'Til Dowry Do Us Part:
Bargaining and Violence in Indian Families

Rossella Calvi[*]

Ajinkya Keskar[†]

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Abstract

We develop a non-cooperative bargaining model with incomplete information linking dowry payments, domestic violence, resource allocation between a husband and a wife, and separation. Our model generates several predictions, which we test empirically using amendments to the Indian anti-dowry law as a natural experiment. We document a decline in women's decision-making power and separations, and a surge in domestic violence following the amendments. These unintended effects are attenuated when social stigma against separation is low and, in some circumstances, when gains from marriage are high. Whenever possible, parents increase investment in their daughters' human capital to compensate for lower dowries.

Keywords: Domestic violence, dowry, non-cooperative bargaining, India, marital surplus, women's empowerment, human capital, gender norms, mental health.

JEL codes: J12, D13, I31, O15.

1 Introduction

Transfers of wealth between families at the time of marriage existed historically in many parts of the world, from the Babylonian civilization to Renaissance Europe, from the Roman and Byzantine empires to the Song Period in China. In current times, marriage payments remain pervasive in many areas of the developing world. While the practice of bride-price (a transfer from the groom's side to the bride's) is widespread in parts of East Asia and some African countries, dowries (wealth transfers from the bride's family to the groom or his family) are most common in South Asia. In India, Pakistan, and Bangladesh, dowry payments are nearly universal and quite sizable, often amounting to several times more than a household's annual income (Goody, 1973; Anderson, 2007).

The custom of dowry in India has been linked to extreme forms of gender inequality, such as sex-selective abortion related to parental preferences for sons (Alfano, 2017; Bhalotra et al., 2020), and the occurrence of bride-burning, dowry-deaths, and other forms of domestic violence (Bloch and Rao, 2002; Srinivasan and Bedi, 2007). It has also been shown that higher dowries can increase women's status and decision power in their marital families (Zhang and Chan, 1999). Since more than one-third of women in India report being physically abused by their husbands and about half are excluded from consequential household decisions,[1] understanding the connections between marriage transfers and women's status in their marital family is of primary importance.

In this paper, we develop a non-cooperative bargaining model that links marriage payments, women's human capital, domestic violence, intra-couple resource allocation, and separation. Popular models of intra-household bargaining (e.g., Chiappori (1988, 1992)) assume complete information and generally predict that the household allocation is efficient. However, this assumption conflicts with the occurrence of domestic violence, a prominent form of inefficient household behavior. Instead, we consider a bargaining model with incomplete information, where domestic violence is used by the husband to signal his private type and extract resources from his wife. We extend the non-cooperative framework of Bloch and Rao (2002) in multiple directions: by considering within-couple bargaining, by accounting for gains from marriage and their division, by endogenizing parental investments in the human capital of girls, and by examining the role of social norms against separation. To this point, we follow the insights of sociological and psychological studies on the consequences of marital dissolution in traditional societies and account for the social cost and psychological distress associated with separation (Sharma, 2011; Ragavan et al., 2015; Pachauri, 2018).

Our model generates several predictions, which we test empirically using amendments to the Indian anti-dowry law as a natural experiment. We estimate a fall in dowries following the amendments, along with a decline in women's empowerment, a surge in domestic violence, and a decrease in separations. These unintended effects are attenuated (and can even be reversed) when social stigma against separation is low. Our model helps make sense of this heterogeneity.

Theoretical Framework. We start by modeling the relationship between dowries and

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[1]These figures are based on women's responses to the National Family Health Survey (see Section 2 for more details).

women's status in their marital family. In our model, at the time of marriage, a dowry is paid and the husband learns his private type, which we interpret as his level of satisfaction with the match. This timeline of events is consistent with the widespread custom of arranged marriage, whereby the spouses are selected for each other by their parents, and the bride and the groom often meet on or shortly before their wedding day. After the marriage, the husband and the wife bargain over the allocation of gains from marriage, which may arise from joint consumption and joint production (Becker, 1973, 1991). The post-marital bargaining game consists of three stages. In the first stage, the husband chooses whether to exercise violence. If violence occurs, then both the husband and the wife incur a utility cost: the cost for women is fixed, while the cost faced by husbands varies with their private type. At this time, the husband may demand a higher fraction of marital gains. In the second stage, the wife chooses whether to accept the husband's demand. In the last stage of the game, the husband decides whether to separate from his wife. Under certain assumptions outlined in Section 3, there exists a unique perfect bayesian equilibrium of the game that satisfies the intuitive criterion: it is a separating equilibrium, whereby only dissatisfied husbands facing a low cost of violence engage in domestic violence, only dissatisfied husbands with a high cost of violence separate from their wives, and wives accept their husband's demand for a reallocation of marital gains only if violence occurs.

Our model yields five testable predictions linking changes in dowries to changes in women's post-marital outcomes. First, the share of marital gains commanded by the husband and the likelihood of domestic violence increase following a decrease in dowry. Second, the probability of separation decreases following a decrease in dowry. Third, these effects are reduced and can even be of opposite signs when social stigma against separation is low. Through the lens of our model, we interpret this heterogeneity as resulting from the psychological distress faced by women after separation.[2] Fourth, the impact of a reduction in dowry on the husband's share of marital gains weakens as marital gains increase. Fifth, the impact of a reduction in dowry on the probability of wife-abuse strengthens when marital gains are high.

We also consider the pre-marital bargaining game between the bride's family and the groom or his family. In this game, parents make decisions about how much to invest in the human capital of their daughter and how much to save for the dowry (Anukriti et al., 2019). Such decisions culminate in a marriage offer by the bride's parents that the groom can accept or reject. Under the assumptions that parents prefer their daughters to be married relative to them remaining unmarried and that grooms value brides' education (Adams and Andrew, 2019), the pre-marital model yields an additional prediction: parents invest more in their daughters' human capital in response to a decrease in expected dowry payments.

Empirical Analysis.   Our empirical analysis exploits the introduction of amendments to the Dowry Prohibition Act between 1985 and 1986 as a natural experiment, and consists of two main parts. Using data from the Rural Economic and Demographic Survey, we first confirm that the amendments, which tightened the existing anti-dowry legislation, were successful at reduc-

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[2]We model such distress as affecting women's preferences over consumption and material resources. This is consistent with anhedonia, a common symptom of depression and other mental health disorders (Angelucci and Bennett, 2021).

ing dowry payments (Alfano, 2017). Next, using data from the National Family Health Survey, we test the predictions of our model. Since the Dowry Prohibition Act (initially introduced in 1961) and its amendments did not apply to Muslims,[3] we exploit variation in religion and year of marriage to identify the effect of the amendments in a difference-in-differences framework. The validity of this approach requires that, in the absence of the 1985-1986 amendments, the evolution of dowry payments and the model's outcomes should have been the same for Muslims and non-Muslims. We provide empirical evidence supporting this fact. To further adjust for observable differences between Muslims and non-Muslims, we use nearest-neighbor matching based on propensity score estimates and find our difference-in-difference estimates to be confirmed when focusing on the matched sample. As recent work in econometrics has shown that difference-in-differences estimates may be biased due to treatment effects heterogeneity over time and across groups (Goodman-Bacon, 2018; De Chaisemartin and d'Haultfoeuille, 2020; Callaway and Sant'Anna, 2020), we also assess the issue of heterogeneous effects in our setting, finding it not to be a critical source of concern.

We estimate that the Dowry Prohibition Act amendments significantly reduced dowry payments. Women exposed to the amendments paid 0.2 standard deviations lower dowries, on average, and are 6 percentage points more likely to pay no dowry at all. We carefully rule out that these findings are driven by changes in reporting, which would be relevant if survey respondents were less keen to answer dowry-related questions after the reforms. We also assess the potential endogeneity of the time of marriage, which could matter if parents anticipated the introduction of the amendments and scheduled the wedding date of their sons and daughters accordingly. Next, we analyze the interaction between the Dowry Prohibition Act amendments and other reforms that may have had differential impacts by religion, and do not find it critical for our findings. Finally, we show that our findings are confirmed by a triple-difference specification that exploits inter-caste variation in dowry prevalence.

Turning to the model predictions, we estimate a decline in women's involvement in household decision-making (which we use to measure her share of marital gains; Browning et al. (2013)), and an increase in domestic violence following the introduction of the amendments. For instance, we find that women exposed to the reforms (and the subsequent decline in dowry payments) are 3 percent less likely to be involved in household decisions, on average. The decline in women's decision-making power is particularly pronounced for infrequent, possibly more consequential decisions, such as large household purchases and women's health care decisions. We also show that the amendments resulted in a 16 percent increase in the probability of domestic violence against women. Conditional on ever experiencing violence by their husbands, treated women suffer a wider array of injuries, such as cuts, bruises, burns, sprains, dislocations, broken bones or teeth. Consistent with our model, we document a decrease in separations after the reforms. Finally, we show that women exposed to the amendments have better human capital outcomes (e.g., education and height), suggesting that parents increased investment in the human capital of their daughters to compensate for lower expected dowries. These findings are robust to various

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[3]The Shariat governs marriage and family matters for Muslims.

specifications and appropriate restrictions of the estimation sample, and are not driven by changes in marital sorting.

We uncover substantial heterogeneity in the impact of the anti-dowry reforms on women's status in their marital families. We provide evidence of differential effects by a couple's gains from marriage, which we proxy with fertility outcomes (Becker, 1973, 1991). In line with our predictions, we show that the impact of the reforms on women's decision making power is alleviated when gains from marriage are high. By contrast, the impact on domestic violence and separation is exacerbated when marital gains are large. Importantly, the effects of the reforms on women's post-marital outcomes are mitigated when social stigma against separation is low (such as in North-East and South India, urban areas, and villages with relatively higher rates of separation) and exacerbated when social norms concerning marital dissolution are strict. This finding suggests that the local cultural context (and the possible social pressure associated with it) may matter a great deal when designing policies aimed at changing traditional customs (e.g., Rao and Walton (2004) and Ashraf et al. (2020)). It also emphasizes the need of "development approaches based on a fuller consideration of psychological and social influences" (World Bank, 2015, p.582).

Outline. The rest of the paper is organized as follows. In Section 2, we provide an overview of the custom of dowry, discuss the issues of domestic violence and women's limited power in India, and illustrate the legal framework governing marital transfers. In Section 3, we set out our theoretical model and derive six testable predictions. In Section 4, we discuss the identification strategy and data sources. In Section 5, we present our main empirical results. Section 6 concludes. A detailed literature review, proofs and additional material are in an online Appendix.

2   Dowries, Violence, and Women's Power in Indian Families

In contemporary India, dowry payments are nearly universal, and a woman is typically unable to marry without such transfers. The prospect of paying a dowry is often listed as a critical factor in parents' desire to have sons rather than daughters and has been linked to female infanticide, sex-selective abortion, and the missing-women phenomenon (Sen, 1990; Anderson and Ray, 2010, 2012; Jayachandran, 2015; Borker et al., 2017). Dowries have also been associated with the dreadful occurrence of bride-burning and dowry-deaths (Bloch and Rao, 2002; Srinivasan and Bedi, 2007; Sekhri and Storeygard, 2014). These are extreme forms of domestic violence, which is pervasive in India as well as in other developing countries. The following figures may help gauge the gravity of the phenomenon. According to the latest National Family and Health Survey (hereafter NFHS), 36 percent of ever-married Indian women have experienced physical or sexual violence by their husbands. The most common type of domestic violence is less severe physical violence (28 percent), followed by severe physical violence (8 percent), and sexual violence (7 percent). One out of three female respondents in the India Human Development Survey (IHDS) answers affirmatively when asked whether in their community it is usual for a husband to beat his wife when her natal family does not provide enough money or gifts. According to data from

the National Crime Records Bureau (NCRB), out of the almost 330,000 crimes against women committed in 2015,[4] 19 percent consisted of acts of "cruelty by husband or his relatives," and 1 percent were dowry deaths.

Domestic violence is a dramatic form of gender inequality, but the limited decision-making power of women inside their families is another widespread example. Due to growing attention regarding the status of women in developing countries, in many household surveys, a common type of question to ask is, "Who usually makes decisions about [X] in your household?" The NFHS asks this question to ever-married women aged 15 to 49, with [X] referring to decisions regarding, e.g., own health care, contraceptive use, household purchases and finances, visits to relatives, or even what to cook. According to the most recent wave of the survey, less than two-thirds of currently married women participate in decision making about their health, major household purchases, or visits to their own family or relatives. One in six women reports being involved in no decision at all.

Divorce is rare in India and often riddled with stigma.[5] According to the 2011 Census of India, 1.36 million individuals in India are divorced, amounting to 0.24 percent of the married population and 0.11 percent of the total population (Jacob and Chattopadhyay, 2016). The dissolution of a marriage is often seen as damaging to a woman's reputation and is a source of substantial distress (Ragavan et al., 2015).[6] Social spaces may become unpleasant for separated women since their marital status is either the starting point or the focus of most conversations. They may be cast out by friends and relatives as broken, atypical, or having some astrological affliction. They may also be excluded from many religious practices supposedly meant to be performed only by married people.[7]

Several sociological and psychological studies document the adverse consequences of marital dissolution for Indian women, which may lead to depression and anhedonia (inability to derive pleasure from various activities).[8] We also provide empirical evidence in this direction. Using data from the 2004-2005 Survey on Morbidity and Health Care, we compare women's probability of suffering from psychiatric disorders across marital statuses. While concerns related to under-

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[4]The NCRB classifies as crimes against women: rape, attempt to commit rape, kidnapping and abduction of women, dowry deaths, assault on women with intent to outrage her modesty, insult to the modesty of women, cruelty by husband or his relatives, importation of girls from foreign country, abetment of suicides of women, and violations of the Dowry Prohibition Act (1961), the Indecent Representation of Women (Prohibition) Act (1986), the Commission of Sati Prevention Act (1987), the Protection of Women from Domestic Violence Act (2005), and the Immoral Traffic (Prevention) Act (1956).

[5]Pothen (1989), for example, writes: "Many people waited for a number of years in order to approach the court even after the marriage had broken down. Fear of social stigma, uncertainty about future, lack of legal knowledge, emotional upheavals, etc. were the main reasons for this delay."

[6]The likelihood of remarriage is low in India, but somewhat higher for men. According to the India Human Development Survey, less than 1 percent of ever-married Indian women remarry, while about 3.5 percent of them report their husband being married more than once. This figures exclude polygamous families and include remarriage after the death of the spouse.

[7]As discussed in Ragavan et al. (2015), "[If a woman gets a divorce] they [her family, the community] will think badly of her. They will think she had an affair or did something wrong, and for those reasons she asked for a divorce. Even if her husband made a mistake, and she did nothing wrong, the whole community will still think that the woman is wrong."

[8]Based on a qualitative study in Jaipur, Rajasthan, Sharma (2011) finds that divorced women face significantly higher risk of suffering from anxiety, depression, stress, and fatigue. Interviewing divorced women in Meerut, Uttar Pradesh, Pachauri (2018) shows that they face various challenges related to social, familial, financial, emotional, and psychological problems. Kotwal and Prabhakar (2009) study the issues faced by single mothers (which includes divorced, separated, and widowed women) and show that majority report feeling of loneliness, helplessness, hopelessness, lack of identity, and lack of confidence. Amudhan et al. (2020) study the prevalence and sociodemographic differentials of suicidality using data from the 2015-2016 National Mental Health Survey, finding widowed, separated, or divorced individuals to have a higher risk of overall suicidality. Finally, Zafar and Kausar (2014) find divorced women in Pakistan experience more depression, loneliness, and anxiety than married women.

reporting, underdiagnosis, and reverse causality are valid, we document a significantly higher probability of suffering from mental distress for women who are divorced or separated (even conditional on a battery of individual controls; see Figure A2 in the Appendix). As we discuss later on, the extent of women's psychological and emotional distress after separation may be critical to predict how a change in dowry impacts women's post-marital outcomes.

The Dowry Prohibition Act and Its Amendments. In 1961, the government of India enacted the Dowry Prohibition Act, prohibiting both the giving or receiving of a dowry. The law defined a dowry as "any property or valuable security given or agreed to be given either directly or indirectly (a) by one party to a marriage to the other party to the marriage; or (b) by the parents of either party to a marriage or by any other person, to either party to the marriage or any other person [...]." The act explicitly excluded from the definition of dowry (and hence from the law itself) any marital transfers "in the case or persons to whom the Muslim Personal Law (Shariat) applied." It also stipulated that dowries could be punished either by imprisonment up to six months *or* with a fine up to 5,000 Rupees.

The provisions of the act were not strong enough and its attempt to reduce dowries proved mostly unsuccessful (Chiplunkar and Weaver, 2019). Between 1985 and 1986, the Indian government took a series of steps towards tightening the existing anti-dowry legislation. The Dowry Prohibition Rules (introduced in October 1985) established a set of rules according to which a list of wedding gifts must be maintained. The list must include a brief description of each gift, the approximate value of the gift, the name of the person who has given the gift, and, when the person giving the present is related to the bride or groom, a description of such a relationship. Another amendment followed closely in 1986, increasing the minimum punishment for taking or abetting dowry to five years of imprisonment *and* to a fine of not less than 15,000 Rupees or the amount of the value of the dowry (whichever is higher).[9,10] Finally, the amendment gave power to any state government to appoint "as many Dowry Prohibition Officers as it thinks fit," to prevent the taking or demanding of dowry and to collect the necessary evidence for the prosecution of violators of the Dowry Prohibition Act, and made it easier to punish husbands and in-laws for dowry-related cruelty. By showing an increase in the number of convicted offenders and of dowry cases heard by the Supreme Court after 1986, Alfano (2017) provides evidence of both the enforcement and the public awareness of the amendments.

Figure A3 in the Appendix plots the results of local polynomial regressions of real dowry payments on year of marriage. We obtain information about dowry payments from the 1999 Rural Economic and Demographic Survey (we provide details about this survey in Section 4.1) and convert all dowries to 1999 Rupees. Gross dowries represent the value of transfers made to the groom's family at the time of marriage, while net dowries are defined as gross dowries minus the value of transfers made from the groom's family to the bride's family. Before 1985, the

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[9]This aspect of the law is critical to make sense of any effects at the intensive margin.

[10]Between 1975 and 1976, the states of Bihar, Punjab, Haryana, Himachal Pradesh, West Bengal, and Orissa implemented state-level amendments to the 1961 act. The changes introduced by these early amendments, however, were moderate. In the states of Bihar and Punjab, for instance, the taking of dowry was made punishable by a prison sentence of six months *and* a fine of 5,000 Rupees. In Himachal Pradesh, the punishment was changed to 1-year imprisonment and a 5,000 Rupees fine (Alfano, 2017).

Figure 1: Dowries: Differences Between Non-Muslims and Muslims

(A) Gross Dowries   (B) Net Dowries
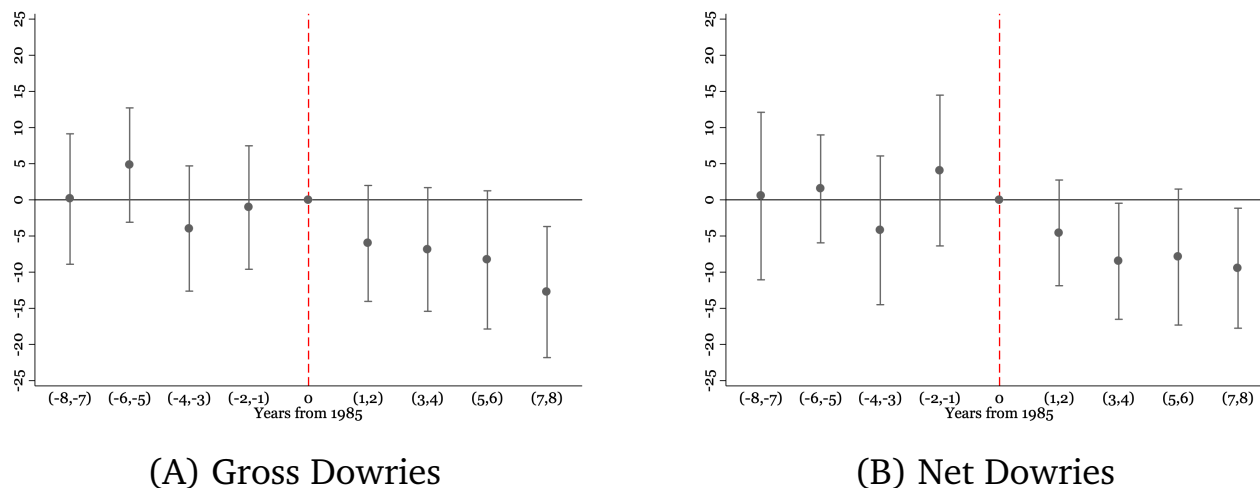
NOTES: This figure plots the the differences between non-Muslims and Muslims in gross dowries (Panel A) and net dowries (Panel B) around the amendments and 90 percent confidence intervals. The coefficients are estimated in 2-year intervals from the year of treatment conditional on state, religion, and year of marriage and birth fixed effects. Zero denotes the reform year 1985. Gross dowries represent the value of transfers made to the groom's family at the time of marriage. Net dowries are defined as gross dowries minus the value of transfers made from the groom's family to the bride's family. All dowry amounts are converted to 1999 Rupees.

average gross dowry ranged between 42,000 and 56,000 Rupees, and net dowries varied between approximately 24,000 and 33,000 Rupees. Between 1985 and 1990, both gross and net dowries declined by more than 20 percent. Dowry transfers kept declining in subsequent years, but at a slower pace.

Consistent with the scope of the law, dowry payments for non-Muslim declined after 1985, while marital transfers for Muslims were virtually unaffected. In Figure 1, we present event-study graphs displaying the differences between non-Muslims and Muslims in gross and net dowries before and after 1985 (for clarity, we consider two-year periods and normalize the difference in 1985 to zero). It is reassuring to see that these gaps are not statistically different from zero before the amendments. Moreover, the gaps in both gross and net dowries between non-Muslims and Muslims are negative and increasingly significant in the years following the reforms.[11]

Given the connections between dowry payments, violence, and women's empowerment, one natural question is whether (and how) the 1985-1986 tightening of the anti-dowry law impacted women's post-marital status. Previous work has documented an improvement in the gender composition of children following the amendments, possibly due to a decrease of parental preference for sons (Alfano, 2017). We instead focus on the effects of the reforms on women's well-being in their marital families. While we defer a more rigorous investigation of these effects to Sections 4 and 5, it is interesting to look at the differences between non-Muslims and Muslims in women's decisions power and domestic violence before and after 1985. As shown in Panel A of Figure 2, there is a visible drop in women's involvement in family decision-making after the amendments. In addition, we detect an increase in women's likelihood to be victim of violence by their husbands. Despite these differences being less precisely estimated, the change in trend (slightly downwards before 1985 and upwards after 1985) is particularly notable.

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[11]In Appendix D, we investigate the possible misreporting of dowry data, finding that it is unaffected by the amendments.

Figure 2: Women's Power and Domestic Violence: Differences Between Non-Muslims and Muslims

(A) Women's Decision Power

(B) Domestic Violence
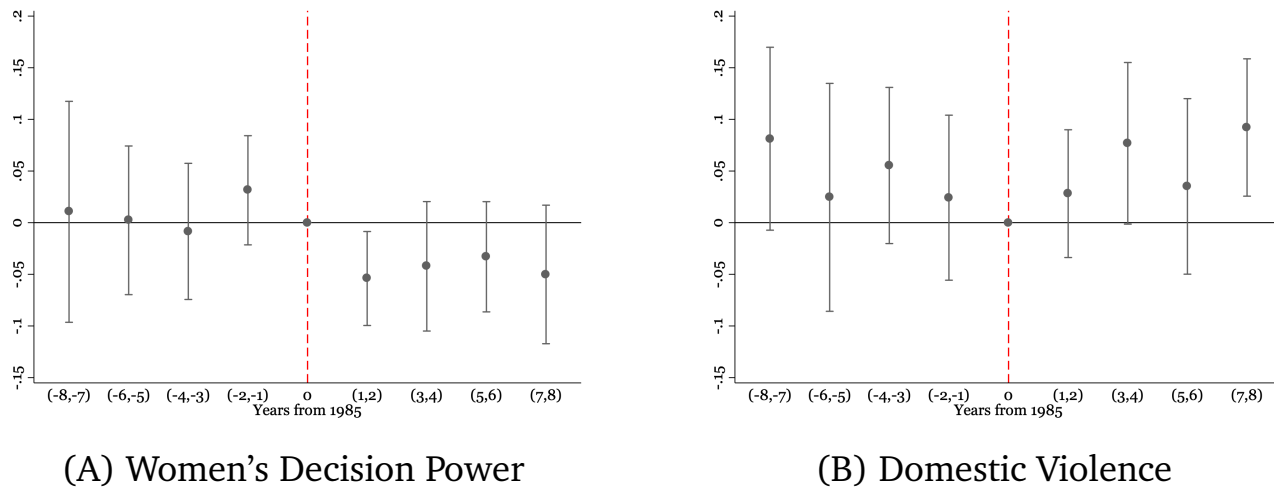
NOTES: This figure plots the the differences between non-Muslims and Muslims in women's involvement in household purchasing decisions (Panel A) and the likelihood to be victim of violence by their husbands (Panel B) around the amendments and 90 percent confidence intervals. The coefficients are estimated in 2-year intervals from the year of treatment conditional on state, religion, and year of marriage and birth fixed effects. Zero denotes the reform year 1985.

3   Theoretical Model

In this section, we focus on the post-marital bargaining between a husband and a wife, which we model as a non-cooperative bargaining game with incomplete information, where domestic violence is used by the husband to command a higher share of the marital surplus. We draw on the framework developed by Bloch and Rao (2002), where violence is used by the groom's family as an instrument to extract transfers from the bride's family after marriage. Differently from Bloch and Rao (2002), we focus on the couple instead of their families, account for potential gains from marriage and their division, and examine the role of social norms against separation. We first develop a baseline model where the dowry amount and the human capital of brides are taken as given. We then extend the model to endogenize dowry payments as well as parental investment in their daughters' human capital. In the Appendix, we consider several extensions to our baseline model that relax or modify some of its assumptions. For simplicity, we do not model the process through which the agents pair up and instead take the marital match as given.[12]

3.1   Setup

Agents and Preferences.   There are two agents in our model, a husband and a wife, which we index by $j = h, w$. The two agents can be married to each other or separated. When married, the agents partake in marital gains, which may arise from joint consumption and production. For instance, both spouses can enjoy their children and live in the same home. They could also partially share some goods, such as fuel for transportation, and save on food waste and spoilage. The couple can also benefit from specialization in production, comparative advantage, and increasing returns to scale (Becker, 1973, 1991). We denote by M the material gains from marriage and define them

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[12]As discussed in Section 5.5, we find the Dowry Prohibition Act amendments not to impact marital sorting and matching empirically, thus removing (through Occam's razor) the need for a more complex model of the marriage market in this paper. Future work focusing on different applications may expand the model in this direction.

as follows:

$$M = Y_{hw} - Y_h - Y_w \geq 0,$$

where the Y_h is the husband's resources if unmarried, Y_w is the wife's resources if unmarried, and Y_{hw} is the resources available to the couple jointly when married.[13] Y_h and Y_w may include, but are not limited to, the husband's and the wife's family wealth. In our model, we focus on the allocation of M between the husband and the wife, and denote by γ the share of marital gains commanded by the husband. Importantly, the insights and implications of our model are invariant to interpreting γ as the share of Y_{hw} (and not only M) allocated to the husband.

Agents derive utility from their overall resources (including their wealth and consumption) and characteristics (such as their health and education). When married, agents also derive utility from their spouse's characteristics. We denote by U_h and U_w the husband's and the wife's present discounted utility at the time of marriage. Let $U_h = u_h(C_h, \mathbf{x}_w, \mathbf{x}_h, \theta)$ and $U_w = u_w(C_w, \mathbf{x}_w, \mathbf{x}_h)$, where C_j indicates j's wealth and consumption, $\mathbf{x}_j$ is a vector of human capital characteristics (which are ordered so that higher values of $\mathbf{x}_j$ correspond to more desirable traits), and θ is the husband's private type. In the spirit of Bloch and Rao (2002), we interpret θ as the husband's level of satisfaction with the match.[14] We assume that the functions $u_h(\cdot)$ and $u_w(\cdot)$ are increasing in all their arguments.

Let $V_h = v_h(C_h, \mathbf{x}_h, m)$ and $V_w = v_w(C_w, \mathbf{x}_w, m)$ be the husband's and the wife's discounted utility flows when separated, where m denotes the marriage market conditions at the time of separation. Note that we can interpret separation as a situation where the husband and the wife stop living together while staying married. Alternatively, separation can represent an unproductive marriage, where the marital surplus is null (Lundberg and Pollak, 1993) and the spouses stop deriving utility from each others' traits. As above, we require the functions $v_h(\cdot)$ and $v_w(\cdot)$ to be increasing in all their arguments.

At the time of marriage, the bride's family pays a dowry D to the husband's family, which we take as given for now. The overall resources available to the husband and the wife can be summarized as follows: if the marriage is intact, then $C_h = Y_h + D + \gamma M$ and $C_w = Y_w - D + (1 - \gamma)M$; if separation occurs, then $C_h = Y_h + D$ and $C_w = Y_w - D$. So, each agent's overall resources depend on their resources if unmarried, any marital transfer upon marriage, and their share of marital gains (if any). Since Y_j captures to some extent the spouses' natal family wealth, it is reasonable to assume it is increased by D for the husband and decreased by D for the wife after the marriage takes place and the dowry is exchanged. For simplicity, we assume women and men have full access to their family wealth; relaxing this assumption is straightforward and not consequential for the model predictions.

There are some features of our baseline model that deserve particular mention. First, dowries enter each spouse's utility only through their available resources C_j. The husband's private type (θ) and the marital surplus (M) are not affected by the dowry. Second, the impact of dowry on

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[13]There may be emotional gains from marriage, such as love and companionship. While we do not model those explicitly, they can be captured by different preferences of women and men when married v.s separated (see below).

[14]Alternative interpretations are of course possible: θ, for instance, could be interpreted as a generic shock to the husband, whose consequence are unknown to the wife.

the agents' resources is twofold: on one hand, it may change the share of marital surplus they each command; on the other hand, it may reduce or increase their natal family wealth.[15] Third, we take gains from marriage as given and do not treat them as a strategic lever of the spouses. Fourth, we assume that dowries do not serve as early bequests for daughters and that dowries are not returned to the bride's family in case of separation.

In Section C in the Appendix, we consider several extensions to our baseline model that relax or modify some of these features. First, we extend our model to a framework where the husband (or his family) receives a transfer equal to αD, while the wife retains control over $(1-\alpha)D$ (Appendix C.1). Such a model, which leads to qualitatively similar predictions, accommodates situations in which dowries serve as early bequests for daughters. Next, we consider models where the marital surplus varies with the occurrence of violence (Appendix C.2) or dowry (Appendix C.3). Further, we develop a model where dowries can impact the likelihood that the husband is satisfied with the marriage (Appendix C.4). Finally, we consider a framework where women have varying access to their natal family's wealth when married vs. separated (Appendix C.5). As described later on, this version of the model allows for an additional channel through which social stigma against separation may play a role.

The Bargaining Game. When the marriage takes place, the newlyweds learn about observable marriage characteristics. We denote such characteristics by **z**. These include (but are not limited to) the initial division of the gains from marriage, γ_0, which we interpret to be fully determined by the marriage market conditions for brides and grooms at the time of the match. Right after marriage, the husband learns his private type θ, that is, his level of satisfaction with the match.[16] This information can trigger a post-marital renegotiation over the division of the marital surplus. For simplicity, we define θ to be binary, with satisfied husbands having θ equal to 1 and dissatisfied husbands having θ equal to 0. We denote by $p(\mathbf{z})$ the prior probability that the husband is not satisfied with the marriage.

We model the post-marital interaction between the husband and the wife as a non-cooperative bargaining game with incomplete information. The game consists of three stages. In the first stage, the husband decides whether to exercise violence. If violence occurs, then the husband and the wife incur a utility cost, which we denote by K_h and K_w, respectively. At this time, the husband can request a reallocation of marital gains and make a take-it-or-leave-it demand for a higher share $\gamma > \gamma_0$.[17] In the second stage, the wife decides whether to accept the husband's request. In the third stage, the husband chooses whether to separate. For tractability, we assume that satisfied husbands face an infinite cost of violence (i.e., $K_h(1) = \infty$). For dissatisfied husbands, the cost of

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[15]While we do not explicitly model post-marital transfers from the woman's natal family, it is reasonable to assume that such transfers could be lower the higher is the amount of dowry paid upon marriage, which would be reflected in our specification. Introducing post-marital transfers in our setting would essentially mean combining our model with the original Bloch and Rao (2002)'s framework.

[16]This timing of events is reasonable in the Indian context, where the majority of marriages is arranged by the bride's and the groom's family (Anukriti and Dasgupta, 2017; Vogl, 2013) and the spouses only meet on the day of the wedding (or shortly before then).

[17]In this regard, in our model, domestic violence has a primarily extractive (or instrumental) motive (Angelucci and Heath, 2020; Baranov et al., 2021). While extending the model to intrinsic (or expressive) motives for domestic violence (e.g., husbands derive direct utility from it) is feasible, doing so would not change our predictions. If the direct utility from violence were separable, κ could be interpreted as the cost of violence net of its benefits (with F_κ having a different support). Even if preferences for violence were to depend on dowries, it is reasonable to assume that they would be decreasing in the dowry amount. So, a reduction in dowry, would increase violence through two channels: material resources and direct preferences.

violence is a random variable with cumulative distribution function F_κ on $[0, \infty)$. To avoid issues related to limited commitment, we assume that any intra-household reallocation of marital gains occurs after the husband makes the separation decision.

Context-driven Assumptions. As discussed in Section 2, divorce and separation are riddled with stigma in India, especially for women. So, while separation is undesirable for all, women disproportionately bear the cost of marital dissolution. This is an essential feature of the Indian context that we embed in our model as follows. Under the initial allocation of marital gains, women prefer to be in a marriage than to separate, even when the husband exercises domestic violence:[18]

$$u_w(Y_w - D + (1-\gamma_0)M, \mathbf{x}_h, \mathbf{x}_w) - K_w > v_w(Y_w - D, \mathbf{x}_w, m).$$

Moreover, satisfied husbands always prefer to stay married:

$$u_h(Y_h + D + \gamma M, \mathbf{x}_h, \mathbf{x}_w, 1) > v_h(Y_h + D, \mathbf{x}_h, m),$$

while, under the initial allocation of marital gains, dissatisfied husbands prefer to separate:

$$u_h(Y_h + D + \gamma_0 M, \mathbf{x}_h, \mathbf{x}_w, 0) < v_h(Y_h + D, \mathbf{x}_h, m).$$

3.2 Equilibrium Analysis

We analyze the bargaining game using the concept of perfect bayesian equilibrium (PBE). Given that there is a signaling component to the game through the choice of violence by the husband, we follow Cho and Kreps (1987) in applying the intuitive criterion as an equilibrium refinement.

We solve the game by backward induction. In the last stage of the game, only dissatisfied husbands whose demand for a higher share of marital gains is not met decide to end their marriage. In particular, dissatisfied husbands choose not to separate if the following inequality holds:

$$u_h(Y_h + D + \gamma M, \mathbf{x}_h, \mathbf{x}_w, 0) \geq v_h(Y_h + D, \mathbf{x}_h, m). \tag{1}$$

Denote by $\underline{\gamma}$ the minimal transfer that keeps the marriage intact. Then, for $\gamma = \underline{\gamma}$ equation (1) holds with equality.

In the second stage, having observed any occurrence of violence and a reallocation proposal, the wife updates her belief about her husband's satisfaction. Denote this posterior belief by σ. The wife must decide whether or not to accept the husband's proposed reallocation γ. The wife rejects any request where $\gamma < \underline{\gamma}$, since it would not dissuade the husband from separating. The wife accepts any request where $\gamma \geq \underline{\gamma}$, satisfies the following condition:

$$u_w(Y_w - D + (1-\gamma)M, \mathbf{x}_h, \mathbf{x}_w) \geq \sigma v_w(Y_w - D, \mathbf{x}_w, m) + (1-\sigma)u_w(Y_w - D + (1-\gamma_0)M, \mathbf{x}_h, \mathbf{x}_w). \tag{2}$$

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[18]According to the Survey of Status of Women and Fertility, 90 percent of women would not consider leaving their husbands even if he abuses her or if he is a drunk or drug addict; only one out of five women believes that she could leave her husband if he were unable to provide for the family financially.

When the wife is indifferent between accepting or rejecting her husband's request, then equation (2) holds with equality and $\gamma = \bar{\gamma}(\sigma)$. So, $\bar{\gamma}(\sigma)$ is the maximal share of marital gains that the husband can extract. Note that this maximal share is an increasing function of the wife's beliefs. In other words, the wife is willing to forgo a higher share of the marital gains when she is more likely to believe that her husband is dissatisfied. The wife's optimal decision is to accept any request for $\bar{\gamma}(\sigma) \geq \gamma \geq \underline{\gamma}$ and to reject it otherwise. In the first stage, the husband decides whether to exercise violence and may demand a higher γ.

In what follows, we assume that the wife rejects any request for reallocation whenever her posterior beliefs about the husband's degree of satisfaction equals her prior. We also assume that she is willing to increase her husband's share of gains from marriage and keep the marriage intact when she believes that her husband is dissatisfied. More formally, we assume that $\bar{\gamma}(1) > \underline{\gamma} > \gamma(p(\mathbf{z}))$.

The perfect Bayesian equilibria of the game could involve pooling or separating. Any pooling equilibria would be such that both satisfied and dissatisfied husbands send the same signal with probability one. Given that the cost of violence for satisfied husbands is infinite, there are no equilibria where both satisfied and dissatisfied husbands behave violently. Consider instead a situation where both satisfied and dissatisfied husbands do not exercise violence. Then, the husband's signal would be uninformative, the wife's prior and posterior beliefs would coincide, and the wife would reject any request for reallocation. For such equilibrium to exist, off-the-equilibrium beliefs must be specified so that no one has an incentive to deviate. For this to occur, however, the wife must assign a positive probability to the event that a satisfied husband would exercise violence, which violates the intuitive criterion.

Any separating equilibria would be such that different types of husbands send different signals. There are no equilibria where satisfied husbands exercise violence and dissatisfied husbands do not. Moreover, there exists no separating equilibrium satisfying the intuitive criterion, where neither types exercise violence but demand different shares. Consider instead a scenario where the husband chooses violence when $\theta = 0$, he chooses non-violence when $\theta = 1$, and $\underline{\gamma} \leq \gamma(1) \leq \bar{\gamma}(1)$. Then, after observing violence, the wife accepts any request for an intra-couple reallocation of the surplus. Consequently, the husband's optimal strategy is to request a share of marital surplus equal to $\bar{\gamma}(1)$.

Denote by κ^* the cost of violence that makes dissatisfied husbands indifferent between exercising domestic violence or not. Husbands with high costs of violence ($K_h = \kappa$, with $\kappa > \kappa^*$) will not exercise violence, even when dissatisfied. The wife's posterior belief that the husband is dissatisfied after not observing violence is therefore given by:

$$\sigma(0) = \frac{p(\mathbf{z})[1 - F_\kappa(\kappa^*)]}{p(\mathbf{z})[1 - F_\kappa(\kappa^*)] + 1 - p(\mathbf{z})}. \tag{3}$$

Since $\sigma(0) < p(\mathbf{z})$ and $\bar{\gamma}(\sigma)$ is an increasing function, the wife rejects any request from a non-violent husband.

Proposition 1. *There is a unique PBE of the game that satisfies the intuitive criterion. It is a separating*

equilibrium, where:

(i) *Satisfied husbands and dissatisfied husbands with a high cost of violence do not behave violently; dissatisfied husbands with a low cost of violence behave violently.*

(ii) *If violence occurs, the wife accepts the request for reallocation of the marital surplus and $\gamma = \bar{\gamma}(1)$; if violence does not occur, then the wife rejects any request.*

(iii) *Satisfied husbands and dissatisfied husbands with low cost of violence remain married; dissatisfied husbands with high cost of violence separate.*

3.3 Comparative Statics

To derive testable predictions, we assume that the utility functions of both spouses are additively separable in C_j. So, we assume that the husband's and the wife's discounted utilities when married are $u_h(C_h, \mathbf{x}_h, \mathbf{x}_w, \theta) = f_h(C_h) + \phi_h(\mathbf{x}_h, \mathbf{x}_w, \theta)$ and $u_w(C_w, \mathbf{x}_h, \mathbf{x}_w) = f_w(C_w) + \phi_w(\mathbf{x}_h, \mathbf{x}_w)$, respectively. Analogously, we assume that the discounted utilities when separated are $v_h(C_h, \mathbf{x}_h, m) = f_h(C_h) + \psi_h(\mathbf{x}_h, m)$ and $v_w(C_w, \mathbf{x}_w, m) = g_w(C_w) + \psi_w(\mathbf{x}_w, m)$ and that $f_j(\cdot)$ and $g_j(\cdot)$ are increasing and concave functions. Recall that C_j denotes the spouses' resources (including their wealth and consumption). For simplicity, we will refer to C_j interchangeably as resources or consumption when discussing the model predictions.
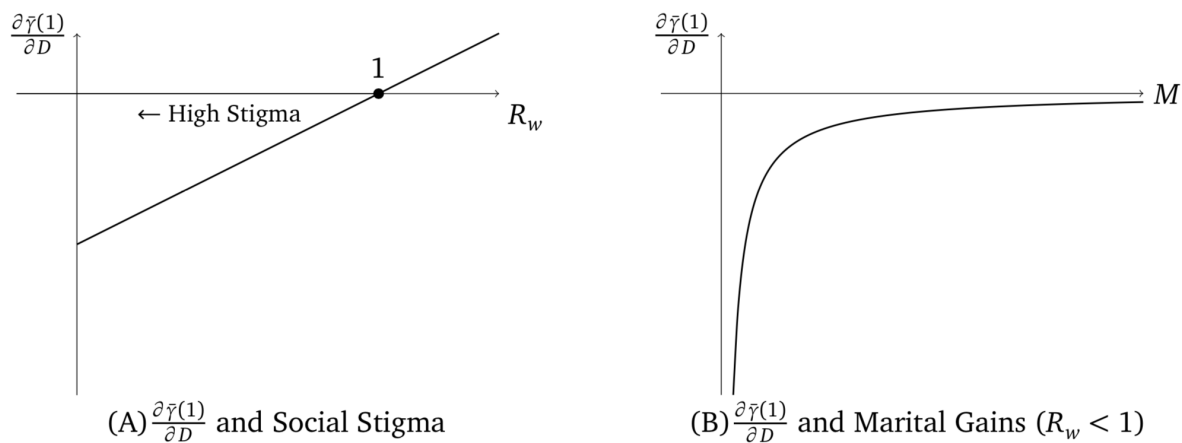
As discussed in Section 2, marital dissolution is highly stigmatized in India, especially for women, which may have important consequences for their psychological well-being and mental health (Sharma (2011), Ragavan et al. (2015), Pachauri (2018)). Consistent with anhedonia (a common symptom of depression and psychological distress), we posit that women may have different preferences for consumption when married vs. separated. Specifically, as illustrated in Figure A4 in the Appendix, we posit that their marginal utility of consumption when married may be higher than when separated in spite of the concavity of $g_w(\cdot)$ and $f_w(\cdot)$ and the higher level of consumption achieved when married.[19,20]

Since our empirical analysis exploits a legal reform that reduced dowry payments in India, we focus on the effect of changes in D. Additional comparative statics results are included in Appendix B. As a preview, the main predictions of the model are as follows. When D declines, the direct effect is to reduce the husband's resources, which increases his propensity to bargain over the marital surplus and, if dissatisfied, his willingness to use marital violence to extract resources from his wife. So, when D declines, the model predicts a reduction in the wife's share of marital gains and an increase in episodes of marital violence. By impacting women's willingness to accept their husbands' requests, social stigma against separation may strengthen or weaken these associations. By increasing within-marriage consumption, gains from marriage may curb the effect of a change

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[19]In a study of depression treatment in India, Angelucci and Bennett (2021) provide an insightful description of the different channels through which mental distress and depression may impact consumption. Besides lowering utility and productivity, depression may limit one's ability to derive pleasure from enjoyable activities (anhedonia). So, depression can essentially flatten the utility function, which is what we are assuming in our framework.

[20]By contrast, we assume the husband's preferences over consumption to be independent of his marital status, i.e., $g_h(\cdot) = f_h(\cdot)$. While this last assumption can be relaxed, doing so does not add much to our analysis.

Figure 3: Effect of a Change in Dowry on Intra-Household Allocation

(A) $\frac{\partial \bar{\gamma}(1)}{\partial D}$ and Social Stigma
(B) $\frac{\partial \bar{\gamma}(1)}{\partial D}$ and Marital Gains ($R_w < 1$)

in dowry on intra-household allocation. But, by increasing the value of staying married, they may intensify the impact of a change in dowry on the likelihood violence and separation.

Effect of a Change in Dowry on Intra-household Allocation. We first compute the change in the share of marital gains dissatisfied husbands demand in equilibrium following a change in dowry D. Consider equation (2) with $\sigma = 1$. Then, by implicit differentiation,

$$\frac{\partial \bar{\gamma}(1)}{\partial D} = \frac{1}{M} \left[\frac{g'_w(Y_w - D)}{f'_w(Y_w - D + (1 - \bar{\gamma}(1))M)} - 1 \right]. \tag{4}$$

Whether a decrease in dowry leads to an increase or a decrease in the husband's share depends on the wife's marginal utility of consumption when married versus separated and on the gains from marriage. Define $R_w = \frac{g'_w(Y_w - D)}{f'_w(Y_w - D + (1 - \bar{\gamma}(1))M)}$ and note that the value of R_w may be determined by the degree of social stigma associated with separation. When social pressure is high enough to, e.g., affect a woman's emotional and psychological well-being, her marginal utility of consumption when married may be higher than her marginal utility of consumption when separated (see Panel A of Figure A4 in the Appendix). This may hold in spite of the concavity of the utility function and of higher consumption when married vs. separated. In these cases, R_w is less than one, the derivative in equation (4) is negative, and a decrease in dowry would increase the share of marital gains devoted to the husband. When $f'_w(\cdot) = g'_w(\cdot)$ (e.g., in contexts where social stigma against separation is not so harsh to impact women's preferences over consumption), equation (4) is unambiguously positive due to concavity (Panel B of Figure A4).

We also analyze how the impact of dowries on intra-household allocation changes with gains from marriage. To this end, we compute the cross-derivative of $\bar{\gamma}(1)$ with respect to both D and M. A positive cross-derivative indicates that any effect on $\bar{\gamma}(1)$ induced by a change in dowry increases as M increases. Conversely, a negative cross-derivative indicates that any effect of dowry payments on the share of marital gains commanded by the husband is lower for higher values of M. If the cross-derivative is zero, then equation (4) is independent of M.[21]

Figure 3 provides a graphical illustration of these results. When social stigma against separa-

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[21]In Appendix B, we also show that the sign of the cross-derivative of $\bar{\gamma}(1)$ with respect to dowry and the wife's human capital is ambiguous. So, in our model and consistent with our data (see Section 4), increases in a woman's human capital need not offset any increase in the share of surplus allocated to the husband following a decrease in dowry.

Figure 4: Effect of a Change in Dowry on Domestic Violence

(A) $\frac{\partial \kappa^*}{\partial D}$ and Social Stigma (B) $\frac{\partial \kappa^*}{\partial D}$ and Marital Gains ($R_w < 1$)
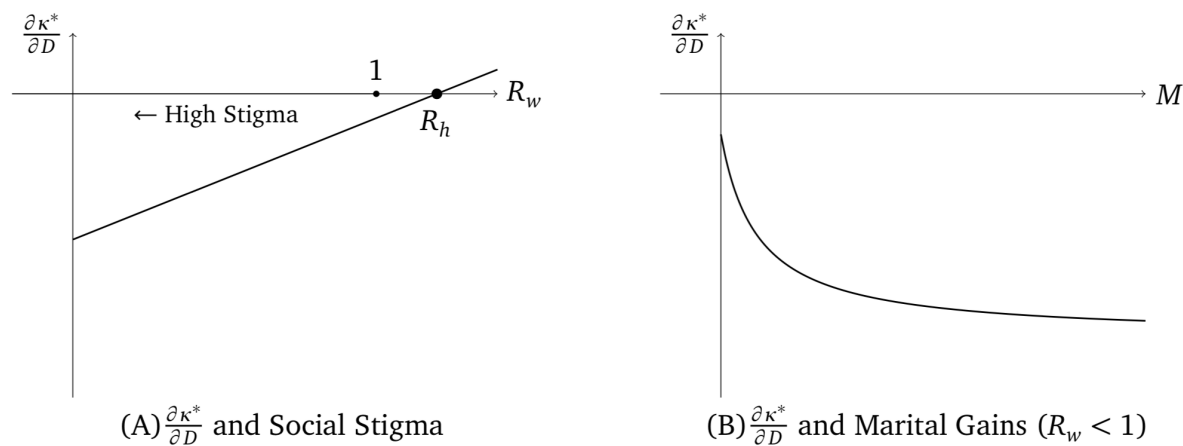
tion is high, we should expect the share of marital gains commanded by the husband to increase following a reduction in dowry (Panel A). Such an increase, however, should become less pronounced as social stigma against separation falls. When social stigma against separation is low enough, it is possible that the share of marital gains commanded by the husband decreases following a reduction in dowry (Panel A). Any impact of a decline in dowry on intra-couple allocation should also be less severe for couples with substantial gains from marriage (Panel B).

Effect of a Change in Dowry on Domestic Violence. To understand how a change in dowry impacts domestic violence, we analyze how such change impacts κ^* (i.e., the maximal cost of violence that dissatisfied husbands are willing to face in order to force a reallocation of resources and avoid separation). When κ^* increases, the probability of violence increases; vice versa, if κ^* decreases, then a higher fraction of dissatisfied husbands refrains from exercising violence. In equilibrium, such threshold is defined by

$$\kappa^* = f_h(Y_h + D + \bar{\gamma}(1)M) + \phi_h(\mathbf{x}_h, \mathbf{x}_w, 0) - f_h(Y_h + D) - \psi_h(\mathbf{x}_h, m). \tag{5}$$

So,

$$\frac{\partial \kappa^*}{\partial D} = R_w f_h'(Y_h + D + \bar{\gamma}(1)M) - f_h'(Y_h + D). \tag{6}$$

Recall that, given equation (4) and given that $f_w(\cdot)$ and $g_w(\cdot)$ are increasing functions, R_w is always positive. If $R_w \leq 1$, the derivative in equation (6) is unambiguously negative due to concavity and any decrease in dowry would increase the probability of domestic violence. The sign of $\frac{\partial \kappa^*}{\partial D}$, however, is ambiguous overall. The derivative in equation (6) is negative as long as $R_w < R_h$, with $R_h = \frac{f_h'(Y_h + D)}{f_h'((Y_h + D) + \bar{\gamma}(1)M)}$. So, whether a decrease in dowry increases domestic violence depends not only on the wife's relative marginal utility of consumption when married vs. separated (our proxy for social stigma) but also on her husband's and on the extent of marital gains. As before, $\frac{\partial \kappa^*}{\partial D}$ is increasing in R_w. In a context like India with high social stigma against separation which is particularly high, we expect the probability of domestic violence to increase following a decrease in dowry payments (see Panel A of Figure 4). Since gender norms and the stigmatization of marital dissolution vary substantially across India, however, we expect the effect of a change in dowry on the probability of violence to be highly heterogeneous.

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Figure 5: Distribution of Cost of Violence and Effect of a Decline in Dowry

(A) High Stigma ($R_w < R_h$)   (B) Low Stigma ($R_w > R_h$)
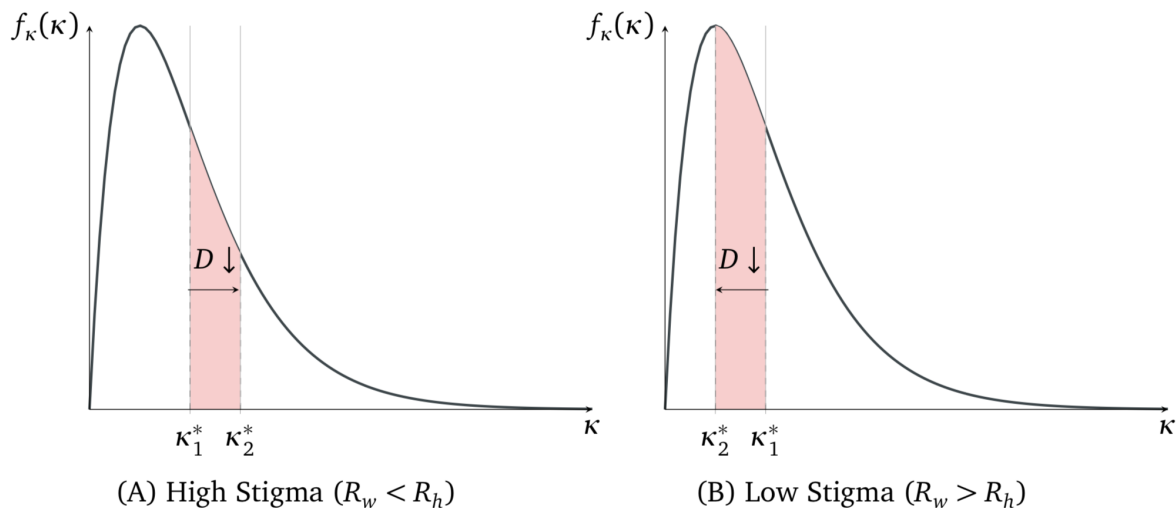
Note that this prediction differs from Bloch and Rao (2002), who show that an decrease in dowry would unambiguously lead to an increase in domestic violence. This discrepancy arises from the fact that Bloch and Rao (2002) excludes the existence of any gains from marriage so that women's resources are the same when married or unmarried. Moreover, they assume that women's preferences are the same inside or outside of the marriage, which may be questionable in more conservative settings.

Our analysis of the cross-derivative of κ^* with respect to D and M yields some additional insights. As we show in Appendix B, $\frac{\partial^2 \kappa^*}{\partial D \partial M}$ is always negative. So, any increase in violence following a decrease in dowry would be particularly strong when gains from marriage are high (see Panel B of Figure 4).

Effect of a Change in Dowry on Separations. Recall that, in the last stage of the game, the husband decides whether to separate from his wife and that, in equilibrium, only dissatisfied husbands with a high cost of violence (i.e., with κ above the equilibriums threshold κ^*) separate. Thus, any change in dowry payments would have an impact on separations that is the reverse of its impact on domestic violence: when social stigma against separation is high, a decrease in dowry should decrease separations. In other words, the model predicts a negative correlation between changes in domestic violence and separation following a change in dowry. Figure 5 helps illustrate this prediction. The figure shows a hypothetical unimodal distribution of the cost of violence κ and the cost of violence threshold κ^*. When social stigma against separation is high, the threshold κ^* shifts upwards when D declines, hence increasing the probability of violence and decreasing the probability of separation; by contrast, when $R_w > R_h$, the threshold κ^* shifts downwards when D declines, hence decreasing the probability of domestic violence and increasing the probability of separation.

3.4 Endogenous Dowry and Human Capital

So far, we have taken dowry payments and the bride's characteristics as given. In Section C.6 in Appendix, we provide an extension to our model that includes a pre-marital bargaining game

between the bride's family and the groom (or his family). We interpret this first stage, which we briefly summarize below, as one in which parents make decisions about how much to invest in the human capital of their daughter and about how much to save for a future dowry (Anukriti et al., 2019). For simplicity, we abstract from the specific process through which potential grooms match with brides.

In line with the social norms in the Indian context, we assume a very high social cost of a daughter remaining unmarried (as in Borker et al. (2017)). So, parents strictly prefer their daughters to be married relative to them remaining unmarried. Before the marriage takes place, the bride's parents make a take-it-or-leave-it offer to the groom. This offer consists of the dowry payment and a set of bridal characteristics, including her human capital. At this stage, the marriage characteristics, the cost of domestic violence, and the future marriage market conditions are unknown to the potential groom and the bride's parents (although their distributions are known). The groom decides to accept or reject the offer based on how his expected utility from marriage fares relative to his reservation utility. His expected utility from marriage takes into account the three possible post-marital scenarios discussed before (that he is satisfied, dissatisfied but non-violent, or dissatisfied and violent), while his reservation utility depends on his income, human capital, and the current marriage market conditions.

In equilibrium, the bride's parents' offer makes the potential groom indifferent between accepting and rejecting the marriage proposal. Since the groom values consumption as well as his future wife's human capital, and parents strictly prefer to have their daughter married over remaining unmarried, a decrease in dowry would lead to an increase in the human capital of future brides. However, the impact of a change in human capital on domestic violence, intra-household resource allocation, and marital dissolution is ambiguous (see Section B in the Appendix). So, an increase in women's human capital may not help offset the negative consequences of lower dowries on women's well-being after marriage. In Section 5, we explore this issue empirically.

3.5   Summary of the Model Predictions

Our theoretical framework illustrates the relationship between dowry payments, the allocation of marital gains between a husband and a wife, and the occurrence of domestic violence and separation. It also describes the link between dowry payments and parental investment in the human capital of future brides. Our model incorporates many features of the Indian cultural and social norms associated with marriage, including the widespread social stigma against separation. This stigma can have significant consequences not only for the material but also for the spouses' psychological well-being (especially for women), which we model as a difference in women's preferences over wealth and consumption when married vs. separated. Under this modeling assumption, the predictions of the model can be summarized as follows:

Prediction 1. *If social stigma against separation is high, the share of marital gains commanded by the husband increases following a decrease in dowry.*

Prediction 2. *If social stigma against separation is high, the probability of domestic violence increases*

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following a decrease in dowry.

Prediction 3. *The effect of a decrease in dowry on the share of marital gains commanded by the husband and on the probability of domestic violence weakens as social stigma against separation decreases. If social stigma against separation is low enough, the husband's share of marital gains and the probability of domestic violence decrease following a decrease in dowry.*

Prediction 4. *The effect of a decrease in dowry on the share of marital gains commanded by the husband weakens as marital gains increase. The effect of a decrease in dowry on the probability of domestic violence strengthens as marital gains increase.*

Prediction 5. *If social stigma against separation is high, the probability of separation decreases following a decrease in dowry.*

Prediction 6. *Parental investment in the human capital of future brides increases following a decrease in (expected) dowry payments.*

4 Empirical Strategy

4.1 Data and Measurement

To our knowledge, no nationally-representative dataset exists recording dowry payments, women's decision power and living arrangements, and information about domestic violence against women. So, for our empirical application, we rely on two separate data sources: data on dowry payments are from the 1999 Rural Economic and Demographic Survey; data on intra-household bargaining power, domestic violence, and separations are from the 2005-2006 National Family Health Survey.

Dowries. The Rural Economic and Demographic Survey (hereafter REDS) is a detailed panel survey of rural households conducted by the National Council of Applied Economic Research. The survey covers sixteen of the most populous states in India and contains detailed retrospective information on year of marriage and marital transfers for the household head, their parents, their sisters and brothers, and their daughters and sons. It also includes socio-economic and demographic traits.[22] From the 1999 REDS round, we select a sample of 17,897 marriages that took place between 1975 and 1999. The average gross dowry is about 38,000 Rupees ($4,104 PPP), the average net dowry is about 25,000 Rupees ($2,699 PPP), and respondents reported that dowries were paid in 90 percent of marriages (see Table A9 in the Appendix). The average year of marriage in the sample is 1986, while the median is 1985. All respondents live in rural areas, and they are primarily Hindu (though Muslims account for 6.8 percent of the sample). More than half of the sample belongs to Scheduled Castes, Scheduled Tribes or other backward castes. Educational attainment is low, with average years of schooling being four and five for women and their spouses, respectively.

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[22]In Section D in the Appendix, we investigate the quality of the REDS data, with a particular focus on the possible misreporting of dowry amounts.

Intra-household Allocation, Domestic Violence, and Separation. One well-known issue in empirical applications of household economics is that the allocation of gains from marriage (or of household resources in general) is not directly observable. We overcome this data limitation by using self-reported measures of women's decision-making power to construct proxies for the share of gains from marriages commanded by the wife (i.e., $1-\gamma$).[23] The National Family Health Survey (NFHS) contains information about both a woman's involvement in household decisions and domestic violence. The survey also provides information on year of marriage and religion as well as women's current marital status, educational attainment, anthropometric indicators, and other demographic and socioeconomic traits. To ensure an adequate number of marriages before and after the 1985-1986 anti-dowry law amendments, we use data from the 2005-2006 round. To ensure comparability with our analysis of dowry payments, we select a sample of more than 65,000 married women whose marriage took place between 1975 and 1999.

As we report in Table A10 in the Appendix, slightly more than half of the women in our sample reside in rural areas, 74 percent are Hindu, 13 percent are Muslim, and two-thirds married after 1985. For women, the average age is 34, and the average schooling is five years. For their husbands, the average age is 40, and the average schooling is seven years. More than 10 percent of women report having experienced injuries caused by the husband or severe physical violence, and one-third of women report ever experiencing less severe physical violence. Questions about injuries caused by the husband are quite detailed: 33 percent of women report cuts, bruises, or aches, 8 percent report eye injuries, sprains, dislocations, or burns, and 6 percent report deep wounds, broken bones, broken teeth, or any other serious injury. Based on these reports, as well as on general questions about experiences of different types of domestic violence, we construct an ordinal measure of violence, which ranges between 1 and 6. Conditional on ever experiencing any injuries or violence, a woman experiences two types of injuries, on average.[24]

For a number of household decisions, the survey asks respondents about their degree of involvement in the decision-making process. We construct several indicator variables for whether the respondent reports participating in household decisions. One in three women in our sample has no say in decisions about household purchases; in one out of six families, the husband is in charge of all decisions regarding contraception and his wife's health care. To capture the scope of women's decision-making power, we also consider the number of decisions she reports being involved in (conditional on being involved in at least one). This variable ranges between 1 and 6 and is based on women's answers to questions regarding decisions over large and small household purchases, how to spend their husband's money, health and contraception decisions, and decisions about what to cook.

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[23]While these measures have been widely used in the literature, we acknowledge some important limitations. First, having a say in decisions may not always be empowering to women. Moreover, some areas of decision-making may be more desirable than others and therefore reflect higher decision-making power (Heath and Tan, 2019).

[24]One concern about using self-reported occurrences of domestic violence is misreporting (Alderman et al., 2013). Looking at a sample of women in Peru, Agüero and Frisancho (2017) employ indirect questioning techniques to measure the misreporting of intimate partner violence when using direct questions (such as those included in the NFHS). They find that, on average, there are no significant differences in direct versus indirect questions. However, they find significant underreporting of violence for highly educated women. Since education levels are quite low in our context, concerns about misreporting may be less critical.

4.2 Identification Strategy

As discussed in Section 2, the Dowry Prohibition Act and its amendments explicitly exclude marital transfers governed by the Muslim Personal Law. So, for our identification strategy, we exploit variation by religion as well as the timing of the marriages. Our baseline specification is as follows:

$$y_i = \beta_1 \text{Post}_i \times \text{Non-Muslim}_i + \beta_2 \text{Post}_i + \beta_3 \text{Non-Muslim}_i + X_i' \gamma + \alpha_c + \alpha_s + \epsilon_i, \qquad (7)$$

where y_i is the outcome of interest for woman i and Post_i is an indicator variable equal to one if woman i got married in or after 1986; X_i is a vector of exogenous covariates (indicator variables for religion, for living in rural areas, and for being part of disadvantaged social groups such as Scheduled Castes, Scheduled Tribes or other backward castes); α_c are women's birth-cohort fixed effects and α_s are state fixed effects. In alternative specifications, we include year of marriage and state by year of marriage fixed effects, district-level fixed effects, state by birth cohort fixed effects, and religion-specific time trends. β_1 is the parameter of interest and captures the average treatment effect on the treated of being exposed to the 1985-1986 tightening of anti-dowry laws in India. As a robustness check, we also include covariates that may be impacted directly by the amendments, such as women's education, household size and wealth, as well as husband's characteristics. Unless otherwise noted, we estimate equation (7) with OLS, using a sample of married women, who got married between 1975 and 1999. Standard errors are clustered at the state level. Whenever appropriate, we account for multiple hypothesis testing and apply the Romano-Wolf step-down procedure to compute adjusted p-values.

Parallel Trends.   As typical in a difference-in-difference framework, the validity of our results relies on the parallel trend assumption. This assumption requires that, in the absence of the 1985-1986 amendments, the evolution of dowry payments, domestic violence, women's decision power and human capital, and separations should have been the same for Muslims and non-Muslims. To confirm that this is the case in our framework, we restrict the sample to the pre-reform period (that is, to women who married between 1975 and 1985), and regress the outcomes of interest on indicators for the year of marriage and for being non-Muslim, and their interactions. As shown in Figure A5, we do not detect any significant divergence in dowry payments, occurrence of violence and separations, women's decision power, and human capital outcomes between the two religious groups before the reforms.[25] We also perform a falsification test and estimate our baseline model with Post_i being replaced by a variable equal to one if the marriage took place between 1980 and 1985 and to zero if it took place between 1975 and 1979. If there were differences in trends between Muslims and non-Muslims, we would find statistically significant coefficients on the newly defined interaction term. This is not the case for any of our outcomes of interest (results are available on request).

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[25]In our model, any change in dowry impacts women's power, domestic violence, and separations through consumption. So, it is also critical to rule out that, in the absence of the 1985-1986 amendments, the evolution of consumption should have been the same for Muslims and non-Muslims. To this aim, we again restrict the sample to the pre-reform period and regress the household income (from REDS), household wealth (from NFHS), and an indicator for owning a below-poverty-line card (from NFHS) on indicators for the year of marriage and for being non-Muslim, and their interactions. The estimated coefficients for the interaction terms are not statistically different from zero (results are available on request).

Treatment Effect Heterogeneity. There is a recent literature indicating that estimates of equation (7) may be biased if treatment effects are heterogeneous across groups or periods.[26] To assess the robustness of our estimates to this issue, we follow De Chaisemartin and d'Haultfoeuille (2020) and estimate the minimal value of the standard deviation of the average treatment effects under which β_1 and the average treatment effect on the treated could be of opposite signs. When this measure is large, it means that the estimated β_1 is not an appropriate estimate of the average treatment effect on the treated only if there is an implausible amount of treatment effect heterogeneity. In this case, treatment effect heterogeneity is not too much of a concern. By contrast, if this measure is too close to zero, then the average treatment effect on the treated and the estimate of β_1 can be of opposite signs even under small and plausible amount of treatment effect heterogeneity.[27] As discussed later on, we do not find treatment effect heterogeneity to be a critical issue in our setting.

Alternative Policies. One might also worry that, during our period of analysis, other policies were implemented that may have had an impact on dowry payments and women's outcomes. We are primarily concerned about two sets of reforms. The first set consists of early amendments to the Dowry Prohibition Act. Between 1975 and 1976, the states of Bihar, Punjab, Himachal Pradesh, Haryana, West Bengal, and Orissa introduced local amendments, increasing penalties for requesting, receiving, or giving a dowry. Though the prescriptions of the local amendments were more moderate than those introduced in 1985-1986 nationwide, we check that the impact of the reforms is not limited to these early amended states. The second set of reforms pertains to amendments to the Hindu Succession Act that equalized women's inheritance rights to men in several Indian states between 1976 and 2005. These reforms only applied to Hindu, Buddhist, Sikh or Jain women, who were not yet married at the time of the amendment in their state. We check that the Dowry Protection Act amendments affected dowry payments and women's outcomes independently of their exposure to the inheritance rights reforms.[28]

Matching. One concern about using the Muslim subsample as a control group is that it is small relatively to the non-Muslim one, especially in the REDS data. In addition, women in the Muslim sample may be systematically different from women in the non-Muslim group. While religion fixed-effects and conditioning on covariates help address this issue, we also employ a matching strategy to further adjust for observable differences between Muslims and non-Muslims. Specifically, we use a logit model to compute each woman's propensity score conditional on a battery of individual and household traits, and nearest-neighbor matching without replacement

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[26]See, e.g., Goodman-Bacon (2018), Callaway and Sant'Anna (2020), Sun and Abraham (2020).

[27]Under the assumption that the treatment effects of the treated groups and time periods are drawn from a uniform distribution, De Chaisemartin and d'Haultfoeuille (2020) suggest the following rule of thumb. Assume that the treatment effect of every group and time period cannot be larger in absolute value than $B > 0$. If $|\widehat{\beta_1}| \geq \underline{\hat{\sigma}}\sqrt{3}$, then $\underline{\hat{\sigma}}$ may not be an implausibly high amount of treatment effect heterogeneity, and the average treatment effect on the treated may be equal to 0. By contrast, if $|\widehat{\beta_1}| < \underline{\hat{\sigma}}\sqrt{3}$, then $\hat{\sigma}$ may or may not be an implausibly high amount of treatment effect heterogeneity, depending on whether the maximum reasonable $B < \underline{\hat{\sigma}}\sqrt{3}$ or $B \geq \underline{\hat{\sigma}}\sqrt{3}$. Since we do not know the true value of B, we consider our estimates robust to treatment effect heterogeneity if $|\widehat{\beta_1}| < \underline{\hat{\sigma}}\sqrt{3}$.

[28]Kerala in 1976, Andhra Pradesh in 1986, Tamil Nadu in 1989, and Maharashtra and Karnataka in 1994 passed reforms making daughters coparceners. National ratification of the amendments occurred in 2005. Importantly for our analysis, Roy (2015) shows that women who were close to marriageable age at the time of the reform in their state subsequently made higher dowry payments to their husbands.

to match non-Muslim women with Muslim women with the closest propensity score (appropriate balancing tests are satisfied and available upon request). We then drop the unmatched observations and estimate model (7) over the matched subsample. As discussed in Blundell and Costa Dias (2000) and Smith and Todd (2005), propensity score matching in combination with difference-in-difference can improve the quality of non-experimental evaluation results.

We start by establishing that the amendments were successful at reducing dowries. To this aim, we estimate equation (7) with measures of dowry amounts and prevalence as outcomes. Next, we test the model predictions we outlined in Section 3.3. We test Predictions 1 and 2 by estimating the regression model in equation (7) using NFHS responses to questions on domestic violence and intra-household decision-making as outcomes of interest. To test whether the impact of an exogenous decrease in dowry on the women's decision power varies with societal norms about divorce and separation (Prediction 3), we check whether β_1 is lower in villages with higher rates of divorced or separated women or in urban, possibly more progressive, areas. We also check whether the Dowry Protection Act amendments had weaker effects in North-East and South India, where marriage dissolution rates are higher (Dyson and Moore, 1983).

A central assumption of household economics is that children provide union-specific utility to parents. This is particularly true in the Indian context, where out-of-wedlock fertility is rare. According to the World Values Survey (1990-1994), four out of five women in India consider children a critical component of a successful marriage. So, in the spirit of Becker (1973, 1991) and, more recently, of Angelucci and Bennett (2019), we use fertility outcomes and fertility preferences to construct measures of gains from marriage. We then test Prediction 4 by allowing β_1 to vary with these measures. If the data support this prediction, we expect β_1 to be decreasing in gains from marriage when we use women's decision-making power as the dependent variable. By contrast, we expect the effect of the anti-dowry reforms on domestic violence to be increasing in gains from marriage.

To test Prediction 5, we estimate the impact of the 1985-1986 amendments on the probability of being divorced or separated. Since divorce is extremely rare and may be suffering from under-reporting due to social stigma, we define women to be separated if they report not living together with their husbands.[29] Finally, we test Prediction 6 by comparing the human capital outcomes of women who were exposed to the amendments to those of women who were not. Since we expect younger girls to be more responsive to changes in human capital investment (especially for outcomes such as height and primary school completion), we estimate different effects based on the age of women at the time of the reform.

5   Results

We now present our empirical results. We begin by documenting a decline in dowries following the introduction of the Dowry Prohibition Act amendments. We then proceed by discussing the

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[29]One possible drawback of this approach is that we do not observe why the couple does not live together, and so it may include cases of temporary or permanent migration.

Table 1: Dowries

	Full Sample						Matched Sample	
	Gross Dowry	Net Dowry	Gross Dowry (if > 0)	Net Dowry (if ≠ 0)	Zero Dowry	Missing Dowry Info	Gross Dowry	Zero Dowry
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post × Non-Muslim	-11.951**	-6.700**	-9.681*	-3.750	0.060*	-0.034	-17.127***	0.050*
	(4.081)	(2.342)	(4.762)	(2.843)	(0.029)	(0.024)	(2.887)	(0.027)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	15,008	9,069	13,689	7,979	15,008	15,918	877	877
R sq.	0.244	0.150	0.251	0.179	0.143	0.250	0.335	0.160
Mean Dep. Var.	37.960	25.234	41.618	28.681	0.088	0.147	55.083	0.084
FWER Adj. P-values	0.016	0.018	0.060	0.086	0.054	0.086	0.002	0.086
TEH Robust $\hat{\sigma}$	72.445	32.273	56.599	17.275	0.420	0.181	154.400	0.316

NOTES: OLS estimates. Sample of women aged 15 to 49 in 2005, who married between 1975 and 1999. The matched sample is obtained using one-to-one nearest-neighbor matching without replacement to match non-Muslim and Muslim women with the closest propensity score (based on caste, age, wealth, own and spouse's education, and household size). The caliper width equals 0.2 of the standard deviation of the propensity score. All dowry amounts are converted to 1999 Rupees (×1000). Individual controls include indicator variables for religion, year of marriage after 1985, for type of residence (rural or urban), and for belonging to schedule caste, schedule tribe or other backward caste. Standard errors (in parentheses) are clustered at the state level. ***, **, * mean statistical significance at 1, 5 and 10 percent levels. The Romano-Wolf FWER adjusted p-values are based on 500 bootstrap replications. TEH (Treatment Effect Heterogeneity) Robust $\hat{\sigma}$ corresponds to the minimal value of the standard deviation of the treatment effect across the treated groups and time periods under which $\hat{\beta}_1$ and the average treatment effect on the treated could be of opposite signs. When this measures is large, it means that the estimated β_1 is not an appropriate estimate of the average treatment effect on the treated only if there is an implausible amount of treatment effect heterogeneity (see footnote 27).

empirical results for women's decision-making power, domestic violence, separations, and human capital, which we present in the order in which our predictions were introduced in Section 3.5.

5.1 Dowries

Table 1 contains the baseline estimates of the impact of the 1985-1986 reforms on dowry payments.[30] The first four columns focus on dowry amounts over the full sample (Columns (1) and (2)) and a sample restricted to marriages with non-zero transfers (Columns (3) and (4)). In Column (5), we study the probability of a marriage involving no dowry. In Columns (6), we estimate the effect of the reforms on the likelihood of missing dowry information, possibly related to respondents refusing to answer dowry-related questions.

We estimate that the 1985-1986 reforms to the Dowry Prohibition Act were successful at reducing dowries. Specifically, the amendments decreased gross and net dowries by approximately 12,000 and 6,700 Rupees over the full sample. To gauge magnitudes, these correspond to reductions in dowry payments by roughly 0.2 standard deviations. Such reductions may result from changes occurring both at the extensive and intensive margins: on the one hand, we document a 6 percentage points increase in the probability that the marriage involved no transfer at all; on the other hand, we detect sizable and negative declines in dowry payments when we restrict our attention to non-zero transfers (though caution needs to be applied here, since we are restricting our

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[30]We wish to stress that Alfano (2017) has previously investigated the impact of these reforms on dowry payments. While our analysis is qualitatively in line with this previous work, we estimate a different empirical specification, try to unpack effects at the intensive and extensive margins, and combine propensity score matching with difference-in-difference to better control for differences between Muslims and non-Muslims.

sample based on outcomes).[31] Since the pecuniary punishments introduced by the amendments are indexed to the dowry amount when higher than than 15,000 Rs., this finding is reasonable. Importantly, the reforms did not have any impact on the probability of the information about dowry being missing or not reported, which curbs concerns related to changes in reporting following the introduction of the amendments (for a more detailed analysis of changes in misreporting of dowry amounts after the reforms based on Benford's law, see Appendix D).

The last two columns of Table 1 present the estimated effects of the amendments on gross dowries and the likelihood of no dowry using the matched sample,[32] which only includes Muslim and non-Muslim women with similar observable characteristics (see Section 4.2). Reassuringly, the effects are qualitatively consistent with the those estimated on the full sample. Our findings are robust to accounting for multiple hypothesis testing and treatment effect heterogeneity, as indicated by the low Romano-Wolf adjusted p-values and the high De Chaisemartin-d'Haultfoeuille summary measures reported in Table 1. They are also robust to changes in the estimation sample and more restrictive specifications, as we describe in details in Section E in the Appendix.[33]

5.2 Predictions 1 to 4: Women's Decision Power and Domestic Violence

Predictions 1 and 2. If social stigma against marital dissolution is high, Predictions 1 and 2 state that women exposed to the reforms should have lower decision-making power in their marital families and should face a higher likelihood of domestic violence, on average. If social stigma is low, we may see an increase in women's decision-making power and a decrease in domestic violence following the amendments.

Table 2 reports the estimated impact of the Dowry Prohibition Act amendments on women's participation in family decisions. The table reports estimates of linear probability models. The estimation of probit models for binary outcomes delivers estimated effects that are quantitatively similar and significantly smaller standard errors (results are available upon request). In Columns (1) and (2), the dependent variables are an indicator variable equal to one if the woman reports being involved in at least one financial or health-related decision (see Section 4.1 for details) and the number of decisions she has a say in (conditional on being involved in at least one decisions). In line with the prediction of our model and the widespread societal attitude against separation in India, we find that women's decision-making power declines following the introduction of the 1985-1986 reforms: women exposed to the reforms are 2.6 percentage points less likely to being involved in household decisions, on average (approximately 3 percent); if they are at all involved,

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[31]The estimation of tobit models for censored outcomes yields qualitatively similar results. Our results are quantitatively confirmed when we estimate probit regressions for binary outcomes. Our results are also robust to excluding or downweighting outliers. We estimated equation (7) after trimming or topcoding the top 1 and 5 percent of dowry amounts and after transforming dowry amounts using logarithmic or inverse hyperbolic sine transformations of the dowry amounts. Finally, the estimated effects from quantile regressions for the dowry amounts are statistically significant at all quantiles and not statistically different from the OLS estimates for most quantiles. The full set of estimates is available upon request.

[32]Estimates for net dowries and other outcomes are qualitatively similar and available on request.

[33]While we do not report these results for brevity, we take several steps to address concerns about the possible endogeneity of treatment. First, we show that excluding marriages that occurred between 1984 and 1987 does not substantially impact our estimates. Next, we develop an intent-to-treat analysis, where the treatment variable is defined as the interaction between an indicator variable for being non-Muslim and an indicator variable equal to 1 if the woman was 14 or younger in 1986 (hence, likely not married) and to zero if she was older than 23 (hence, likely married). Our findings are confirmed.

the scope of their involvement declined by approximately 2.9 percent (once again these results need to be interpreted with caution, as we are restricting the estimation sample based on an outcome).

To better understand these results, we estimate equation (7) using indicators for specific decisions as dependent variables (Columns (3) to (6)). The estimated coefficients are negative and statistically significant for infrequent and possible more consequential decisions, such as large household purchases and a woman's health care (including decisions about contraception). We also document a reduction in women's decision-making power regarding how to spend their husband's earnings.

We present the estimation results for the domestic violence outcomes in Table 3. Following a structure similar to Table 2, the first two columns feature, as outcomes, an indicator for a woman ever suffering injuries due to her husband's actions and the number of different types of injuries she has suffered, respectively. As we described in Section 4.1, the array of injuries we consider include eye injuries, sprains, dislocations, burns, deep wounds, broken bones or teeth, or any other serious injury. In line with Prediction 2, women's exposure to the Dowry Prohibition Act amendments increases their likelihood of being victims of domestic violence, both at the extensive and (in a slight misuse of terminology) at the intensive margin. The estimated effects are sizable and indicate that the reforms increased the likelihood of wife-abuse by 1.9 percentage points (15.8 percent). Conditional on ever experiencing violence by their husbands, treated women suffer a wider array of injuries.

In Columns (3) to (6), we exploit additional survey questions about women's experience of physical, sexual, and emotional violence by the husband. While all the point estimates support the existence of a positive association between women's exposure to the amendments and their likelihood to be abused by their husbands, the estimated coefficients for women's exposure to sexual and emotional violence are not statistically significant at conventional levels. By contrast, we find that the amendments substantially increased the likelihood of severe and less severe physical violence (by 3.4 percentage points and 2.9 percentage points, respectively).[34]

To gauge the magnitudes of the estimated effects presented in Tables 2 and Tables 3, we compare them to alternative policies. For example, Heath and Tan (2019) estimate that amendments to Hindu Succession Act (that equalized inheritance rights for women and men in several Indian states between 1976 and 2005) increased women's participation in decisions about large purchases by 10 percentage points, about their own health by 5 percentage points, and about how to spend their husbands' money by 3 percentage points (though this coefficient is not statistically different from zero). Sunder (2020) shows that women's exposure to the District Primary Education Programme (a flagship policy of the Indian government in the 1990s, which led to the construction of over 160,000 new schools and boosted female primary school completion rates by 12 percentage points) increased women's participation in household spending decisions by 8 percentage points. In the Kenyan context, Haushofer et al. (2019) find that a large cash transfer targeting men (ap-

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[34]As mentioned in Section 2, the 1985-1986 amendments made it easier to punish husbands and in-laws for dowry-related cruelty. In particular, in 1986 Section 498a dictated the automatic arrest and imprisonment of husband and family if the wife called the police to complain about cruelty, which would have likely reduced (rather than increased) the occurrence of violence.

Table 2: Prediction 1: Women's Decision Power

	Full Sample						Matched Sample
			Type of Decision				
	Any Decision	Number of Decisions (if>0)	Household Purchases	Health & Contracept.	Husband's Money	Daily Decisions	Any Decision
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post × Non-Muslim	-0.026*	-0.125**	-0.056***	-0.029*	-0.025*	-0.017	-0.034**
	(0.014)	(0.052)	(0.017)	(0.016)	(0.014)	(0.016)	(0.012)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	65,105	61,309	65,054	62,496	59,977	65,105	15,836
R sq.	0.088	0.066	0.063	0.068	0.047	0.063	0.075
Mean Dep. Var.	0.917	4.219	0.619	0.876	0.737	0.816	0.895
FWER Adj. P-values	0.070	0.030	0.006	0.070	0.070	0.136	0.022
TEH Robust $\hat{\sigma}$	0.091	0.644	0.057	0.034	0.141	0.002	0.095

NOTES: OLS estimates. Sample of women aged 15 to 49 in 2005, who married between 1975 and 1999. The matched sample is obtained using one-to-one nearest-neighbor matching without replacement to match non-Muslim and Muslim women with the closest propensity score (based on caste, age, wealth, own and spouse's education, and household size). The caliper width equals 0.2 of the standard deviation of the propensity score. Individual controls include indicator variables for religion, year of marriage after 1985, for type of residence (rural or urban), and for belonging to schedule caste, schedule tribe or other backward caste. Standard errors (in parentheses) are clustered at the state level. ***, **, * mean statistical significance at 1, 5 and 10 percent levels. The Romano-Wolf FWER adjusted p-values are based on 500 bootstrap replications. See Table 1 for details on TEH Robust $\hat{\sigma}$.

proximately equal to $700 PPP, on average) decreased the likelihood of women being slapped by their husband by 10 percentage points (32 percent) and kicked, dragged, or beaten by 9 percentage points (59 percent). In our context, the Dowry Prohibition Act amendments (which reduced gross dowries by roughly $1,200 PPP and net dowries by $600 PPP) increased the likelihood of severe and less severe physical violence by 33 and 9 percent, and the likelihood of ever suffering any injury by the husband by 16 percent.

Column (6) of Tables 2 and 3 reports the effects of the amendment estimated on women's power and domestic violence obtained from the sample of Muslim and non-Muslim women matched based on their propensity score. For brevity, we present results only for our primary outcomes (results for the other outcomes are available on request). The estimated effects on the restricted sample are consistent with those from the full sample. In fact, they are larger in magnitude, suggesting that our findings are unlikely driven by the limited size or comparability of the control group.

As indicated by the Romano-Wolf p-values and the De Chaisemartin-d'Haultfoeuille summary measures reported in Table 1, our estimates are generally robust to accounting for multiple hypothesis testing and treatment effect heterogeneity. The estimated effect on women's likelihood of suffering any injury by their husbands turns slightly insignificant at conventional levels when using the full sample; importantly, it remains statistically significant at the 5 percent level when using the matched sample. For women's involvement in large household purchases and decisions about health and contraception, however, the De Chaisemartin-d'Haultfoeuille measures are quite low relative to the estimated effects, suggesting that treatment effect heterogeneity may be a source of concern (see footnote 27). To test the sensitivity of our findings, we perform a battery of additional

Table 3: Prediction 2: Domestic Violence

	Full Sample						Matched Sample
			Type of Violence				
	Any Injury	Number of Injuries (if>0)	Severe Violence	Less Severe Violence	Sexual Violence	Emotional Violence	Any Injury
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post × Non-Muslim	0.019*	0.114*	0.034**	0.029**	0.011	0.008	0.037**
	(0.010)	(0.058)	(0.015)	(0.013)	(0.014)	(0.019)	(0.014)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year of Birth FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	50,006	16,894	50,084	50,080	50,085	50,085	11,581
R sq.	0.046	0.023	0.028	0.073	0.059	0.021	0.047
Mean Dep. Var.	0.119	1.970	0.102	0.322	0.082	0.142	0.131
FWER Adj. P-values	0.112	0.112	0.086	0.086	0.491	0.545	0.032
TEH Robust $\hat{\sigma}$	0.116	0.682	0.154	0.291	0.055	0.049	0.007

NOTES: OLS estimates. Sample of women aged 15 to 49 in 2005, who married between 1975 and 1999. The matched sample is obtained using one-to-one nearest-neighbor matching without replacement to match non-Muslim and Muslim women with the closest propensity score (based on caste, age, wealth, own and spouse's education, and household size). The caliper width equals 0.2 of the standard deviation of the propensity score. Individual controls include indicator variables for religion, year of marriage after 1985, for type of residence (rural or urban), and for belonging to schedule caste, schedule tribe or other backward caste. Standard errors (in parentheses) are clustered at the state level. ***, **, * mean statistical significance at 1, 5 and 10 percent levels. The Romano-Wolf FWER adjusted p-values are based on 500 bootstrap replications. See Table 1 for details on TEH Robust $\hat{\sigma}$.

robustness checks, which we present in Section E in the Appendix.

Prediction 3.   Next, we study the presence of differential effects of the anti-dowry reforms by the level of social stigma against separation. Our model predicts that any impact on women's decision-making power and the occurrence of domestic violence following a decrease in dowry should be stronger when social norms regarding marital dissolution are strict (Prediction 3). While we cannot empirically test that social stigma against separation impacts women's preferences over consumption (though psychological and sociological studies point in this direction; see Section 2), to study Prediction 3, we leverage the spatial variation in the degree of stigmatization of marital dissolution across India. Divorce and separations are more prevalent (and more accepted) in the North-Eastern states and in South India. Moreover, people in urban India, especially younger generations, adhere to less traditional ideas of marriage and are typically more open to marriage dissolution, divorce, and women's autonomy more broadly.

Table 4 reports our estimation results. Each specification includes our baseline difference-in-difference terms, a set of indicators for areas with likely low(er) social stigma against marital dissolution, and their interactions. For brevity, we here focus on binary outcomes for women's decision-making power and domestic violence (results are confirmed when using the full set of outcomes of Tables 2 and 3, and are available upon request). Consistent with our model, we find that the unintended negative effects of the 1985-1986 reforms on women's decision-making power are mitigated in more progressive areas (Columns (1) to (2)). Women exposed to the reforms are 2.9 percentage points less likely to be involved in family decisions in rural areas (the omitted cate-

Table 4: Prediction 3: Differential Effects by Social Stigma

	Any Decision			Any Injury		
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Non-Muslim	-0.029**	-0.037**	-0.029*	0.020*	0.015	0.023*
	(0.014)	(0.016)	(0.015)	(0.011)	(0.013)	(0.014)
Post × Non-Muslim × Urban	0.010*			-0.001		
	(0.005)			(0.011)		
Post × Non-Muslim × East India		0.009			0.010	
		(0.021)			(0.014)	
Post × Non-Muslim × West India		0.012			0.002	
		(0.011)			(0.011)	
Post × Non-Muslim × South India		0.028***			0.010	
		(0.007)			(0.011)	
Post × Non-Muslim × North-East India		0.047***			-0.021**	
		(0.010)			(0.010)	
Post × Non-Muslim × High Divorce Rate			0.007			-0.011
			(0.008)			(0.013)
Obs.	65,105	65,105	65,105	50,006	50,006	50,006
R sq.	0.088	0.088	0.088	0.046	0.046	0.046
Mean Dep. Var.	0.917	0.917	0.917	0.119	0.119	0.119

NOTES: OLS estimates. Sample of women aged 15 to 49 in 2005, who married between 1975 and 1999. Rural is the omitted category in Columns (1) and (4), North India is the omitted category in Columns (2) and (5), areas with low prevalence of divorce (below median) is the omitted category in Columns (3) and (6). Individual controls include indicator variables for religion, year of marriage after 1985, for type of residence (rural or urban), and for belonging to schedule caste, schedule tribe or other backward caste. Standard errors (in parentheses) are clustered at the state level. ***, **, * mean statistical significance at 1, 5 and 10 percent levels.

gory in Column (1)), while for women living in urban areas the estimated effect is not statistically different from zero. The most striking differences in the impact of the reforms on women's decision power, however, are found across regions, with the nation-wide effects presented in Table 2 being driven mostly by North Indian states (which are often viewed as the most conservative and traditional states for gender norms). In this region (the omitted category in Column (2)), women exposed to the reforms are 3.7 percentage points less likely to be involved in household decisions relative to non-exposed women. Note that these spatial differences are present, though less pronounced, for the domestic violence outcomes (Columns (4) to (5)).

To measure the prevalence of divorce and separations at the village level, we compute the share of respondents within a primary sampling unit (which in the NFHS is a village in rural areas or a block in urban areas) who report being divorced, separated, or living apart from their spouse. In high-prevalence areas (i.e., in the top half of the distribution, where marital dissolution may be less stigmatized), the introduction of the Dowry Prohibition Act amendments had a weaker impact on women's involvement in household decisions (the point estimate is -0.021, but not statistically different from zero). This pattern is qualitatively confirmed for the domestic violence outcome, with women experiencing a 1.1 percentage point (9.5 percent) increase in violence in high-prevalence areas and a 2.3 percentage points (19 percent) increase in low-prevalence areas.

Prediction 4. We now turn to Prediction 4, which states that the effect of a change in dowry payments should vary with gains from marriage. Specifically, any impact on women's decision-making power following a decrease in dowry should be weaker when gains from marriage are high; by contrast, the impact on domestic violence should be more pronounced when gains from

Table 5: Prediction 4: Differential Effects by Gains from Marriage

	Any Decision			Any Injury		
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Non-Muslim	-0.079***	-0.028*	-0.031**	0.007	0.015	0.025*
	(0.017)	(0.014)	(0.013)	(0.013)	(0.010)	(0.012)
Post × Non-Muslim × Number of Kids	0.022***			0.005*		
	(0.003)			(0.002)		
Post × Non-Muslim × Completed Fertility		0.008			0.017*	
		(0.007)			(0.009)	
Post × Non-Muslim × First Born Boy			0.015**			-0.003
			(0.006)			(0.008)
Obs.	65,105	65,105	63,139	50,006	50,006	48,445
R sq.	0.094	0.089	0.078	0.046	0.048	0.047
Mean Dep. Var.	0.917	0.917	0.922	0.119	0.119	0.119

NOTES: OLS estimates. Sample of women aged 15 to 49 in 2005, who married between 1975 and 1999. Women with no children are in the omitted category in Columns (1) and (4); women whose ideal number of children is not yet met are in the omitted category in Columns (2) and (5); women with a female first-born child are in the omitted category in Columns (3) and (6). All specifications include individual controls, year of birth fixed effects and state fixed effects. Individual controls include indicator variables for religion, year of marriage after 1985, for type of residence (rural or urban), and for belonging to schedule caste, schedule tribe or other backward caste. Standard errors (in parentheses) are clustered at the state level. ***, **, * mean statistical significance at 1, 5 and 10 percent levels.

marriage are large. As discussed in Section 4.2, we construct proxies for gains from marriage based on a couple's fertility outcomes and preferences.[35]

Table 5 reports estimates of the differential effects by gains from marriage of the anti-dowry reforms on women's decision-making power and domestic violence. In Columns (1) and (4), we measure a couple's marital gains with the number of children they have. The estimated coefficients are consistent with the model predictions. Women who were exposed to the anti-dowry reforms are 7.9 percentage points (8.6 percent) less likely to be involved in financial and health-related decisions if they have no children. These effects, however, are significantly weaker for women with children. In line with our model, the impact on wife-abuse is stronger when children are present, as indicated by the positive coefficients on the interaction terms in Column (4). In essence, exposure to the anti-dowry reforms increased domestic violence for women with and without children. However, the effect is more prominent (and statistically significant only) when children are present.

One might worry that more children do not necessarily yield higher gains. This is especially true if there is a mismatch between realized and desired fertility. One may expect gains from marriage to be the highest when the couple meets their fertility preferences, and the fertility is complete. In Columns (2) and (5), we estimate different effects by a couple's achievement of their desired fertility, which we measure with an indicator variable equal to one if the number of children equals a woman's ideal number of children and her spouse does not want any more (or any less) children. While the estimated coefficient is only significant for the violence outcome, both signs are as expected.

Finally, we use the gender of the first born child as an alternative measure of marital gains.

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[35]We also test Prediction 4 using alternative measures of marital surplus. Similarly-educated or similarly-aged spouses may experience higher gains from marriage; so, we test whether the impact of the amendments are heterogeneous by the absolute value of the spousal gaps in age or schooling. We find the effects of the reforms on women's decision-making power to be statistically significant only for those couples with low gains from marriage (with large spousal gaps in age or education). Results are available on request.

While parental preferences for sons are widespread in India, the sex of the firstborn child is quasi-random (Anukriti et al., 2016). We find that the impact of the policy on women's decision power is mitigated when gains from marriage are high (i.e., when the first born child is male). We do not find any statistically significant difference for domestic violence.

Discussion. Taken together, the results presented so far are mostly consistent with Predictions 1 to 4 of our model. They also imply that the tightening of anti-dowry laws introduced by the Indian government between 1985 and 1986 had some unintended negative consequences for women's welfare. The overall decline in women's involvement in household decisions and the increase in domestic violence following the amendments (and the consequent decreases in dowry payments documented in Section 5.1) indicate that social stigma against separation in India is high, on average (that is, $R_w < 1$). We document substantial variation in the stigmatization and social cost of marital dissolution across regions, which results in markedly differential impacts of the anti-dowry reforms on women's outcomes (Prediction 3). The unintended consequences of the reforms appear to be mitigated in more progressive areas and exacerbated in more conservative regions, suggesting that one-size-fits-all policies may not be optimal, and that the social and cultural context may matter a great deal when designing policies aimed at changing traditional customs (an important point also raised by Rao and Walton (2004), World Bank (2015), and Ashraf et al. (2020)).

Our heterogeneity analysis by gains from marriage hinges on the assumption that any changes in dowry payments did not affect the number of children a couple decides to have. In our theoretical model, this assumption is reflected in gains from marriage being taken as given and not chosen strategically by the agents. While this is a challenging task, we attempt to empirically investigate the validity of this assumption by estimating the impact of the anti-dowry reforms on fertility. In Section 5.5, we compare the fertility preferences and outcomes of treated and untreated women and do not find noteworthy differences. Although these results provide suggestive evidence of the validity of our assumption, given the challenge of accurately measuring marital gains, we wish to interpret our test of Prediction 4 with caution.

As discussed in Section 3.4, the model predictions about how the effects of a change in dowry should vary with women's human capital are ambiguous. Stating it differently, the impact of the amendments could be exacerbated or weakened or unchanged for women with higher human capital relative to women with lower levels of human capital. We estimate alternative specifications that allow for differential effects of the anti-dowry reforms on women's decision-making power and domestic violence by women's completed years of education. We do not detect any significant heterogeneity by human capital, suggesting that increases in women's education may not help curb the negative consequences of reducing dowries for women's post-marital welfare. The full set of results is available on request.

Table 6: Prediction 5: Separations

| | Divorced or Separated | | | | | |
| | Full Sample | | High Stigma | | Low Stigma | |
	(1)	(2)	(3)	(4)	(5)	(6)
Post × Non-Muslim	-0.029**	-0.004	-0.045*	-0.007	-0.017	0.007
	(0.011)	(0.011)	(0.022)	(0.021)	(0.012)	(0.014)
Post × Non-Muslim × Number of Kids		-0.006***		-0.011***		-0.006
		(0.002)		(0.002)		(0.004)
Obs.	69,837	69,837	26,437	26,437	43,400	43,400
R sq.	0.046	0.063	0.062	0.079	0.028	0.045
Mean Dep. Var.	0.134	0.134	0.154	0.154	0.121	0.121

NOTES: OLS estimates. Sample of women aged 15 to 49 in 2005, who married between 1975 and 1999. In Columns (2), the estimation sample excludes women living in urban areas, North-India, or South India; in Columns (3), the estimation sample includes only women living in urban areas in North-India or South India. All specifications include individual controls, year of birth fixed effects and state fixed effects. Individual controls include indicator variables for religion, year of marriage after 1985, for type of residence (rural or urban), and for belonging to schedule caste, schedule tribe or other backward caste. Standard errors (in parentheses) are clustered at the state level. ***, **, * mean statistical significance at 1, 5 and 10 percent levels.

5.3 Prediction 5: Separations

We have documented a surge in domestic violence following the amendments to the Dowry Prohibition Act. The fifth prediction to emerge from our model states that the effect on the probability of separation should be the reverse. This prediction follows from the fact that, in equilibrium, only dissatisfied husbands with a high cost of violence choose to separate. So, we expect the decrease in dowries induced by the amendments to decrease the probability of separation.

The estimated effects reported in Table 6 are consistent with this prediction. Odd numbered columns report estimates of equation (7) featuring a binary indicator for a woman being divorced, separated, or living apart from her husband as the dependent variable. The estimation sample varies across columns. In Column (1), we consider the full sample of ever-married women aged 15 to 49, who got married between 1975 and 1999, and find a 2.9 percentage points decrease in the probability of separation following the anti-dowry amendments. In Column (3), we restrict the estimation sample to rural areas outside of the North-East and South India regions (hence more traditional and less open to divorce and separation), while in Columns (5), we only consider women who live in urban areas, North-East India or South India (typically more progressive and more acceptive of marital dissolution). A comparison of the estimated coefficients across columns indicates that the decrease in separation induced by the reforms is primarily driven by more conservative areas, where social stigma against marital dissolution is high. In even numbered columns, we report the estimated differential effects by gains from marriage. Consistent with our model, we find evidence of a more pronounced decline in the probability of separation following the 1985-1986 amendments for couples with high marital gains.

5.4 Prediction 6: Women's Human Capital

We now turn to our last prediction, which states that parental investment in the human capital of future brides should increase following a tightening of anti-dowry laws. The NFHS does not

Figure 6: Prediction 6: Women's Human Capital By Cohort

(A) Education
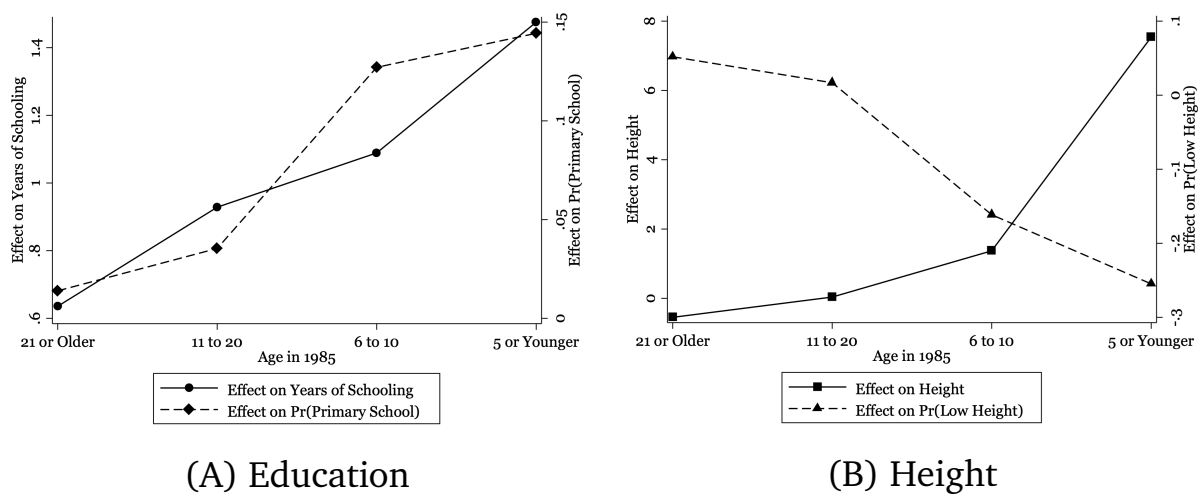
(B) Height

NOTES: This figure plots the estimated effects of the 1985-1986 amendments to the Dowry Prohibition Act on education outcomes (Panel A) and height (Panel B) by women's age in 1985.

include information on past expenditure or saving patterns of a woman's natal family. So, we rely on women's outcomes in adulthood to inform us of any changes in parental investment induced by the reforms.

We focus on two sets of human capital outcomes: outcomes related to education, such as years of schooling and the probability of having completed primary school; and long-run health outcomes, such as height and the probability of being in the bottom half of the stature distribution in our sample. Naturally, parents' ability to shape their daughters' human capital in response to the 1985-1986 amendments would be limited if their daughters were too old at the time of the reforms. Height, for instance, is mostly determined by early childhood inputs. So, any response from parents whose daughters were, e.g., five or older in 1985, may not be reflected in their daughter's outcomes in adulthood. Similarly, the effect of the amendments on primary school completion may be strongest for those women who were not too old to attend primary school in 1985. We test these hypotheses by estimating equation (7) using measures of women's education and height as dependent variables over four subsamples based on women's age in 1985.[36]

We summarize the results of our analysis in Figure 6 (the corresponding coefficients and standard errors are reported Tables A11 and A12 in the Appendix). Panel A shows the estimated effects of the reforms on education outcomes (years of schooling on the left-hand side axis and a binary indicator for primary school completing on the right-hand side); Panel B plots the estimated effects on long-run health (height in centimeters on the left axis and a binary indicator for below-median height on the right axis). The horizontal axis denotes each cohort's age as of 1985. The estimated coefficients are consistent with our expectations. If possible (that is, for girls who were not too old at the time of the amendments), parents successfully improved their daughters' human capital outcomes: the younger the girls at the time of the reforms, the more pronounced the effects. For the education outcomes, the gradient is positive (with younger cohort experiencing the largest increases), and the estimated effects are statistically different from zero for women who were

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[36]Note that any change in women's human capital outcomes may also reflect a change in parental beliefs about their marriage market return and in parental preference for girls' human capital. Given the data at hand, however, it is not possible to distinguish one channel from the other.

children or teenagers at the time of the reforms. For height, the gradient is also positive. As expected, however, we do not detect any statistically significant differences for those cohorts who were six or older at the time of the reform.

5.5 Alternative Channels

In the previous sections, we established that the 1985-1986 amendments to the Dowry Prohibition Act were successful at reducing dowry payments. We also tested the six predictions that emerge from our theoretical model and find that they are consistent with the data. Nonetheless, there may be alternative explanations of our findings that are outside of our model but may be critical to fully understand the connections between dowries, domestic violence, women's decision-making power, and the occurrence of separation. For instance, marital sorting and matching may change in response to a drop in dowries. Fertility outcomes and preferences may also be impacted by the reforms. Finally, the validity of our domestic violence findings may be jeopardized if the reforms changed women's propensity to report domestic abuse. In Section F in the Appendix, we assess the scope of these alternative mechanisms, but find them not to be critical for out results.

6 Conclusion

India ranks 112th out of 153 countries based on the 2020 Gender Gap Index.[37] Gender inequality in India is a complex and multifaceted phenomenon, which permeates the most private spheres of a woman's life. Beyond their precarious economic condition and limited political representation (Chattopadhyay and Duflo, 2004; Iyer et al., 2012), Indian women face significant discrimination within the household walls. Sex-selective abortion, infanticide, and underinvestment in girls related to parental preferences for sons are well-documented phenomena. The prospect of paying a dowry is commonly cited as a critical factor in parents' desire to have sons rather than daughters (Jayachandran, 2015). In their marital families, Indian women are often victims of domestic violence and their decision-making power is limited.

We provide a framework to understand the complex connections between dowry payments, parental investment in girls, women's decision-making power in their marital families, the occurrence of domestic violence, and the likelihood of separation. We derive predictions on how changes in dowries can impact women's well-being in their marital families. To test these predictions empirically, we exploit legal reforms to the Indian anti-dowry law that successfully reduced dowry payments. Consistent with our model, we find that women's decision-making power decreases and domestic violence increases following a reduction in dowries. The likelihood of separation also decreases, indicating that women are unable or unwilling to exit abusive marriages. To compensate for lower dowries in the marriage market, parents increase their investment in the human capital of their daughters.

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[37]The Gender Gap Index is compiled by the World Economic Forum to track progress on relative gaps between women and men on health, education, economy, and politics around the world.

For women, the reputation cost of separating from their husbands is prohibitive, which leaves them little to no escape from unsatisfying or abusive marriages. We incorporate this fact in our model and argue that the extent of women's psychological distress after separation may be critical to predict how a change in dowry may impact women's post-marital outcomes. In line with this model insight (which admittedly remains untested), we unveil substantial heterogeneity by social stigma against separation in the impact of the anti-dowry reforms on women's status in their marital families, suggesting that one-size-fits-all policies may not be optimal and that the local social and cultural context may matter a great deal when designing policies aimed at changing traditional customs. We hope future work will further investigate the interactions between such policies and local gender norms, and directly study their psychological and emotional effects. Doing so will require collecting detailed data on psychological and emotional well-being, a task that is especially challenging in developing countries where mental illness is frequently stigmatized (Ridley et al., 2020; Baranov et al., 2020; Angelucci and Bennett, 2021).

While previous work has stressed the positive impact of anti-dowry policies on son-preference and sex-ratios, our analysis unveils some unintended consequence of such policies. Understanding the interlinkages between dowry payments and a woman's well-being at different stages of her life is critical to devise policies to successfully improve the status of Indian women. As one-sixth of the world female population live in India, doing so would represent a significant step toward eliminating gender inequality globally — a United Nations Sustainable Development Goal to be achieved by 2030.

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