not be a major concern for our analysis.[11]

2.2. Recall bias in dowry data

Given the lack of extant historical data on dowry, the data on dowry payments in the REDS is retrospective. One concern is that respondents may not accurately recall dowry transactions. There are numerous reasons to think that recall bias should be modest. First, the importance of marriage makes events around this time particularly salient to households. The rate of missing data on dowry payments is quite low (5% of marriages), consistent with recall being good. Second, the substantial size of dowry payments makes it likely that respondents recall them, similar to asking a homeowner what they had paid for their house; for example, the median dowry payment is around 1–2 times the average annual rural male earnings.

We also conduct two tests to examine the extent of recall bias. The first test takes advantage of the panel nature of the REDS survey to test for a systematic recall bias that increases over time. Since respondents were interviewed in 1999 and 2008 and asked similar questions about dowry payments, a systematic recall bias would lead to differences in responses between the 1999 and 2008 waves of the survey. Ideally, we would compare the recall for a particular marriage across the 1999 and 2008 waves, but it is not possible to match marriages across waves of the REDS. We instead take the full distribution of nominal dowry size for each state within five year bands for each wave of the survey (e.g. the distribution of dowry payments in Bihar between 1960–64 in both the 1999 and 2008 waves). We calculate five percentiles of that distribution (20th, 35th, 50th, 65th, 80th) for each state in each five year period and regress the 1999 wave percentiles of the distribution on the 2008 percentiles (e.g. 20th percentile of the dowry distribution in Bihar in 1960–1964 in the 1999 data as compared to the 20th percentile of the dowry distribution in Bihar in 1960–1964 in the 2008 data). This is a relatively stringent test since we not only focus on the central moments, but also other parts of the distribution. We cannot reject the null hypothesis that the values of the percentiles of the dowry distribution are on average the same between the two waves, i.e. that the coefficient is equal to one (Column 1 of Table B2).[12] This does not preclude that classical measurement error may be increasing over time, but suggests that recall is not systematically biasing our estimates of dowry payments upwards or downwards. In Column (2), we add an interaction term to test for recall bias as a function of the number of years since the marriage. There is no systematic bias that is increasing in the number of years since the marriage either.

We also use an alternative data source, the Survey of Women and Fertility (SWAF), for a second test of the measurement error in recall of dowry payments over time. This data was collected between 1993–1994 in the states of Tamil Nadu (1551 households) and Uttar Pradesh (895 households) and contains retrospective data on marriages. In particular, it separately interviews husbands and wives and asks them identical questions about whether particular items (land, jewelry, cash, vehicles, household assets, furniture, utensils, livestock and clothing) were part of dowry in their marriage. If there is significant measurement error in recall of dowry, we would expect that the answers of the two would be poorly aligned: in the extreme case where individuals have no recall of dowry gifts and were randomly selecting yes or no for each response, they would only match half of the time. Instead, their responses match in 87.8 percent of cases. There is also nearly no decline in match rates between couples with the earliest marriages in the data (between 1970–1975) and those whose marriages were within a year of the survey (Figure A2). This increases our confidence that while recall might be poor for less significant economic transactions, it appears to be excellent for a transaction as important as dowry.

Another possible concern is that even if the REDS sample is representative at the time of sampling in 1971, it will not be a representative sample of marriages in other years — for example, a parent married in 1940 who has many surviving offspring will be more likely to observed than one who has fewer children. To assess the extent of this concern, we reconstruct the main descriptive figures in the paper with a sample reweighted by family size (Online Appendix A8). We find that they are virtually identical to the unweighted versions, indicating that the correlation between family size and dowry is not so large that this would significantly bias our analysis of dowry trends.[13]

2.3. Population and descriptive data

We combine the REDS data with two other data sources that measure demographic factors relevant to marriage markets. The first of these is the Census of India, a survey of all Indian households conducted every 10 years by the Government of India. For example, in our analysis on how sex ratios affect dowry (Section 4.2), we construct sex ratios using the district-level population counts of men and women in different age groups from the four Census rounds between 1961–1991.

The second data set is the National Sample Survey (NSS), a large, nationally representative, repeated cross-sectional survey administered by the Government of India. We use NSS data to estimate the distribution of educational attainment of men and women on the "marriage market" in a given year. We pool five NSS rounds (Rounds 38 [1983], 43 [1987], 50 [1993], 55 [1999], and 62 [2005]) that collect information on every member of a surveyed household, including state of residence, broad caste grouping, religion, gender, education and birth year. This generates a data set of 2.4 million observations, which we re-weight to produce representative figures for the entire population. For our analysis using these data, we define the marriage market as being within a particular year, state, religion, and caste group. The pool of men and women defined to be "on the marriage market" in a given year is women between the ages of 13–20, and men between the ages of 18–25.[14] On average, data from 1368 men and 1422 women are used

[11] Trends in whether dowry was paid are also similar for the five states and the rest of India (Figure A1), suggesting that the descriptive statistics on trends in dowry amount should generalize well to all of India.

[12] The coefficient indicates that dowry payments are slightly larger in the 1999 wave, but the difference is not significantly different from 1.

[13] A related concern is the possibility of attrition due to mortality. Fortunately, the REDS data contains information on marriages for deceased family members, and so avoids attrition due to mortality, but it is possible that recall of dowry for those marriages is worse. Online Appendix Section C.4 shows that if we restrict to only marriages of those still alive at the time of the REDS survey in 1999, aggregate trends in dowry amounts are similar, and all of main results remain the same.

[14] Note that we can use these finer age ranges because exact age is available in this data, whereas in the census data, it is only available in five-year age bins. In cases where the NSS data contains fewer than 100 men or 100 women in a particular state-religion-caste-marriage year, we do not estimate the distribution of educational attainment due to concerns about accuracy. In practice, results are nearly identical if we include these cases since the restriction affects less than 1500 cases.

to estimate the distribution of educational attainment in a particular state-religion-caste-year.[15]

3. Marriage markets in India: 1930–present

3.1. Marriage practices

Marriages in India are nearly all monogamous with fewer than 1 percent ending in divorce (National Family Health Survey, 2006). Parents play an important role in marriage decisions — in over 90 percent of marriages between 1960 and 2005, parents chose the spouse (Indian Human Development Survey, 2005). Over 90 percent of couples live with the husband's family after marriage, and over 85 percent of women marry someone from outside their own village (Ibid). While brides move outside of their village, they do not move far — 78.3 percent of marriages are within same district (REDS, 1999), with an average travel time of 3 h from the household of the bride to that of the groom (Indian Human Development Survey, 2005).[16] One of the most significant features of the Indian marriage market is caste. Indian society has traditionally divided individuals in different sub-castes (*jatis*), based on the traditional occupation of an individual's ancestors within a village economy (e.g. leather workers, blacksmiths). Individuals have a strong preference for marrying within their own *jati*, or sub-caste group (Dugar et al., 2012; Banerjee et al., 2013). In fact, Banerjee et al. (2013) find that the preference is so strong that a woman would be indifferent between a husband from the same *jati* with no education and a husband from a different *jati* with a master's degree. The prevalence of marriages across caste boundaries is incredibly low in rural areas, with only 6 percent of marriages occurring between individuals from different sub-castes. There is no change in inter-caste marriage in rural areas between 1930 and 2011, with only a slight increase of 2 percentage points in urban areas (Figure A3).

3.2. Dowry prevalence and size

Since the seminal work of sociologist M.N. Srinivas, the conventional wisdom has been that dowry payments became larger and more prevalent in India over the twentieth century (Srinivas, 1976, 1984; Rajaraman, 1983; Billig, 1992). To the best of our knowledge, there has not been any quantitative documentation of an extensive margin shift towards dowry, and work on changes in average dowry size have been based on small and non-geographically representative samples. Using the 1999 wave of the REDS data, we document three stylized facts on the evolution of dowry payments in India:[17]

Fact #1: On the extensive margin, there was a rapid increase in the prevalence of dowry payments between 1935 and 1975. After 1975, dowry payments were nearly universal.

Fact #2: On the intensive margin, dowry payments increased across all parts of the distribution between 1945 and 1975. This was initially driven by an increase in mass in the upper tail of the distribution (i.e. larger dowry payments), followed by a shift in the bottom half of the distribution. Post-1975, there was a decline in larger dowry payments, but the rest of the distribution remained unchanged.

Fact #3: Median dowry payments were around twice the average annual rural male earnings in the 1960s. Payments (as a fraction of income) have declined over time and were around 1.2 times the average annual rural male earnings in 1990.

Fig. 1(a) shows the prevalence of dowry over time (Fact #1). Before 1930, only 38 percent of households engaged in the payment of dowry (defined as a positive net dowry payment), which increased to 88.2 percent by 1970, and has remained relatively steady since then.[18] The timing of adoption is consistent with ethnographic evidence, such as Srinivas (1976) noting the adoption of dowry in Karnataka in the 1940s.[19]

One concern is that the pattern could be produced by poor recall, where individuals have systematically worse recall in earlier periods and hence state they did not pay dowry. However, the data separates non-payment and non-recall of dowry, and the rate of non-recall is quite low. Moreover, it is not skewed towards older/earlier marriages either (Online Appendix Figure C1).[20]

Turning now to the size of dowries, the existing literature has focused on the change in the *average* dowry payments, with the common wisdom that it has increased over time (Billig 1991, 1992, Epstein 1973, Rajaraman 1983, Bhaskar 2016; see Anderson (2007a) for a review). Quantitative evidence from Rao (1993) using the ICRISAT data concurs with this as well. Instead, we consider the evolution in the size of dowry payments between 1930 and 1999 using the 1999 wave of the REDS data, which has two key advantages over existing research. First, the coverage is broader and more representative, as discussed previously. Second, we can examine how the *distribution* of dowry payments has changed, as opposed just the average payments, which could shed light on interesting patterns in the data that are masked by the central moments.

Fig. 1(b) plots the median real dowry payment in thousands of rupees as a three year moving average (normalized to real value in 2010).[21] Median dowry size steadily rose in the post-1945 period, from Rs. 4,324 in 1944 (real value in 2010 rupees, equivalent to roughly US$96) to Rs. 18,088 in 1975 (real value in 2010 rupees, equivalent to roughly US$401). However, it has not consistently grown in real value since around 1975. This is in stark contrast to popular accounts, which suggest steady increases in dowry payments over time. This discrepancy may be attributable to thinking in nominal rather than real terms (Shafir et al., 1997), as there have been large increases in nominal dowry payments over time. However, as we will show later, the value of dowry payments as a fraction of average earnings has indeed declined post 1975.

[15] The NSS data is not representative at the district level, but is at the state level. We thus only use the NSS for state-level estimates rather than using the district identifiers.

[16] Despite advances in communications technology, there has been no change in the average distance between bride and groom households over time (see Online Appendix Section E.8 (Chiplunkar and Weaver, 2023)). This is consistent with earlier literature on the role of social connections in screening partners (Rosenzweig and Stark, 1989).

[17] A limitation of this analysis is that the REDS data is only from rural areas and so may not represent what is happening in urban areas. A large majority of the Indian population lived in rural areas over our study period (from 82.7% in 1951 to 80.1% in 1971 to 74.5% in 1991), so this still represents the experience of most Indians. However, Online Appendix Section E.2 uses data from the IHDS and the Census of India 2011 to delve into the evolution and integration of urban and rural marriage markets (Chiplunkar and Weaver, 2023). We find that patterns in urban and rural marriage markets appear to be similar, so it may be that trends in rural areas also reflect what is happening in urban areas.

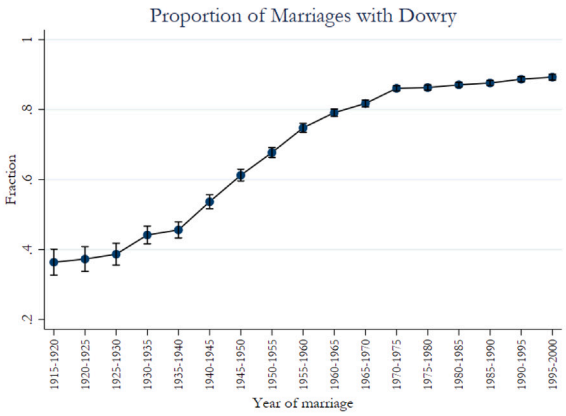
[18] Online Appendix Figure A1 shows the geographical heterogeneity in adoption of dowry.

[19] Approximately 3 percent of marriages in the data set involved a negative net dowry payment (brideprice). These are typically much smaller in absolute value than dowry payments. For the analysis on dowry payment, we code these as non-payment of dowry since our paper is broadly interested in the shift to dowry practices from either non-payment of dowry or bride price.

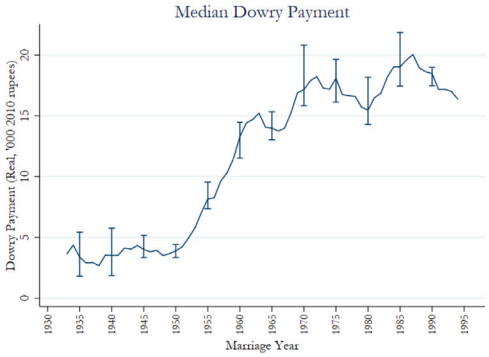
[20] Another concern is the survival of households over decades, where marriages who produced more surviving offspring will be over-represented. Our results are virtually identical when we re-weight households by family size to account for the over-representation of larger households with more surviving offsprings (Figure A8), so this cannot explain the observed aggregate trends.

[21] Non-payment of dowry, i.e. a dowry payment of zero, is included in this median as well as when calculating all of the other summary statistics used in the paper related to dowry size.

(a) Prevalence of Dowry



(b) Dowry Payment By Year of Marriage



(c) Dowry Payments and Annual Household Earnings

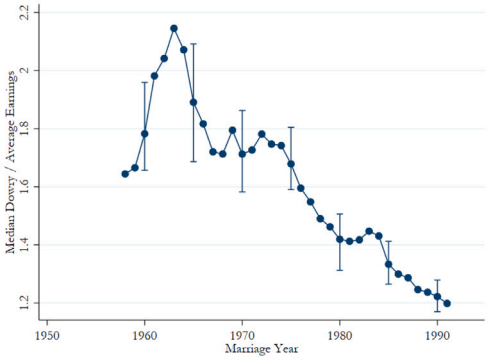


Fig. 1. Evolution of Dowry from 1930–1995

Notes: Figure (a) plots the proportion of marriages in which dowry was paid over a given five year period. Figure (b) plots a three-year moving average of median real dowry payments in each year between 1930 to 1999. Figure (c) plots a three year moving average of median dowry as a proportion of average household earnings from 1960 to 1991. The average household earnings are calculated using the average daily rural agricultural wage at the state level from the relevant NSS round. The bars in all figures correspond to bootstrapped 95% confidence intervals around the estimates at 5 year intervals.

Fig. 2 plots the full probability density function of dowry payments by decade between 1940 and 1999. In the 1940s and 1950s, the median of the distribution shifted upwards, along with some increase in the upper tail as well. Between the 1950s and 1960s, the entire distribution of dowry payments shifted outwards, with the largest increase in the upper tail of the distribution. Starting in the 1970s, there an inwards shift of the upper tail of the distribution, an outwards shift around the 60th–70th percentile of the payment distribution, and stagnation elsewhere. After the 1970s however, there is a clear decline in dowry in the upper tail of the distribution, with no major changes in the lower tail. As a result, the mean dowry has declined over that period, which we will discuss in greater detail in Section 4.4. In all cases, we can easily reject equality of the distribution of dowry payments across each decade and the decade preceding it (Kolmogorov–Smirnov p-value <0.001 in all cases).

Next, we document trends in dowry payment as a fraction of average annual earnings. These earnings are calculated as the average daily rural agricultural wage by state, using the National Sample Surveys between 1960 and 1995. We use rural wages since the REDS data is entirely rural in its coverage. Since wages in the NSS and dowry in REDS are both in nominal terms, we divide the reported dowry payment by the average daily rural agricultural wage multiplied by 300 (approximate working days per year). Using a three-year moving average, Fig. 1(c) shows that dowry payments have declined as a fraction of average annual earnings. Nonetheless, median dowry payments are still substantial — around one to two times the annual average income of rural males.

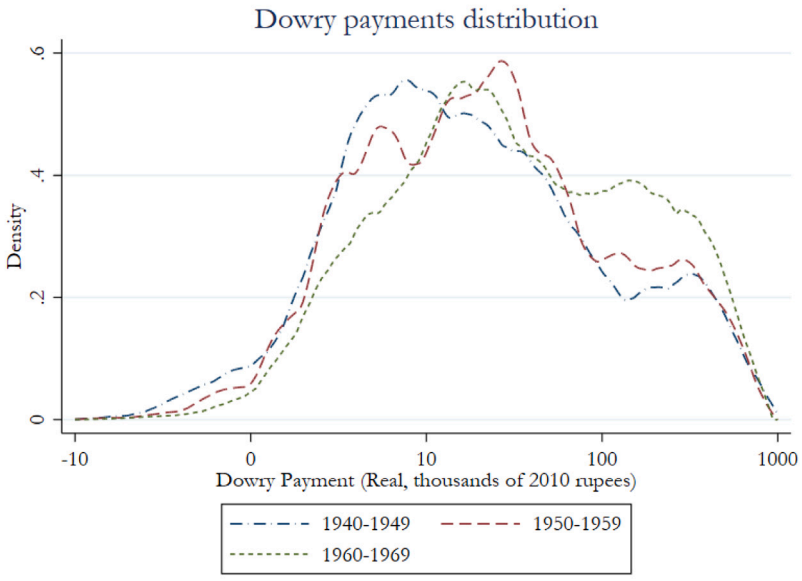
Finally, we combine the data on dowry size with demographic information from the Census of India to estimate the approximate size of the dowry market between 1950 and 1999. Based on the REDS data, 27% of women married before the age of 15 over this time period, 56% of women married between the ages of 15–19, and 14% of women married between the ages of 20–24. To get a rough estimate of the number of marriages in each five year period, we multiply these figures by the Census of India count of the total number of women in each of those age ranges over the relevant period. We then multiply the estimated number of marriages in a given period by the proportion of marriages with dowry and the average size of dowry payments in that period. Summing across all the periods, we estimate that the total real value of dowry payments between 1950 and 1999 was $247 billion US dollars, or nearly five billion dollars annually.

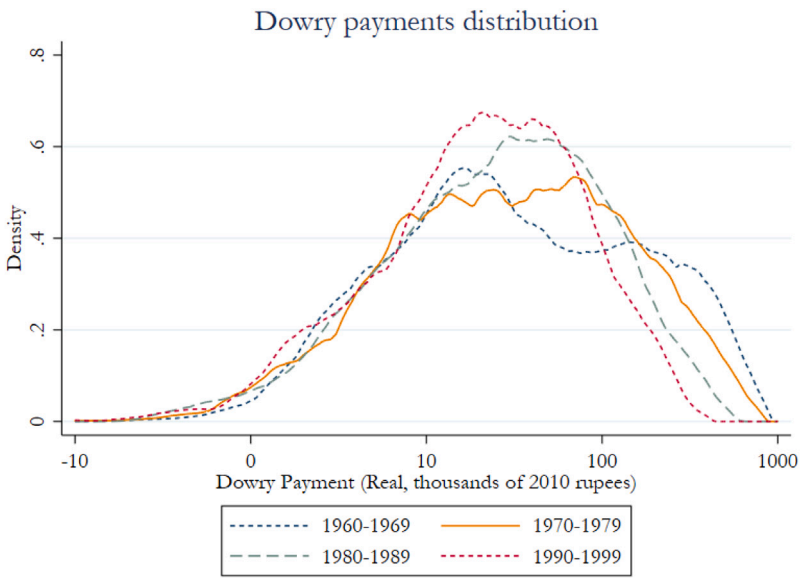
4. Empirical examination of theories of dowry

As discussed before, there is a rich theoretical literature on the evolution and prevalence of dowry practices, especially in India. Most theories model dowry as a price in a two-sided marriage market, where brides pay higher prices to match with better quality grooms (Becker, 1973).[22] However, due to the lack of comprehensive data on dowries,

[22] Depending on the relative values of brides and grooms, payments might instead go from the groom's family to the bride's family (bride price); the direction of payments has implications for investment behavior (Ashraf et al., 2019; Corno et al., 2020; Vogl, 2013).

(a) Dowry payments 1940-1979





(b) Dowry payments 1970-2000

Fig. 2. Distribution of dowry payments
Note: This figure plots the entire distribution of log real dowry payments for each decade between 1940 to 1969 in Figure (a) and 1960 onward in Figure (b). Broadly, the dowry payments distribution is shifting to the right in Panel (a), while in Panel (b), there is an inwards shift of the upper tail of the distribution..

there has been a limited empirical examination of these theories. The spirit of the discussion in this section is using the REDS data to empirically examine the insights of these theoretical models and thereby better understand why dowry exists.[23]

4.1. Sanskritization

One of the most widely cited theories in Indian sociology is that of Sanskritization, first proposed by Srinivas (1956) during his field

[23] One theory that we do not formally test is the bequest theory of Botticini and Siow (2003). Even without formal tests, it is clear that theories of bequest cannot rationalize the rapid and massive increase in the size of dowry in India: such an increase would have to come either from increases in family wealth, which are small over this time period, or the desire to provide daughters with a greater share of the inheritance, which is inconsistent with other family investment decisions. See Online Appendix Section E.6 for a discussion of this theory (Chiplunkar and Weaver, 2023).

research in rural villages of Karnataka in the late 1940s and 1950s. The theory states that Brahmins, the priestly caste, traditionally carried out a number of practices that reinforced their elevated caste status, such as payment of dowry, vegetarianism and particular forms of dress. Lower castes then began emulating these practices, including dowry, in order to increase their ranking in the caste hierarchy. Other authors have disputed this explanation for dowry on theoretical grounds,[24] but to the best of our knowledge, no study has quantitatively tested it.

Sanskritization has two main testable predictions with regards to dowry. First, if Sanskritization is to explain the wide scale adoption of dowry, i.e. the observed increase of over 50 percentage points, dowry payments historically must have been relatively rare in lower caste marriages and common in upper caste marriages. Fig. 3 reports the proportion of marriages with dowry payments (defined as a net positive payment to the household of the groom) over time across four caste groupings in the REDS data. Even in the early time period, upper caste marriages had only modestly higher rates of dowry payments. Table B4 formally tests this by regressing an indicator for whether a marriage included dowry payments on an indicator for caste grouping, as well as district and year fixed effects. Panel A compares Brahmin to non-Brahmin marriages, while Panel B divides into general caste (including Brahmins) and lower caste. The difference between Brahmin and non-Brahmin marriages is not statistically significant prior to the 1930s, although this may be due to a lack of statistical power. Upper caste marriages were indeed slightly more likely to involve dowry in the pre-1930 period (Panel B of Table B4), but the small difference (5.2 percentage points) is inconsistent with dowry historically being an exclusively upper caste institution.

A second testable prediction of Sanskritization is that the wide scale adoption of dowry comes from increased adoption among lower caste marriages. Fig. 3 shows that all caste groups adopt dowry at similar rates until peaking at near universal adoption of dowry around 1975. Based on Table B4, we cannot reject that the difference in dowry prevalence across lower and upper caste marriages, or Brahmin and non-Brahmin marriages was the same in the 1930s–1940s (2 and 1.6 p.p. respectively) as it was in the 1970s–1990s (1.5 and 0.9 p.p.), which is inconsistent with the overall rise of dowry coming from low caste emulation of upper caste practices.

Put together, we conclude that it may be that lower caste individuals began to emulate upper caste practices other than dowry, but Sanskritization cannot explain the broad adoption of dowry practices over the past century.

4.2. Marriage squeeze hypothesis

A prominent strand of the dowry literature attributes the shifts in Indian dowry practices to a *'marriage squeeze'*. This theory, initially proposed by Caldwell et al. (1983), notes that in India, as in many other developing countries, women typically marry at younger ages than men. As a result, if the population of a country is growing, the cohort of men on the marriage market is smaller than the cohort of women. This could lead to increased competition over limited men, thus increasing dowry payments.

Using the decadal Census of India data between 1961–1991, Figure A4 in the Online Appendix plots: (i) the approximate marriage market sex ratio i.e., the number of women aged 10–25 divided by the number of men aged 15–30; (ii) the aggregate population sex ratio i.e., the number of women of all ages divided by the number of men of all ages; (iii) the population sex ratio for ages 0–5 and 5–10 years i.e., the number of women in the age groups 0–5 (or 5–10) divided by the number of men in the same age bin. We find that though the population sex ratios (defined in (ii)-(iv) above) are relatively steady over time, the marriage market sex ratio increased prior to 1970 and then decreased, consistent with the timing of changes in dowry discussed in Section 3.2.

On the other hand, there are reasons why dowry practices may not respond to population growth and sex ratio imbalances. Imbalances can be relieved through changes in the age of marriage, where women may marry later or men may marry earlier to equilibrate the market (Bergstrom and Lam, 1991). Foster and Khan (2000) show that even small changes in age of marriage can equilibrate large cohort size differences, as well as demonstrate that the nature of shift in ages will differ across static and dynamic models. The static model of Anderson (2007b) expands upon these models to explicitly incorporate dowry and argues that the marriage squeeze will not cause dowry inflation, but only shift the age at which individuals marry. Bhaskar (2016) further extends this model in a dynamic setting to incorporate the impact of persistent and transient population growth on the equilibrium age gap and size of dowry. He shows that persistent population growth will not affect the age gap, but there will be an increase (decrease) in dowry paid with positive (negative) growth of cohort size. Furthermore, a transitory shock to cohort size could affect both age gaps and dowry sizes of the nearby cohorts, and the dynamic adjustment will depend on how sensitive cohorts are to age considerations. It is unclear which type of shock is empirically relevant in this context since prospective brides and grooms are unlikely to observe aggregate changes in population growth outside of their local areas and/or know whether those are transitory or permanent.

Rao (1993) provided the first empirical support for the marriage squeeze hypothesis, showing a positive relationship between the marriage market sex ratio and dowry size in the ICRISAT data. Edlund (2000) reanalyzed the same data and found no relationship between sex ratio and dowry size, although Rao (2000) demonstrated a relationship when a quadratic term is added to the specification. Regardless, both Edlund (2000) and Rao (2000) note that their limited sample size makes it difficult to draw definitive conclusions, and that analysis with a larger data set is needed.[25]

With the REDS data, we analyze the relationship between marriage market sex ratios and dowry using a two-way fixed effects approach. Marriage market sex ratios are estimated at the district level since around 80 percent of marriages are within the same district, and most marriages outside the district are still geographically proximate (REDS, 1999). We use four rounds of data from the Census of India (1961–1991), which provides the total number of men and women in a district within 5 year age bands (0–4,5–9,10–14, etc.), and calculate the marriage sex ratio within five year bins (1950–1954, 1955–1959, etc.). For each five year bin, we estimate the fraction of men and women who married at each age using REDS data from the prior five year period. For each district, we then multiply these fractions by the number of men and women in each age band in the district to get the estimated number of men and women on the marriage market in that district.[26] The marriage market sex ratio is the ratio of marriage age women divided by marriage age men. We estimate the following regression specification for a marriage m in a district d in year t:

$$y_{mdt} = \alpha_d + \alpha_t + X_{mdt}\beta + \gamma \text{ Sex Ratio}_{dt} + \varepsilon_{mdt} \quad (1)$$

where: y_{mdt} is an outcome variable of interest (dowry payments, age gap, etc.), X_{mdt} is a vector of controls (education levels of the bride and

[24] For example, Rao (1993) argues that the increase in status conferred by dowry could not justify the payments of this size. Caldwell et al. (1983) points out that demands for dowry are typically viewed in a negative light and thus are unlikely to confer higher status.

[25] Dalmia and Lawrence (2005) also find no relationship between sex ratio and dowry in a different data set, but have very little variation in sex ratios since they only have data from ten districts across two states.

[26] By using ages of marriage from the prior 5 year period, we avoid the endogeneity in the sex ratio-marriage age relationship, but allow the age of marriage to vary with historical changes in age of marriage in Indian marriages; below we show that results are similar if using a fixed set of marriage ages.

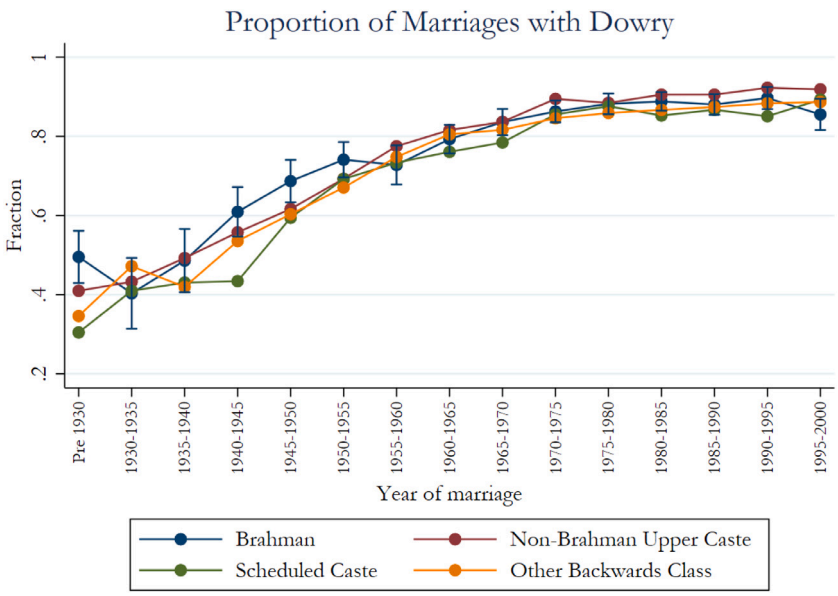


Fig. 3. Prevalence of dowry by decade across caste groups
Notes: This figure plots the proportion of marriages in which dowry was paid over a given five year period for different caste groups. For Brahmins, we include 95% confidence intervals around the estimates to provide a visual representation on whether we can reject equivalence of dowry among Brahmins and non-Brahmins in a given year.

groom, caste fixed effects, etc.) to account for compositional differences in the types of individuals getting married in a particular year. District (α_d) and year (α_t) fixed effects account for unobserved heterogeneity over time and space.[27]

While all the empirical papers on the marriage squeeze have examined the relationship between sex ratio and dowry size, the same mechanism can affect both size and prevalence; indeed, the original paper on the marriage squeeze was focused as much on the emergence of dowry as on the size of dowry payments (Caldwell et al., 1983). We thus look at the relationship between sex ratio and both whether dowry is paid in the marriage (Column 1 of Panel A of Table 1) and the net dowry amount (Column 2).[28] In both cases, we do not observe a statistically significant relationship.[29] Although we do not observe a relationship between sex ratio and dowry payments, it is possible that the magnitude of the relationship is sufficiently small that we are underpowered to detect it. However, this would still imply that the response of dowry to changes in sex ratio is not sufficiently large to generate the rise in dowry between 1940–1975, the pattern that this paper seeks to explain.[30]

However, as discussed earlier, sex ratio pressures may be relieved through changes in the age of marriage rather than necessarily dowry size. In the REDS data, the age at marriage is only recorded for the household head and their spouse, so this reduces the sample size to approximately five thousand marriages. Columns (3)–(5) of Table 1 use the same specification, but with the outcomes as the marriage age gap (defined as the age of the groom minus the age of the bride) and age at marriage for grooms and bridges. Results are consistent with Anderson (2007b): an increase in the number of marriage age women relative to men reduces the gap in bride and groom ages. Interestingly, the smaller gap comes from an increase in female age of marriage, suggesting sex ratios are at least partially responsible for the rise in female age of marriage in India over time.[31]

We now discuss two important caveats for the above analysis. First, the true marriage market sex ratio experienced by an individual would ideally be the ratio of marriage age women to marriage age men from the same *jati* and 'marriage market' as the individual. Since there are no data of such granularity, we have used district-level marriage age sex ratios as an approximation. For robustness, we also test alternate approaches to estimating the relevant sex ratio. Our first alternative approach uses the *Age Tables* from the 1991 round of the Indian Census, which gives the full age distribution of individuals by gender at the district level (e.g. as of 1991, there were 37,120 men and 36,260 women born in 1975 in the West Godavari district of Andhra Pradesh). Another approach combines multiple rounds of the National Sample Survey (Rounds 38, 43, 50, 55, and 62) to construct sex ratios within broad caste groups at the state (rather than district) level. Both of these alternative approaches have strengths and weaknesses (see Online Appendix Section E.1 for a detailed discussion (Chiplunkar and Weaver,

[27] Given the recent advances in the two-way fixed effects literature, especially when the treatment variable is continuous (as in our case), in Online Appendix Section E.7, we follow suggestions by Callaway et al. (2021) and Cook et al. (2023) to show that it is not a potential concern in our case.

[28] In this and all of the following analysis, the value of net dowry is negative if the transfer to the bride's side exceeds the value of the transfer to the groom's side.

[29] Note that the number of observations is only 59,120 in the first column since we lack reliable census data prior to 1961, and so cannot run this regression for early years. There is a smaller number of observations in Column (2) than Column (1) because there are five states for which we observe whether dowry was paid, but not the dowry amount. In Online Appendix Section C.3, we implement two robustness checks: the first drops those five states for all of the outcomes in the table, and the second uses data on dowry amounts from the 2008 REDS in those five states. Results are very similar.

[30] For example, the next paragraph shows that women marry at older ages in response to sex ratio shifts, which could increase average dowry due to the positive relationship between female age of marriage and size of dowry. As a back of the envelope calculation on how much the shift in age of marriage would affect average dowry, we multiply the aggregate change in sex ratio over this period with the estimated relationship between sex ratio and female age of marriage as well as with the estimated relationship between bride age and dowry in the data. The resulting implied effect on dowry due to marriage age adjustments is less than 5% of the overall inflation in dowry value between 1940 and 1975.

[31] Outside of India, other papers have found that imbalanced sex ratios change ages of marriage, including Bergstrom and Lam (1994) in Sweden, Brandt et al. (2016) in China, and Edlund (1999) in cross-country regressions. However, these papers do not estimate the effect on dowry and are primarily from non-dowry paying societies.

Table 1
Sex ratio and dowry.

	Dowry (=1)	Dowry value	Age gap	Age of marriage (Male)	Age of marriage (Female)
	(1)	(2)	(3)	(4)	(5)
			Panel A: Sex Ratio (Census)		
Sex Ratio	0.087	−6.946	−3.043*	0.705	4.104**
	(0.123)	(37.335)	(1.692)	(2.062)	(2.041)
Oster's δ			−5.38		1.98
Observations	59120	40467	5477	5567	5480
			Panel B: Sex Ratio (All Sources)		
Sex Ratio	0.037	4.201	−1.575***	−0.226	1.355**
	(0.031)	(5.748)	(0.570)	(0.617)	(0.610)
Oster's δ			0.24		1.09
Observations	63080	43149	5851	5949	5854
			Panel C: Sex Ratio (Census, Static)		
Sex Ratio	−0.043	37.010	−1.061	1.214	2.327**
	(0.066)	(28.900)	(0.969)	(1.204)	(1.127)
Oster's δ			−10.23		−1.21
Observations	56095	38061	5273	5344	5275

Notes: This table reports the relationship between marriage market sex ratios and marriage outcomes. All specifications include controls for bride and groom education as well as district, time, and caste fixed effects. In column (1), the dependent variable is a dummy variable for if dowry was paid in a given marriage. In column (2), the dependent variable is the real value of the dowry payment, which is equal to zero if no payment was made. Age gap in column (3) is the difference in groom and bride ages. There is a smaller number of observations in column (2) than column (1) because there are five states for which we observe whether dowry was paid, but not the dowry amount. The REDS data contains data on marriage age only for the marriage of the head of the household, so there are fewer observations in columns (3) to (5). Panel A uses data from the census to define the district-level marriage market sex ratio. The census counts the total number of men and women within five year age ranges (0–4, 5–9, etc.) in each district. For each marriage, we use the REDS data to calculate the fraction of men/women within each age range who were on the marriage market over the preceding five year period. For each district, we multiply this by the number of men/women in that age range to calculate the sex ratio. Panel B uses the average of the marriage market sex ratio calculated in three different data sets: the census data (panel A), the Age Tables from the 1991 census, and pooled data from the National Sample Survey (see Table B6 for details on calculating the sex ratio in those data sets). Standard errors are clustered at the district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

2023)). For example, both of these allow us to construct marriage market sex ratios in each year rather than over five year periods, but are subject to mortality-related concerns since the data were collected after the marriages of interest. For each marriage, we estimate the sex ratio using all three methods of estimating sex ratio. Panel B of Table 1 takes the average across these three estimates and re-estimates Eq. (1), while Panels A and B of Table B6 re-estimates the regression with the two alternative definitions of sex ratio separately. In each case, we find no relationship between sex ratios and dowry as well as a consistent relationship between marriage market sex ratios and marriage ages.[32]

Second, the identifying assumption behind our empirical strategy warrants careful examination, given that we do not have any plausible exogenous variation in the marriage market sex ratios. Given the district and year fixed effects, the identifying variation comes from the differential changes in marriage market sex ratios across districts over time.[33] This variation must either result from differential gender-specific pre-marital mortality across districts or differences in population growth rates, where faster population growth in some locations leads to more women on the marriage market with an approximately 15 year lag. Changes in gender-specific mortality rates can be directly observed and controlled for using the *contemporaneous* sex ratio at birth in a given period, which we define as the ratio of women between the ages of 0–4 to men between the ages of 0–4; if there were a decrease in this ratio, this would indicate that the survival rate for female children has decreased relative to the survival rate for male children. Results are similar after controlling for contemporaneous sex ratio (Panels C and D of Table B6), indicating that differential gender-specific pre-marital mortality does not explain the findings.[34] The identifying variation instead comes from lagged differential population growth rates across districts over time, i.e. whether changes in dowry amount between $t-5$ and t are greater for districts with a faster population growth approximately 15 years prior (i.e. change in the size of the cohort between $t-13$ and $t-20$ as compared to the cohort born from $t-18$ and $t-25$ relative to the preceding five year period).[35]

Given that the marriage squeeze hypothesis predicts a positive relationship between sex ratio and dowry while our estimate is indistinguishable from zero, the key concern is whether our estimates are downwards biased. There are two main empirical concerns with using lagged differential population growth rates. First, households may endogenously adjust their fertility in response to expectations of the value of dowry payments 15–20 years in the future. This could bias our estimates downwards if households lower total fertility in response to expected higher dowry payments. Other work on household response to dowry finds that although households do exhibit gender preference in fertility in response to changes to current dowry payments, this roughly balances out across male and female children (Bhalotra et al., 2020); thus we would not expect aggregate fertility to respond.[36] It is also likely to be difficult to accurately predict the trend in dowry over the next 20 years at the time of conception.

The bigger concern is that the determinants of population growth might independently affect dowry, such as wealth shocks increasing both population growth and dowry. However, a wealth shock should

[32] As a further robustness check, we re-estimate these regressions using fixed marriage age ranges when calculating the marriage market sex ratios, rather than allowing the age range to adjust over time. The results are similar though slightly weaker (Panels E and F of Table B6).

[33] To check whether there is sufficient variation after the inclusion of fixed effects, we regress the marriage market sex ratio on the district, time and caste fixed effects, and then plot the distribution of the residual in Figure A5(a). There is still substantial residual variation.

[34] Note that sex-selective abortions also only become prevalent in India after 1984 (Bhalotra and Cochrane, 2010), meaning that it should not affect the marriages in our sample (pre-1999).

[35] Table B5, shows that the lagged population growth over the period t-20 to t-10 is strongly related to marriage market sex ratios using the Census data.

[36] In particular, Bhalotra et al. (2020) find that in response to shocks in the price of gold, prenatal mortality goes up for female children and down for male children at similar rates.

begin to affect dowry values immediately, rather than with a 15–20 year lag. This would also bias our estimates in a positive direction rather than towards zero, whereas we are concerned with factors that would bias our estimates in a negative direction.[37]

Lastly, we also examine the role of omitted variables more systematically by calculating Oster's δ statistic (Oster, 2019). This statistic indicates how important unobservables would need to be as compared to the observables for omitted variable bias to fully explain our results.[38] Of the statistically significant variables in both panels of Table 1 (age gap and age of marriage for women), the estimated δ is larger than one in 2 out of the 4 cases and negative in one other. Oster (2019) recommends a threshold of 1, while a negative value of δ indicates that the omitted variables would bias us in the opposite direction. This implies that omitted variable bias would have to be considerably large as compared to the observables to explain away the results.

4.3. Modernization in caste-based societies

Anderson (2003) develops a novel theoretical framework to explain why dowry disappears during modernization in some societies but increases in others. In this section, we provide a high-level overview of the theory, but mostly focus on two tests of its empirical predictions. In the portion of the model that pertains to India, individuals are divided into caste groups. Caste is an inherited and hierarchical characteristic, with a universally agreed upon ranking of caste groups. Potential brides are characterized by their caste and the wealth of their parents, while grooms are characterized by their caste and wealth. Matches form between brides and grooms, where dowry transfers are made from brides to the groom in order to secure matches. The model assumes that women prefer marrying men of higher caste status and wealth, where these characteristics are substitutable. Men are assumed to only care about the dowry they can receive, and so are indifferent to the caste status of their potential brides. In equilibrium, the size of dowry transfers are such that a bride married to a particular groom is indifferent between marrying him and the next best groom. Initially, marriages are between brides and grooms of the same caste group and positive assortative on wealth.

Modernization has two components in the model: increasing average wealth and increasing income dispersion within caste groups. The highest caste groups are the first to experience modernization/wealth dispersion, and over time, castes of progressively lower ranks also experience modernization. Broadly, an increase in within-caste wealth dispersion leads to an inflation in the size of dowry payments — because of how lower caste brides value upper caste grooms. For the lowest quality grooms within a given caste group of rank c, the wealth dispersion from modernization may cause their quality to be lower than that of the lowest quality groom of rank c in the previous period. However, as a result of the competition over them by brides from the caste group of rank $(c-1)$, the dowry they receive does not decline by as much as it otherwise would have.[39] Cross-caste competition causes further inflation as increased dispersion in the quality of lower caste grooms increases the dowries paid to higher caste grooms.

Fundamentally, the model revolves on the presence of cross-caste competition among brides over grooms. This is manifested in one of the model's key empirical predictions: dowry payments for a caste of rank c will increase if there is an increased dispersion in groom quality/wealth among the castes ranked $\{1, \ldots, c-1\}$ below them in the caste hierarchy (*Proposition 4(b)* in Anderson, 2003). This occurs because increased dispersion leads to dowry inflation among the lower caste groups, and to maintain incentive compatibility and marriage within caste groups, dowry payments in caste c rise.

At an aggregate level, the time period of dowry inflation matches well with increasing dispersion in groom educational attainment in India. Fig. 4 plots the standard deviation of the groom educational distribution among grooms married in a given five-year period among all grooms (Fig. 4(a)) as well as within caste groupings (Fig. 4(b)) in the REDS. There is a clear increase in dispersion in educational attainment that begins around 1940 and slows after 1965, lining up closely with the period of dowry inflation and the pattern of increasing dowry prevalence by caste, as seen in Fig. 3.[40]

As a test of this model of cross-caste competition, we test the proposition that dowry payments for a caste of rank c are affected by increases in average groom quality or increased dispersion in groom quality among castes lower in the caste hierarchy. We focus on education as our measure of groom quality since there is a tight link between the level of educational attainment of a groom and the dowry they receive (see Section 4.4). First, we test how increases in educational attainment among Scheduled Castes (SC), the lowest group in the caste hierarchy, affect dowry payments among Other Backwards Classes (OBC), the next highest group in the caste hierarchy. Second, we test how increases in educational attainment among scheduled castes affect marriages among all individuals above them on the caste hierarchy. Finally, we look at how changes in the OBC educational attainment affect the dowry of general caste individuals, a broad category encompassing all those above OBCs. Note that the model predicts that changes among the lower castes will cascade through all of higher castes i.e., increases in educational attainment among one group affects the group immediately above them, and continue to cascade through higher caste marriages to preserve stable matches. This implies that the marriage market of the highest caste group can be affected by changes among even the lowest caste groups, even if lower caste households are too poor to directly compete for high caste grooms.

We use a two-way fixed effects specification so that identification comes from differential changes in lower caste groom quality across locations over time:

$$y_{mrsct} = \alpha_t + \alpha_{src} + \beta \text{ Lower Caste Quality}_{srt} + X_{mrsct}\gamma + \varepsilon_{mdt} \quad (2)$$

where: y_{mrsct} is the dowry payment in marriage m for an individual from state s, religious group r, and caste group c in year t. $LowerCasteQuality_{srt}$ is based on the NSS data and is either the average or standard deviation of educational attainment among the relevant group of lower caste men whose age would place them on the marriage market within a particular five year period (1950–1954, 1955–1959, 1960–1964, etc.), and who are from the same state and religious group as marriage m. The regression includes controls for the groom and bride quality in marriage m (years of education), and the average/standard deviation of education among grooms in the relevant state-religious group sample. Year (α_t) and religion-state-caste (α_{rsc}) fixed effects account for aggregate time trends and unobserved (time-invariant) heterogeneity over space. The theory only makes predictions on the magnitude of dowry payments rather than whether dowry is paid, so the net dowry payment is the sole outcome of interest.

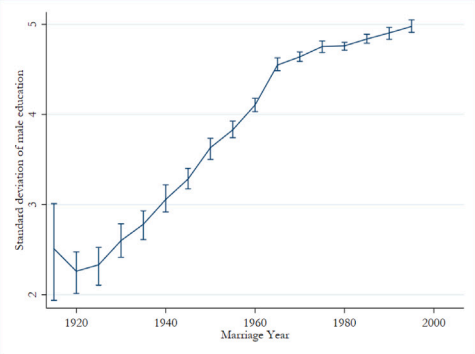
[37] Another concern is that pre-marital investments may respond to sex ratios (Lafortune, 2013). We do not observe a relationship between groom or bridal education and the marriage market sex ratios that they face (Online Appendix table OA9), likely because it takes time for rural households to recognize shifts in sex ratios and adjust pre-marital investments accordingly. Our empirical strategy relies on short-run fluctuations before there is time for pre-marital investment to respond.

[38] Similar to Oster (2019), we set $R^2_{max} = 1.2R^2$ i.e., we assume that inclusion of omitted variables in a hypothetical regression can lead to a maximum R^2 that is 1.2 times the estimated R^2 in our specification.

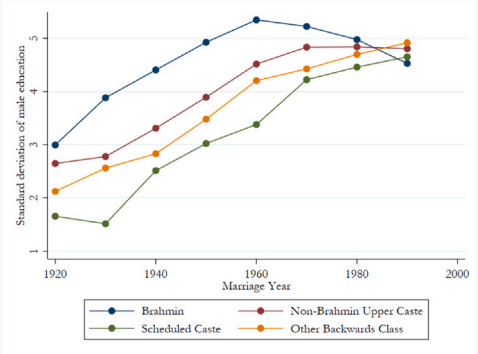
[39] This is the result of two assumptions: brides of lower castes are less sensitive to income differences among higher caste grooms than higher caste brides; and as part of a concavity assumption on the utility function of brides, the loss to a bride from marrying a groom one rank lower in the caste hierarchy is larger than the gain to "marrying up" one rank.

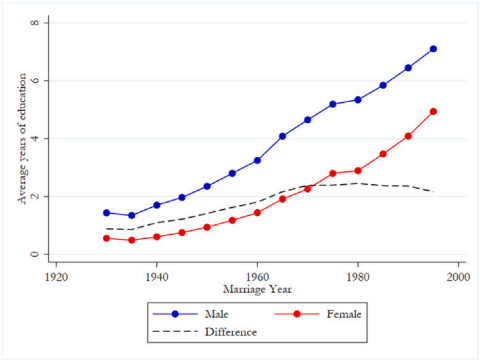
[40] Fig. 4(c) shows that average education attainment is consistently increasing over the full sample period for both males and females.

(a) Dispersion of education (overall)



(b) Dispersion of education (by caste group)





(c) Average Educational Attainment by Gender

Fig. 4. Educational attainment by year of marriage

Note: This figure plots the standard deviation of the male educational attainment distribution for grooms married in the REDS data within a given five year period. Figure (a) plots the standard deviation across all grooms, while figure (b) plots it within larger caste groupings. Panel (c) plots the average years of education for brides and grooms in the REDS data over each 5 year period.

The first two columns of Table 2 restrict the sample of marriages in which the groom is OBC and check for a relationship with educational attainment among potential grooms in Scheduled Castes (SCs). Columns (3) and (4) relate SC educational attainment to dowry among the full set of general caste and OBC marriages, since this model predicts that changes among the lowest caste groups will cascade to all higher caste groups, not just those directly above them in the caste hierarchy. Across all specifications, we do not observe a statistically significant relationship between changes in the educational distribution among low castes (either the average or standard deviations) and the size of dowry payments for higher caste individuals.

Although not directly in the model, one concern may be that SCs are so low in the caste hierarchy that they do not participate in cross-caste competition, but that there is such competition between OBC and General Caste grooms. Columns (5) and (6) thus test for a relationship between OBC educational attainment and dowry in General Caste marriages.[41] Again, we do not observe that increased educational attainment or dispersion in lower caste educational attainment increases higher caste dowry payments.

Another concern with this approach could be that the relevant demarcator of status is the *jati*, and OBC and General Castes are broad groupings that encompass many *jatis*. However, note that increases in average educational attainment among all SCs or OBCs imply that there must be increases for at least some *jatis* within that group. Since the model predicts cascading effects, increased education among even only some lower caste *jatis* should produce changes for marriages higher in the caste hierarchy. Although *jati*-level measures would allow for additional, more precise tests, the current data is sufficient to test the model predictions. Thus, the broad lack of response of upper caste marriages to changes in marriage market conditions among lower caste individuals suggests an absence of this type of cross-caste competition in marriage markets.

A last concern could be that education is an imperfect measure of groom quality, and other measures such as groom income would be better. In Online Appendix Section E.3, we use multiple rounds of the National Sample Survey to construct the average and standard deviation of groom earnings by state-identity group in a given time period (Chiplunkar and Weaver, 2023). We then rerun the analysis with income instead of education, but again find no evidence for cross-caste competition.

As a second test of the theory, we examine whether the small number of cross-caste marriages in the data (1,810 cases) are consistent with a model in which there is cross-caste competition over grooms and a desire to "marry up". We create a variable that is equal to −1 if the wife is of a higher caste than the husband, 0 if they are of the same caste, and +1 if the husband is higher caste. Table B3 regresses whether dowry is paid and the dowry amount on this variable, controlling for bride and groom education, and caste and birth order fixed effects. We also control for various (rather restrictive) temporal and spatial fixed effects, such as a household-five year fixed effect, where the variation comes from differences across marriages within the same household

[41] Our sample size is reduced for this test because we use the NSS to measure the distribution of educational attainment, but some rounds of the NSS do not have data separately identifying OBC and general caste individuals. For this analysis, we use the rounds that do have this differentiation (Rounds 55 and 62), but since we require a minimum number of observations to estimate educational attainment, the sample size is smaller.

Table 2
Dowry and shifts in the lower caste groom quality distribution.

	OBC		OBC/general		General only	
	Dowry value	Dowry value	Dowry value	Dowry value	Dowry value	Dowry value
Lower caste groom education avg	6.383		22.75		10.01	
	(9.188)		(14.00)		(16.88)	
	[0.537]		[0.330]		[0.750]	
Lower caste groom education SD		−4.058		1.726		−35.03
		(13.30)		(14.72)		(12.23)
		[0.818]		[0.921]		[0.211]
Observations	14206	14206	33709	33709	11019	11019
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table investigates how changes in educational attainment among lower caste groups affect the dowry payments of higher caste groups. Dowry value is reported in real terms (2010 rupees). In columns (1) and (2), we restrict to marriages in which the groom is OBC, while columns (3) and (4) also include general caste marriages. Columns (5) and (6) use data from two rounds of the NSS (55, 62) to look at the relationship between OBC educational and general caste marriages. p-values are wild clustered bootstrapped at the state-caste group level and included below the standard errors. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

that occur over the same five year period.[42] Contrary to what the theory would suggest, we do not observe that brides pay more when "marrying up" as compared to "marrying down".[43]

While Anderson (2003) provides an elegant and internally consistent theory of how dowry practices might evolve over time, it does not appear to fit the Indian context. This is probably due to the assumption that brides prefer to marry higher caste men. Banerjee et al. (2013) estimate preferences over the caste of prospective partners using data on responses to matrimonial advertisements. Even among a relatively educated and urbanized sample, they find an extremely strong preference for marrying within caste; Hortaçsu et al. (2019) complement this by showing that even a large monetary incentive to marry across caste lines has only a small effect on inter-caste marriage. Therefore, such a high cost of marrying outside of caste can prevent cross-caste competition and dominate any vertical preferences that individuals might have over caste.

4.4. Changes in labor market opportunities

Finally, we test whether changes in dowry result from changes in economic opportunities and educational attainment. Prior to the 1930s, the vast majority of rural India was uneducated and worked in agriculture. During the 1930s and following decades, there was an expansion in the availability of education, especially in response to the passage of compulsory primary schooling laws across a large number of states (Sharma and Sharma, 1996). Portions of the male labor force also began to shift out of agriculture into other types of jobs, such as those in urban areas and the public sector, which had the potential to earn higher and more stable wages. These often required some level of education, while technical change also led to positive returns to education in agriculture as well (Foster and Rosenzweig, 1995, 1996). Fig. 4(a) shows the rapid increase in the dispersion of educational attainment among grooms between 1940 and 1965. This is followed by a slowdown in dispersion after 1965, which closely matches the period of dowry inflation, although mean educational attainment continued to rise in the post-1965 period (Fig. 4(c)). Caldwell et al. (1983) and Srinivas (1984) both hypothesized that competition over these scarce quality grooms was a reason for increases in both the prevalence and size of dowry payments.

More formally, an expansion in the number of more desirable grooms can potentially lead to dowry inflation in a two-sided matching market.[44] For simplicity, grooms can be thought of as either high quality or low quality types, while brides are not differentiated on quality. Dowry transfers can be made at the time of marriage in order to match with a particular groom — brides get a higher marital surplus from matching with a high quality type, so offer higher dowries to those grooms. The dowry payment to a low quality groom will depend on a potential bride's return to marrying them relative to remaining single; she will give no more than an amount that makes her indifferent to marrying a low quality man and remaining single. Dowry payments to the high quality grooms will similarly depend on the return to marrying them relative to low quality grooms. In the two-sided matching framework, an increase in the fraction of high quality grooms does not change bride's reservation utility from remaining single or marrying low quality grooms, so the dowry amount given to high quality groom would remain the same; we will later show that this is not true in a search model. As the fraction of high quality grooms increases, the average dowry payment increases, producing aggregate dowry inflation. Thus dowry inflation would initially come from payments to higher quality grooms, consistent with the initial shifts in the right tail of the dowry payment distribution observed in Fig. 2. The key underlying mechanism is modernization, as in Anderson (2003), but here castes are operating in independent marriage markets.

We test this hypothesis by examining the returns to groom quality on the marriage market. A number of other papers have previously tested for associations between dowry size and groom education in India (Rao, 1993; Deolalikar and Rao, 1995; Dalmia, 2004), Bangladesh (Ambrus et al., 2010), and Pakistan (Anderson, 2004) by regressing dowry payments on groom education. However, it is hard to know whether to attribute such an association to qualities of the groom or to other characteristics of the household related to groom qualities (e.g. overall wealth of the household, caste group, unobserved tastes for paying dowry).[45]

[42] One might be concerned that there is insufficient variation to be statistically powered to detect a relationship. However, the standard errors allow us to rule out any economically meaningful positive relationship (low caste women pay more to marry high caste grooms). Even with the household-five year fixed effects, our 95% confidence intervals rule out positive effects of greater than 1.6pp on whether dowry was paid and on dowry amount of Rs 900.

[43] Another concern is that competition may occur within broader caste categories (e.g. OBC), but not outside of them. Online Appendix Figure A7 takes the set of inter-caste marriages and plot the percent of marriages by a groom within a particular caste group to a bride from each of the other caste categories. While grooms are more likely to marry someone within their category (57%), they do marry outside of their broad caste category 43% of the time; this points against "hard boundaries" at the level of caste group for inter-caste marriages. Banerjee et al. (2013) also estimates preferences over partners and finds evidence against this type of competition.

[44] See Anderson (2004) for a theoretical model corresponding to the intuition laid out here. Anderson and Bidner (2015) builds on that earlier paper, but endogenizes decisions on pre-marital investments.

[45] Calvi, Fulford, and Beauchamp (2022) also estimate preferences over spousal characteristics and dowry in India, but within a structural general equilibrium model. Their identifying assumption differs from these other papers,

Table 3
Dowry and education.

	(1) Dowry (=1)	(2) Dowry value	(3) Dowry (=1)	(4) Dowry value	(5) Dowry (=1)	(6) Dowry value
Groom education (Years)	0.00291*** (0.000810)	1.014*** (0.249)			0.00225* (0.00118)	0.610* (0.309)
Groom education Percentile			0.0332** (0.0143)	15.24*** (4.462)	0.000335 (0.0182)	6.399 (4.977)
Observations	44298	30658	39435	26997	39435	26997
Oster's δ	9.068	8.553	6.800	15.65		0.604
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Household-5 year FE	Yes	Yes	Yes	Yes	Yes	Yes
Birth order FE	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the relationship between groom education and marriage outcomes. In columns (1), (3) and (5), the dependent variable is a dummy variable for if dowry was paid. In columns (2), (4), and (6), the dependent variable is the real value of the dowry payment in 2010 rupees, which is equal to zero if no payment was made. There is a smaller number of observations in columns (2), (4) and (6) than columns (1), (3) and (5) because there are five states for which we observe only whether dowry was paid. We calculate the percentile rank in educational attainment using individual-level data from the National Sample Survey on men from the same state, religion, and caste group who are aged 18 to 25 in the year of marriage. The number of observations also drops in regressions with groom education percentile as an independent variable since we use the NSS data to calculate these percentiles, and there are insufficient observations in some cases. Standard errors are clustered at the district level. The table notes report the value of delta from Oster (2019). * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

An advantage of the REDS data is that we observe multiple marriages within each household and so can account for time invariant confounders with household fixed effects. However, some of the most obvious confounds, such as household wealth and tastes, are not time invariant: a household may be relatively poor and have poorly educated grooms in the 1940s, but grow wealthier and educate its grooms in the 1960s. We thus include more stringent time-varying "household-five year" fixed effects, i.e. one fixed effect for marriages in that household between 1940–1944, another for marriages between 1945–1949, etc. Under this set of fixed effects, the identifying variation comes from whether differences in dowry between siblings married within the same five-year window are related to differences in their education.[46] While such stringent fixed effects implicitly drop only children or cases where all have the same level of education, there remains substantial residual variation in education to identify the coefficients, as seen in Figure A5.[47] For a marriage m in household h in district d in year t within the five-year band f, we estimate the following specification:

$$y_{mhdt} = \alpha_{hf} + \alpha_t + \beta e_{mhdt} + X_{mhdt}\gamma + \varepsilon_{mhdt} \quad (3)$$

where: y_{mhdt} is either a binary variable for whether dowry is paid or the real value of the dowry payment. X_{mhdt} contains a control for the bride's education and birth order fixed effects, e_{mhdt} is the years of education of the groom, and α_t and α_{hf} are marriage year and household-five year fixed effects respectively. Marriage year fixed effects account for changes in aggregate dowry payments over time, while birth order fixed effects account for cultural norms around birth order. β is not a causal estimate of the effect of education, since there may be omitted qualities of a groom related to education that allow them to command a higher dowry. However, since those omitted characteristics related to education are still measures of quality, we still observe what we seek to measure, i.e. dowry responses to groom quality.[48]

Columns (1) and (2) of Table 3 indicate substantial returns to groom quality on the marriage market.[49] Educated grooms are substantially more likely to receive dowry ($p < 0.001$), and each additional year of a groom's education is associated with an increase in the real value of dowry of over Rs. 1000 (approximately 4 percent of the median dowry payment; $p < 0.001$).[50]

While this is suggestive, it does not necessarily mean that an increasing number of higher quality grooms will result in dowry inflation. That will depend on the nature of bridal preferences over groom quality, and in particular, whether bridal utility is over the *absolute* level of groom quality or the groom's *rank* in the distribution of potential grooms. On the one hand, a bride seeking economic security should care about the absolute level of education (proxying for life-time income). On the other hand, if marrying a more educated groom is a "status" good, then brides should care about the rank of the groom in the relevant marriage market i.e., utility from marrying a groom with 10 years of education will be higher if this groom is the most educated groom in the local marriage market, as compared to if he is the median. Moreover, if preferences are over rank, changes in the distribution of groom earnings/education should not affect the average dowry size — a man at the 80th percentile of groom quality would still receive the same dowry regardless of whether he has completed 5 or 10 years of education. However, if brides care about the absolute level of groom

where their model moments are estimated from cross-sectional differences in marriage market conditions across districts rather than across individuals. However, it is difficult to directly compare to our estimates as a result of our approach being reduced form, as well as the differences in the data sets used (see Section 2 and Online Appendix Section C for more discussion on the data).

[46] The key identifying assumption is that there are not other within-household changes over that five year span that are simultaneously related to dowry and the quality of the groom. That is plausible given that education is completed prior to marriage for 97.4 percent of males in our sample.

[47] In Figure A5, we plot the distribution of the residual from a regression of years of education e_{mhdt} on a household-five year fixed effect (α_{hf}) and find substantial residual variation in the education levels after controlling for α_{hf} (around 25% of the underlying variation in education in the sample).

[48] It is not possible to use household-five year fixed effects in previous tests as sex ratio and distribution of education for lower caste grooms do not significantly vary within the household-five year fixed effect.

[49] Note that the number of observations is only 44,299 in the first column since we are restricting to households that experience multiple marriages within a five year period. The number of observations also drops when groom education percentile is included since there are insufficient observations in the NSS data to calculate percentiles in some cases. There is a smaller number of observations in the even columns (amount of dowry) than odd columns (whether dowry was paid) because there are five states for which we observe whether dowry was paid, but not the dowry amount. In Online Appendix Section C.3, we implement two robustness checks: the first drops those five states for all of the outcomes in the table, and the second uses data on dowry amounts from the 2008 REDS in those five states. Results are very similar.

[50] The relationship between whether dowry is paid and groom quality is attenuated by the nearly universal adoption of dowry by 1970. If we split the sample before and after 1970 and re-estimate Eq. (3) for that outcome, the estimated coefficient $\hat{\beta}$ is 0.0058 ($p < .001$) in the pre-1970 period and 0.0020 ($p = 0.025$) in the post-1970 period.

quality, then an increasing number of high quality grooms, who receive large dowries, will cause aggregate inflation in dowry.

We take advantage of the segmented nature of Indian marriage markets to identify whether bride preferences are over the absolute quality or rank of grooms. We define $\widetilde{e}_{mhdt}$ as the groom's percentile rank in the distribution of educational attainment for men in his marriage market.[51] Columns (3) and (4) of Table 3 estimate Eq. (3) but with $\widetilde{e}_{mhdt}$ as the outcome variable instead of e_{mhdt} and suggest that individuals' relative rank within the marriage market is a strong predictor of receipt of dowry ($p = 0.022$) and dowry size ($p = 0.003$).

$$y_{mhdt} = \alpha_{hf} + \alpha_t + \beta_1 e_{mhdt} + \beta_2 \widetilde{e}_{mhdt} + X_{mhdt}\gamma + \varepsilon_{mhdt} \quad (4)$$

Eq. (4) then runs a horse race between e_{mhdt} and $\widetilde{e}_{mhdt}$ to see which set of preferences determine dowry payments. We are able to separately identify β_1 and β_2 due to the segmentation of marriage markets in India. For example, suppose there were two sets of brothers on the marriage market from state s in a five year period f, but one set of brothers is from caste group A and the second is from caste group B. In both sets, the first brother has 8 years of education and the second has 10 years of education, but the brothers from caste A are in the 30th and 50th percentile of the distribution of education in their market, while those from caste B are in the 70th and 80th percentile of their market. Intuitively, β_1 and β_2 are derived from taking the difference in dowry between the brothers and seeing if that is related to either the difference in their years of education (2 years) or their relative ranking in the educational distribution (20 p.p. and 10 p.p.).

As reported in Column (6) of Table 3, only years of education is a statistically significant predictor of dowry payments after both variables are included.[52] Moreover, the estimated coefficient on the groom's percentile $\hat{\beta}_2$ drops sharply (Columns 4 and 6). This implies that bridal preferences over the absolute level of groom education are a stronger predictor of dowry payments, as opposed to the relative standing of the groom in the distribution. Therefore, the increase in average level of groom education (and hence potential earnings) before 1970 discussed above could rationalize the dowry inflation observed during this period.

As a back of the envelope calculation, we estimate the extent to which the rise of dowry can be explained by this mechanism. Since the returns to groom education on the marriage market may change over time, we use the same household-fixed effects strategy to estimate separate returns to groom education for each 5 year interval between 1930 and 1980 (i.e. estimate Eq. (3) for each five year interval to separately determine the returns to education for 1945–1949, 1950–1954, etc.). We then multiply the estimated returns to education by the change in the groom educational distribution between five year intervals to determine how much we expect dowry to increase over that period, and sum up across all of the intervals. Summed over all of the intervals, changes in groom education explains around 70 percent of the increase in dowry amounts between 1930–1980 (71.8 percent of change in median dowry, 68.9 percent of change in mean dowry). Given that education is not a perfect proxy for the change in the groom earnings distribution, the explanatory power may be even higher if we were able to observe that. While other factors may also play a role, changes in the groom quality distribution appear to be a significant factor in the observed changes in dowry payments.[53]

In section E.4 of the Appendix, we provide additional corroborative evidence by taking advantage of a policy reform that led to the expansion of primary education due to the District Primary Education Program (DPEP) (Chiplunkar and Weaver, 2023).[54] Under this program, districts that were below the national average of female literacy rate in 1991 received additional primary schooling resources, which translated into higher levels of education attainment — but only for boys and not girls (Khanna, 2023). This creates an exogenous (policy-induced) increase in the education level of grooms on the marriage market later on, which we find results in higher average dowry payments in those districts.

One question raised by these results is why modernization did not lead to similar dowry inflation in other societies.[55] There are many unique features of the Indian context that could explain this, where cultural aspects of India (aside from caste) may interact with economic factors to produce a different path for dowry. For one, India is unique in having female labor force participation decline with modernization. As a result, improved economic opportunities from modernization may disproportionately favor men on the marriage market relative to countries in which modernization is accompanied by higher female labor force participation. Another possible explanation is that in India, individuals typically marry partners from outside their local areas. As a result, households may match more strongly based on economic characteristics rather than non-economic factors that are only observable when matching to partners within a local geographical area (e.g. personality). In the end, the question is likely impossible to answer empirically given there is one observation (India) and a high-dimensional vector of plausible explanations. Our focus is on explaining changes in marriage practices in a single country, as in Ambrus, Field, and Torero (2010), and so we see the question of why India is different from other countries as outside of the scope of the paper.

4.5. Changes in labor market opportunities in a search model

One remaining question is why there is a decline in high value dowry payments in the post-1975 period, especially given the relative stability in lower value dowry payments (see Fig. 2). We propose a refinement of the existing theories to characterize marriage markets with a search model rather than a matching model. This refinement produces a channel where competitive pressures lead to the decline in high value dowries.

In this model, there are two types of individuals of gender $g \in \{M, F\}$ on the marriage market: educated or high quality (H) and uneducated, low quality (L), where α^g is the fraction of H-type individuals. These potential brides and grooms are randomly matched, bargain over

[51] We calculate the distribution of education attainment by combining individual-level data from multiple rounds of the National Sample Survey. We calculate the groom's relative position among men from the same state, religion, and broad caste grouping (SC, ST, and general+OBC) who are aged 18 to 25 in the year of marriage. For example, for a Scheduled Caste Hindu groom who was married in 1984 in Rajasthan, we calculate the number of Scheduled Caste Hindu males in Rajasthan aged 18–25 in 1984 who had lower educational attainment than this groom. We divide that by the total number of Scheduled Caste Hindu males in Rajasthan aged 18–25 in 1984 to get their percentile ranking.

[52] Similar to Section 4.2, we also report the values of Oster's δ statistic in the table (Oster, 2019). Given the estimated values of δ, it is unlikely that these patterns are driven by omitted variables.

[53] Figure A6 plots the percent of marriages with dowry by the education level of the groom and shows that the prevalence of dowry is higher among the more educated grooms. Moreover, the change in the distribution of dowry amounts by education group (Figure A9) shows that the distribution is relatively static, with a slight shift outwards between 1940 and 1970 for each of the educational groups. This is followed by an inwards shift of the distribution for all of the groups post-1970. Put together, it is plausible that most of the large increase in average dowry followed by its muted fall post 1975 can be explained by shifts in the prevalence of the more highly educated grooms.

[54] We thank an anonymous referee for this suggestion.

[55] An advantage of the model in Anderson (2003) is that it offers an explanation for why dowry declined in Europe after modernization. Within the model, modernization in non-caste based societies leads to declines in dowry. However, this is a particular matching model, and it is possible to write alternative models based on different assumptions in which modernization in non-caste based societies could produce dowry inflation.

dowry, and marry if they are able to agree on a dowry payment. If not, they are rematched in the next period and repeat the process. The model predicts that *conditional* on the fraction of H-type brides, an increase in the fraction of educated grooms in the population (α^m) has two effects on how average dowry evolves. First, brides receive a higher marital surplus from marrying a more educated groom. Therefore, she would prefer to match with him even at a higher dowry, rather than randomly rematch with a different, potentially lower quality groom in the future. This would suggest an increase in average dowry as more grooms get educated. However there is also a second countervailing force: with an increase in α^m, a bride now also has a higher probability of meeting a high quality groom if she rematches in the future, and so he has to give up some of his surplus for her to match with him. Such a model is consistent with each of the patterns observed in the data: while the former channel dominates for low values of α^m, an inflection point is eventually reached, where the latter channel starts to dominate instead. To put it another way, with an increase in the dispersion in groom quality, there is initially an increase in the size of dowry (driven by high value dowries received by educated grooms). However, this is eventually followed by a decline in dowries, as these higher quality men no longer command such large sums because there are more of their type.[56,57]

To test the predictions of the model, we want to see whether returns to groom education decline as the number of educated grooms on the marriage market increases. For each marriage in the REDS data, we use the NSS data to calculate the fraction of men in the same state-religion-caste marriage market with twelve or more years of education.[58] We therefore modify Eq. (3) to estimate the following relationship:

$$y_{mhdt} = \alpha_{hf} + \alpha_t + \beta_1 e_{mhsct} + \beta_2 e_{mhsct} \times \text{Frac. Educated}_{scf} + X_{mhdt}\gamma + \varepsilon_{mhsct} \quad (5)$$

where: y_{mhsct} is the (real) dowry payment, e_{mhsct} is the years of education of the groom, $Frac.Educated_{scf}$ is the fraction of prospective grooms within this state-religion-caste over this five year period that have attained twelve or more years of education, and (like before) α_t and α_{hf} are marriage year and household-five year fixed effects respectively. A non-interacted term $Frac.Educated_{scf}$ is excluded because it is absorbed by the household-five year fixed effects. We are interested in the sign of β_2, which can be interpreted as how the educational level of other grooms on the marriage market affects the returns to education in terms of dowry. A negative sign would imply that a higher fraction of educated grooms on the marriage market reduces the dowry premium for more educated grooms.

The results are reported in Table 4. From Columns (1) and (2), the returns to groom education – either in the probability of receiving dowry, or the value of dowry – decrease as the proportion of highly educated grooms increases (p-value = *0.027* and p-value = *0.067* respectively). This is also robust to an alternative definition of e_{mhsct} in columns (3) and (4), where we use a binary variable for whether the groom has more than the median level of education in the sample. There is the same pattern when looking at the size of dowry payment (Column (4), p-value = *0.011*), and the result on whether dowry is paid has a negative point estimate that is just below significance at conventional levels (Column (3); p-value = *0.16*).[59] Put together, these results provide support of a search model in which the returns to groom education decrease as the supply of educated grooms increases.

The principal concern with Eq. (5) is that areas with an increasing fraction of educated grooms are changing in other ways that could affect the returns to education for grooms on the marriage market. Groom education is an endogenous choice, and high returns to education on the marriage market may cause investment in groom education. This reverse causality would bias the estimate of β_2 in a positive direction, and so cannot explain the consistently negative estimates of β_2. Moreover, areas with faster growth in groom education may also have faster economic growth, which could increase the size of dowries by increasing household wealth or raising the returns to education (Rosenzweig, 2010). Again, this would bias β_2 in the opposite direction of what we observe.[60]

Another possibility, as outlined in our theoretical model above, is that growth in male education is correlated with growth in female education (see Fig. 4(c)), and improved female education could produce the decline in dowry payments. We conduct three checks to examine this hypothesis. First, we use the NSS data and similar to the males, calculate the educational attainment of potential brides in the same state-religion-caste group during the five-year period in which the marriage occurs. Columns (4)–(8) of Table 4 then add interactions between this variable and e_{mhsct} to the regression. In Columns (5) and (6), we look at the interaction with the fraction of women in the most highly educated category, exactly as we did with male education in Columns (1) and (2). Since few women are in the highest education category at this time, Columns (7) and (8) interact groom education with average female education instead. In all cases, the coefficient on the interaction of groom education with the fraction of highly educated grooms (β_2) is larger (more negative) in magnitude as compared to Column (2), implying that if anything, the estimates in columns 1 and 2 were conservative.[61]

As a second check, we examine the aggregate effects of changes in average male and female education on dowry payments. Similar to the previous analysis, we calculate average male and female educational attainment at the state-religion-caste-year using the NSS data. We then regress dowry value on average male and female education attainment, controlling for marriage characteristics, economic conditions, and state-religion-caste and marriage year fixed effects. The identifying variation

[56] We present and solve the theoretical model in Section D of the Online Appendix (Chiplunkar and Weaver, 2023). The model also predicts a decrease in average dowry as more women get educated i.e., as α^f increases (Figure D1). Given the rapid increase in male as opposed to female education in India during this period, we focus on the former in this paper, and provide evidence later in this section that groom education is the more important channel.

[57] A more complicated model with more than two types can also match the increase in the prevalence, rather than just size, of dowry — for example, suppose there were three types, where the surplus from marrying the lowest quality type is equal to the value of remaining single. This man would receive a dowry of zero. As the proportion of this type in the population shrinks, the proportion of marriages with dowry increases.

[58] We select 12 or more years of education because that is the highest level available in the NSS data. 18% of grooms in the REDS sample have 12 or more years of education (mostly because there are more observations in later years), with that proportion quadrupling between the 1940s and 1990s. This aligns closely with other papers measuring educational attainment over this time period (Mukherjee, 2004).

[59] This could be because dowry payment is almost universal around midway through the study period, so we are underpowered to detect an effect on dowry prevalence.

[60] A final possibility is that the increase in the proportion of educated grooms depresses the economic returns to education on the job market, which lowers the marriage market value of education (Khanna, 2023). Given that this mechanism is similar to the one proposed, we do not seek to disentangle the two.

[61] An interesting point to note is that the coefficient of "Groom Education X Avg Fem Education" in Column (8) of Table 4 is positive. This could result from intra-household complementarities that cause an increase in the returns to groom education when there are more educated brides on the market; in this scenario, if shifts in the bride and groom educational distributions are positively correlated, then failure to account for the distribution of bride education in a regression would cause the (negative) coefficient on the interaction of groom education and the fraction of highly educated grooms (β_2) to be biased in a conservative (positive) direction. While better understanding of these potential complementarities between male and female education in the marriage market is certainly interesting and important, we view this as outside the scope of this paper.

Table 4
Dowry and education with marriage market competition.

	(1) Dowry (=1)	(2) Dowry value	(3) Dowry (=1)	(4) Dowry value	(5) Dowry (=1)	(6) Dowry value	(7) Dowry (=1)	(8) Dowry value
Groom education	0.00612***	2.085***			0.00579***	2.204***	0.00658***	1.814***
(Years)	(0.00187)	(0.637)			(0.00182)	(0.674)	(0.00193)	(0.588)
Groom education X	−0.0156**	−5.088*			−0.00618	−8.274**	−0.00468	−11.27**
Highly Educated Frac	(0.00692)	(2.729)			(0.00993)	(4.092)	(0.0101)	(4.283)
Above Med. Education			0.0408***	15.57***				
			(0.0133)	(3.913)				
Above Med. Education			−0.0769	−39.73**				
X Highly Educated Frac. (Male)			(0.0545)	(15.19)				
Groom Education X					−0.0149	5.290		
Highly Educated Frac. (Women)					(0.0117)	(3.741)		
Groom education X							−0.00176	1.083**
Avg Fem Education							(0.00114)	(0.449)
Observations	43002	29616	43002	29616	43002	29616	43002	29616
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Household-5 year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Birth order FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: This table reports the returns to education on the marriage market as a function of aggregate marriage market characteristics. In odd columns, the dependent variable is a dummy variable for if dowry was paid, and in even columns, the dependent variable is the real value of the dowry payment in 2010 rupees, which is equal to zero if no payment was made. Groom education is defined in years. Highly Educated Fraction is the fraction of men on the marriage market in the same state-caste-five year period with more than 12 years of education. Above Median Education takes the value 1 if the groom's education is above the median education level for men. All regressions include controls for the bride's education. There is a smaller number of observations in even columns because there are five states for which we observe whether dowry was paid, but not the dowry amount. Standard errors are clustered at the district level. * $p < 0.10$, ** $p < 0.05$, *** $p < 0.01$.

therefore comes from the differential changes in educational attainment across state-religion-caste groups over time (similar to the other tables). As reported in Table B7, increases in average male educational attainment increase dowry, and increases in average female education decrease it.[62] However, the magnitude of these estimates imply that a one year increase in average male education has an effect 1.75–2 times larger than a one year increase in female education.[63] Fig. 4(c)) shows that the increases in female education over our sample period are never more than 1.75–2 times larger than male education, meaning that this cannot explain aggregate declines in dowry; however, this may not be true in more recent years when growth in female education has accelerated.

Lastly, the above discussion shows that while an increase in female education is unlikely to explain the decline in dowry, it could nevertheless be an important driver of dowry dynamics. To assess its quantitative importance, we take the estimated coefficients from Column (6) of Table 4 and use the male and female education distribution (from the previous analysis), to predict the average dowry for each five-year period between 1930–95 (denoted by $\bar{D}_t^0$).[64] Next, in a counterfactual simulation, we fix the female education distribution to that in 1930, and predict average dowry for each five-year period again ($\bar{D}_t^1$). By construction, the ratio $\bar{D}_t^1/\bar{D}_t^0$ therefore captures the change in average dowry that can be explained solely by changes to the male education distribution. In the post 1975 period (when we observe a decline in dowry), this ratio is around 85% from 1975–85 and around 80% from 1985–95, meaning that changes in male education are substantially more important than changes in the female distribution.[65]

Put together, we interpret the above analysis as evidence that the increase in proportion of educated grooms (and hence the search channel) was an important channel driving the decline in dowry after 1975. However, by no means was it the only factor. For example, Calvi and Keskar (2021a) and Alfano (2017) find that the passage of the Dowry Prohibition Act amendment in 1985 significantly lowered dowry payments. Moreover, changes to the brides' side of the marriage market, and in particular, the continued increase in female education in recent years may play an important part in further lowering dowry payments. We leave it to future work to consider these other channels.

5. Conclusion

This paper provides evidence on what factors explain the institution of dowry in India. We document key facts and show that many prominent theories are not supported by the data. Instead, the emergence and evolution of dowry is best explained by shifts in the distribution of groom quality during the process of modernization. This has relevance for policy: if policymakers wish to eliminate dowry due to its many undesirable consequences, they need to understand what causes dowry. For example, if dowry emerges because payment of dowry increases social status (e.g. Sanskritization), anti-dowry strategy should focus on changing norms among high status individuals. On the other hand, if the relative earnings distributions of brides and grooms determine dowry, then encouraging female labor force participation is a promising strategy.

Our findings suggest that norms-based approaches to eliminating dowry may prove less effective because of the strong economic factors that perpetuate dowry. On the bride side, families who refuse to pay dowry for their daughters may end up with less educated grooms. Grooms have a strong economic incentive to accept dowry, particularly if their family has to pay dowry for its own female children or wants to recoup investments in the groom's education. Future campaigns to eliminate dowry must acknowledge these factors and address

[62] Columns (2) and (3) show robustness to inclusion of different types of fixed effects, including household fixed effects and household-generation fixed effects. We are unable to use household-five year fixed effects here because this removes nearly all identifying variation, which comes from variation in male/female education across state-religion-caste groups as opposed to the individual.

[63] The larger effect of male education is plausibly because low female labor force participation means returns to female education come from within-household channels such as educating children (Behrman et al., 1999b). Although valuable, these are likely less valued than wages accruing to more educated males in the labor market.

[64] See Online Appendix Section E.5 for a more detailed discussion of this method. We take into account the precision of the estimate for each regression coefficient ($\hat{\beta}$) by simulating dowry payments using the underlying distribution of each $\hat{\beta}$, as measured by the point-estimate and its corresponding standard error, and averaging over these simulations.

[65] For robustness in Online Appendix Section E.5, we re-calculate the ratio by estimating Eq. (5) with more flexible interactions between the male and female education distributions. The results are similar: changes in male education continue to explain over 65%–75% of the predicted dowry changes post 1975.

the economic factors that perpetuate dowry, such as low labor force participation of women.

While this paper addresses many empirical questions on dowry, others remain. We have focused on the male side of the marriage market, but it would be useful to understand how changes on the bridal side of the market affect dowry. Existing evidence points in different directions: Calvi et al. (2022) and Dalmia (2004) find that higher levels of education for women reduces their marriage market value, while Behrman et al. (1999b) and Maertens and Chari (2020) conclude the opposite. Our data is not well-suited to test for the female side of the market, but future research should consider collecting data on dowry and marriage market outcomes as part of experiments related to female education, empowerment, or labor force participation in order to better understand that side of the market. Our paper also does not address why modernization did not lead similar dowry inflation in other societies, the focus of the model in Anderson (2003). There are many unique features of the Indian context that could explain this, such as the low rates of female labor force participation and nature of marriage market matching, but this remains an interesting question for other future research.

Declaration of competing interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Data availability

The authors do not have permission to share data.

Appendix A. Supplementary data

Supplementary material related to this article can be found online at https://doi.org/10.1016/j.jdeveco.2023.103115.

References

Alfano, Marco, 2017. Daughters, dowries, deliveries: The effect of marital payments on fertility choices in India. J. Dev. Econ. 125, 89–104.

Ambrus, Attila, Field, Erica, Torero, Maximo, 2010. Muslim family law, prenuptial agreements, and the emergence of dowry in Bangladesh. Q. J. Econ. 125 (3), 1349–1397.

Anderson, Siwan, 2003. Why dowry payments declined with modernization in Europe but are rising in India. J. Polit. Econ. 111 (2), 269–310.

Anderson, Siwan, 2004. Dowry and Property Rights. Technical Report, Mimeo.

Anderson, Siwan, 2007a. The economics of dowry and brideprice. J. Econ. Perspect. 21 (4), 151–174.

Anderson, Siwan, 2007b. Why the marriage squeeze cannot cause dowry inflation. J. Econ. Theory 137 (1), 140–152.

Anderson, Siwan, Bidner, Chris, 2015. Property rights over marital transfers. Q. J. Econ. 130, 1421–1484.

Anukriti, S., Kwon, Sungoh, Prakash, Nishith, 2022. Saving for dowry: Evidence from rural India. J. Dev. Econ. 154, 102750.

Arunachalam, Raj, Logan, Trevon D., 2014. Is there dowry inflation in South Asia? Hist. Methods A J. Quant. Interdiscip. Hist. 47 (2), 81–94.

Ashraf, Nava, Bau, Natalie, Nunn, Nathan, Voena, Alessandra, 2019. Bride price and female education. J. Polit. Econ.

Banerjee, Abhijit, Duflo, Esther, Ghatak, Maitreesh, Lafortune, Jeanne, 2013. Marry for what? Caste and mate selection in modern India. Am. Econ. J. Microecon. 5 (2), 33–72.

Becker, Gary S., 1973. A theory of marriage: Part I. J. Polit. Econ. 81 (4), 813–846.

Behrman, Jere, Foster, Andrew, Rosenzweig, Mark, Vashishta, Prem, 1999b. Women's schooling, home teaching, and economic growth. J. Political Econ. 107 (4), 682–714.

Bergstrom, Theodore, Lam, David, 1991. The two-sex problem and the marriage squeeze in an equilibrium model of marriage markets.

Bergstrom, Theodore, Lam, David, 1994. The effects of cohort size on marriage markets in twentieth century Sweden. In: The Family, the Market, and the State in Ageing Societies. Oxford University Press, pp. 46–63.

Bhalotra, Sonia, Chakravarty, Abhishek, Gulesci, Selim, 2020. The price of gold: Dowry and death in India. J. Dev. Econ. 143, 102413.

Bhalotra, Sonia R., Cochrane, Tom, 2010. Where Have All the Young Girls Gone? Identification of Sex Selection in India. IZA Discussion Paper.

Bhaskar, Venkataraman, 2016. The Demographic Transition and the Position of Women: A Marriage Market Perspective. Working Paper.

Billig, Michael S., 1991. The marriage squeeze on high-caste Rajasthani women. J. Asian Stud. 50 (02), 341–360.

Billig, Michael S., 1992. The marriage squeeze and the rise of groomprice in India's Kerala state. J. Comp. Fam. Stud. 197–216.

Bloch, Francis, Rao, Vijayendra, 2002. Terror as a bargaining instrument: A case study of dowry violence in rural India. Amer. Econ. Rev. 92 (4), 1029.

Borker, Girija, Eeckhout, Jan, Luke, Nancy, Minz, Shantidani, Munshi, Kaivan, Swaminathan, Soumya, 2017. Wealth, Marriage, and Sex Selection. Technical Report, Cambridge University, Working Paper.

Botticini, Maristella, Siow, Aloysius, 2003. Why dowries? Amer. Econ. Rev. 93 (4), 1385–1398.

Brandt, Loren, Siow, Aloysius, Vogel, Carl, 2016. Large demographic shocks and small changes in the marriage market. J. Eur. Econ. Assoc. 14 (6), 1437–1468.

Caldwell, John C., Reddy, Palli Hanumantha, Caldwell, Pat, 1983. The causes of marriage change in South India. Popul. Stud. 37 (3), 343–361.

Callaway, Brantly, Goodman-Bacon, Andrew, Sant'Anna, Pedro H.C., 2021. Difference-in-differences with a continuous treatment. arXiv preprint arXiv:2107.02637.

Calvi, Rossella, Fulford, Scott, Beauchamp, Andrew, 2022. Terms of Engagement: Marriage and Migration in India. Working Paper.

Calvi, Rossella, Keskar, Ajinkya, 2021a. Til Dowry Do Us Part: Bargaining and Violence in Indian Families. CEPR Working Paper.

Calvi, Rossella, Keskar, Ajinkya, 2021b. Resource allocation, and poverty. J. Econ. Behav. Organ. 192, 268–303.

Chakraborty, Tanika, 2015. Trade liberalization in a traditional society: implications for relative female survival. World Dev. 74, 158–170.

Chiplunkar, Gaurav, Weaver, Jeffrey, 2023. Online Appendix for Marriage Markets and the Rise of Dowry in India. SSRN Working Paper 4419201.

Cook, Lisa D., Jones, Maggie E.C., Logan, Trevon D., Rosé, David, 2023. The evolution of access to public accommodations in the United States. Q. J. Econ. 138 (1), 37–102.

Corno, Lucia, Hildebrandt, Nicole, Voena, Alessandra, 2020. Age of marriage, weather shocks, and the direction of marriage payments. Econometrica 88 (3), 879–915.

Dalmia, Sonia, 2004. A hedonic analysis of marriage transactions in India: Estimating determinants of dowries and demand for groom characteristics in marriage. Res. Econ. 58 (3), 235–255.

Dalmia, Sonia, Lawrence, Pareena G., 2005. The institution of dowry in India: Why it continues to prevail. J. Dev. Areas 38 (2), 71–93.

Deolalikar, Anil B., Rao, Vijayendra, 1995. The demand for dowries and bride characteristics in marriage: empirical estimates for rural South-central India. In: Presented At the Annual Meeting of the Population Association of America, Denver, Colorado, April 30 - May 2, 1992. [Unpublished] 1992. Presented at the Annual Meeting of the Population Association of America Denver Colorado April 30-May 2 1992.

Dugar, Subhasish, Bhattacharya, Haimanti, Reiley, David, 2012. Can't buy me Love? A field experiment exploring the trade-off between income and caste-status in an Indian matrimonial market. Econ. Inq. 50 (2), 534–550.

Edlund, Lena, 1999. Son preference, sex ratios, and marriage patterns. J. Polit. Econ. 107 (6), 1275–1304.

Edlund, Lena, 2000. The marriage squeeze interpretation of dowry inflation: A comment. J. Polit. Econ. 108 (6), 1327–1333.

Edlund, Lena, 2006. The price of marriage: Net vs. Gross flows and the south Asian dowry debate. J. Eur. Econom. Assoc. 4 (2/3), 542–551.

Epstein, T. Scarlett, 1973. South India: Yesterday, Today and Tomorrow. Macmillian.

Foster, Andrew, Khan, Nizam, 2000. Equilibrating the marriage market in a rapidly growing population: Evidence from rural Bangladesh. Unpublished Manuscript.

Foster, Andrew, Rosenzweig, Mark, 1995. Learning by doing and learning from others: Human capital and technical change in agriculture. J. Polit. Econ. 103 (6), 1176–1209.

Foster, Andrew, Rosenzweig, Mark, 1996. Technical change and human-capital returns and investments: evidence from the green revolution. Am. Econ. Rev. 931–953.

Hortaçsu, Ali, Hwang, Sam Il Myoung, Mathur, Divya, 2019. Monetary incentives on inter-caste marriages in India: Theory and evidence. J. Dev. Econ. 141, 102371.

Khanna, Gaurav, 2023. Large-scale education reform in general equilibrium: Regression discontinuity evidence from India. J. Polit. Econ. 131 (2).

Lafortune, Jeanne, 2013. Making yourself attractive: Pre-marital investments and the returns to education in the marriage market. Am. Econ. J. Appl. Econ. 5 (2), 151–178.

Maertens, Annemie, Chari, A.V., 2020. What's your child worth? An analysis of expected dowry payments in rural India. World Dev. 130, 104927.

Mukherjee, Dipa, 2004. Educational Attainment in India: Trends, Patterns and Policy Issues. Dept of Economics, Narasinha Dutt College.

Oster, Emily, 2019. Unobservable selection and coefficient stability: Theory and evidence. J. Bus. Econom. Statist. 37 (2), 187–204.

Rajaraman, Indira, 1983. Economics of bride-price and dowry. Econ. Political Week. 18 (8), 275–279.

Rao, Vijayendra, 1993. The rising price of husbands: A hedonic analysis of dowry increases in rural India. J. Polit. Econ. 101 (4), 666–677.
Rao, Vijayendra, 2000. The marriage squeeze interpretation of dowry inflation: Response. J. Polit. Econ. 108 (6), 1334–1335.
Rosenzweig, Mark, 2010. Microeconomic approaches to development: Schooling, learning, and growth. J. Econ. Perspect. 24 (3), 81–96.
Rosenzweig, Mark, Stark, Oded, 1989. Consumption smoothing , migration , and marriage : Evidence from rural India. J. Polit. Econ. 97 (4), 905–926.
Roy, Sanchari, 2015. Empowering women? Inheritance rights, female education and dowry payments in India. J. Dev. Econ. 114, 233–251.
Sautmann, Anja, 2011. Partner Search and Demographics: The Marriage Squeeze in India. Working Papers.
Sekhri, Sheetal, Storeygard, Adam, 2014. The impact of climate variability on crimes against women: Dowry deaths in India. J. Dev. Econ. 111, 212–223.
Shafir, Eldar, Diamond, Peter, Tversky, Amos, 1997. Money illusion. Q. J. Econ. 112 (2), 341–374.
Sharma, Ram Nath, Sharma, Rajendra Kumar, 1996. History of Education in India. Atlantic Publishers & Dist.
Singh, Vir Bahadur, 1965. Economic History of India, 1857-1956. Allied Publishers.
Srinivas, M.N., 1956. A note on Sanskritization and Westernization. J. Asian Stud. 15 (04), 481–496.
Srinivas, M.N., 1976. The Remembered Village. University of California, Berkeley Press.
Srinivas, M.N., 1984. Some Reflections on Dowry. OUP India.
Vogl, Tom S., 2013. Marriage institutions and sibling competition: Evidence from South Asia. Q. J. Econ. 1017–1072.
World Gold Council, 2019. Historical Gold Prices - 1833 to Present. Technical Report.