Conflict and Gender Subjugation: The Impact of Religious Violence on Women's Age at Marriage

Sisir Debnath* Sourabh B. Paul† Asad Tariq‡

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Abstract

This paper studies how religious riots affect age at marriage in India. We build a one sided matching model where we assume that the agency to make marriage decisions belongs to the girl's father. Riots are positively related to the cost of keeping the daughter unmarried and negatively related to the waiting time for a father to accept a marriage proposal for his daughter, i.e., the age at marriage of his daughter. To test our hypothesis empirically, we use five rounds of National Family Health Survey data, and an extended version of Varshney-Wilkinson data set on riots. We construct a pooled cross section data from 1980 to 2000. Since riots are endogenous, we use an instrumental variable approach to isolate the causal impact of riots. Our findings suggest that riots have a negative impact on age at marriage, specifically for women. The incidence of a riot in a state, in the year prior to marriage, decreases the age at marriage by 1.3 years for women. It also increases their probability of getting married before 18 years of age by more than 13 percent. This in turn results in early age mothers, and also affects child mortality. We conduct a robustness check by randomizing number of riots across states and years. We find coefficients close to zero for the robustness check. Our study motivates the need to provide rehabilitation measures in the form of safety infrastructure, income support and health services in riot affected areas.

Keywords: Riots, Age at Marriage, Early age marriage, India

JEL Classification: D12, O12, Z12

*Indian Institute of Technology Delhi. Email: sisirdebnath@iitd.ac.in

†Indian Institute of Technology Delhi. Email: sbpaul@hss.iitd.ac.in

‡Indian Institute of Technology Delhi. Email: asad.tariq@hss.iitd.ac.in

1 Introduction

Conflict based on religion or race in the Indian subcontinent has scarred the psyche of the population and may have extraordinary physical and mental consequences. Women in conflict prone areas might face dual burden of violence: both within and outside their domestic boundaries. The partition of Pakistan in 1947 and Bangladesh in 1971 have been two significant events that have had significant adverse impacts on women. There are studies which document violence against women and their abduction during Pakistan's partition in 1947 (Menon & Bhasin, 1993). Saikia (2011) investigates the rapes and gendered torture which took place on a mass scale during conflicts leading to Bangladesh's partition. In the recent past, conflict in Myanmar has led to human rights violation in the form of human trafficking, hard labour and social inequality, which has disproportionately affected Muslim women and children (Abdelkader, 2014). Within India, localised religious conflict, which materializes as riots, have raised significant security concerns in violence prone areas. Mehta and Shah (1992) report several cases where women were scared to step out of their houses, made to drop out of school and displaced during and after the *Rath Yatra* riots of 1990 in Baroda. Engineer (2002) also documents how sexual violence was used a tool for humiliation against Muslim women during the Gujarat riots in 2002.

The behaviour of households in violence prone areas might be different from those in non violence prone areas, specially in the context of their daughters. Women safety and security is a serious concern in India in general. These concerns result in adverse impact on women's human capital formation. For example, women in Delhi choose worse colleges because the travel route is perceived safer by them (Borker, 2021). Muralidharan and Prakash (2017) illustrate how overcoming distance to school is a significant challenge for women, because of potential threats of sexual violence and eve teasing. Sarkar (2021) finds that in neighbourhoods where harassment of unmarried girls is common, parents tend to marry off their daughters at an earlier age. In addition to these general security concerns, in presence of sporadic and frequent religious violence, there is an increased need for maintaining the safety of women. Even if the households are not direct victims of violence, there is a sense of uncertainty and psychological compulsion for the parents to provide safety to their teenage daughters. In such an environment, there is higher likelihood that the girl child will be married off at an earlier age. In the context of India, daughters are often financially dependent on their parents prior to marriage, and the household head, usually the girl's father, bears the responsibility of her physical safety and financial needs. In violence prone areas, there might be an incentive to marry off the daughter to transfer these responsibilities from her father to her husband.

In this paper, we study the effect of riots on women's age at marriage in India, which in turn affects the prevalence of child marriage, mother's age at first birth and child mortality. If women are more vulnerable to sexual violence in a riot prone area, then they might be married off earlier, since marriage in the context of India is a means of migration to safety for women. It is also a transfer of responsibility of the safety of a woman from her father to her husband. However, this has not been empirically explored in economic literature till now.

Violence which leads to displacement acts as a mechanism to decrease the marrying age of women,

due to the presence of a male spouse, married women and their families might feel less threatened (Lu, Siddiqui, & Bharadwaj, 2021). Moreover, marriage is a means of migration to safety for women. Lu et al. (2021) infer that displaced families may also marry off their young daughters to ease their financial burdens. There is anecdotal evidence that women bear a larger brunt of violence, during and after the riots (Mander, 2019; Campion, 2015; Dhillon, 2022). Riots also lead to displacement in the form of an increase in segregated neighbourhoods, where people tend to migrate from religiously heterogeneous neighbourhoods to more homogeneous neighbourhoods (Kalra, 2021). Displacement in developing countries is usually correlated with a negative income shock. Natural disasters such as floods and earthquakes which result in displacement significantly decrease the age at marriage (Das & Dasgupta, 2020; Khanna & Kochhar, 2020). This is in part driven by the dowry payment mechanism, since it is often used to smoothen the consumption during a negative income shock. Lu et al. (2021) shows that displacement and violence at the time of India's partition, specifically in Punjab, decreased the age at marriage for adolescent women. In the context of Rwanda there is some contradictory evidence - conflict is positively associated with age at marriage, however this was due to the fact that conflict skewed the male-female ratio so much that the marriage market was disrupted (Jayaraman, Gebreselassie, & Chandrasekhar, 2009).

We use five rounds of the National Family Health Survey (NFHS) to divide women into cohorts by their year of marriage. The extended Varshney-Wilkinson data set is used to identify the location and number of riots in a particular year. Establishing causality between conflict and age at marriage has been a major methodological challenge of several studies (Jayaraman et al., 2009; La Mattina, 2017; Lu et al., 2021) because such conflicts are usually endogenous. To deal with this, we resort to an instrumental variable constructed by Iyer and Shrivastava (2018) - incidence of a major Hindu festival on a Friday. This also gives us the ability to calculate the time varying effect of riots.

Our paper contributes to multiple strands of literature. First, this paper contributes to the economics of religious conflict. Mitra and Ray (2014) theorise that an increase in Muslim incomes increases the competition for scarce market resources, leading to enmity and higher probability of a riot. Field et al. (2008) interrogate the association between non transferable tenancy rights in Ahemdabad and the Gujarat riots of 2002. However, there is limited literature on the aftereffects of such religious violence in India. Kalra (2021) finds links between *Rath Yatra* riots, neighbourhood segregation and education outcomes for Muslims. Iyer and Shrivastava (2018) capture the effect of riots on electoral vote shares and politics. We borrow Iyer and Shrivastava (2018)'s instrument for our analysis and look at the effects of riot on age at marriage in India.

Second, our paper also contributes to literature on age at marriage, specifically how age at marriage is affected by events that lead to displacement and negative income shocks. Das and Dasgupta (2020) look at the effect of Gujarat earthquake of 2001 on early age marriages. Similarly, Khanna and Kochhar (2020) capture the impact of Kosi river floods in Bihar on early age marriages. Jayaraman et al. (2009) investigate the association between Rwandan conflict of 1994 and age at marriage. However, conflict as a cause of early age marriages is sparsely discussed in the context of India. Lu et al. (2021) find evidence of early age marriages due to partition in Pakistan's Punjab. But the partition was a one time event

which lead to inter country migration. Our paper uses localised religious conflict instead, which are a more frequent occurrence and looks at the time varying causal effect over a period of two decades.

Third, we also look at the long term consequences of conflict, by identifying age at marriage as a channel through which it affects other outcomes such as early age pregnancy and child mortality, which further restrict human capital formation.

2 Background: Riots in India

Religious riots have been a frequent occurrence in post independence India. The riots which followed independence and partition of India are estimated to have a death toll varying between 200,000 to 1 million (Pandey, 2001). The year 1950, in which India adopted its written constitution, saw around 50 riots across the country (Varshney & Wilkinson, 2006). The reason for occurrence of riots have been several. The political character of the riots, which were permitted to take place in order to polarise the majority vote share, is a feature of the Hindu-Muslim riots in India that is well-documented in the literature (Iyer & Shrivastava, 2018). There have also been instances of mass riots across districts and even states during a short span of time, triggered by some event. One such example is the *Rath Yatra* in 1990, which started off as a religious and political campaign by Hindu Nationalists to construct a temple in place of *Babri Masjid*, a 16th century mosque in Ayodhya, Uttar Pradesh, resulted in multiple riots across various districts and states (Engineer, 1991).

These riots take a toll on the local economy and severely affects the already marginalised sections of the society. Engineer (1993) roughly estimates an economic loss of over Rs.10,000 crores due to the Bombay riots in January 1993. The most common aftereffect of such communal violence is the emergence of segregated neighbourhoods where the minority community relocates due to security concerns or because of rehabilitation measures set up by the governments, though the severity, duration, and occurrence of violence differ significantly in each incident (Field et al., 2008; Kalra, 2021). There is skewness across religion when it comes to bearing the major brunt of riots. Out of 526 Hindu-Muslim riots that occurred from 1985-1987, Muslims accounted for 60 percent of the 443 deaths, 45 percent of the 2667 injuries and 73 percent of property damage. (Wilkinson, 2006).

There is anecdotal evidence that shows competition in the markets acts as a catalyst for riots. In 1961, economic competition between two industrial households in Jabalpur, Madhya Pradesh, manifested as religious hostility between Hindus and Muslims, which sparked riots in the city. Later, riots followed a similar pattern, with the primary motivation being the appropriation of economic surpluses, but the immediate cause was religious, including the vandalism of houses of worship, religious processions, reports of cow slaughter, etc. (Graff & Galonnier, 2013). Similar acts of violence were also reported in Varanasi (1991), Meerut (1984), and Bhiwandi (1984). Mitra and Ray (2014) find a positive correlation between incidence of riots and income of Muslims. Using a theoretical approach, the authors conclude that a positive correlation exists because an increase in Muslim incomes acts as an incentive and catalyst for Hindus to suppress their competition - *"There is more to loot, greater urgency to exclude, or more reasons to hate."*

3 Theoretical Model

We model the marriage age decision by using a search theoretic model similar to McCall (1970). This is a one sided matching model where we assume that the agency to make marriage decisions belongs to the girl's father. We consider a girl's father who is searching for a groom. The father draws an offer of quality θ in each period from the groom distribution $F(\hat{\theta}) = Prob\{\theta \leq \hat{\theta}\}$ with $F(0) = 0$ and $F(B) = 1$ for $B < \infty$. The father can reject the offer, in which case he receives time invariant dis-utility of $-c$. He then draws another offer from F in the next time period. $-c$ is time invariant depending on factors such as the search cost, security cost, etc. If the father accepts the offer to marry his daughter to groom of quality θ, he receives a utility of $u(\theta)$ per period forever, with $u'(\theta) > 0$ and $u''(\theta) < 0$. We ignore marriage quits, i.e., divorces.

The father's utility in period t is defined as y_t, where $y_t = -c$ if his daughter is unmarried and $y_t = u(\theta)$ if the father accepts to marry his daughter to groom of quality θ. He maximizes the expectation of $\sum_{t=0}^{\infty} \beta^t y_t$ where $0 < \beta < 1$ is a discount factor.

$v(\theta)$ is defined as the expected value of $\sum_{t=0}^{\infty} \beta^t y_t$ for a father who has a groom offer of quality θ, and he decides either to accept or reject it.

$$v(\theta) = \max_{\{accept, reject\}} \left\{ \frac{u(\theta)}{1-\beta}, -c + \beta \int_0^B v(\theta') dF(\theta') \right\} \tag{1}$$

The solution for equation (1) is of the form:

$$v(\theta) = \begin{cases} \dfrac{u(\overline{\theta})}{1-\beta} = -c + \beta \displaystyle\int_0^B v(\theta') dF(\theta'), & \text{if } \theta \leq \overline{\theta} \\ \dfrac{u(\theta)}{1-\beta}, & \text{if } \theta \geq \overline{\theta} \end{cases} \tag{2}$$

Using equation (2) the functional equation (1) can be converted in the value function $v(\theta)$ into an ordinary equation in the reservation quality $\overline{\theta}$. Evaluating $v(\overline{\theta})$ and using equation (2), we have:

$$u(\overline{\theta}) + c = \frac{\beta}{1-\beta} \int_{\overline{\theta}}^B [u(\theta') - u(\overline{\theta})] dF(\theta') \tag{3}$$

Left hand side of equation (3) is the utility foregone when the father rejects an offer of $\overline{\theta}$, deciding to search for a groom one more time. Right hand side is the expected benefit the father will derive from searching for a groom one more time in terms of the expected present value associated with drawing $\theta' > \overline{\theta}$. Equation (3) implies the father sets $\overline{\theta}$ such that the utility foregone by searching for the groom one more time equals the utility gained.

3.1 Waiting time

Let N be a random variable defined as the duration of time until an offer is accepted by the girl's father. $N = 1$ if the first marriage offer is accepted. Let $\lambda = \int_0^{\overline{\theta}} dF(\theta')$ be the probability that a marriage offer

is rejected. Then we have:

$$\begin{aligned} Prob\{N=1\} &= 1-\lambda \\ Prob\{N=2\} &= (1-\lambda)\lambda \\ &\vdots \\ Prob\{N=j\} &= (1-\lambda)\lambda^{j-1} \end{aligned}$$

The waiting time is geometrically distributed. The mean wait time $\overline{N}$:

$$\begin{aligned} \overline{N} = \sum_{j=1}^{\infty} j.Prob\{N=j\} = \sum_{j=1}^{\infty} j.(1-\lambda)\lambda^{j-1} \\ &= (1-\lambda)\sum_{j=1}^{\infty}\sum_{k=1}^{j}\lambda^{j-1} \\ &= (1-\lambda)\sum_{k=0}^{\infty}\sum_{j=1}^{\infty}\lambda^{j-1+k} \\ &= (1-\lambda)\sum_{k=0}^{\infty}\lambda^{k}(1-\lambda)^{-1} \\ &= \frac{1}{1-\lambda} \end{aligned}$$

3.2 Age of marriage in riot prone areas

In riot prone areas, the cost of keeping the daughter safe in the absence of a spouse is going to be higher than non riot prone areas. This would result in a higher disutility to the father if he decides to reject a marriage offer. Therefore, c is going to be higher in riot prone areas.

$$\text{Mean wait time is given by } \overline{N} = \frac{1}{1-\lambda}$$

$$\text{where } \lambda = \int_0^{\overline{\theta}} dF(\theta')$$

$$\text{Therefore, } \frac{d\lambda}{d\overline{\theta}} > 0$$

From proposition 1 (see Appendix), we know $\overline{\theta}$ is a negative function of c, hence $\frac{d\lambda}{dc} < 0 \implies \frac{d\overline{N}}{dc} < 0$

4 Data

We construct a pooled cross section data set from five rounds of National Family Health Survey conducted in 1992-93, 1998-99, 2004-05, 2015-16 and 2019-21. We specifically look at married men and women - their age at marriage and year of marriage. We restrict our sample for analysis to the men and women who got married between 1980 to 2000. For riots, we use the extended version of Varshney-Wilkinson dataset by Iyer and Shrivastava (2018) which gives us the number of riots in each state till 2000. Merging these data sets gives us more than 450,000 women spread across two decades (1980 to 2000) and 16 states. The summary statistics are reported in Table 1. Column (1) reports the means if there were no riot in

the year prior to the year of marriage, and Column (2) reports the means when there was atleast one riot in the year prior to the year of marriage. The third column denotes the differences of means through a t-test. We also plot a map in Figure 1 of total number of riots occurred across states between the 1980 to 2000. As shown in the map, there is geographical variation in the number of riots occurring during this time period across various states. Gujarat, Uttar Pradesh and Maharashtra saw the highest number of riots during this period.

Table 1: Summary Statistics

	(1)	(2)	(3)
	Riot did not occur	Riot occurred	Difference (2)-(1)
Age at Marriage (Women)	17.39	16.75	-0.64***
Age at Marriage (Men)	23.47	22.82	-0.64***
Child Marriage (Women)	0.54	0.61	0.07***
Child Marriage (Men)	0.04	0.05	0.01***
Mother's age at First Birth	19.71	19.28	-0.43***
First born child is alive	0.96	0.96	-0.00***
No. of Deceased Children	0.23	0.27	0.04***
Rural	0.73	0.72	-0.01***
Hindu	0.77	0.83	0.06***
Muslim	0.13	0.13	0.00
Scheduled Caste	0.20	0.19	-0.01***
Scheduled Tribe	0.11	0.09	-0.02***
OBC	0.35	0.41	0.06***
Observations	190885	290932	481817

Notes: The first column reports the means if there were no riot in the year prior to the year of marriage, and the second column reports the means when there was atleast one riot in the year prior to the year of marriage. The third column denotes the differences of means through a t-test. Child Marriage is defined as marriage before 18 years of age.

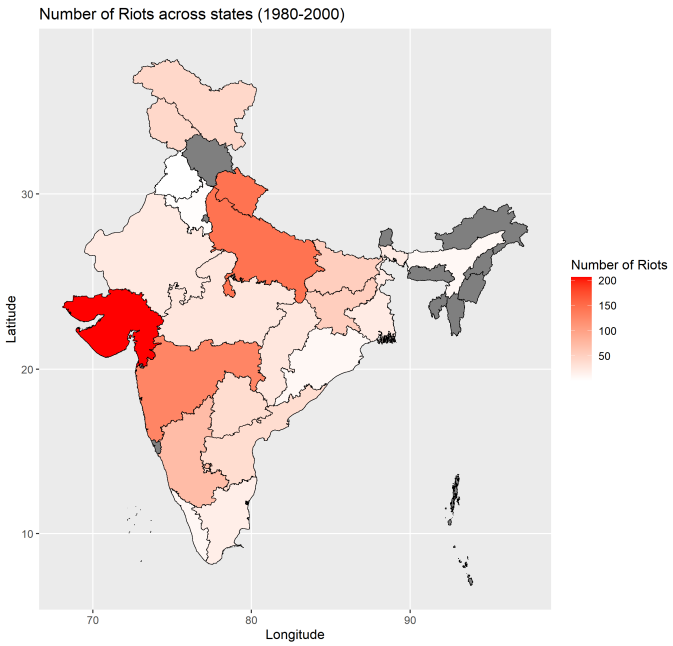

Figure 1: Map of India

5 Methodology

We use the following empirical specification to estimate the effect of riots on age at marriage:

$$\begin{aligned} MarriageAge_{ist} = \beta_0 + \beta_1 \widehat{Riots}_{st-1} + \beta_2 HouseholdControls_{ist} \\ + State_s + Rel_i + Caste_i + InterviewYear_i + \upsilon_{ist} \end{aligned} \tag{4}$$

Where age at marriage is the age at which an individual i in state s and time t got married. Through this specification we capture the effects of riots in the previous year on age at marriage.

But riots can be endogenous, and other unobservables variables might affect our outcome of interest. There is anecdotal evidence that riots are premeditated in certain areas to curb competition in the market. In the context of Bhiwandi riots of 1984, although the *Shivaji Jayanti* procession served as the first provocation, but commercial rivalry was the main cause (Rajgopal, 1987). The *bloody trail* of *Rath Yatra* has been discussed by Engineer (1991), where he finds that the districts from which the *Rath Yatra* went through, saw a larger number of riots. The same has been empirically proved by (Kalra, 2021). These districts were not randomly selected and had political motives behind their selection. Moreover, there are several unobservables that can affect our outcome of interest - age at marriage. Areas with lower education can affect both age at marriage and probability of riots. Similarly, poorly administered areas are more prone to riots as well as rapes, eve teasing and illegal practices such as child marriage.

To isolate the causal effect of riots on our variable of interest, we use an instrumental variable. The instrument used for identification of the causal impact of riots - incidence of a major Hindu festival on a Friday is constructed in the same manner as Iyer and Shrivastava (2018). The instrument is correlated with riots because the incidence of a major Hindu festival on Friday, which is a religious day for Muslims,

causes a contest for public spaces, leading to enmity between the two groups. The instrument takes value 1 when in a given year and state, a major Hindu festival falls on a Friday, 0 otherwise. The first stage regression equation is as follows:

$$\begin{aligned} Riots_{st} = \alpha_0 + \alpha_1 Festival_{st} + \alpha_2 HouseholdControls_{it} \\ + State_s + Rel_i + Caste_i + InterviewYear_i + \epsilon_{ist} \end{aligned} \tag{5}$$

$Riot_{st}$ is a binary variable that takes value one if there is at least one riot in state s at time t. Alternatively, we have also used the number of riots in state s at time t. $Festival_{st}$ is the occurrence of a major Hindu festival on Friday in state s at time t. It takes value one if a major Hindu festival in a state, in a given year, fell on a Friday and zero otherwise. The major Hindu festivals across states are reported in Table 2. We control for household level characteristics such as toilet facility, type of residence (rural or urban), electricity and number of household members. We include state, religion, caste and year of interview fixed effects.

Table 2: List of major festivals across states (Source: Iyer and Shrivastava (2018))

States	Festival 1	Festival 2	Festival 3	Festival 4	Festival 5
Andhra Pradesh	Ramnavami	Durga ashtami	Navami	Dushehra	Diwali
Assam	Janmashtami	Durga ashtami	Navami	Dushehra	Diwali
Bihar	Holi	Ramnavami	Navami	Dushehra	Diwali
Gujarat	Holi	Ramnavami	Navami	Dushehra	Diwali
Haryana	Shivratri	Holi	Janmashtami	Dushehra	Diwali
Jammu and Kashmir	Shivratri	Ramnavami	Janmashtami	Dushehra	Diwali
Karnataka	Shivratri	Ganesh Chaturthi	Navami	Dushehra	Diwali
Kerala	Shivratri	Janmashtami	Navami	Dushehra	Diwali
Madhya Pradesh	Holi	Ramnavami	Janmashtami	Dushehra	Diwali
Maharashtra	Ramnavami	Ganesh Chaturthi	Navami	Dushehra	Diwali
Orissa	Holi	Durga ashtami	Navami	Dushehra	Diwali
Punjab	Holi	Ramnavami	Janmashtami	Dushehra	Diwali
Rajasthan	Holi	Ramnavami	Janmashtami	Dushehra	Diwali
Tamil Nadu	Janmashtami	Ganesh Chaturthi	Navami	Dushehra	Diwali
Uttar Pradesh	Ramnavami	Janmashtami	Navami	Dushehra	Diwali
West Bengal	Holi	Durga ashtami	Navami	Dushehra	Diwali

Notes: $Festival_{st}$ takes value one if in state s and year t, any one of the major Hindu festivals for state s mentioned in the above table falls on a Friday, zero otherwise.

The instrument - incidence of a major Hindu Festival on a Friday is an exogenously decided event based on the lunar cycle. However, the exclusion restriction might be violated in two scenarios: Firstly, the instrumental variable varies across most states, but for some neighbouring states, the major Hindu festivals remain the same. This might result in incidence of riots in one state affecting age at marriage in the other. We plan to introduce a decay function which will be inversely proportional to the distance

of the place of riot to overcome this issue. It is still a work in progress. Secondly, the incidence of a Hindu festival on Friday might result in small non violent verbal conflicts and tensions at the local level. Even if riots are not triggered, but still due to such tensions it is possible that women are married off at a younger age in anticipation and fear of riots happening. However, such non violent conflicts need to be widespread and consistent across years to have a significant bias on our estimates. There is no report or study which provides evidence for this. Therefore, we assume that such non violent tensions, if exist, are rare and do not bias our estimates significantly.

6 Results

Table 3 gives the OLS correlation between number of riots and age at marriage. Estimates in Column (1) show correlation between number of riots and age at marriage, without any fixed effects or controls. In column (2) we add state and year of interview fixed effects. The final regression in column 3 controlled for fixed effects and all variables as specified in equation (5). There is a negative correlation between number of riots occurring in a state s at time $t-1$ and age of marriage at time t as shown in Table 3. An additional riot in the state is correlated with 0.04 years of decrease in age of marriage for women.

Table 3: OLS estimates - Correlation between riots and age at marriage (Women)

	(1)	(2)	(3)
No. of Riots	-0.049*	-0.039***	-0.040***
	(0.023)	(0.011)	(0.011)
Observations	481,817	481,817	476,318
R-squared	0.004	0.088	0.139
State FE	No	Yes	Yes
Time FE	No	Yes	Yes
Controls	No	No	Yes

Notes: Standard errors are robust and clustered at the state level. *** p<0.01, ** p<0.05, * p<0.1

But this is not a causal estimate - states which are more prone to riots might affect age at marriage through other channels: lack of education, poor administration, other crimes, etc. To isolate the causal effect of riots, we use an instrument: incidence of a major Hindu festival on Friday. The first stage results from equation (4) is reported in the Table 4. Number of riots and Riot as a dummy variable, both are strongly correlated with the festival instrument. The F-statistic is just below the usual cut off score of 10. Our instrument satisfies the inclusion criterion to a satisfactory extent.

Table 4: First stage IV results

	(1)	(2)
	No. of Riots	Riot Dummy
Festival	1.773***	0.168***
	(0.591)	(0.056)
Observations	476,318	476,318
F-statistic	8.988	9.006

Notes: Standard errors are robust and clustered at the state level. Both models include district fixed effects, time fixed effects and controls. *** p<0.01, ** p<0.05, * p<0.1

6.1 The effect of riots on age at marriage

We first look at the marginal effect of an additional riot in time $t-1$ on age of marriage for an individual woman in state s at time t. Estimates in Table 5 shows that the age of marriage for women decreases significantly by 0.125 years or almost 1.5 months. Alternatively, if we define riot as a binary variable - takes value 1 if at least one riot happened in a state s at time $t-1$, 0 otherwise, we find that a riot happening in time period $t-1$ decreases the age of marriage significantly by 1.31 years in time period t.

Table 5: The effect of riots on age at marriage (Women)

	(1)	(2)	(3)	(4)
No. of Riots	-0.122***	-0.125***		
	(0.039)	(0.040)		
Riot Dummy			-1.287**	-1.312**
			(0.556)	(0.562)
Observations	481,817	476,318	481,817	476,318
R-squared	0.079	0.129	0.068	0.119
Controls	No	Yes	No	Yes

Notes: Standard errors are robust and clustered at the state level. All models include district fixed effects and time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

In comparison, when we run the same model on our sample of males, we find much lower estimates for the effect of riots on age at marriage. The estimates reported in Table 6 show that the marginal effect of an additional riot on age at marriage for men is -0.053 years whereas the effect for incidence of a riot is -0.67 years.

Table 6: The effect of riots on age at marriage (Men)

	(1)	(2)	(3)	(4)
No. of Riots	-0.055**	-0.053**		
	(0.025)	(0.024)		
Riot Dummy			-0.684*	-0.666*
			(0.373)	(0.364)
Observations	179,716	177,397	179,716	177,397
R-squared	0.094	0.118	0.093	0.117
Controls	No	Yes	No	Yes

Robust standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Notes: Standard errors are robust and clustered at the state level. All models include district fixed effects and time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

6.2 Effect of riots on child marriage

Since the age of marriage has decreased, the probability of child marriage might rise as well. We construct a new dependent variable $ChildMar_{ist}$, which takes value 1 if women i in state s at time t got married below 18 years of age, 0 otherwise. More than 58 percent of married women underwent child marriage. Table 7 reports the estimates. An additional riot increased the probability of child marriage by 1.2 percent whereas the incidence of atleast one riot increased the probability of child marriage by 13.4 percent.

Table 7: The effect of riots on child marriage (less than 18 years)

	(1)	(2)	(3)	(4)
No. of Riots	0.012***	0.013***		
	(0.004)	(0.004)		
Riot Dummy			0.131**	0.134**
			(0.064)	(0.064)
Observations	481,817	476,318	481,817	476,318
R-squared	0.060	0.098	0.053	0.090
Controls	No	Yes	No	Yes

Notes: 58.5 percent of total married women underwent child marriage. Standard errors are robust and clustered at the state level. All models include district fixed effects and time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

6.3 Effect of riots on mother's age at first birth

We have established that riots cause early marriages among women in India. Early marriage could also result in relatively younger mothers. To test this hypothesis we construct a variable - age at first birth by adding age at marriage and number of months between marriage and first birth. The estimates are reported in Table 8. The age at first birth decreases significantly by almost a similar magnitude - an additional riot in state s at time $t-1$ decreases the age at first birth by 0.13 years for those women who got married in time t. If we take riot as a binary variable, the age at first birth decreases by 1.33 years.

Table 8: The effect of riots on mother's age at first birth

	(1)	(2)	(3)	(4)
No. of Riots	-0.127***	-0.131***		
	(0.036)	(0.037)		
Riot Dummy			-1.287**	-1.328***
			(0.502)	(0.511)
Observations	406,836	401,933	406,836	401,933
R-squared	0.025	0.058	0.018	0.051
Controls	No	Yes	No	Yes

Notes: Standard errors are robust and clustered at the state level. All models include district fixed effects and time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

6.4 Effect of riots on child mortality

Children born to relatively younger mothers in the aftermath of riots might not get the necessary care and access to health services such as hospital delivery, vaccinations, etc. This leads to a higher probability of the child dying. NFHS questionnaire asked mothers whether their first born child is alive, 3.95 percent (18,087) mothers replied in negative. We construct a variable $ChildAlive_{ist}$ which takes value 1 if the first child born to mother i in state s who got married at time t is alive, 0 otherwise. Estimates reported in Table 9 show that an additional riot in the year prior to mother's marriage, decreases the probability of the first child surviving by 0.2 percent, whereas the incidence of atleast one riot decreases the probability by 2.1 percent.

Table 9: The effect of riots on first child's mortality

	(1)	(2)	(3)	(4)
No. of Riots	-0.002***	-0.002***		
	(0.001)	(0.001)		
Riot Dummy			-0.022***	-0.021***
			(0.007)	(0.006)
Observations	457,735	452,520	457,735	452,520
R-squared	0.002	0.008	0.002	0.008
Controls	No	Yes	No	Yes

Notes: 3.95 percent mothers reported that their first born child has deceased. Standard errors are robust and clustered at the state level. All models include district fixed effects and time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

Riots prior to the year of marriage can not only affect the mortality of first child, but also of subsequent children born. We create a new variable - the difference between total children born and total children alive. For 81.4 percent of our sample this difference is zero. However, 89,495 mothers do report at least one deceased child. Estimates in Table 10 show that an additional riot increases the number of deceased children by 0.013 whereas the incidence of a riot increases the number of deceased children by 0.134, in the presence of controls.

Table 10: The effect of riots on total deceased children

	(1)	(2)	(3)	(4)
No. of Riots	0.013***	0.013***		
	(0.004)	(0.004)		
Riot Dummy			0.136**	0.134**
			(0.056)	(0.054)
Observations	481,816	476,317	481,816	476,317
R-squared	0.023	0.039	0.021	0.037
Controls	No	Yes	No	Yes

Notes: 18.5 percent mothers report at least one deceased child. Standard errors are robust and clustered at the state level. All models include district fixed effects and time fixed effects. *** p<0.01, ** p<0.05, * p<0.1

6.5 Discussion

The results show that riots have a much larger impact on women as compared to men. Riots trigger early age and child marriages for women, which in turn results in a domino effect on early age pregnancy

and child mortality. We propose three channels through which riots affect early age marriages: First, women safety is a severe concern in conflict prone areas, and in the Indian context, where victims of sexual abuse are often shunned by the society. This produces an increase in the safety cost for women in riot prone areas. Since marriage is a means of migration to safety for women, they tend to be married off at an earlier age. Second, there is a transfer of responsibility for the safety of the woman from her parents to her husband and his family. Third, riots might be correlated with negative income shocks, and in such scenarios, the dowry payment mechanism, which is transfer payment from the bride's family to the groom's family, is used to smoothen consumption.

7 Robustness Checks

We randomly assign the number of riots across different states a thousand times, and then run an OLS model to see if a significant correlation exists between the number of riots and age at marriage for women. The coefficients are plotted in Figure 2, and are close to zero. If our estimates were driven by some unobservables, then the coefficients after a thousand randomizations for number of riots would not have been close to zero.

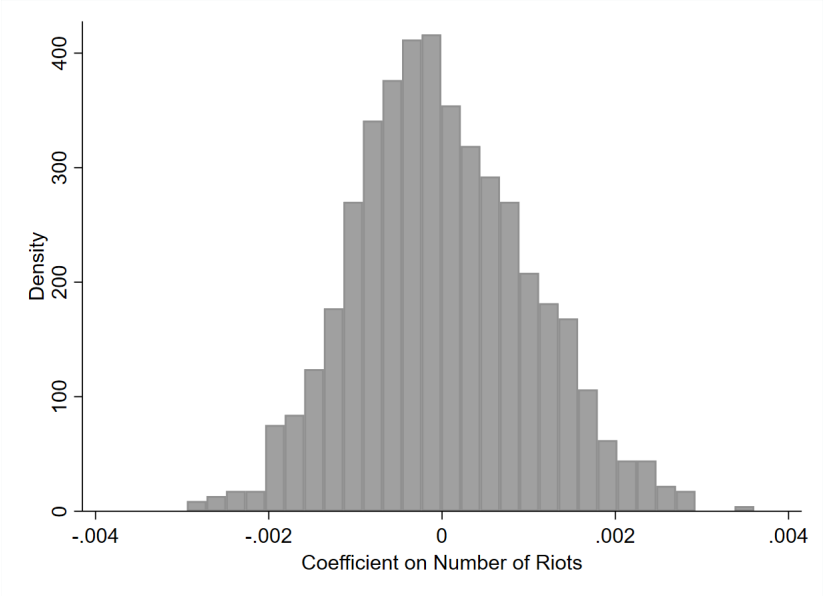

Figure 2: Randomization Inference

8 Conclusion

This paper provides theoretical and empirical evidence of the negative effect of riots on age at marriage. Using a one sided matching model we construct a groom search model where the father of a girl is the decision maker. Additionally, we look at how age this negative impact on age at marriage affects other related outcomes, such as child marriage, early age mothers and child mortality. We find that the incidence of a riot in a state, in the year preceding to marriage, leads to a higher probability of child

marriages. This in turn results in younger mothers and lower probability of survival of children born to such mothers. These results highlight the adverse impact of riots on women and their infants. These results also motivate the need for proper policy measures which aid rehabilitation, income, safety and health support in riot affected areas.

9 Appendix

9.1 Derivation of groom search model

$v(\theta)$ is defined as the expected value of $\sum_{t=0}^{\infty} \beta^t y_t$ for a father who has a groom offer of quality θ, and he decides either to accept or reject it.

$$v(\theta) = \max_{\{accept, reject\}} \left\{ \frac{u(\theta)}{1-\beta}, -c + \beta \int_0^B v(\theta') dF(\theta') \right\} \tag{6}$$

The solution for equation (6) is of the form:

$$v(\theta) = \begin{cases} \dfrac{u(\overline{\theta})}{1-\beta} = -c + \beta \displaystyle\int_0^B v(\theta') dF(\theta'), & \text{if } \theta \leq \overline{\theta} \\ \dfrac{u(\theta)}{1-\beta}, & \text{if } \theta \geq \overline{\theta} \end{cases} \tag{7}$$

Using equation (7) the functional equation (6) can be converted in the value function $v(\theta)$ into an ordinary equation in the reservation quality $\overline{\theta}$. Evaluating $v(\overline{\theta})$ and using equation (2), we have:

$$\frac{u(\overline{\theta})}{1-\beta} = -c + \beta \int_0^{\overline{\theta}} \frac{u(\overline{\theta})}{1-\beta} dF(\theta') + \beta \int_{\overline{\theta}}^B \frac{u(\theta')}{1-\beta} dF(\theta')$$

$$\frac{u(\overline{\theta})}{1-\beta} \int_0^{\overline{\theta}} dF(\theta') + \frac{u(\overline{\theta})}{1-\beta} \int_{\overline{\theta}}^B dF(\theta') = -c + \beta \int_0^{\overline{\theta}} \frac{u(\overline{\theta})}{1-\beta} dF(\theta') + \beta \int_{\overline{\theta}}^B \frac{u(\theta')}{1-\beta} dF(\theta')$$

$$u(\overline{\theta}) \int_0^{\overline{\theta}} dF(\theta') + c = \frac{1}{1-\beta} \int_{\overline{\theta}}^B [\beta u(\theta') - u(\overline{\theta})] dF(\theta')$$

Adding $u(\overline{\theta}) \int_{\overline{\theta}}^B dF(\theta')$ to both sides of the equation

$$u(\overline{\theta}) + c = \frac{\beta}{1-\beta} \int_{\overline{\theta}}^B [u(\theta') - u(\overline{\theta})] dF(\theta') \tag{8}$$

9.2 Proposition 1: Reservation quality of groom $\overline{\theta}$ is a negative function of c

$$u(\overline{\theta}) = -c + \frac{\beta}{1-\beta} \int_{\overline{\theta}}^B [u(\theta') - u(\overline{\theta})] dF(\theta')$$

Leibniz's rule states that if $\phi(t) = \displaystyle\int_{\alpha(t)}^{\gamma(t)} f(x,t) dx$

then, $\phi'(t) = f[\gamma(t), t]\gamma'(t) - f[\alpha(t), t]\alpha'(t) + \displaystyle\int_{\alpha(t)}^{\gamma(t)} f_t(x,t) dx$

Using this result and total differentiating our equation, we get

$$u' d\overline{\theta} = -dc - \frac{\beta}{1-\beta} u'[1 - F(\overline{\theta})] d\overline{\theta}$$

$$\frac{d\overline{\theta}}{dc} = \frac{-1}{u'[1 + \frac{\beta}{1-\beta}[1 - F(\overline{\theta})]]} < 0$$

9.3 Lemma 1: Existence and uniqueness of $\overline{\theta}$

We assume $c < u(\overline{\theta})$, i.e., the expected utility for a father derived from getting his daughter married to groom of quality $\overline{\theta}$ is higher than the cost of keeping her unmarried.

$$u(\overline{\theta}) + c = \frac{\beta}{1-\beta} \int_{\overline{\theta}}^{B} [u(\theta') - u(\overline{\theta})] dF(\theta')$$

For existence of a unique solution under our assumption, LHS should be increasing and RHS should be decreasing in $\overline{\theta}$

Differentiating LHS we get $u'(\overline{\theta}) > 0$

Differentiating RHS by using Leibniz's rule, we get $\frac{-\beta}{1-\beta}[1 - F(\overline{\theta})] < 0$. Therefore, a unique solution exists for $\overline{\theta}$

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