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Dowry in the absence of the legal protection of women's inheritance rights

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Abstract The practice of dowry is often thought to be the root cause of the unequal treatment of girls in India, as represented by sex-selective abortion and female infanticide. This is because the prospect of burdensome dowry payments in future makes the birth of a girl child unwelcome. For adult women without inheritance rights, however, dowry may function as their only source of protection. Using a nationwide dataset and exploiting a natural experimental setting, this study explores the relationship between dowry and women's empowerment in India, a society where women do not have inheritance rights, and thus do not usually possess immovable assets. In such a society, dowry seems to enhance women's status in the marital household. The relationship reverses when women have equal inheritance rights as their brothers. Empirical analysis suggests that the outright ban on dowry that ignores the context may not necessarily benefit women. It also implies that dowry may become unnecessary and disappear once women are assured of inheritance rights.

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1 Introduction

Women's empowerment, broadly defined as having control over their own lives,[1] has attracted the attention of those engaged in development issues, for its importance in alleviating poverty and promoting economic development (World Bank 2011; Duflo 2012). Given its importance as a potential means of poverty alleviation, researchers have investigated methods to enhance women's empowerment. Microeconomists consider women's bargaining position within the household as key to determining women's empowerment. Women with more outside options have a higher reservation utility and thus, relatively more bargaining power within the household (the Nash bargaining model: for example, Manser and Brown 1980; McElroy and Horney 1981). A typical outside option is based on employment opportunities for women because it is easier for women with a lucrative job to make a living without their husbands. The amount of immovable assets (e.g., land and houses) that women possess, either via inheritance or purchase, is also important because securing a place to stay is indispensable when leaving their husbands (Panda and Agarwal 2005). Outside options may also be broadened by the ease of divorce without spousal consent (Friedberg 1998; Wolfers 2006) and favorable marriage-market situations (e.g., Becker 1991; Chiappori et al. 2002).

In the context of South Asian countries, where divorce is very rare and women usually do not work outside the home or have access to immovable assets in reality, the aforementioned outside options are irrelevant in most cases. While the outside options are usually interpreted in terms of opportunities when the current marriage dissolves (Manser and Brown 1980; McElroy and Horney 1981), they do not necessarily require divorce. Theoretically, a non-cooperative equilibrium can be an outside option (Lundberg and Pollak 1993). Without divorce, women may go back to their natal families. In this case, the level of support that these families can offer is important, as measured by the strength of women's bonds with their natal families and the assets owned by the natal families. Furthermore, the status of working women is not particularly high in South Asian countries. There is no consensus on the relationship between women's employment and their status within the household, but several studies indicate that women's employment opportunities and wages do not affect their bargaining position within the household in India, unlike the possession of immovable assets such as land and house (e.g., Sen 1999; Panda and Agarwal 2005). In particular, the northern states of India are well known for women's lower status in every aspect, such as inheritance rights, sex ratio, fertility, and gender gap in education and mortality (Dyson and Moore 1983; Jejeebhoy and Sathar 2001). In northern India, traditional factors such as the number of sons to whom a woman gives birth and the amount of dowry that they bring at the time of marriage are believed to positively affect women's empowerment (Jejeebhoy 2000).

This study examines the above hypothesis suggested by Jejeebhoy (2000). The focus is on the relationship between dowry and women's status in the

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[1] In empirical studies, this is often measured by the extent to which women can take decisions, have autonomy, are free from mental and physical threats within the household, and can move freely and independently by themselves.

marital household. In particular, we investigate the difference between the environments where women have no inheritance rights and where they have equal inheritance rights as their brothers. We exploit a natural experimental situation in India that generated such environmental differences across states, namely, the amendment of the Hindu Succession Act of 1956 in five states, from 1976 to 1994. The amendment assures equal inheritance rights for daughters and sons with respect to joint family property. The empirical results reveal that the amount of dowry is positively associated with women's empowerment when women have no inheritance rights.

Although the focus of this study is the relationship between women's status and dowry, we also examine the relationship between women's status and bride price. Bride price is paid by the groom's side at the time of marriage, and often coexists with dowry in the same marriage, in many cultures (Zhang and Chan 1999; Anderson 2007; Maitra 2007; Makino 2015). In comparison with dowry, few studies look at how bride price is related to women's status within the household. If bride price is offered to the bride's parents, it may decrease her bargaining position within the marital household because she may be under pressure not to go back to her natal family (Ashraf et al. 2015). In contrast, if bride price is offered to the bride, the fact that it becomes her property may enhance her bargaining position, or may decrease it by obliging her to perform more household production such as providing eldercare to her parents-in-law (Grossbard 2017). In reality, bride price seems to be offered to both the bride and her parents, and which party gets to keep its majority share seems to vary across regions and families (Anderson 2007). Our empirical results show that in most cases, the relationship between women's status and bride price is the opposite to that of dowry.

The closest to this study may be those by Zhang and Chan (1999) and Brown (2009), which test the Nash bargaining model with the amount of dowry as an outside option, using datasets for Taiwan and China, respectively. Using the same theoretical framework, this study tests whether dowry enhances women's welfare in the context of India where, traditionally, women had no inheritance rights. While the study by Jejeebhoy (2000) demonstrates that dowry enhances women's decision-making power in a northern state (i.e., Uttar Pradesh) but not in a southern state (i.e., Tamil Nadu), it does not investigate which factor generates such regional differences. By explicitly examining the relationship between women's empowerment and the legal provision of inheritance rights, this study fills the gap. The results also suggest that the argument that dowry represents a premortem inheritance (Tambiah 1973; Botticini and Siow 2003) is also applicable in modern India.

The results have several important policy implications. They suggest that the universal ban on dowry does not necessarily achieve its intended policy consequences, such as the welfare improvement and empowerment of women. Rather, dowry may function as the only measure to protect women in situations where women have no inheritance rights in reality. Thus, parents may be willing to pay the highest dowry possible at the time of their daughter's marriage, with the expectation of her better treatment in the marital household. This may be one of the reasons for the well-known ineffectiveness of India's Dowry Prohibition Act of 1961. The results simultaneously suggest that the legal provision of equal inheritance rights for

daughters and sons, regardless of whether equal inheritance is actually realized, may be effective if the policymakers' aim is to end the practice of dowry. This is because parents would not have any incentive to give dowry to their daughter if it does not affect their daughter's status in the marital household. Legal provisions can be one of the many factors that generate dissociation between dowry and a daughter's status.

The remainder of the paper is organized as follows. Section 2 describes the background, namely, the practice of dowry and the amendment of the Hindu Succession Act, 1956. Section 3 describes the dataset used in this empirical study. Section 4 presents the estimation strategy. Section 5 provides the empirical results. Section 6 presents the conclusions.

2 Background: dowry practice and amendment of the Hindu Succession Act, 1956

2.1 Dowry practice

Dowry, broadly defined as a transfer, at the time of marriage, from the bride's parents to her as well as the groom and his family, was traditionally observed only among the Hindu higher caste. Nowadays, the practice is prevalent in South Asia not only among Hindus but also among other groups such as Muslims who had originally practiced bride price (i.e., a transfer from the groom's parents to the bride's parents). Srinivas (1994) argues that the modern dowry now prevalent in South Asia should not be regarded the same as the traditional dowry. Traditionally, dowry is seen as the property taken by the bride to her new home or given to her during the marriage ceremony (Tambiah 1973), while modern dowry is the property expected or even demanded by the husband and his family at the time of marriage (Billig 1992). In practice, however, distinguishing modern dowry from traditional dowry is often difficult because even though all these gifts are initially given to the bride, she brings them to the groom's place in a patrilocal society. Under weak property rights in practice, the actual ownership of these gifts is unclear and may depend on the family. Thus, in this study, the term dowry is used to describe modern as well as traditional dowry paid at the time of marriage, as commonly used by NGOs, activists, the media, and researchers. Dowry thus includes gifts and valuable assets both to the bride and to the groom and his parents.

Dowry in India is often considered to be the root cause of the unequal treatment of girls vis-à-vis boys, as represented by sex-selective abortion, female infanticide, and the undernourishment of girls. The practice of dowry has led to daughters being considered a burden to the family, while sons, especially those with a higher income-earning capacity, can be assets to the family by commanding a higher dowry. This leads to an intensive parental son preference and an incentive for human capital investment in sons. Unequal treatment leads to the notorious phenomenon of "missing women," which refers to an unnaturally high male-to-female ratio in South Asia (e.g., Sen 1990). Dowry is also severely criticized by the media as well as academics for its association with "dowry murder" and "dowry suicide" (Stone and

James 1995; Rudd 2001; Bloch and Rao 2002; Sekhri and Storeygard 2014).[2] The Dowry Prohibition Act of 1961 prohibits the practice because of these alleged negative consequences. However, this legal prohibition is well known for its ineffectiveness.

Although the negative consequences associated with dowry seem logically valid, empirical support is scarce. One of the main reasons may be that data on dowry is unavailable or unreliable. Since its practice is banned, questionnaire respondents are unwilling to reveal the dowry recipients as well as the correct amounts of dowry. Moreover, the respondents retrospectively state the dowry amount paid at the time of their marriage, and thus, recall errors are common. Hence, empirical evidence under these data limitations is limited and mixed. Some studies show that dowry enhances women's welfare in the marital household (e.g., Bloch and Rao 2002; Srinivasan and Bedi 2007),[3] but the opposite is found in other studies (e.g., Suran et al. 2004). This mixed empirical evidence is not surprising because the effects of dowry may be different across different contexts, even in South Asia. For example, Jejeebhoy (2000) shows that dowry leads to women's empowerment in the northern part of India, where women's status is relatively low, while it does not have this effect in the southern part of the country.

In contrast, theoretical studies on dowry have been systematically developed. According to Becker (1991), the one who gains in the marriage pays the price at the time of marriage, which clears the marriage market (the price model). The price model predicts that an undersupply of grooms or a lower premarital sex ratio may increase the dowry amount. Being consistent with the price model, dowry is often interpreted as the compensation by the bride's parents to the groom and his parents, which reflects people's perception in South Asia that women do not contribute to family income because they usually do not participate in the labor market (Boserup 2007; Anderson 2007). However, there is little, often weak or indirect, empirical evidence supporting the price model in South Asia (Behrman et al. 1995; Mbiti 2008; Ambrus et al. 2010; Peters 2011; Horioka and Terada-Hagiwara 2017). Another interpretation is that dowry is a pre-mortem bequest from the bride's parents to the bride (the bequest model). According to Becker (1991), daughters who do not inherit their parents' assets may be given dowry at the time of marriage. The necessary conditions in the bequest model are patrilocality and poor inheritance rights (Botticini and Siow 2003; Arunachalam and Logan 2016). Most parts of South Asia are characterized by patrilineal and patrilocal societies where, in practice, women have no inheritance rights. Some refute the bequest model based on the fact that the value of the dowry amount is usually much lower than that of immovable assets inherited by male siblings (e.g., Agarwal 1994). No matter how much lower the value is, this

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[2] "Dowry murder" is officially defined as any instance where the death of a woman is caused by burns or bodily injury or occurs in circumstances other than under normal circumstances, within seven years of her marriage, and it is proven that before her death, the woman was subjected to cruelty or harassment by her husband or any relative of her husband for, or in connection with, any demand for dowry (the Dowry Prohibition Amendment Act, 1986). Some criticize the term "dowry murder" because it is likely to include any kind of homicide, including those presumably unrelated to dowry (for example, Kishwar 1989; Narayan 1997; Leslie 1998; Oldenburg 2002; Palriwala 2009).

[3] Datasets other than those from South Asia provide some evidence of a positive effect of dowry on women's welfare in the marital household (e.g., Zhang and Chan 1999; Brown 2009).

fact does not necessarily refute the bequest nature of dowry; that is, gifts by parents to their daughter at the time of marriage. In a society where, in practice, women do not inherit parental land, dowry may be the only asset for women and their only source of protection (Kishwar 1988, 1989). Although studies seem to focus on the distinction between the two models (e.g., Anderson 2004, 2007; Arunachalam and Logan 2016), the price and bequest models are not necessarily mutually exclusive. Recently, Anderson and Bidner (2015) have formalized the simultaneous dual role of dowry as a price and a bequest.

2.2 Amendment of the Hindu Succession Act, 1956

In India, inheritance practices and their legal provisions, which differ by the religion to which one belongs, are very complex. The Hindu Succession Act, 1956, applies to Hindus, Buddhists, Jains, and Sikhs, who represent more than 80% of the population.

It embodies the gender discriminatory nature of inheritance practices in India. While it assures equal inheritance rights for sons and daughters with respect to separate or non-ancestral assets, it excludes daughters from joint family assets. A typical example of separate assets is land purchased by one's father. By contrast, joint family assets are inherited generationally. For example, if a man's grandfather were alive, he would have a natural right to inherit his grandfather's joint family assets with his father. Joint family assets are estimated to constitute 84% of the total household assets in India (Roy 2015). In other words, women are assured of inheritance rights over only 16% of the total assets, under the Hindu Succession Act, 1956. Several states amended this discriminatory provision to assure equal inheritance rights for both daughters and their brothers with respect to joint family assets: Kerala in 1976, Andhra Pradesh in 1986, Tamil Nadu in 1989, and Maharashtra and Karnataka in 1994 (Fig. 1). The Hindu Succession Act was finally amended at the central government level in 2005, and the amendments, whether at the state or central government levels, run along the same lines: they stipulate that the daughter of a coparcener will acquire coparcenary rights equally with her brothers at birth, but only if she were unmarried at the time of the amendment. Typically, the coparcener is the father, and his daughter has inheritance rights at birth on assets owned by her grandfather.

Empirical evidence on whether the amendment actually led to women inheriting immovable assets is mixed. Some studies indicate that the amendment increased women's likelihood of inheriting land (e.g., Deininger et al. 2013). In contrast, other studies such as those by Roy (2015) find that the amendment had no impact on the likelihood of inheritance by women. Whether or not an actual inheritance is realized, the studies seem to agree that the amendment affects people's expectation and perception about women's inheritance rights, and enhances women's empowerment, which may be represented by several aspects, such as the characteristics of a woman's spouse and his family; her level of education, age at marriage, and reproductive decisions; and her status in the marital household, including her vulnerability to domestic violence. For example, despite the fact that she finds no impact of the amendment on the actual likelihood of inheritance by women, Roy (2015) finds that it enhances women's level of education, whereby parents are believed to compensate their daughters with more schooling in place of their disinheritance.
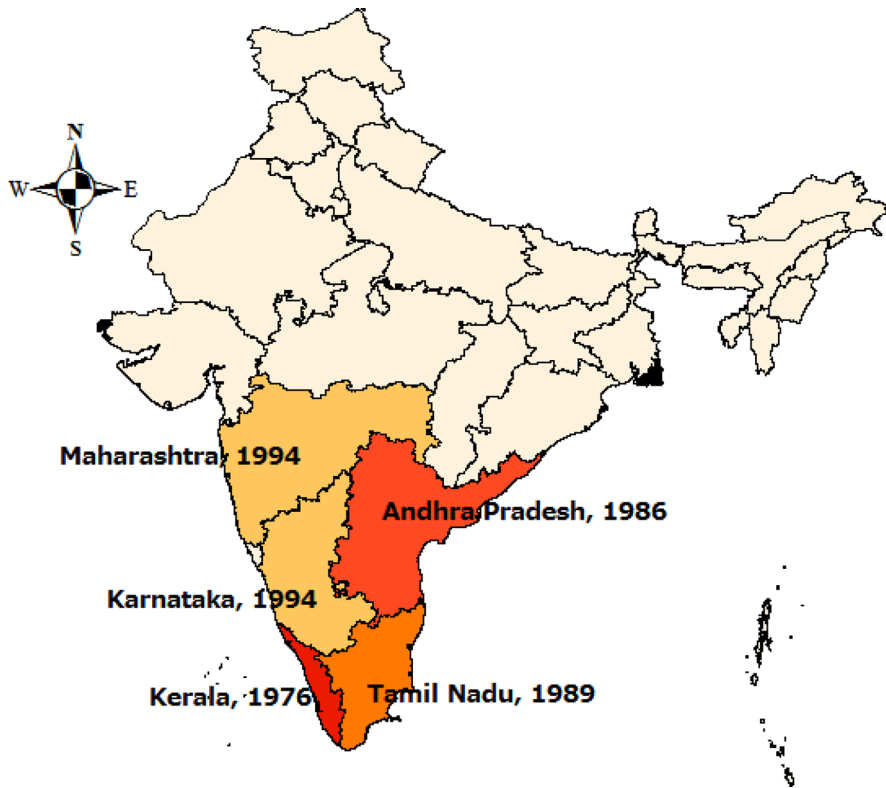
Fig. 1 Years of amendment of the Hindu Succession Act, 1956 in each state

3 Data

The data used for this study are drawn from the India Human Development Survey (IHDS), 2005, which covers 41,554 households in 1503 villages and 971 urban neighborhoods across India. The IHDS includes information such as marriage, fertility, and gender relations, as well as socioeconomic characteristics of households and individual members. One of the salient features of the IHDS is that the education and health questionnaire is answered by "eligible women," defined as those who were ever married between the ages of 15 and 49. The education and health questionnaire includes specific questions closely relevant to this study, such as dowry payments and detailed gender relations within the household. In the main estimation, the state of Kerala is excluded based on the literature that points out that Kerala is an outlier, especially with respect to the status of women, and needs to be excluded when studying gender-related issues (e.g., Deininger et al. 2013; Anderson and Genicot 2015).[4] Our sample consists of 23,039 married women aged 15 to 49 whose husbands are the heads of their households.

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[4] The inclusion of Kerala does not substantially alter the main estimation results. The results including Kerala are available upon request.

The IHDS reports variables that measure the extent of women's bargaining position, specifically, their decision-making power within the household. When the female respondent has the "most say" in a specific household decision-making matter, it is indicated by the binary variable taking the value one. The IHDS also has information on whether the female respondent has "some say" in the same decision-making matter, but we use the variables for whether women have the "most say" as proxies to measure their welfare and empowerment in the marital family. This is because the information included in the answers that they have "some say" in each of five decision-making matters is difficult to interpret uniformly because "some say" covers a range of the decision-making power that women have. In one case, they may have equal decision-making power as their husbands, and it would not matter which variable, "some say" or "most say," should be used. In the other case, women may answer that they have "some say" when they feel some psychological pressure from their husbands. While it may be easy to answer that they do not have the most decision-making power, women may find it more difficult to answer that they do not have any decision-making power if they are really being controlled. If so, the binary variable taking the value one when women have "some say" may not necessarily indicate that they have decision-making power; rather, the opposite may be true.[5] Figure 2 presents the extent to which women have the most decision-making power within the household on each of five matters. Among all female respondents who answered the questions, 82.6% and 29.5% have decision-making power about what to cook on a daily basis and when their children fall sick, respectively, while few women have decision-making power about matters that are strategically important in the long term, such as the purchase of expensive items (9.7%), the number of children they have (18.3%), and the marriage of their children (8.5%).

Table 1 shows the descriptive statistics of the socioeconomic variables. The average age of the women is 34.4 years and their average age at marriage is 17.3 years. Almost half of the women are illiterate. Their average schooling is 4.0 years, while their husbands' average is 6.2 years. Our sample has 39% of respondents living in urban areas. Household income is the sum of all sources, namely, family farm income, wages and salaries, net business income, income from property, remittances, and transfers from the government. The average annual household income is Rs.49,531.[6] Although the typical test of the Nash bargaining model considers wages as an outside option, we do not consider them here, given that they are less likely to affect the outside options in the context of South Asia.[7] Wages are reported by only 27.2% of married women and 71.5% of their husbands, which characterizes Indian society where women usually do not work outside their home and a considerable number of men are self-employed. Thus, wages only partially capture information about the earning capacity or wealth of the individual. The variables related to gender relations within the household and those specific to Indian society, such as caste and religion variables, are also reported in

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[5] In fact, the estimation results when women have "some say" as an outcome variable are different from those when women have the "most say" (see Appendix Fig. 5 and Table 10).

[6] In the regression analysis, non-wage income (i.e., total income minus wages and salaries) is used as a control variable to deal with endogeneity. The use of total income is alternatively checked and does not affect the estimation results.

[7] Inclusion of wage information does not affect the main results. The results are available upon request.
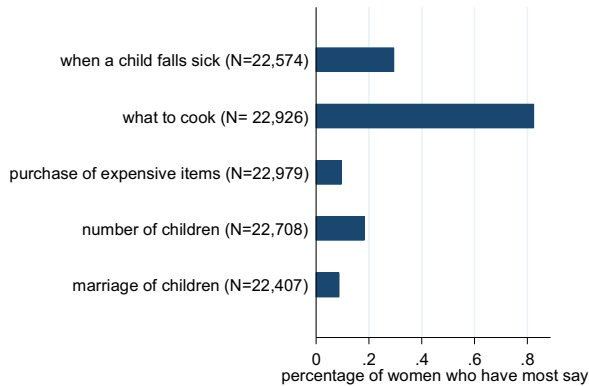
Fig. 2 Women's decision-making power within the household (woman has the most decision-making power = 1)

Table 1 Summary statistics

	Mean
Woman's age	34.39 (7.57)
Woman's age at marriage	17.34 (3.58)
Age difference (husband-wife)	5.57 (3.67)
HH income (Rs.)	49,531 (63,734)
Agricultural land owned (acre)	10.40 (187.18)
Dowry (Rs.)	97,462 (104,895)
Bride price (Rs.)	66,063 (79,133)
Women's literacy (yes =1)	0.51 (0.50)
Women's school years	4.01 (4.63)
Husband's school years	6.24 (4.91)
Urban (yes = 1)	0.39 (0.49)
Brahmin (yes = 1)	0.05 (0.23)
Highcaste (yes = 1)	0.17 (0.37)
Scheduled caste (yes = 1)	0.21 (0.41)
Scheduled tribe (yes = 1)	0.09 (0.28)
Other backward caste (yes = 1)	0.39 (0.49)
Hindu (yes = 1)	0.81 (0.39)
Muslim (yes = 1)	0.12 (0.32)
Christian (yes = 1)	0.02 (0.15)
Sikh (yes = 1)	0.02 (0.14)
Buddhist (yes = 1)	0.01 (0.08)
Other religions (yes = 1)	0.02 (0.12)
Wealth (natal > husband's family, =1)	0.19 (0.39)
Endogamous marriage (yes = 1)	0.27 (0.45)
Number of observations	23,039

Standard deviations are in parentheses

Table 1. We consider two variables reflecting gender relations: one is the relative wealth of the natal household, which takes the value one when the woman's natal family is better off than her husband's family at the time of marriage,[8] and the other is endogamy, which takes the value one when any member of the woman's family is married into her husband's family, the woman is related to her husband by blood, or the woman has grown up in the same village/town as her husband. The endogeneity of endogamy is treated using the methodology described in Section 4. The specific questions used to construct these variables are presented in the Appendix.

The average amount of dowry is Rs.97,462, which is almost twice as large as the average annual household income, while the average bride price is Rs.66,063. This seems consistent with the common view that the dowry is several times greater than annual household incomes. The variables of dowry and bride price are constructed as follows based on information available in the IHDS that asks about the amount of money usually spent by the bride's and groom's families at the time of marriage.[9] Since the questionnaire allows for some range in the amounts quoted in responses, we take the median value spent by the bride's and groom's families for our definition of dowry and bride price, respectively. Given that these amounts are mentioned by wives in their answers, we assume that dowry refers to the amount paid, and bride price to the amount received.[10] In South Asian marriages, marital transfers are usually not unilateral, and are incurred at the time of the marriage ceremony.[11] It should be noted that the dowry and bride price in the IHDS are not the amount paid at the time of the respondent's marriage, but the customary amount paid in the community (*jati*, but not village) of the respondent. Since *jati* is synonymous with the sub-caste or brotherhood, reflecting the respondent's living standard, we assume that women's answers refer to the present value of the actual dowry amount personally paid at the time of their marriage. This assumption does not seem to be irrelevant empirically. Given the fact that dowry consists of many items (gold, cash, clothing, furniture, electronics, kitchen items, and so on), the actual amount of the dowry paid at the time of one's own marriage is often subject to serious recall errors. Jejeebhoy (2000) notes that the personal dowry amount is imputed in her empirical study because it is not usually easily revealed by female respondents in their answers as it consists of gold, cash, and a variety of other property, including expensive consumer goods. Typically, the longer the gap between the interviewees' marriage and the recall time, the more likely they overestimate the dowry amount. Makino (2015) shows the serious recall errors with this overestimation tendency using

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[8] Since this is the subjective measure gleaned from the answers given by the women (see the Appendix for the exact question), it can be subject to measurement errors. For robustness, we check whether the estimated coefficients change by excluding this variable, and find no difference. The results are available upon request.

[9] See the Appendix for the exact questions used for constructing the variables of dowry and bride price.

[10] On the basis of our own field survey, the paid and received amounts in a specific family are often symmetric because of the practice of arranged marriage and of assortative family matching of marriages in South Asia.

[11] It seems standard to include all expenses, both transfers and ceremonial expenses, incurred at the time of marriage in the dowry variable when conducting empirical studies (e.g., Deolalikar and Rao 1998). At any rate, the ceremonial expense is relatively small compared with that for dowry. The study by Bloch et al. (2004) report that the ceremonial expense is only one-eighth of the amount spent for dowry.

existing data, namely the Pakistan Rural Household Survey 2004 conducted by the World Bank, and contrasts it with her own unique survey conducted in 2013 that asked about both *jati*-based dowry and the retrospective personal dowry amount.[12] Given the serious recall errors with regard to the retrospective amount of dowry, we believe that the community (*jati*)-based amount is no less accurate than the amount that the respondents mention retrospectively as the nominal amount of dowry at the time of their own marriage. Using the same dataset in Makino (2015), we plot the retrospective amount of personal dowry corrected for recall errors because of the tendency to overestimate, against the community-based dowry (Appendix Fig. 4). The community (*jati*)-based dowry seems to reflect the personal dowry amount with the correlation coefficient 0.65. After all, we recognize measurement errors in the community (*jati*)-based dowry and deal with them as appropriate, as described in Section 4. According to the IHDS, the reason the question does not ask for the personal amount of dowry is the fact that dowry is a banned practice in India. This may also help formulate the exogenous variables of dowry that do not capture individual household characteristics. Rahman and Rao (2004) insist on the importance of using community-based variables on the right-hand side (RHS) to deal with endogeneity in their study of women's decision-making power in the household.[13] However, since we assume that women give the personal dowry amount as their answer to the question about community (*jati*)-based dowry, it is likely that the community (*jati*)-based dowry variable captures the respondent's unobserved characteristics. Like measurement errors, the potential endogeneity of the community (*jati*)-based dowry variable is addressed further in Section 4.

4 Estimation strategy

The identification is based on a difference-in-differences strategy that compares the effects of dowry on women's status in the marital household when women married before and after the amendment across the reform and non-reform states.[14] The control group comprises women who are not affected by the amendment. This includes those women who reside in the reform states and were married before the amendment as well

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[12] In the eastern provinces of Pakistan, namely Punjab and Sindh, the practice of dowry is as common as it is in India. However, because dowry is not legally banned in Pakistan, the interviewees have no hesitation answering the actual amount of dowry paid at the time of their marriage, unlike in India.

[13] They study how kinship affects women's decision-making power. Their measure of kinship is community-based, such as the village exogamy, and not based on whether the husband and wife are blood relatives.

[14] Precisely speaking, the amendment applies to those who were married and whose paternal grandfather died after the amendment. Moreover, women's natal states, not their current states, determine the reform and non-reform states. Since the IHDS does not include information on the timing of a woman's paternal grandfather's death or her natal states, the timing of a woman's marriage in her current resident state is used in the difference-in-differences strategy. The unavailability of information on women's natal states may not be a serious drawback for this study, given that inter-state marriages before the amendment were not very common in the southern states where the amendment was preceded. We believe that the timing of marriage in the current resident state vis-à-vis the amendment is more important for the purpose of this study because a woman's status can be affected not only by whether she actually inherits ancestral property but also by changes in attitude following the amendment (see Roy 2015).

as those who reside in the non-reform states and those other than Hindus, Buddhists, Jains, and Sikhs. The treatment group consists of women who were married after, and are thus affected by, the amendment in the reform states, namely, Andhra Pradesh in 1986, Tamil Nadu in 1989, and Maharashtra and Karnataka in 1994.

We test the Nash bargaining model with the amount of dowry that represents the women's outside option, as in Zhang and Chan (1999) and Brown (2009). The refutable implication is that the amount of dowry increases the women's bargaining position and their welfare in the marital family. To estimate the relationship between a dowry and the variables showing the women's decision-making power, we use the following linear probability model (LPM):[15]

$$y_{is} = \beta_0 + \beta_1 A_{is} + \beta_2 D_{is} + \beta_3 A_{is} \times D_{is} + \beta_4 B_{is} + \beta_5 A_{is} \times B_{is} + X_{is}\beta_6 + \eta_s + \varepsilon_{is} \quad (1)$$

where y_{is} is the probability of women in household i in state s having a high bargaining position in the marital household, based on women's decision-making power with respect to each of the five decision-making topics presented in Fig. 2 (see the Appendix for the exact questions). D_{is} is the amount of dowry and B_{is} is bride price, both of which are reported by women. A_{is} takes the value one when a woman marries after the amendment in the reform states. Our interest lies in β_2 and β_3 (or β_4 and β_5), the difference between the treatment and control groups in the association of dowry (or bride price) with women's decision-making power. According to the Nash bargaining model, the assets brought into marriage enhance one's bargaining position, and thus, the base effects, β_2 and β_4, are expected to be positive and negative, respectively. If dowry plays a smaller role in enhancing women's bargaining position for those who have equal inheritance rights as their brothers, the coefficient of the interaction term, β_3, is expected to be significantly negative. In addition to the negative sign of β_3, if dowry is useless, or even harmful, for those women who have inheritance rights, the absolute value of β_3 is expected to be greater than that of β_2. In contrast to β_3, there is no theoretical implication concerning the sign of β_5. This is likely because the groom's parents decide the amount of bride price while the bride's parents decide the level of bequest, and thus the interaction term between the bride price and amendment involves confounding factors from both sides. The vector X_{is} is a set of covariates—household socioeconomic characteristics shown in the summary statistics—and η_s is the state fixed effects.[16] The unearned household incomes are controlled in our estimations. We have also checked the set of covariates that include the total household income from all sources and/or the husbands' wages.[17]

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[15] We also check robustness with the multivariate regression model, and the estimated association between dowry and the decision-making variables (Appendix Table 11) is not qualitatively different from the LPM estimation results. The implication of the probit model and the multivariate probit model instead of the LPM and the multivariate regression model is not substantially different. The probit and multivariate probit estimation results are available upon request.

[16] We cannot include the village fixed effects because the IV based on the "-i method" captures the village-level marriage-market situation. Also, the endogamy variable is treated by the "-i method," and thus multicollinearity occurs with the village fixed effects.

[17] We do not include the women's wages as an explanatory variable, since it is difficult to impute the missing values owing to various possible reasons for this not being reported. Wages are reported by only 27.2% of married women. For the remaining 72.8%, it is not clear whether the women work at home or in family enterprises without pay. The inclusion of wages is not critical to testing our model.

The results are not substantially different with respect to which income variables are included. Two variables that reflect gender relations within the household are included: one is the relative wealth of the natal household and the other is endogamy. We construct a village-level variable for endogamy using the "-i method" described below because such a marriage practice is possibly endogenous (Rahman and Rao 2004). The variables specific to Indian society such as the caste and religion variables are also included. These variables are considered exogenous because one's caste or religion is not chosen by the individual.

The variable of dowry (bride price) in the IHDS is the customary amount paid in the *jati* of the respondent, and we assume that wives answer based on the actual dowry amount personally paid by their parents at the time of their marriage. Likewise, we assume that wives answer based on the actual bride price personally received at the time of one's marriage. Although treating the community (*jati*)-based dowry (or bride price) as a proxy for personal dowry (or bride price) seems appropriate for empirical studies, we are concerned about the inherent measurement errors. Besides, it likely captures some individual household characteristics and thus generates an endogeneity problem. For example, a relatively empowered female respondent such as one who has more decision-making power about her daughter's marriage and treating her daughter and son equally, is likely influenced by her natal family's unobserved progressiveness. Possibly, her natal family paid a smaller amount of dowry, and she may also report a smaller amount of dowry than respondents who have a strong son preference.

Both measurement errors and the endogeneity problem are a real challenge because finding good candidates for instruments of dowry (bride price) is usually very difficult. We face the same problem when it comes to finding the instrumental variable (IV) in the dataset, but we take the IV approach by constructing an instrument of dowry utilizing the "-i method," following Aizer (2010) and Vogl (2013). The IV is constructed as follows:

$$\overline{D_{ij}} = \frac{1}{n-1}\sum\nolimits_k D_{k-i} \qquad (2)$$

where $\overline{D_{ij}}$ is the average amount of dowry (or bride price) reported by women in the same village, j, except for respondent i. By construction, $\overline{D_{ij}}$ is not correlated with the respondent's individual household's unobserved characteristics, while it may be correlated with the amount of dowry personally paid at the time of the respondent's marriage by, say, capturing the marriage-market situation in the village as well as village-level wealth. A higher dowry implies that the bride's threat point is also higher, in the sense that she has more of an incentive to go back to her parents or that any repeated transfers from the bride's parents are more meaningful. The instrument for bride prices is constructed in the same manner. As expected, the correlations between individual dowry and the average village dowry, as well as between individual bride price and the average village bride price, are positive and high, at 0.55 and 0.49, respectively. In the LPM with IV estimation, Eq. 1 is estimated by replacing D_{is} (B_{ij}) with the fitted value $\widehat{D_{ij}}$ ($\widehat{B_{ij}}$) obtained from the first-stage regression of D_{ij} (B_{ij}) onto $\overline{D_{ij}}$ ($\overline{B_{ij}}$). Additionally, we address the endogeneity problem by checking how important the remaining unobservables should be in explaining the current results by following the procedure developed by Altonji et al. (2005) although a set of covariates

cannot control for the possible correlation between unobserved household character-istics and women's decision-making power in the household.[18]

5 Estimation results

5.1 Main results

We estimate the LPM expressed by Eq. 1 and report the results in Table 2. Dowry is significantly positively associated with the decision-making power of women not affected by the amendment. Positive associations are consistently observed across different decision-making matters: how to treat sick children, the purchase of expensive items, how many children to have, and the marriage of their children. The fact that there is no significant association with decision making about what to cook is understandable, given that the majority of women have this power by default. These positive associations are significantly reversed, with a greater absolute value of the coefficients, for women affected by the amendment with respect to decision making on the purchase of expensive items and on fertility. On the other hand, bride price has a significantly negative association with women's decision making on how to treat sick children and a significantly positive association with the decision making on fertility of women who are affected by the amendment. Although not always significant, dowry is positively associated with women's status in the states where women do not have equal inheritance rights as their brothers and negatively, or less positively, associated with women's status in the states where women have equal inheritance rights as their brothers.

Next, we estimate Eq. 1 using the IVs given by Eq. 2. The coefficient estimates of the first-stage regression are presented in Table 3. $\overline{D_{ij}}$ and $\overline{B_{ij}}$, in fact, have sig-nificantly positive effects on D_{ij} and B_{ij}, respectively. The IV coefficient estimates of interest are reported in Table 4. Given that measurement errors exist and a robust regression test rejects exogeneity at the 5% significance level, these results are our preferred estimates. Overall, the results support the implication of the LPM estimates. The base effects of dowry are much larger than those estimated using the LPM, which implies that the status of women without equal inheritance rights as their brothers is enhanced by a higher dowry. These positive associations are not negli-gible. One standard deviation above the dowry mean enhances women's decision-making power regarding how to treat sick children, the purchase of expensive items, the number of children they have, and the marriage of their children, by 31, 7, 11, and 6 percentage points, respectively. The association with the status of women who could be affected by the amendment becomes ambiguous with larger standard errors, except for women's decision making on fertility. The decision-making power of women with regard to fertility of women who have the same inheritance rights as their brothers is reduced by a higher dowry. Likewise, the associations of a bride price are greater than those estimated using the LPM. The associations of a bride price are mostly opposite to those of dowry. In particular, a higher bride price

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[18] For examples of studies using the same procedure, see Kingdon and Teal (2010) and Bellows and Miguel (2009).

Table 2 Effects of dowry/bride price on women's decision-making power in the reform and non-reform states with control variables (woman has the most decision-making power = 1): Estimated using an LPM

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0019**	0.0002	0.0009**	0.0012**	0.0007*
	(0.0005)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Dowry × amendment	−0.0006	−0.0001	−0.0017*	−0.0027*	−0.0002
	(0.0015)	(0.0009)	(0.0009)	(0.0012)	(0.0009)
Bride price (Rs.10,000)	−0.0014*	−0.0003	0.0003	−0.0005	−0.0001
	(0.0006)	(0.0005)	(0.0004)	(0.0005)	(0.0004)
Bride price × amendment	0.0028	0.0000	−0.0006	0.0037*	−0.0021
	(0.0020)	(0.0012)	(0.0013)	(0.0018)	(0.0011)
Amendment	0.0086	0.0147	0.0126	0.0056	0.017
	(0.0167)	(0.0131)	(0.0108)	(0.0141)	(0.0102)
Caste variables (dummies, the excluded is middle caste):					
Brahmin	0.0118	−0.0114	−0.0039	0.0092	−0.0019
	(0.0205)	(0.0181)	(0.0130)	(0.0176)	(0.0122)
Highcaste	0.0259	−0.0081	−0.0061	0.0196	0.0045
	(0.0175)	(0.0154)	(0.0108)	(0.0144)	(0.0105)
Scheduled caste	0.0189	−0.0377*	0.0099	0.0104	0.0018
	(0.0169)	(0.0152)	(0.0107)	(0.0140)	(0.0102)
Scheduled tribe	0.0044	−0.0340*	−0.0131	−0.0035	0.0100
	(0.0184)	(0.0168)	(0.0118)	(0.0154)	(0.0117)
Other backward caste	0.0107	−0.0341*	0.0025	0.0084	0.0019
	(0.0154)	(0.0140)	(0.0098)	(0.0128)	(0.0094)

Table 2 continued

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Socio-economic variables:					
Woman's age	0.0137**	0.0092**	0.0042*	0.0046	0.0017
	(0.0033)	(0.0029)	(0.0020)	(0.0027)	(0.0020)
Woman's age^2	−0.0002**	−0.0001**	−0.0001	−0.0001	−0.0000
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Woman's age at marriage	0.0007	−0.0015	0.0009	−0.0011	0.0001
	(0.0009)	(0.0008)	(0.0006)	(0.0008)	(0.0006)
Age difference (husband–wife)	0.0015	0.0000	0.0015*	0.0018*	0.0005
	(0.0009)	(0.0007)	(0.0006)	(0.0008)	(0.0006)
Women's school years	0.0054*	0.0013	−0.0022	−0.0008	−0.0003
	(0.0021)	(0.0018)	(0.0014)	(0.0018)	(0.0013)
Women's school years^2	−0.0001	0.0000	0.0004**	0.0005**	0.0001
	(0.0002)	(0.0001)	(0.0001)	(0.0002)	(0.0001)
Husband's school years	−0.0044*	−0.0034*	−0.0034**	−0.0006	−0.0024*
	(0.0020)	(0.0017)	(0.0013)	(0.0017)	(0.0012)
Husband's school years^2	0.0002	0.0001	0.0001	−0.0001	0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
HH non-wage income (Rs.10,000)	−0.0008	−0.0004	−0.0006	−0.0007	−0.0007*
	(0.0005)	(0.0005)	(0.0003)	(0.0004)	(0.0003)
Agricultural land owned (10 acre)	−0.0002*	−0.0002	0.0000	0.0001	−0.0000
	(0.0001)	(0.0001)	(0.0000)	(0.0001)	(0.0001)
Urban (yes =1)	0.0249**	0.0350**	0.0209**	0.0241**	0.0087*
	(0.0071)	(0.0059)	(0.0047)	(0.0060)	(0.0044)

Table 2 continued

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Religion variables (dummies, the excluded is Hindu):					
Muslim	0.0057	−0.0097	−0.0143	−0.0184	−0.0135
	(0.0131)	(0.0123)	(0.0084)	(0.0114)	(0.0075)
Christian	0.0173	0.0319	0.0111	0.0094	0.0188
	(0.0242)	(0.0180)	(0.0169)	(0.0205)	(0.0158)
Sikh	0.0186	0.0306	0.0251	0.0201	0.0204
	(0.0291)	(0.0253)	(0.0153)	(0.0220)	(0.0149)
Buddhist	−0.0066	0.0098	−0.0038	−0.0208	0.0108
	(0.0384)	(0.0262)	(0.0208)	(0.0224)	(0.0217)
Other non-Hindu religions	0.0131	0.0328	−0.0132	−0.004	−0.0128
	(0.0256)	(0.0188)	(0.0177)	(0.0222)	(0.0169)
Gender relations variables (dummies):					
Wealth (natal > husband's family, =1)	−0.0126	−0.0426**	0.0257**	−0.0166**	0.0089
	(0.0074)	(0.0067)	(0.0053)	(0.0064)	(0.0048)
Village: endogamous marriage	0.125**	−0.0660**	0.0343**	0.0611**	0.0539**
	(0.0144)	(0.0121)	(0.0096)	(0.0119)	(0.0089)
Constant	−0.103	0.574**	−0.0766	0.0444	0.0967
	(0.0962)	(0.0943)	(0.0456)	(0.0770)	(0.0823)
Observations	22,240	22,578	22,632	22,377	22,073
R-squared	0.122	0.058	0.115	0.133	0.142

Robust standard errors are in parentheses. State dummies are included in the RHS

$*p < 0.05$; $**p < 0.01$

Table 3 First stage regression (only the coefficient estimates of the excluded variables are reported)

	(1) Dowry (Rs.10,000)	(2) Dowry × amendment	(3) Bride Price (Rs.10,000)	(4) Bride price × amendment	(5) Net dowry (Rs.10,000)	(6) Net dowry × amendment
Village(-i) dowry (Rs.10,000)	0.467**	−0.0110**	0.117**	−0.0040**		
	(0.0381)	(0.0016)	(0.0223)	(0.0012)		
Village(-i) dowry × amendment	0.0451	0.709**	−0.0025	0.198*		
	(0.108)	(0.108)	(0.0961)	(0.0967)		
Village(-i) bride price (Rs.10,000)	0.182**	−0.0041*	0.427**	−0.0064**		
	(0.0528)	(0.0021)	(0.0411)	(0.0017)		
Village(-i) bride price × amendment	−0.0750	0.191	−0.0951	0.444**		
	(0.109)	(0.109)	(0.138)	(0.138)		
Village(-i) net dowry (Rs.10,000)					0.366**	−0.0095**
					(0.0304)	(0.0017)
Village(-i) net dowry × amendment					0.0542	0.565**
					(0.0871)	(0.0858)
Observations	22,922	22,922	22,922	22,922	22,922	22,922
R-squared	0.362	0.612	0.305	0.524	0.106	0.256
F statistics	115.42	64.74	87.24	40.62	81.85	50.84

Robust standard errors are in parentheses. The included variables are the same as those in Table 2

*$p < 0.05$; **$p < 0.01$

Table 4 Effects of dowry/bride price on women's decision-making power in the reform and non-reform states with control variables: IV estimation (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0287**	−0.0018	0.0066**	0.0105**	0.0060**
	(0.0039)	(0.0027)	(0.0022)	(0.0027)	(0.0020)
Dowry × amendment	0.0315	0.0052	−0.0011	−0.0156*	0.0086
	(0.0192)	(0.0052)	(0.0054)	(0.0061)	(0.0066)
Bride price (Rs.10,000)	−0.0362**	0.0012	−0.0080**	−0.0099*	−0.0072**
	(0.0057)	(0.0039)	(0.0030)	(0.0039)	(0.0028)
Bride price × amendment	−0.0572	0.0011	−0.0070	0.0247*	−0.0221
	(0.0377)	(0.0092)	(0.0101)	(0.0116)	(0.0120)
Amendment	0.0457	−0.0379	0.0421*	0.0127	0.0457*
	(0.0630)	(0.0210)	(0.0198)	(0.0213)	(0.0232)
Observations	22,240	22,578	22,632	22,377	22,073
Robust regression test of exogeneity (P-value)	25.95 (0.0000)	3.43 (0.0082)	2.68 (0.0299)	5.31 (0.0003)	5.49 (0.0002)

Robust standard errors are in parentheses. The included variables are the same as those in Table 2

$*p < 0.05$; $**p < 0.01$

decreases women's decision-making power on fertility when they do not have equal inheritance rights as their brothers, but increases it when they have.

5.2 Robustness checks

Following the method used by Altonji et al. (2005), we examine how important the remaining unobservables should be to completely remove the associations observed in Table 2. The estimation procedure is repeated without a set of covariates and the coefficient estimates are reported in Table 5. Comparing the coefficient estimates of dowry in Table 2 and Table 5 suggests that the inclusion of a set of covariates reduces the associations of dowry with women's decision-making power with regard to the treatment of sick children, the purchase of expensive items, and fertility by 0.1, 0, and 0.06 percentage points, respectively. The estimated effects of the unobservables have to be 2 times, 18 times, and 2 times larger than those of the observables to completely remove the above associations of dowry with women's decision-making power. Given a set of included observables such as a household's socio-economic variables, caste, religion, and state fixed effects in Table 2, it is unlikely that the effects of the unobservables are large enough to completely remove the associations of dowry. Furthermore, the association with women's decision making concerning the marriage of their children becomes significant and larger in magnitude by the inclusion of a set of covariates, which implies that the removal of the associations by the unobservables is highly unlikely.

The Nash bargaining model implies that the assets brought into marriage by both sides determine the bargaining position of the wife and husband, and thus, the effect of the net dowry (dowry minus bride price) matters in determining the women's status in the marital household. The extent to which bride price is brought into marriage is not clear because some portions are obviously received by the bride's parents. With this caveat in mind, the estimation procedure is repeated with and without IVs, and the coefficient estimates of net dowry are reported in Table 6. Overall, the results support the implication of the Nash bargaining model that the assets brought into the marriage (i.e., the net amount of dowry by the bride) enhance her decision-making power on how to treat sick children, the purchase of expensive items, how many children she has, and the marriage of her children. These positive associations are observed for the women without equal inheritance rights as their brothers. These associations are not surprising, given that the associations of a bride price are mostly opposite of those of a dowry in the previous estimations. Being consistent with the previous results, these positive associations disappear when women have equal inheritance rights as their brothers, especially with regard to how many children they should have.

Since the states that pushed through the amendment are all located in southern India, the opposite associations of dowry between the reform and non-reform states may not be owing to the amendment itself, but to the pro-gender nature of southern India. With this concern, the estimation procedure is repeated by replacing the amendment with an indicator taking the value one when a woman resides in a southern state. The coefficient estimates of interest are reported in Table 7.[19]

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[19] The estimation with IVs is also repeated by replacing the amendment with the southern indicator. The results support the estimation results given in Table 7 and are available upon request.

Table 5 Effects of dowry/bride price on women's decision-making power in the reform and nonreform states without control variables: Estimated using an LPM

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0030**	0.0003	0.0009**	0.0018**	0.0004
	(0.0005)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Dowry × amendment	−0.0017	0.0003	−0.0006	−0.0005	0.0009
	(0.0014)	(0.0009)	(0.0009)	(0.0013)	(0.0009)
Bride price (Rs.10,000)	−0.0007	−0.0012*	−0.0007	−0.0005	−0.0009*
	(0.0006)	(0.0005)	(0.0004)	(0.0005)	(0.0004)
Bride price × amendment	0.0031	0.0019	0.0004	0.0049*	−0.0012
	(0.0022)	(0.0012)	(0.0013)	(0.0020)	(0.0011)
Amendment	0.0632**	0.0423**	0.0149	−0.0271*	−0.0040
	(0.0145)	(0.0110)	(0.0091)	(0.0118)	(0.0086)
Constant	0.263**	0.825**	0.0907**	0.170**	0.0873**
	(0.0044)	(0.0038)	(0.0032)	(0.0038)	(0.0032)
Observations	22,430	22,776	22,831	22,566	22,264
R-squared	0.005	0.003	0.001	0.002	0.000

Robust standard errors are in parentheses

$*p < 0.05$; $**p < 0.01$

Table 6 Effects of net dowry on women's decision-making power in the reform and non-reform states with control variables (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
A. LPM estimation					
Net dowry (Rs.10,000)	0.0018**	0.0002	0.0007*	0.0011**	0.0006*
	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Net dowry × amendment	−0.0008	−0.0001	−0.0015	−0.0028*	0.0001
	(0.0015)	(0.0008)	(0.0009)	(0.0011)	(0.0009)
Amendment	0.0205	0.0141	−0.0008	0.0108	0.0044
	(0.0140)	(0.0104)	(0.0092)	(0.0105)	(0.0083)
B. IV estimation					
Net dowry (Rs.10,000)	0.0251**	−0.0023	0.0061**	0.0108**	0.0055**
	(0.0030)	(0.0024)	(0.0019)	(0.0023)	(0.0017)
Net dowry × amendment	0.0179*	0.0090*	−0.0058	−0.0105**	0.0006
	(0.0081)	(0.0036)	(0.0032)	(0.0040)	(0.0036)
Amendment	−0.0391	−0.0195	0.0167	0.0417*	0.0042
	(0.0314)	(0.0173)	(0.0138)	(0.0171)	(0.0149)
Observations	22,240	22,578	22,632	22,377	22,073

Robust standard errors are in parentheses. The included variables are the same as those in Table 2

*$p < 0.05$; **$p < 0.01$

Table 7 Effects of dowry/bride price on women's decision-making power in the southern states and other states: Estimated using an LPM (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0014**	−0.0001	0.0009**	0.0011**	0.0006*
	(0.0005)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Dowry × south	0.0025*	0.0015*	−0.0002	−0.0009	0.0004
	(0.0011)	(0.0007)	(0.0008)	(0.0009)	(0.0008)
Bride price (Rs.10,000)	−0.0009	−0.0001	0.0003	−0.0004	0.0000
	(0.0006)	(0.0006)	(0.0004)	(0.0005)	(0.0004)
Bride price × south	−0.0010	−0.0001	−0.0003	0.0013	−0.0022*
	(0.0017)	(0.0012)	(0.0012)	(0.0014)	(0.0011)
Southern states	0.0182	−0.0036	0.0321*	0.0172	0.0168
	(0.0221)	(0.0187)	(0.0157)	(0.0186)	(0.0146)
Observations	22,240	22,578	22,632	22,377	22,073

Robust standard errors are in parentheses. The included variables are the same as those in Table 2

*$p < 0.05$; **$p < 0.01$

Table 8 Effects of dowry/bride price on women's decision-making power by marriage cohort: Estimated using an LPM (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0025*	−0.0001	0.0007	0.0016	0.0012
	(0.0013)	(0.0016)	(0.0007)	(0.0011)	(0.0011)
Dowry × cohort2	0.0003	0.0018	0.0000	0.0000	−0.0004
	(0.0015)	(0.0017)	(0.0009)	(0.0013)	(0.0011)
Dowry × cohort3	−0.0020	−0.0002	−0.0005	−0.0014	−0.0016
	(0.0016)	(0.0019)	(0.0009)	(0.0013)	(0.0012)
Dowry × cohort4	0.0008	−0.0003	0.0003	0.0009	0.0002
	(0.0016)	(0.0018)	(0.0009)	(0.0014)	(0.0012)
Dowry × cohort5	−0.0022	−0.0008	0.0003	−0.0020	−0.0008
	(0.0015)	(0.0018)	(0.0009)	(0.0013)	(0.0011)
Bride price (Rs.10,000)	−0.0029*	0.0015	−0.0005	−0.0015	−0.0020*
	(0.0014)	(0.0022)	(0.0009)	(0.0015)	(0.0010)
Bride price × cohort2	0.0012	−0.0026	0.0012	0.0011	0.0021
	(0.0017)	(0.0023)	(0.0011)	(0.0018)	(0.0011)
Bride price × cohort3	0.0037	−0.0014	0.0014	0.0031	0.0040**
	(0.0020)	(0.0026)	(0.0013)	(0.0018)	(0.0015)
Bride price × cohort4	−0.0004	−0.0010	0.0000	−0.0018	0.0001
	(0.0019)	(0.0024)	(0.0012)	(0.0018)	(0.0012)
Bride price × cohort5	0.0027	−0.0025	0.0006	0.0023	0.0015
	(0.0017)	(0.0024)	(0.0011)	(0.0017)	(0.0011)
Cohort2	0.0249	−0.0090	−0.0075	−0.0232	−0.0168
	(0.0198)	(0.0182)	(0.0129)	(0.0175)	(0.0125)

Table 8 continued

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Cohort3	0.0313	0.0036	−0.0062	−0.0432*	−0.0181
	(0.0261)	(0.0233)	(0.0170)	(0.0225)	(0.0165)
Cohort4	0.0488*	0.0285	−0.0016	−0.0066	−0.0171
	(0.0286)	(0.0250)	(0.0183)	(0.0247)	(0.0177)
Cohort5	0.0480	0.0438	−0.0057	−0.0092	−0.0346
	(0.0344)	(0.0301)	(0.0220)	(0.0293)	(0.0213)
Observations	22,240	22,578	22,632	22,377	22,073

Robust standard errors are in parentheses. The included variables are the same as those in Table 2. The marriage-year cohorts are separated by the year when the Hindu Succession Act was amended in each state. The shares of women who are in cohort 1 (married before 1976), cohort 2 (married 1976–1985), cohort 3 (married 1986–1988), cohort 4 (married 1989–1993), and cohort 5 (married after1993) are 6.9%, 33.5%, 12.2%, 19.8%, and 27.6%, respectively

*$p < 0.05$; **$p < 0.01$

The base effects of dowry are very similar to those shown in Table 2, but the coefficient estimates of the interaction term are very different. This means that the non-positive associations of dowry with the status of women who are affected by the amendment are not derived by the fact that they reside in southern states.

The women who are affected by the amendment and marry after the year the amendment passed in the state where they live, are thus naturally younger. Since modern dowry is often criticized as a symbol of gender discrimination, while traditional dowry is not (Billig 1992; Srinivas 1994), it is possible that the non-positive associations of dowry are only observed in the younger cohort. Therefore, the opposite associations of dowry between the reform and non-reform states may simply capture the marriage-year cohort effect. To examine this possibility, the estimation procedure is repeated by including four marriage-year cohort dummies (the reference cohort is women who married before 1976) and their interactions with dowry and bride price, respectively. The results are reported in Table 8.[20] The base effects of dowry are not significant, except for the decision making on how to treat sick children, but the magnitudes are similar to those presented in Table 2. No interaction term is significant, which means that the non-positive associations of dowry with the status of women who are affected by the amendment are not derived by the marriage-year cohort effects.

6 Conclusion

Exploiting the natural experiment given by the state-level amendment of the Hindu Succession Act, our estimations provide evidence that dowry enhances women's status in the marital household when women have no inheritance rights. When they are given equal inheritance rights as their brothers, the negative associations are found between dowry and their decision-making power on fertility and on the purchase of expensive items. The results are consistent with Jejeebhoy (2000) hypothesis that dowry empowers women in the northern states where women's status is relatively low, while they do not function similarly in the pro-gender southern states. This study suggests inheritance rights as a potential mechanism generating such north–south differences.

The results have important policy implications. The total ineffectiveness of the legal ban on dowry is well known. If the policy's objective is to make people abandon the practice of dowry, a more effective way may be to assure property and inheritance rights for women. On the other hand, an outright ban on dowry does not necessarily lead to the better treatment of women. In the context of India, where women do not have equal inheritance rights as their brothers in reality, dowry may function as the only way to enhance women's status in the marital household. In this case, dowry may be an example of a social institution that complements an imperfect legal system. Examples of such social institutions include *watta-satta* (exchange marriage, see Jacoby and Mansuri 2010), *purdah* (women's segregation), and caste/cousin endogamy. How these seemingly costly practices alleviate formal institutional failures is left to future research.

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[20] The estimation with IVs is done similarly. The results support the estimation results given in Table 8 and are available upon request.

Compliance with ethical standards

Conflict of interest The author declares that she has no conflict of interest.

7 Appendix

The India Human Development Survey (IHDS), 2005

The data for this study comes from the India Human Development Survey (IHDS), which is a nationally representative survey covering 41,554 households in 1503 villages and 971 urban neighborhoods across India, collected between November 1, 2004 and October 30, 2005. The survey consists of three parts—the household questionnaire, the education and health questionnaire, and the children's learning tests questionnaire. The household questionnaire includes standard questions on socioeconomic characteristics and demographics that can be answered by anybody in the household. The education and health questionnaire is also called women's questionnaire because it is answered by "eligible women," defined as those who were ever married between the ages of 15 and 49. The women's questionnaire contains unique questions such as marriage practice and gender relations within the household. Given that this study is concerned with gender relations between the husband and wife, the respondents of the women's questionnaire in this study are effectively the wives of the heads of households. The children's learning tests questionnaire includes the test scores of all children aged 8 to 11, obtained from reading, math, and writing tests administered by the interviewers.

Some critical variables used in this study are unique because they are constructed based on information in the women's questionnaire. Below, we describe how all these variables are constructed.

Decision-making variables (outcome variables): The variables take the value one when the wife answers yes to the question "Who has the most say in the decision?" with respect to the following matters: "What to cook on a daily basis?," "Whether to buy an expensive item such as a TV or fridge?," and "How many children you have?," and if she has any children, "What to do if a child falls sick?", "To whom your children should marry?" The question comes with the specific instruction that the interviewer should ask the wife who has the most decision-making power, if she answers that such power is vested in more than one household member.

Dowry: The specific question, "At the time of marriage, how much money is usually spent by the girl's family?" follows the instruction "I would like to ask you some questions about marriage customs in your community (*jati*) for a family like yours." The note for the interviewer goes, "Probe to get the amount for a typical wedding. Try to get one number, but accept a range if that is what is given." Since the

question allows for some range in the response amount, we assign the median of the maximum and minimum values spent by the girl's family on dowry at the time of marriage. It should be noted that the difference between the maximum and minimum values given by the majority of respondents is not large. The median of the difference is Rs.10,000, and the 90th percentile is Rs.50,000 (see Appendix Fig. 3 Panel A for the distribution of the difference between the maximum and minimum values).

Bride price: As with dowry, the specific question asked is, "At the time of marriage, how much money is usually spent by the boy's family?" We assign the median of the maximum and minimum values spent by the boy's family at the time of marriage to bride price. Similar to dowry, the difference between the maximum and minimum values given by the majority of respondents is not large: the median of the difference is Rs.10,000, and the 95th percentile is Rs.50,000 (see Appendix Fig. 3 Panel B for the distribution of the difference between the maximum and minimum values).

For a robustness check, we repeat the estimation procedure with the subsample in which the difference between the maximum and minimum values of dowry/bride price given in answers is below Rs.50,000. The results with the subsample are not qualitatively different from the full-sample estimation results (Appendix Table 9).

Wealth (natal > husband's family, =1): The variable takes the value one when the wife answers yes to the question "At the time of your marriage, if you compared the economic status of your natal family with your husband's family. Would you say your natal family was better off?"

Endogamous marriage (yes =1): The variable takes the value one when the wife answers yes to any one of the following questions: "Are any women from your natal family married into this family?," "Are you related to your husband by blood?," "Did you grow up in the same village/town as your husband?"
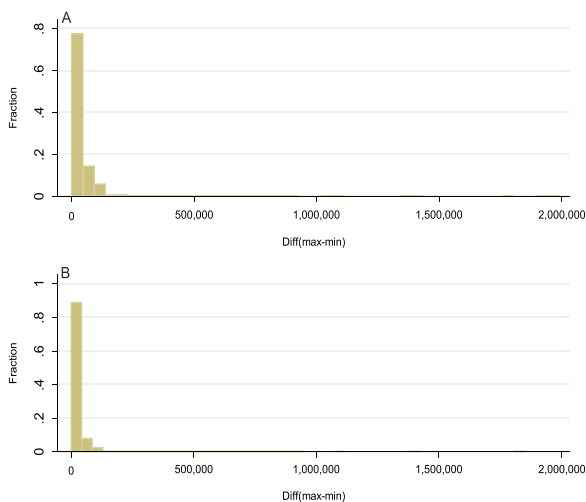

Fig. 3 Distribution of the difference between the maximum and minimum values in answers by respondents. Panel A: *Jati*-based dowry payment (Rs.) and Panel B: *Jati*-based bride price payment (Rs.).
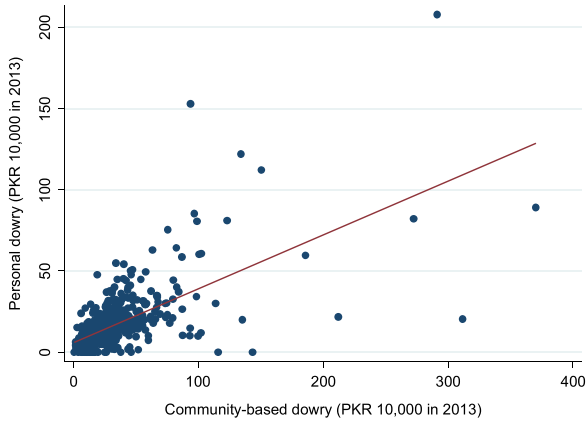
Fig. 4 Correlation between *jati*-based dowry and the personal dowry amount. *Source*: Pakistan rural household survey conducted by the author in 2013
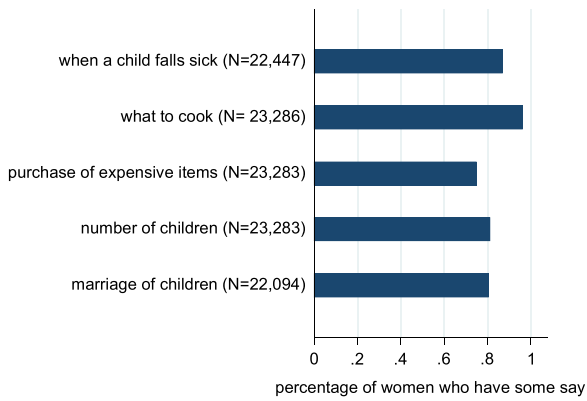

Fig. 5 Women's decision-making power within the household (woman has some decision-making power = 1)

Table 9 Effects of dowry/bride price on women's decision-making power in the reform and non-reform states with control variables, using the subsample in which the difference between the maximum and minimum values of dowry/bride price < Rs.50,000 (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
A. LPM estimation					
Dowry (Rs.10,000)	0.0036**	0.0001	0.0015**	0.0024**	0.0014**
	(0.0007)	(0.0007)	(0.0005)	(0.0006)	(0.0005)
Dowry × amendment	0.0024	0.0018	−0.0004	−0.0029	0.0009
	(0.0026)	(0.0015)	(0.0020)	(0.0024)	(0.0020)
Bride price (Rs.10,000)	−0.0027**	0.0002	0.0006	−0.0011	−0.0002
	(0.0008)	(0.0009)	(0.0006)	(0.0007)	(0.0007)
Bride price × amendment	0.0008	−0.0021	−0.0019	0.0047	−0.0041
	(0.0044)	(0.0023)	(0.0025)	(0.0026)	(0.0029)
Amendment	−0.0007	0.0116	0.0103	0.0026	0.0184
	(0.0195)	(0.0154)	(0.0143)	(0.0175)	(0.0139)
B. IV estimation					
Dowry (Rs.10,000)	0.0466**	−0.0032	0.0125**	0.0203**	0.0107**
	(0.0070)	(0.0047)	(0.0037)	(0.0049)	(0.0035)
Dowry × amendment	0.0373	0.0070	0.0001	−0.0205**	0.0063
	(0.0220)	(0.0073)	(0.0075)	(0.0079)	(0.0080)
Bride price (Rs.10,000)	−0.0640**	0.0037	−0.0159**	−0.0207**	−0.0125*
	(0.0112)	(0.0072)	(0.0057)	(0.0076)	(0.0054)
Bride price × amendment	−0.0574	0.0025	−0.0051	0.0315*	−0.0212
	(0.0421)	(0.0112)	(0.0125)	(0.0136)	(0.0135)
Amendment	0.0128	−0.0506*	0.0244	0.0163	0.0588**
	(0.0567)	(0.0249)	(0.0233)	(0.0243)	(0.0228)
Observations	19,863	20,179	20,229	19,986	19,710

Robust standard errors are in parentheses. The included variables are the same as those in Table 2.

*$p < 0.05$; **$p < 0.01$

Table 10 Effects of dowry/bride price on women's decision-making power in the reform and non-reform states with control variables (woman has some decision-making power = 1): Estimated using an LPM (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0003	−0.0003	−0.0010*	−0.0006	−0.0006
	(0.0003)	(0.0002)	(0.0004)	(0.0004)	(0.0004)
Dowry × amendment	−0.0002	0.0001	−0.0004	−0.0036**	−0.0036**
	(0.0008)	(0.0005)	(0.0011)	(0.0013)	(0.0013)
Bride price (Rs.10,000)	−0.0006	0.0001	0.0005	0.0002	−0.0007
	(0.0004)	(0.0003)	(0.0005)	(0.0005)	(0.0005)
Bride price × amendment	−0.0006	0.0002	0.0024	0.0019	−0.0003
	(0.0011)	(0.0006)	(0.0013)	(0.0018)	(0.0016)
Amendment	0.0175	0.0005	−0.0204	0.0011	0.0365*
	(0.0115)	(0.0065)	(0.0150)	(0.0163)	(0.0156)
Observations	22,120	22,921	22,918	22,918	21,766
R-squared	0.073	0.024	0.092	0.104	0.098

Robust standard errors are in parentheses. The included variables are the same as those in Table 2

*p < 0.05; **p < 0.01

Table 11 Effects of dowry/bride price on women's decision-making power in the reform and non-reform states with control variables: Estimated using a multivariate regression model (only the coefficient estimates of interest are reported)

	(1) If a child falls sick	(2) What to cook	(3) Purchase of expensive items	(4) Number of children	(5) Marriage of children
Dowry (Rs.10,000)	0.0019*	0.0001	0.0007**	0.0012**	0.0007**
	(0.0004)	(0.0004)	(0.0003)	(0.0004)	(0.0003)
Dowry × amendment	−0.0003	−0.0001	−0.0012	−0.0027*	−0.0002
	(0.0013)	(0.0011)	(0.0008)	(0.0011)	(0.0008)
Bride price (Rs.10,000)	−0.0014*	−0.0002	0.0004	−0.0004	−0.0001
	(0.0005)	(0.0005)	(0.0004)	(0.0005)	(0.0003)
Bride price × amendment	0.0027	0.0003	−0.0012	0.0032	−0.0027*
	(0.0020)	(0.0017)	(0.0013)	(0.0017)	(0.0012)
Amendment	0.0097	0.0135	0.0098	0.0108	0.0201*
	(0.0164)	(0.0141)	(0.0105)	(0.0138)	(0.0099)
Observations	21,502	21,502	21,502	21,502	21,502

Robust standard errors are in parentheses. The included variables are the same as those in Table 2

*$p < 0.05$; **$p < 0.01$

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