ESSAYS ON IDENTITY AND SOCIAL INTERACTIONS

A Dissertation

Presented to

The Faculty of the Department

of Economics

University of Houston

In Partial Fulfillment

Of the Requirements for the Degree of

Doctor of Philosophy

By

Shreya Bhattacharya

May 2020

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Abstract

This dissertation consists of two studies on identity based social interactions in India. The first study uses a slum relocation program in India that randomly assigned neighbors to examine the effects of exposure to other caste neighbors on trust and attitudes towards members of other castes. Combining administrative data on housing assignment with original survey data on attitudes, I find evidence corroborating the contact hypothesis. Exposure to more neighbors of other castes increases inter caste trust, support for inter caste marriage, and the belief that caste injustice is growing. I explore the role of friendships in facilitating these favorable attitudes. The results throw light on the positive effects of exposure to diverse social groups through close proximity in neighborhoods.

The second study examines the effect of a technological intervention in agriculture, the Green Revolution, on Hindu Muslim conflict in India between 1957 and 1985. I exploit variation in take-up of the Green Revolution technologies generated by the suitability of agricultural areas in districts to apply the technologies to identify the causal impact of technology on conflict. I find that riots are longer after the Green Revolution is introduced. I find suggestive evidence of an increase in the occurrence and severity of religious conflict. I explore the role of mechanization in agriculture introduced by the Green Revolution in reducing the opportunity cost of engaging in conflict. My findings shed light on the unintended consequences of technology in agriculture as well as the mechanisms through which such technology may influence ethnic conflict.

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to Dida, Dadu and Shailaja Ma'am

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Chapter 1

Intergroup Contact and its Effects on Discriminatory Attitudes: Evidence from India

1.1 Introduction

Exposure to diverse social groups in neighborhoods may shape individuals' attitudes towards members of other groups. However, it is difficult to identify the effect of exposure since people self-select into neighborhoods, and often prefer to live amongst their own group (Wong, 2013). Furthermore, it is difficult to measure such attitudes, and how policies allowing for integration shape them.

I focus on exposure to diverse caste groups and seek to answer the following question: how does caste diversity in one's immediate neighborhood affect her attitudes towards other groups? I use a slum relocation policy in India to examine the effect of living among neighbors from other castes on intercaste prejudice. The policy randomly assigns housing units within two relocation sites to slum dwellers. I combine administrative data on the assignment of housing with survey data that I collected from individuals living in these sites. I exploit the exogenous variation in neighbor composition *within* the housing

site to identify the causal effect of living among other caste neighbors on trust and attitudes towards other castes. I find that exposure to neighbors from other castes engenders more favorable attitudes towards other caste groups. Individuals surrounded by more neighbors from other castes experience an increase in inter caste trust and are more accepting of inter caste marriage. I explore the role of friendships in facilitating these favorable attitudes and find that cross caste friendships are positively correlated with exposure to more neighbors from other castes, but these effects are imprecise.

In India, caste plays an instrumental role in access to labor market opportunities (Akerlof, 1976) and social networks (Kandpal and Baylis, 2019). The caste system is characterized by endogamy (i.e. people marry within their own caste). Only 4.9% of marriages in India take place outside caste (Goli et al., 2013), despite state governments providing incentives for marrying outside caste (Hortaçsu et al., 2019). Affirmative action policies in India aim to counter caste based injustice and discrimination, which are still rampant in Indian society (Munshi, 2017; Bagde et al., 2016). The contact hypothesis states that, under certain conditions, interpersonal contact reduces prejudice between groups (Allport et al., 1954). Facilitating inter caste contact may help in reducing caste based prejudice. However, evidence on the effect of exposure to diversity is mixed. Finseraas et al. (2019) and Scacco and Warren (2018) find that exposure to diverse immigrant or ethnic groups increase trust. On the other hand, Alesina and La Ferrara (2002) and Dinesen and Sønderskov (2015) find that exposure to diversity leads to less trust. Additionally, no comprehensive dataset exists on caste related attitudes and it is difficult to discern and collect information on individuals' underlying caste preferences. I overcome this by collecting data from my own survey in the aforementioned relocation sites. My paper is related to previous literature that uses random assignment of roommates in colleges and finds a reduction in interracial prejudice in the US (Sacerdote, 2001; Boisjoly et al., 2006; Carrell et al., 2015).

I study slum dwellers who were relocated to public housing in the city of Pune, India. These slum dwellers were randomly assigned to apartments in buildings within two public housing sites. Since individuals are not given a choice in selecting neighbors on their assigned floor, this generates exogenous variation in the caste composition of neighbors, which I use to measure contact. My identification strategy exploits this variation to estimate the effect of exposure to diverse caste neighbors on attitudes towards members of other castes. To elicit responses on attitudes as well as friendships within the randomized neighborhood, I designed and collected data from a survey on 692 adults. The attitudes I measure can be divided into two broad categories: (i) trust, which includes general trust and inter caste trust, and (ii) caste attitudes, which include beliefs about inter caste marriage, importance of caste, caste injustice and support for affirmative action. I collected information on friendships of the respondents, in order to understand whether attitudes towards other caste groups are influenced by the caste composition of friendships.

I find a significant increase in the extent of intercaste trust with exposure to more neighbors from other castes. A one standard deviation (s.d.) increase in neighborhood caste diversity causes a 9.6 p.p. increase in trust in members of other castes; a 7.2 p.p. increase in support for inter caste marriage among own family members, and a 9.5 p.p. increase in the belief that caste injustice has increased in the last ten years. I find no effects of caste diversity on support for affirmative action and importance attached to caste identities.

Having established the effects of exposure to neighbors from other castes on attitudes, I examine whether the caste composition of friends is a possible channel through which these effects operate. Being exposed to more caste diversity is positively correlated with having more friends from other castes, but these estimates are imprecise. On the whole, my findings suggest that increased exposure to caste diverse neighborhoods can itself induce less discriminatory attitudes, without changing the composition of friends.

When I repeat my analysis for sub castes, sub castes within the lower caste group tend to attach more importance to their caste identity when surrounded by more neighbors belonging to their sub caste. Those who stay longer in their apartment and those who have more other caste friends prior to residing in the new apartment show more favorable attitudes when exposed to greater caste diversity. My results are robust to alternate specifications and attrition from the sample.

My paper contributes to three strands of literature. First, there is work that shows the effects of contact on inter group prejudice. Closely related are Rao (2019), Lowe (2018) and Okunogbe (2018). Rao (2019) shows that integrating rich and poor children in schools in India can lead to more prosocial behavior. Lowe (2018) shows that attitudes towards other castes in rural India is determined by the type of contact. Okunogbe (2018) looks at the effect of temporary random assignment of university graduates in Nigeria to different regions of the country for national service on inter ethnic marriage and friendships, and finds that inter marriage tends to increase when individuals are transferred to regions with greater ethnic diversity. I find a significant increase in prosocial attitudes induced by proximity and exposure to other caste neighbors, and in contrast to the aforementioned work, I find strong effects simply through living in proximity and the resulting exposure to other groups.

Second, my paper relates to research on the effects of slum relocation policies on integration. Evidence on the effect of these policies on integration is mixed. Bazzi et al. (2019) look at the effects of the Transmigration Resettlement Program on national integration in Indonesia, and find greater integration in communities which are ethnically diverse. In the Indian context, Barnhardt et al. (2017) find that those who won a housing lottery in the city of Ahmedabad lost access to their friends and previous networks after moving location, and were hence unhappy with the provision of public housing. These studies focus on the intent to treat effects of being assigned to a relocation site. I exploit a

second level of randomization to measure the effect on intergroup interactions: I examine the effect of interactions within the relocation site by exploiting the random assignment of apartments *within* each building in the site, *after the relocation takes place.*

Third, I look at attitudes such as beliefs about caste injustice, beliefs about inter caste marriage *within* an individual's family, and an individual's support for caste based reservation. This contributes to the work done on caste in modern day India, such as Appadurai (2004) & Goel and Deshpande (2016), who find that government schemes can change caste perceptions among individuals for the better.

The paper is organized as follows: Section 2 provides background and information on data collection. Section 3 explains the empirical strategy. Section 4 discusses results. Section 5 outlines additional results. Section 6 provides robustness checks. Section 7 provides a discussion and Section 8 concludes.

1.2 Background

1.2.1 Caste and Attitudes

Caste is a system of social categorization, wherein people are classified into closed groups by birth (Bagde et al., 2016). Each broad caste group consists of many sub castes. Membership of a sub caste ensures entry into a job specific to that sub caste. Furthermore, marriage is allowed only within the same subcaste (endogamy) (Lowe, 2018). After India attained independence, affirmative action policies in India came into effect to help historically disadvantaged castes. These disadvantaged groups are formally recognized as the Scheduled Castes (SC), Scheduled Tribes (ST) and the Other Backward Castes (OBC). Under such policies, quotas for these groups were created in higher education, political office, and government jobs. In addition, there are monetary incentives offered by several states for couples marrying outside caste (Hortaçsu et al.,

2019). The role of caste has been studied extensively in rural India (Mosse, 2018; Vijayabaskar and Kalaiyarasan, 2014; Munshi, 2017). Lowe (2018) finds that prejudice reduces when people from different castes work together, and increases when they are pitted against each other. Munshi and Rosenzweig (2008) find that a numerical sub caste majority in local governments leads to increased public provision.

Despite the government implementing policies to bridge the caste divide, caste based discrimination remains high in India. Results from the Social Attitudes Research for India (SARI) survey indicate that 30% of urban India still practices untouchability [1], and about 40% of urban India does not support inter caste marriage (Coffey et al., 2018).

Moreover, cities in India have been experiencing an increase in caste based segregation. The state of Maharashtra, of which Pune is a part, has had 34% of its cities experiencing an increase in caste based segregation (Singh et al., 2019). The increase in caste based segregation in Pune is consistent with this evidence [2]. I use the dissimilarity index (Duncan and Duncan, 1955) to calculate the extent of caste based residential segregation in Pune. The index takes a value of 0 if there is complete integration of castes across wards within the city, and 1 if the groups are completely segregated. This measure is affected if members of the overrepresented caste group in a certain ward within the city move to a ward within the city where they are underrepresented (Gorard and Taylor, 2002)[3]. The index is calculated as:

[1] Untouchability is a practice where those from the upper caste are not supposed to come in close contact with the other caste. They do not share food or allow entry of lower castes into their home. Untouchability is banned by law in India, but is still practised (Coffey et al., 2018).

[2] In contrast, about 41-63% of cities in the southern states (Andhra Pradesh, Tamil Nadu, Karnataka) have seen a decline in caste based segregation

[3] For example, if Caste Group A has an 80% concentration in Ward 1 and 20% concentration in Ward 2, the dissimilarity index would reflect a change when members of Caste Group A move from Ward 1, where they are overrepresented, to Ward 2, where they are underrepresented.

$$D = 0.5 \sum_{i=1}^{n} \mid (P_{ig}/P_g) - (P_{ih}/P_h) \mid \tag{1.1}$$

where P_{ig} is the population of group g in ward i in the city, P_{ih} is the population of group h in ward i in the city, P_g is the total population of group g in the city and P_h is the total population of group h in the city. I use Census data at the ward [4] level to calculate this index for the years 2001 and 2011, using the framework outlined by Vithayathil and Singh (2012). I divide caste into two broad groups: SC/ST population and non SC/ST population. In 2001, the dissimilarity index for caste in Pune stood at 15.37%. In 2011, the index increased to 20.27%. This means that 20.27% of the non SC/ST population in 2011 need to move to other wards in the city to maintain evenness of distribution in population. A change of 0.05 in the dissimilarity index from 2001 to 2011 is indicative of significantly greater caste based segregation in Pune. This implies that caste may be an important factor in an individual's housing decisions in this city. Recent work by Bharathi et al. (2018) provide evidence higher levels of segregation at the intra ward level than the inter ward level in Indian cities, which increases the need for more reliable neighborhood level segregation measures in urban India. The policy experiment I use allows me to define a neighborhood at a precise and granular level, which can contribute to the discussion on intra ward segregation.

1.2.2 The Housing Assignment

The housing scheme I evaluate is part of the Jawaharlal Nehru National Urban Renewal Mission (JNNURM). The JNNURM was a national level urban redevelopment program introduced in 2005 by the Government of India. The Basic Services to Urban Poor (BSUP) is a sub program targeting urban poverty reform. The goal of the BSUP program is to *'provide basic services (including water supply and sanitation) to all poor including security of tenure, and im-*

[4] A ward is an administrative unit of a city, usually used for electoral purposes.

proved housing at affordable prices and ensure delivery of social services such as education, health and social security to poor people' (PMC, 2006).

Under the BSUP, in the city of Pune, slum rehabilitation was one of the primary goals. The policy aimed to eradicate slums and provide affordable housing to slum dwellers. Local government officials in the city identified the slums that needed to be demolished, targeting those located in environmentally fragile zones within the city and those infringing on government land. The representatives of Society For the Promotion of Area Resource Centers (SPARC), a non governmental organization worked with the municipality to make a list of all the residents in these slums and then conducted a lottery within the slum premises. Apartments were randomly assigned through a lottery system, where slum dwellers were asked to pick out a slip of paper. The slip of paper had the name of the site as well as the apartment number written on it. They were not allowed to express preferences for the apartment or floor and were required to stay in the apartment allotted to them. Those who won the lottery got their house numbers assigned to them immediately and were asked to move in within six months of winning the lottery. The first lottery was conducted in November 2012, and the first phase of relocation was completed in May 2013, six months after the lottery was conducted. The lottery was conducted in this manner up until 2018, when all assignment was to be completed. The bulk of these relocations took place in the initial years of 2013 and 2014, with most apartments being allotted in these two years.

Individuals from 33 slums were relocated to buildings in two sites, Site A and Site B. Slum dwellers living in slums to the west of the city were moved to Site A, whereas those located to the east were moved to Site B[5]. A total of 947 houses were allotted by lottery. I designed the survey and after training enumerators and conducting pilots, I conducted the survey in 2018. A timeline of the program and the survey is presented in Figure 1. At the time of the

[5]Site A has 7 buildings with seven floors with 16 apartments on each floor, whereas Site B has 10 buildings with 5 floors and 4 houses on each floor.

survey, 37 apartments were vacant and expected to be filled up in the next six months[6]. Since the floor and apartment allocated to the household under this scheme is random, this allows for localized randomization at the floor level, with neighbors from different caste groups are randomly assigned to live next to each other.

Figure 2 shows the pattern of relocation in the individuals in the sample under study. Most of the sample under study relocated in the years 2013 and 2014. Figure 3 depicts the structure of a building in Site A. All residents in these 33 slums were to move. Subletting these apartments was forbidden. However, while conducting the survey, I found many apartments where the original owners had sublet the premises. SPARC has an office at each of these relocation sites to keep track of the households living in each building, and they verified that 411 houses had been sublet illegally. As a result, there could be concerns of bias in estimates due to selection into the available households surveyed [7]. Those who took part in the survey may be a self selected sample who are open minded about caste and are willing to live in caste diverse settings. Figure 4 graphs the distribution of apartments participating in survey against assigned apartments. I conduct the Kolmogorov-Smirnov test [8] for equality of distributions, and the p value is 0.073. This provides evidence to show that the distribution of participating and assigned apartments is the same. In Section 7, I provide further evidence to show that participation in the survey was not influenced by the caste composition of the floor of the building.

[6]Discussions with the Pune Municipal Corporation chief, as well as the SPARC NGO chiefs, confirmed this process of random assignment.

[7]Out of these 411 households, I found 102 houses where tenants were living. I collected only demographic information on these individuals. These households have been excluded from the main analysis.

[8]The Kolmogorov-Smirnov test is used to decide if a sample comes from a population with a specific distribution.

1.2.3 Data Collection

I use two sources of data in this study: administrative records and survey data. I obtained administrative records from the local municipality, and it contains details of the assignment of units to households. The records contain details on name of the household head, caste, subcaste, expected year of relocation, slum from where they were relocated, site allotted, the building and the apartment number. 947 apartments were assigned in total. Since these records are based on initial assignment, they help me obtain an exogenous measure of other caste neighbors that an individual is exposed to within the floor. This measure is defined as the fraction of other caste households living on the same floor as the individual. Caste is defined as the Scheduled Castes/Scheduled Tribes (SC/ST) group and the non SC/ST group [9]. Figures 5 and 6 shows the distribution of caste exposure of individual respondents and respondent households respectively. About 15% (17%) of the respondents (households) are surrounded by 50% of households belonging to a different caste (Figure 4). Approximately 8% (9%) of respondents (households) are surrounded entirely by their own group, whereas approximately 13% (3%) of respondents (households) are surrounded entirely by households from other caste groups.

The survey modules were designed to cover all consenting adults living in a particular household. The first module consisted of questions on baseline characteristics such as family composition, education, previous slum location, and employment. The second module contained questions on attitudes measuring trust, intercaste marriage and caste salience. 219 households (692 adults) were covered in the survey [10]. The response rate for the survey was 40.83%. While conducting the survey, I found incidence of non occupancy and renting in these apartments, and collected information from SPARC's records on the

[9] SC/ST is defined as Scheduled Caste/Scheduled Tribes, and non SC/ST consists of the General Category and Other Backward Classes (OBC)

[10] Out of these 219 households, I collected data from 87 households. I supervised the collection of 132 households by enumerators.

exact apartment numbers that had been sublet as well as unoccupied [11].

The second module of the survey contains information on respondents' attitudes and friendships. I measure attitudes on two dimensions: trust and caste related attitudes. I ask two questions on trust. The first question is a modified version of the World Values Survey (2012) for India [12]. It is worded as follows: 'How much do you trust people in general?' The second question focuses on inter caste trust and asks 'How much do you trust individuals from another caste?'. A concern here is that people may have anticipated these questions and answered them. Therefore, I randomized the order in which these questions were asked, to minimize the incidence of biased responses.

The second set of outcomes pertains to caste related attitudes. This can be further divided into two categories: beliefs about inter caste marriage and attitudes towards caste. I ask two questions on beliefs about inter caste marriage and are taken from the Social Attitudes Research for India (SARI). The general question on inter caste marriage is worded as follows: 'How much do you support a law prohibiting inter caste marriage?'. Respondents may exhibit social desirability bias while answering this question. Responses might be influenced by perceived views of the enumerator. The second question attempts to counter this, by asking opinions on support for inter caste marriage *within the individual's family*. The wording of this question is 'How much do you support inter caste marriage within your own family?'. In a further attempt to elicit true preferences and to maintain consistency with the SARI survey, I randomize the order of these questions.

Questions on attitudes towards caste examine an individual's beliefs regarding caste injustice ('In your opinion, has caste injustice increased, decreased or

[11]The response rate is calculated as the number of households surveyed divided by the total number of households eligible. In total, there were 947 households. 219 households responded to the survey. 317 households were unavailable and could not be contacted. 411 households were found to be living on rent. 15 households refused to participate in the survey, leading to a low refusal rate of 1.5%. I show robustness checks to address the concerns of selection due to households staying on rent in Section 7.

[12]The World Values Survey question for India is: 'Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?'

remained the same compared to ten years ago?'), the importance attached to caste identity ('In your opinion, is caste as important in people's lives as it was ten years ago?') and the extent of support for caste based quotas (reservations) in schools and government jobs (affirmative action) on the basis of caste ('How much do you support caste based reservation?')

In addition to the questions covering attitudes, I ask respondents to name their five closest friends within the building, as well as people known to them from their previous slum. The questions on trust and marriage are coded up on a 1-5 scale, similar to the Afrobarometer survey used by Nunn and Wantchekon (2011). Tables 1.1 and 1.2 provide the distribution of responses to the questions on trust and caste related attitudes respectively.

1.2.4 Descriptive Statistics

Table 1.3 shows the characteristics of all individuals surveyed. I show attributes of SC/ST, non SC/ST and all individuals in the survey. The average age of an individual surveyed is about 35 and 52% of those surveyed in both groups are female, on average. 54.9% of the individuals belonging to the non SC/ST category are employed, as opposed to 48.1% of those belonging to the SC/ST category. In order to motivate the importance of caste in this setting, I showed the individuals a photograph of the list of residents in the building and asked them to guess the caste and sub caste of the person. The sub caste is easy to ascertain by the last name (surname) of the person. I verified the responses using the administrative level data provided by the municipality. 60% of the respondents accurately guessed the sub castes of the other residents, which is suggestive of a high level of caste consciousness among the respondents. Across all individuals, the general level of trust is high, at almost 96%. When it comes to inter caste trust, however, only 59.4% of all individuals trust those from another caste. The support for caste inter marriage is greater among members of the SC/ST group than the non SC/ST group.

To ascertain salience of caste among individuals, one of the survey questions asks people how highly they rank the importance of caste and religion today as against 10 years ago. Table 1 shows that the 63.5% of the non SC/ST group attach importance to caste, as compared to 57% from the disadvantaged groups. This reflects the growing economic insecurity among those from higher castes, and anecdotal evidence from the field confirms the same. At the time of the survey, there was an increasing clamor for higher quotas from those belonging to the General Category[13]. The survey also asks questions about affirmative action. 85% of the respondents were aware of the existence of caste based quotas for disadvantaged groups in government jobs and higher education institutes. Table 1.3 shows that there seems to be a high level of support for these quotas, especially among members of the SC/ST category, who are the main beneficiaries of affirmative action in India. When asked for reasons why they supported caste based reservations, 62% of respondents from the SC/ST group claimed it was to address historic inequalities faced by marginalized groups. On the other hand, 52% of non SC/ST group respondents felt that they needed caste based reservation in order to avail opportunities, at parity with those from the disadvantaged groups. In response to a question on whether caste based injustice has increased, respondents belonging to both groups seem to think that caste injustice has increased in the last ten years.

1.2.5 Balance Tests

If the initial assignment of housing was indeed random, this requires that the fraction of households belonging to another caste on any given floor, as assigned by the program, should be random. To test the identifying assumption, I regress the independent variable in my main specification on the baseline characteristics

[13]http://www.newindianexpress.com/nation/2018/aug/07/maratha-agitation-police-to-step-up-vigil-in-pune-on-august-9-1854631.html

of the individuals present in the survey. The specification is given as follows:

$$FractionOtherCasteHH_{icf} = \beta_0 + \eta X_{icf} + \epsilon_{icf} \tag{1.2}$$

where $FractionOtherCasteHH_{icf}$ is the fraction of other caste households living on the same floor f as individual i belonging to caste c. X_{icf} is a vector of baseline characteristics such as age, gender, percentage of surveyed individuals who have completed primary education, number of family members, age of oldest child, number of children before the move into public housing and a dummy for caste. To control for unobserved characteristics across slums of origin, I include slum fixed effects. The null hypothesis for the F test is that none of the predetermined characteristics of the surveyed individuals should jointly influence the measure of caste exposure of an individual. If the null hypothesis holds, it would show that caste exposure is indeed random and not influenced by any predetermined variables.

Table 1.4 reports results for the full sample, SC/ST and non SC/ST groups. The joint F test in Table 1.4 shows that the null hypothesis holds (p values at 0.71 for full sample, 0.73 for SC/ST group and 0.76 for non SC/ST group). This provides evidence to show that characteristics of the surveyed slum dwellers do not influence the initial assignment of the houses to slum dwellers. The caste diversity measure is mechanically correlated with the coefficients for the General Category as well as the SC/ST category, as a result of construction.

In light of the high incidence of renting in these locations, the balance test shows that the initial assignment was not influenced by any predetermined characteristics. It also shows that there was no differential attrition on the basis of these characteristics.

1.3 Empirical Strategy

My identification strategy exploits the random assignment of public housing to identify the effect that interacting with a neighbor of a different caste has on trust and caste related attitudes.

I estimate the main effects using an OLS specification as follows:

$$y_{icf} = \beta FractionOtherCasteHH_{icf} + \eta X_{icf} + \alpha_c + \epsilon_{icf} \tag{1.3}$$

where y_{icf} denotes outcome on an attitude y for individual i, who belongs to caste c and lives on floor f. The coefficient of interest is β, which identifies the causal effect of an individual having a certain proportion of his neighbors from another caste on his attitudes. Section 2 shows that the estimate for β is balanced across predetermined covariates, conditional on the caste of the individual. Therefore, all specifications in the main analysis will include caste fixed effects. The results can be interpreted as changes in attitudes of individuals *within* a certain caste group. To allow for correlated shocks within the floor, I cluster standard errors at the floor level. In addition to the OLS specification, I also use a probit specification for the main results. In Section 6, I show that β is not affected by selection into the sample.

The General Castes (GC) form the uppermost rung of the caste hierarchy, with the OBC and SC/ST coming in second and third. In the paper, I look at two broad caste groups: SC/ST and non SC/ST, which consists of the OBC and GC groups. This is consistent with the categorization followed by the Census of India[14], and is also politically meaningful, as OBC's constitute socially forward but economically backward castes of India, and are hence closer to the General Category (Government of India, 2011).

[14]The 2011 Census classifies caste groups as SC/ST and non SC/ST. The distribution of OBC's in Pune is only 22%, according to the National Sample Survey Organisation (NSSO, 2007). In the city Census carried out in 2011, the non SC/ST population is 86%, with no clear distinction between the General and OBC categories

1.3.1 Independent Variable

$FractionOtherCaste$ is the fraction of households assigned who belong to a different caste living on the same floor as individual i. I construct this from administrative records, which contain details on the initial random assignment. When repeating the analysis for subcastes in Section 5, I modify the independent variable to show the presence of subcastes on a given floor. α_c represent caste fixed effects, to control for unobserved differences across caste groups. $\boldsymbol{X_{icf}}$ are a set of time invariant control variables, which are obtained from the survey modules. The controls include an individual's education level, age, employment status, previous slum location, and the caste of the interviewer collecting information from the respondent.

1.3.2 Dependent Variables

I measure the effect of diversity in caste on two sets of outcomes: trust and caste related attitudes. For purposes of analysis and ease of interpretation, all responses have been reduced to binary outcomes and responses where people answer with 'Don't Know/Can't Say' have been excluded from the analysis.

The first set of outcomes pertain to trust through two questions. The first is taken from the World Values Survey (2012) for India. This question is modified and worded [15] as follows: 'How much do you trust people in general?' The second question focuses on inter caste trust and asks 'How much do you trust individuals from another caste?'. I combine the responses to both questions into a binary variable, and generate two measures: 'General Trust' and 'Trust Other Caste'. These measures take a value of 1 if the individual is trusting (if the individual reports that he/she trusts a little or completely), 0 if not trusting (if he reports he/she does not trust too much or does not trust at all).

The second set of outcomes pertains to caste related attitudes. This can

[15]The World Values Survey question for India is: 'Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people?'

be further divided into two categories: beliefs about inter caste marriage and attitudes towards caste. The general question on inter caste marriage is worded as follows: 'How much do you support a law prohibiting inter caste marriage?'. The second question seeks opinions on support for inter caste marriage within the individual's family. The wording of this question is 'How much do you support inter caste marriage within your own family?'. I combine the responses to both questions into a binary variable, and generate two measures: 'Against Marriage Ban' and 'Support Inter Caste Marriage'.These measures take a value of 1 if the individual supports inter caste marriage (if the individual reports that he supports it a little or completely), 0 if he/she opposes inter caste marriage (if he reports he/she does not support it too much or does not support it at all).

Questions on attitudes towards caste are of three types. The first question examines an individual's beliefs regarding caste injustice ('In your opinion, has caste injustice increased, decreased or remained the same compared to ten years ago?'). I combine the response to this question into a binary variable, and generate a measure called 'Caste Injustice', which takes a value of 1 to represent an increase in caste injustice, 0 reflecting a decrease or feeling that caste injustice has remained the same. The second question examines the importance of caste at present ('In your opinion, is caste as important in people's lives as it was ten years ago?'). Responses to this measure, called 'Importance Caste' are categorized as 1 ('Yes') and 0 ('No'). The third question examines the extent of support for affirmative action (reservations) on the basis of caste ('How much do you support caste based reservation?'). This measure is called 'Support Reservation', and takes a value of 1 if there is higher support for caste based reservation, 0 if little or no support.

1.4 Results

1.4.1 Trust

Table 1.5 presents results highlighting the causal relationship between exposure to neighbors of other castes and trust outcomes for an individual. I ask two questions on trust. The first question is taken from the World Values Survey (2012) questionnaire and is framed as follows: 'How much do you trust people in general?'. At an all India level, 77.9% of respondents to the survey believe that people cannot be easily trusted. In contrast, for the surveyed sample, Table 1.3 shows that trust levels in the relocation site are high, at around 93%. Table 1.5 shows that exposure to caste diversity does not have an effect on an individual's general trust level.

The second question I ask in my survey examines inter caste trust. This question is framed as follows: 'How much do you trust members of another caste?'. On average, the level of inter caste trust is lower than general trust, at 59.4% (Table 1.3). Column 3 of Table 1.5 shows a statistically significant increase in the extent of trust in other castes, when exposed to greater caste diversity. A one unit increase (1 sd) in the proportion of other caste households on an individual's floor results in an increase in intercaste trust by 34.2 percentage points (9.6 pp).

In order to understand the difference in significance of effect between general and inter caste trust, I check whether controlling for the order in which the questions were asked make a difference. The estimates remain unchanged. My results are consistent with Finseraas et al. (2019) and Vezzali et al. (2014), which show evidence for increase in trust with increased exposure to other social groups.

1.4.2 Caste Attitudes

Beliefs about Inter Caste Marriage

The caste system is characterized by endogamy. Members of a particular caste are only allowed to marry within their own caste. Goli et al. (2013), in their study of inter caste marriages in India using data from the India Human Development Survey (IHDS), find that inter-caste marriages rose from 3.5 percent in 1981 to 6.1 percent in 2005. In particular, in the state of Maharashtra, which is where the city of Pune is located, only 3.7% of all married women in the state have married outside caste (Goli et al., 2013). This shows that the norms of the caste system are rigid till date, despite evidence showing that outmarriage usually allows for integration McDoom (2019). Intermarriage between social groups is crucial to the formation of wider networks and helpful in fostering greater intergroup contact (Qian and Lichter, 2007).

In order to understand the attachment to this social norm for the surveyed sample, I ask two questions on inter caste marriage, which are taken from the Social Attitudes Research for India (SARI) questionnaire. To gauge general attitudes towards inter caste marriage, I ask the question *'How much do you support a law prohibiting inter caste marriage?'*. Column 1 of Table 1.6 presents results on the effect of exposure to caste diversity in neighbors on an individual's attitudes towards intercaste marriage. A positive coefficient can be interpreted as an increase in opposition to the discriminatory law, which indicates increased acceptance of inter caste marriage. I find a significant decrease in support for the law, where at the baseline, 80% of the individuals do not support the law. A one unit (1 sd) increase in exposure to neighborhood caste diversity increases opposition against the discriminatory hypothetical marriage law by 19.7 pp (4.8 pp).

In an attempt to understand the true preferences of the individual with respect to inter caste marriage, I frame the second question on inter caste

marriage as follows: *'How much do you support intercaste marriage within your own family?'*. Column 3 of Table 1.6 shows that on average, 54.2% of respondents support inter caste marriage within their own family. A one unit increase (1 sd increase) in exposure to caste diversity among neighbors increases support for inter caste marriage within the family by 26.1 pp (7.2 pp). Table 1.7 shows no evidence of difference in attitudes across caste groups when it comes to questions on inter caste marriage. Given the rigid social norms surrounding inter caste marriage and the low rate of out marriage in India, a change in beliefs when exposed to greater caste diversity could be an indicator of more favorable attitudes towards other caste groups.

Caste Salience

Table 1.6 presents results for three sets of questions on general attitudes towards caste. The first question is framed as 'In your opinion, has caste injustice decreased, increased or seen no change compared to ten years ago?'. This question attempts to capture general sentiments about caste injustice. On average, 52.1% of respondents felt that caste injustice has increased. A one unit (1 sd) increase in the exposure to caste diverse neighbors increases the belief that caste injustice has increased in the past few years by 35.4 pp (9.5 pp). The second question is intended to understand how salient caste is among the surveyed individuals. The question is framed as follows: 'In your opinion, is caste as important in people's lives as it was ten years ago?'. The third question gauges the support for caste based affirmative action. Affirmative action in India consists of caste based quotas in government jobs as well as institutions of higher education (Mosse, 2018). The effects on attitudes towards the importance an individual lays on caste as well as support for affirmative action are not affected by exposure to caste diverse neighbors.

These results represent aggregated views on caste identity, and cannot discern whether people refer to their own or others' caste identities when answering

these questions. Members of castes which have been historically disadvantaged, for example, may feel more excluded and hence push more for affirmative action than the non SC/ST group, which are more privileged. To examine whether responses to these questions differ by caste group, I interact the explanatory variable, proportion of other caste households on the floor, with the caste group of the individual. Table 1.7 shows no evidence of difference in attitudes across caste groups when it comes to questions on caste injustice, affirmative action policies as well as importance given to caste. Hence, the results in Table 1.7 reflect that people seem to care less about caste identity and may be more concerned about caste based atrocities. [16] This may also reflect a lack of last place aversion, wherein those from the non SC/ST group do not feel threatened by being surrounded by the disadvantaged non SC/ST group (Kuziemko et al., 2014).

1.5 Additional Results

1.5.1 Sub Caste Variation

The two broad caste groups have many sub castes within them. These sub castes are endogamous in nature, with the sub caste determining occupational choice and marriage (Mosse, 2018; Appadurai, 2004; Vijayabaskar and Kalaiyarasan, 2014). The administrative records have information on sub castes of households, which I use to test whether the sub caste composition of the floor has an effect on attitudes.

$$y_{icf} = \alpha_c + \beta MorethanOneSubcasteHH_{icf} + X_{icf} + \epsilon_{icf} \tag{1.4}$$

[16] At the time of survey, there was an increased clamor for increased quotas for the upper caste community, leading to caste based violence in several parts of the city of Pune. The press coverage on the same may have led to responses on average indicating increased caste injustice (https://www.indiatoday.in/india/story/maratha-protesters-in-violence-pune-maharashtra-1300233-2018-07-30). Moreover, I asked a qualitative question to understand whether people knew why the government had caste based reservations. About 40% of the respondents felt that reservations were misused to gain political mileage and divide society.

where $MorethanOneSubcasteHH_{icf}$ is an indicator variable which takes the value 1 if there is more than one other same subcaste household on floor f. This represents a homogeneous neighborhood for the individual. A value of 0 represents heterogeneous sub caste composition on the floor. This helps examine the role of subcaste minority and majority floors, akin to work done by Tropp and Pettigrew (2005) on the differences between behaviors exhibited by ethnic minorities and majorities, when made to interact with each other.

Tables 1.8 and 1.9 report results on the main outcome variables, with the explanatory variable representing the presence of a subcaste majority on a floor. Column 4 of Table 1.9 shows that an individual from a particular subcaste within the disadvantaged castes (SC/ST) shows greater support for reservations (affirmative action) and lays more emphasis on the importance of caste (Column 5, Table 1.9), if he stays on a floor surrounded by more people of the same subcaste. This effect is consistent with Åslund et al. (2011), who find that exposure to own ethnicity is shown to have a greater effect for disadvantaged groups than advantaged groups in a randomly assigned resettlement program in Sweden. This is also reflective of last place aversion probably showing up in the case of more granular definitions of caste. On most other margins, however, sub caste does not have an effect on people's attitudes [17].

1.5.2 Impact of Duration of Stay

Exposure to different groups over a longer period of time may make the individual less discriminatory (Chetty et al., 2016). To test this, I interact the length of stay at the allotted apartment, as mentioned in the administrative records, with the explanatory variable. The individual questionnaire asks a question on year of move. I corroborate this with administrative data, which has information on expected month and year of move and match the survey responses to

[17] In Table 1.9, subcastes within the SC/ST group show less support for intercaste marriage (though imprecise), contrary to the main effects shown in Table 1.5. This may be due to a tendency for members of higher caste groups to intermarry, and hence punish those who intermarry with lower ranked groups (McDoom, 2019).

ensure accuracy [18]. I use the following specification:

$$y_{icf} = \alpha_c + \beta FractionOtherCasteHH_{icf} \times YearsSinceMove_{icf} + \gamma FractionOtherCasteHH_{icf} + \lambda YearsSinceMove_{icf} + X_{icf} + \epsilon_{icf}$$

where $YearsSinceMove_{icf}$ is indicator variable which takes the value 1 if individual i has stayed more than 3 years, 0 if individual i has stayed less than 3 years.

Table 1.10 and Table 1.11 present results estimates from this equation on each set of outcomes. Column 2 of Table 1.11 shows that with longer exposure, there is an increasing acceptance of intercaste marriage within their family. There is an increase of 0.42 pp in support for intercaste marriage for individuals living in these locations for a longer duration. This reflects an increase of 63% in support of intercaste marriage [19]. The increase in positive attitudes towards intercaste marriage is consistent with Åslund et al. (2011), who find that characteristics of the ethnic environment have a significant effect on children who were assigned to randomly assigned refugee locations in Sweden at an early age than later. However, duration of stay at the site does not have an effect on attitudes related to caste identities .

1.6 Robustness Checks

The results are robust to a binary probit specification. The marginal effects coincide with the estimates obtained from the linear probability specification. Table 1.5 and Table 1.6 report contain estimates of the marginal effects from the probit regressions.

An important threat to identification is non availability of eligible households and subletting of apartments in both sites. 411 houses were found to be

[18] There was no incorrect response to this question from all individuals surveyed

[19] Baseline means for the regression Column 2 of Table 1.11 is 0.661

on rent and 317 houses were not occupied. If owners sublet their houses or do not move in because they are averse to being surrounded by neighbors of other castes, the sample I survey could suffer from selection bias. I may have only captured a sub sample of individuals who are open to associating with individuals from other castes. I was able to confirm the exact apartments that were either sublet or not occupied from my own survey and SPARC officials. This allows me to determine the exact number of participants and non participants in the survey.

In order to show that participation in my survey is not affected by exposure to caste diversity among immediate neighbors, I estimate the following equation:

$$SurveyParticipation_{cf} = \beta_0 + \beta_1 FractionOtherCasteHH_{cf} + \alpha_c + \alpha_s + \epsilon_{icf} \tag{1.5}$$

where $SurveyParticipation_{cf}$ is a dummy variable which takes the value of 1 if a household participated in the survey. α_s represents site fixed effects, which control for unobserved characteristics of the public housing site. Table 1.15 reports estimates from Equation 5 . The caste diversity measure has no effect on participation in the survey. It is possible that people of a particular caste group are more averse to living among diverse individuals, This attrition may also depend on the particular housing site. I split the sample by caste and site, and find no effect on participation in the survey [20]. This provides further evidence for initial random assignment and minimization of selection bias. This allows me to conclude that the estimates I present in Sections 4 and 5 are indeed causal.

[20]These results are in the appendix. I tracked about 30 apartment owners who had sublet their apartments and asked their reasons for leaving the apartment. 20 of these households cited distance from the workplace as a major factor, whereas the others stated the availability of cheaper public schools around the whole neighborhood, which was lacking around the public housing site.

1.7 Discussion

I show evidence of favorable attitudes towards the other caste group with greater exposure to caste diverse neighbors. Living in proximity to more caste diverse neighbors leads to more favorable attitudes towards other groups. However, a change in inner circles of friendship may also be an underlying channel which may influence the change in beliefs. To examine the role of an individual's inner circle, I explore the role that friendships have to play in promoting these favorable attitudes. Kandpal and Baylis (2019) show the importance of friendships to women's security, but the composition of these friends' circles are restricted to one's own caste group.

In the survey, I ask the respondent to name his/her five closest friends within the building. [21] I verify the caste of these friends along with their exact residence within the building from administrative records. This allows me to construct a variable, *FractionFriend*, which represents the fraction of friends from the other caste. In addition, I ask the individual to identify people within the building who they knew from the previous slum.[22] This helps me separate those previously known to an individual and new friends made by him/her after moving to the new neighborhood. I construct a variable, *FractionNewFriend*, which measures the proportion of *new* friends from the other caste. To measure whether any friend or new friend is from the opposite caste, I create dummy variables, *AtleastOneFriend* and *AtleastOneNewFriend*, which switch on when an individual has atleast one friend and one new friend from the other caste group, respectively [23]. Figures 1.6 and 1.7 show the distribution of current friends and new friends respectively.

[21] 'Who are your five closest friends within this building?'

[22] 'From the list of residents in this building, identify five of those you know from your previous slum'

[23] The specification is as follows:

$$y_{icf} = \alpha_c + \beta FractionOtherCasteHH_{cf} + \boldsymbol{X_{icf}} + \epsilon_{icf} \tag{1.6}$$

where y_{icf} denotes the measures of other caste friendship mentioned above.

Table 1.13 depicts the relationship between exposure to caste diversity and friendship. Although friendship with the other caste seems to be positively influenced by diversity in caste composition, these effects are imprecise. Only the likelihood of having atleast one new friend is weakly influenced by the caste diversity among neighbors [24]. The results in Table 1.13 imply that randomly assigning people to live with each other seems to make them more accepting of people from other groups, even if their inner circle of friends does not change. If not exposure to caste diversity, there may be a role that pre existing inner circles have in fostering current caste diverse friendships.

While conducting the survey, I ask a question on 'people known in the building from the previous slum'. I show the respondent the roster of the building asking them to identify those who they knew previously. From the administrative records, I can then decipher the caste of the person previously known. I show evidence in the online appendix for random assignment of previously known individuals, which allows me to use it as a proxy measure for previous contact. I also find high correlation between previous and current friendships, which indicates that those who more other caste before the move continue to maintain cross caste friendships.

It is possible that those who already had more other caste friends prior to the move could have more favorable attitudes, when exposed to greater caste diversity among immediate neighbors. To test this, I regress the outcomes on attitudes on an interaction of the caste diversity measure and the fraction of previous slum friends who are from another caste group [25].

The estimates in Column 2 of Table 1.14 show that intercaste trust in-

[24] The number of friends is also not influenced by the caste diversity measure (see Online Appendix).

[25] The specification is as follows:

$$y_{icf} = \alpha_c + \beta FractionOtherCasteHH_{icf} \times FractionPreviousFriend_{icf} + \gamma FractionOtherCasteHH_{icf} + \lambda FractionPreviousFriend_{icf} + X_{icf} + \epsilon_{icf}$$

where $FractionPreviousFriend_{icf}$ refers to the fraction of friends known previously to the individual from the other caste.

creases significantly for those who live in more caste diverse settings *and* had more friends from other castes prior to moving. This interaction does not have any additional impact on marriage or caste related beliefs (Table 1.14). These results indicate that prosocial attitudes may be facilitated simply through exposure, instead of directly affecting inner circles of friendships. This demonstrates the strength of weak ties Granovetter (1977), wherein close friendships seem to play a lesser role in fostering favorable attitudes, as compared to the much stronger effects of mere exposure to other caste groups.

1.8 Conclusion

In this paper, I examine the effect of cross caste contact between neighbors on individual attitudes towards trust and caste related attitudes. I use administrative records on random assignment of apartments within public housing to slum dwellers, to construct a measure for exposure to neighbors from other castes. To measure attitudes, I designed a survey and collected responses from 692 individuals residing in these sites. I find an increase in favorable attitudes with exposure to more neighbors from other castes. Inter caste trust increases with exposure to more neighbors from other castes. Support for inter caste marriage, in general as well as within the family, increases when exposed to more neighbors from other castes. Exposure to more neighbors from other castes makes people aware of greater caste injustice.

Additional results show that length of exposure to caste diversity matters for positive attitudes towards intercaste marriage. When splitting the sample by sub castes, I find that presence of the same sub caste on a floor may make caste identities appear more salient. The likelihood of making a new close friend from the other caste is a suggestive mechanism through which these effects take place. Having more friends from the other caste prior to moving may also have a role to play in enhancing inter caste trust. My findings support

the contact hypothesis, and in contrast to Rao (2019), I find strong effects with mere exposure, as compared to direct contact.

I rely on self reported attitudes and it may not be obvious to what extent attitudes translate into more accepting behaviors. For instance, in the case of questions related to inter caste marriage, responses supporting inter caste marriage may not necessarily translate into action, given the low incidence of inter caste marriage in India (Hortaçsu et al., 2019; Goli et al., 2013). In future, it may be possible to follow up with the sample and test actual behaviors in order to see if attitudes translate into more prosocial behaviors.

From a policy perspective, my results may have implications for the design of housing programs in other settings. While reallocating people to live in unfamiliar settings may come with costs such as loss of previous friendships (Barnhardt et al., 2017), there may be substantial benefits to living close to members of other social groups (Dragan et al., 2019). There is a need to examine the potential costs and benefits, both explicit and implicit, of such programs and potential tradeoffs through 'forced' integration (Miguel, 2004). My findings throw light on the reintegrating effects of housing policies, thus serving as a potential tool to reduce intergroup prejudice. Future research seeks to examine the longer term effects of exposure to neighbors from other groups on both behaviors and attitudes, to examine whether these effects grow stronger with time.

1.9 Tables

Table 1.1: Distribution of Responses to Trust Question

	General Trust		Trust Other Caste	
Response	%	N	%	N
Trust Completely	45.09%	312	29.62%	205
Trust a little	47.83%	331	31.21%	216
Do not trust too much	5.92%	41	30.06%	208
Do not trust at all	1.01%	7	7.37%	51
Don't Know/Can't Say	0.14%	1	1.73%	12
N	100%	692	100%	692

Notes: Table 1 shows the distribution of responses to questions on trust. General Trust represents responses to the question: 'How much do you trust people in general?'. Trust Other Caste represents responses to the question: 'How much do you trust individuals from another caste?'

Table 1.2: Distribution of Responses to Questions on Caste Related Attitudes

Panel A: Beliefs about Marriage				
	Inter Caste Marriage Ban		Inter Caste Marriage within Family	
Response	%	N	%	N
Do not Support at all	33.24%	230	14.16%	98
Do not Support too much	46.82%	324	29.48%	204
Support a little	10.40%	72	28.90%	200
Strongly Support	8.82%	61	22.25%	154
Don't know/can't say	0.72%	5	5.20%	36

Panel B: Caste Injustice		
	Caste Injustice	
Response	%	N
Increased	36.42%	252
Decreased	39.45%	273
Same as Before	24.13%	167

Panel C: Importance of Caste		
	Importance Caste	
Response	%	N
Yes	60.98%	422
No	38.01%	263
Can't Say	1.01%	7

Panel D: Affirmative Action		
	Support Reservation	
Response	%	N
Strongly Support	52.31%	362
Support a little	16.91%	117
Do not support much	14.45%	100
Do not support at all	11.85%	82
Don't now/Can't Say	4.48%	31
N	100%	692

Table 1.3: Descriptive Statistics of Surveyed Individuals

	SC/ST	Non SC/ST	Full Sample
	(1)	(2)	(3)
General Trust	0.975	0.948	0.959
	(0.155)	(0.222)	(0.197)
Trust Other Caste	0.604	0.589	0.594
	(0.490)	(0.492)	(0.491)
Against Marriage Ban	0.87	0.806	0.833
	(0.337)	(0.396)	(0.374)
Support Inter caste Marriage within Family	0.549	0.492	0.432
	(0.498)	(0.500)	(0.496)
Caste Injustice has Increased	0.411	0.402	0.401
	(0.493)	(0.491)	(0.491)
Support Reservation	0.739	0.660	0.693
	(0.440)	(0.474)	(0.461)
Caste is Important	0.571	0.635	0.609
	(0.496)	(0.482)	(0.488)
Fraction of Other Caste HH	0.497	0.562	0.535
	(0.271)	(0.286)	(0.281)
Age	36.06	35.08	35.48
	(22.26)	(13.80)	(17.78)
Female	0.521	0.52	0.001
	(0.970)	(0.975)	(0.974)
Completed Primary Education	0.717	0.768	0.747
	(0.451)	(0.422)	(0.435)
Employed	0.481	0.549	0.521
	(0.501)	(0.498)	(0.500)
Duration of Stay	2.122	1.975	2.036
	(1.304)	(1.243)	(1.270)
General	x	x	0.423
			(0.494)
General	x	x	0.163
			(0.370)
SC/ST	x	x	0.413
			(0.493)
N	286	406	692

Notes: mean coefficients; sd in parentheses. Data from author's own survey.
***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.4: Balance Tests

	SC/ST	Non SC/ST	Full Sample
	(1)	(2)	(3)
Dependent Var: Fraction of Other Caste HH			
Age	0.0008	-0.0008	-0.0006
	(0.0006)	(0.004)	(0.0007)
Male Age	0.0002	-0.0001	-0.00005
	(0.0004)	(0.003)	(0.0005)
Female	0.007	-0.001	-0.002
	(0.014)	(0.011)	(0.012)
Female Age	-0.0005	-0.0002	-0.0002
	(0.002)	(0.002)	(0.002)
Completed Primary	-0.028	0.003	-0.015
	(0.036)	(0.026)	(0.027)
Number of Family Members	-0.012	0.011	-0.005
	(0.025)	(0.016)	(0.013)
Age of Oldest Child	0.003	0.007	0.005
	(0.006)	(0.005)	(0.004)
Number of Children Before Move	-0.015	-0.028	-0.021
	(0.023)	(0.025)	(0.015)
Female Respondent	-0.132	-0.051	-0.035
	(0.131)	(0.186)	(0.094)
Other Backward Classes (OBC)	-	0.196***	-0.177***
		(0.054)	(0.055)
SC/ST	-	-	0.036
			(0.054)
Previous Slum FE	Y	Y	Y
N	286	406	692

Notes: Table 4 shows the regression of composition of other caste households on a given floor on baseline characteristics. General Caste is the omitted caste category. Standard errors are clustered at the floor level. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.5: Relationship between Trust and Exposure to Other Caste Neighbors

	General Trust		TrustOtherCaste	
	OLS	Probit	OLS	Probit
	(1)	(2)	(3)	(4)
Fraction of Other Caste HH	0.066	0.147	0.342*	0.352*
	(0.074)	(0.117)	(0.157)	(0.148)
OBC	0.034	0.032	-0.208	-0.211
	(0.044)	(0.043)	(0.157)	(0.148)
SC/ST	0.049	0.047	-0.096	-0.098
	(0.047)	(0.043)	(0.082)	(0.085)
Outcome Mean	0.937	0.937	0.603	0.603
Previous Slum FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
N	691	691	680	680

Notes: Each column represents a separate regression. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status, previous slum location and caste of interviewer. Results reported in the probit columns are the marginal effects. *General Trust*: Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people (0-Do not Trust, 1-Trust)? *ExtentTrustOtherCaste*: How much do you trust members of another caste? (0-Do not Trust, 1-Trust). ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.6: Relationship between Caste Attitudes and Exposure to Other Caste Neighbors

	AgainstMarriageBan		SupportIntercasteMarriage		CasteInjustice		ImportanceCaste		SupportReservation	
	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit	OLS	Probit
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Fraction of Other Caste HH	0.197**	0.206*	0.261**	0.267**	0.354**	0.351**	-0.048	-0.03	-0.144	-0.14
	(0.086)	(0.112)	(0.131)	(0.127)	(0.169)	(0.159)	(0.165)	(0.158)	(0.155)	(0.144)
OBC	0.183	0.180	0.079	0.076	-0.035	-0.033	-0.14	-0.15	-0.035	-0.032
	(0.084)	(0.081)	(0.123)	(0.120)	(0.116)	(0.115)	(0.127)	(0.129)	(0.115)	(0.113)
SC/ST	0.099	0.097	0.014	0.015	-0.046	-0.043	-0.155	-0.153	-0.046	-0.048
	(0.063)	(0.061)	(0.077)	(0.074)	(0.097)	(0.097)	(0.096)	(0.079)	(0.075)	(0.097)
Outcome Mean	0.8	0.8	0.542	0.542	0.52	0.52	0.601	0.601	0.692	0.692
Previous Slum FE	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
N	687	687	656	656	525	525	672	672	623	623

Notes: Each column represents a separate regression. Results reported in the probit columns are the marginal effects. Controls include age, education, employment status, previous slum location and caste of interviewer. Standard errors in parentheses and clustered at the floor level. *AgainstMarriageBan*: How much would you support a law prohibiting intercaste marriage? (0-Support, 1-Do not Support Marriage Ban (more accepting of intercaste marriage)) *SupportInterCasteMarriage*: How much do you support intercaste marriage within your own family? (0-Do not Support, 1-Support) *CasteInjustice*: In your opinion, has caste injustice decreased, increased or seen no change? (1-Increased, 0-Decreased) *ImportanceCaste*: In your opinion, is caste still as important in people's lives today as it was ten years ago? (0-Not Important, 1-Important) *SupportReservation*: How much do you support caste based reservation? (0-Do not Support, 1-Support). ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.7: Outcomes on Caste Attitudes Interacted with Caste Categories

	AgainstMarriageBan	SupportIntercasteMarriage	CasteInjustice	SupportReservation	ImportanceCaste
	(1)	(2)	(3)	(4)	(5)
Fraction of Other Caste HH	0.240*	0.380*	0.407*	-0.189	-0.175
	(0.132)	(0.197)	(0.216)	(0.201)	(0.205)
SC/ST	0.183	0.154	0.079	-0.009	-0.238
	(0.131)	(0.162)	(0.197)	(0.148)	(0.190)
Fraction of Other Caste HH × SC/ST	0.160	0.267	-0.209	-0.092	0.217
	(0.220)	(0.291)	(0.286)	(0.271)	(0.322)
N	687	656	525	623	672

Notes: Each column represents a separate regression. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status, previous slum location and caste of interviewer. *AgainstMarriageBan*: How much would you support a law prohibiting intercaste marriage? (0-Support, 1-Do not Support Marriage Ban (more accepting of intercaste marriage)) *SupportInterCasteMarriage*: How much do you support intercaste marriage within your own family? (0-Do not Support, 1-Support) *CasteInjustice*: In your opinion, has caste injustice decreased, increased or seen no change? (1-Increased, 0-Decreased) *ImportanceCaste*: In your opinion, is caste still as important in people's lives today as it was ten years ago? (0-Not Important, 1-Important) *SupportReservation*: How much do you support caste based reservation? (0-Do not Support, 1-Support). Omitted caste category is Non SC/ST. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.8: Outcomes on Trust Using Subcaste Variation

	General Trust	TrustOtherCaste
	(1)	(2)
MorethanOneSubcaste: SC/ST	-0.075	-0.062
	(0.059)	(0.143)
N	285	282
MorethanOneSubcaste: Non SC/ST	-0.021	-0.030
	(0.041)	(0.126)
N	406	398

Notes: Each column represents a separate regression . Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status, previous slum location and caste of interviewer *General Trust*: Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people (0-Do not Trust, 1-Trust)? *TrustOtherCaste*: How much do you trust members of another caste? (0-Do not Trust, 1-Trust). ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.9: Outcomes on Caste Attitudes Using Subcaste Variation

	AgainstMarriageBan	SupportIntercasteMarriage	CasteInjustice	SupportReservation	ImportanceCaste
	(1)	(2)	(3)	(4)	(5)
MorethanOneSubcaste: SC/ST	-0.022	-0.054	-0.131	0.303**	0.255*
	(0.077)	(0.136)	(0.139)	(0.115)	(0.149)
N	284	266	214	264	280
MorethanOneSubcaste: Non SC/ST	-0.020	0.065	0.007	0.042	0.057
	(0.083)	(0.098)	(0.131)	(0.099)	(0.113)
N	403	390	311	359	392

Notes: Each column represents a separate regression. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status, previous slum location and caste of interviewer. *AgainstMarriageBan*: How much would you support a law prohibiting intercaste marriage? (0-Support, 1-Do not Support Marriage Ban (more accepting of intercaste marriage)) *SupportInterCasteMarriage*: How much do you support intercaste marriage within your own family? (0-Do not Support, 1-Support). *CasteInjusticeAttitude*: In your opinion, has caste injustice decreased, increased or seen no change? (0-Decreased, 1-Increased) *ImportanceCaste*: In your opinion, is caste still as important in people's lives today as it was ten years ago? (0-Not Important, 1-Important) *SupportReservation*: How much do you support caste based reservation? (0-Do not Support, 1-Support). ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.10: Outcomes on Trust Interacted with Years Since Move

	General Trust (1)	Extent Trust Another Caste (2)
Fraction of Other Caste HH	0.052	0.285
	(0.077)	(0.177)
Years Since Move	-0.080	0.062
	(0.123)	(0.175)
Fraction of Other Caste HH × Years Since Move	0.118	-0.004
	(0.170)	(0.287)
Caste Fixed Effects	Y	Y
N	691	680

Notes: Each column represents a separate regression. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status, previous slum location and caste of interviewer. *General Trust*: Generally speaking, would you say that most people can be trusted or that you need to be very careful in dealing with people (0-Do not Trust, 1-Trust)? *TrustOtherCaste*: How much do you trust members of another caste? (0-Do not Trust, 1-Trust). Years Since Move: Less than 3 years is the omitted category. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.11: Outcomes on Attitudes Towards Caste Interacted with Duration of Stay

	AgainstMarriageBan	SupportInterCasteMarriage	CasteInjustice	SupportReservation	ImportanceCaste
	(1)	(2)	(3)	(4	(5)
Fraction of Other Caste HH	-0.249**	0.130	0.305	-0.096	-0.109
	(0.108)	(0.136)	(0.189)	(0.165)	(0.171)
Years Since Move	-0.099	0.417**	0.187	0.135	-0.034
	(0.121)	(0.174)	(0.183)	(0.170)	(0.217)
Fraction of Other Caste HH × Years Since Move	0.201	0.635**	0.136	-0.325	0.197
	(0.217)	(0.297)	(0.251)	(0.316)	(0.368)
Caste FE	Y	Y	Y	Y	Y
N	687	656	525	623	672

Notes: Each column represents a separate regression. Controls include age, education, employment status, previous slum location and caste of interviewer. *AgainstMarriageBan*: How much would you support a law prohibiting intercaste marriage? (0-Support, 1-Do not Support Marriage Ban (more accepting of intercaste marriage)) *SupportInterCasteMarriage*: How much do you support intercaste marriage within your own family? (0-Do not Support, 1-Support). *CasteInjusticeAttitude*: In your opinion, has caste injustice decreased, increased or seen no change? (0-Decreased, 1-Increased) *ImportanceCaste*: In your opinion, is caste still as important in people's lives today as it was ten years ago? (0-Not Important, 1-Important) *SupportReservation*: How much do you support caste based reservation? (0-Do not Support, 1-Support). Years Since Move: Less than 3 years is the omitted category. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.12: Relationship between Friendship and Exposure to Other Caste Neighbors

	FractionFriend (1)	AtleastOneFriend (2)	FractionNew (3)	AtleastOneNew (4)
X: Fraction of Other Caste HH	0.056	0.005	0.034	0.076*
	(0.122)	(0.116)	(0.095)	(0.046)
Outcome Mean	0.512	0.713	0.44	0.971
Caste FE	Y	Y	Y	Y
Controls	Y	Y	Y	Y
N	692	692	692	692

Notes: Each column represents a separate regression. *FractionFriend* is defined as the proportion of friends from the other castes. *AtleastOneFriend* is defined as a dummy which takes a value of 1 if the individual has atleast one other caste friend. *FractionNew* is defined as the proportion of new friends from the other castes. *AtleastOneNew* is defined as a dummy which takes a value of 1 if the individual has atleast one other caste new friend. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status, previous slum location and caste of interviewer. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.13: Trust Outcomes: Interaction between Exposure to Other Caste Neighbors and Previous Slum Friends

	General Trust	TrustOtherCaste
	(1)	(2)
Fraction of Other Caste HH	0.062	0.340***
	(0.071)	(0.159)
FractionPreviousFriend	0.034	0.262***
	(0.278)	(0.121)
FractionOtherCaste×PreviousFriend	0.272	0.420***
	(0.404)	(0.208)
Outcome Mean	0.897	0.271
Caste FE	Y	Y
Controls	Y	Y
N	691	680

Notes: Each column represents a separate regression. *FractionPreviousFriend* is defined as the previously known residents from another caste. *AtleastOnePreviousFriend* is a dummy which takes the value of 1 if the person knows atleast one person from the slum he/she previously stayed in. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status and caste of interviewer. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.14: Outcomes on Caste Attitudes: Interaction between Exposure to Other Caste Neighbors and Previous Slum Friends

	AgainstMarriageBan	SupportIntercasteMarriage	CasteInjustice	ImportanceCaste	SupportReservation
	(1)	(2)	(3)	(4)	(5)
Fraction of Other Caste HH	-0.199**	0.257**	0.351**	-0.045	-0.146
	(0.087)	(0.128)	(0.163)	(0.21)	(0.208)
FractionPreviousFriend	-0.207	0.361	0.61	0.227	-0.141
	(0.233)	(0.264)	(0.303)	(0.244)	(0.25)
FractionOtherCaste×PreviousFriend	-0.02	0.097	0.28	-0.226	0.319
	(0.37)	(0.393)	(0.473)	(0.395)	(0.44)
Outcome Mean	0.744	0.541	0.521	0.601	0.692
Caste FE	Y	Y	Y	Y	Y
Controls	Y	Y	Y	Y	Y
N	687	656	525	672	623

Notes: Each column represents a separate regression. *FractionPreviousFriend* is defined as the previously known residents from another caste. *AtleastOnePreviousFriend* is a dummy which takes the value of 1 if the person knows atleast one person from the slum he/she previously stayed in. Standard errors in parentheses and clustered at the floor level. Controls include age, education, employment status and caste of interviewer. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 1.15: Effect of Exposure to Other Caste Neighbors on Survey Participation

	Participation in Survey
Fraction Other Caste HH	0.028
	(0.064)
OBC	-0.014
	(0.032)
SC/ST	-0.02
	(0.025)
N	947

Notes: This table shows the regression of Survey Participation on the composition of other caste households. Standard errors are clustered at the floor level. Participation in Survey: 0 if the household is not in the survey, 1 if the household is in the survey. Site fixed effects included. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

1.10 Figures

Figure 1.1: Program and Survey Timeline

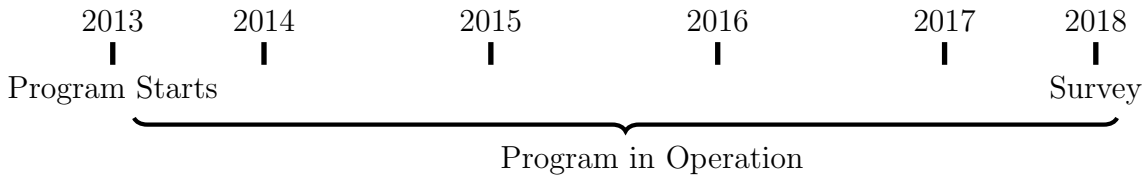


Figure 1.2: Distribution of Year of Relocation

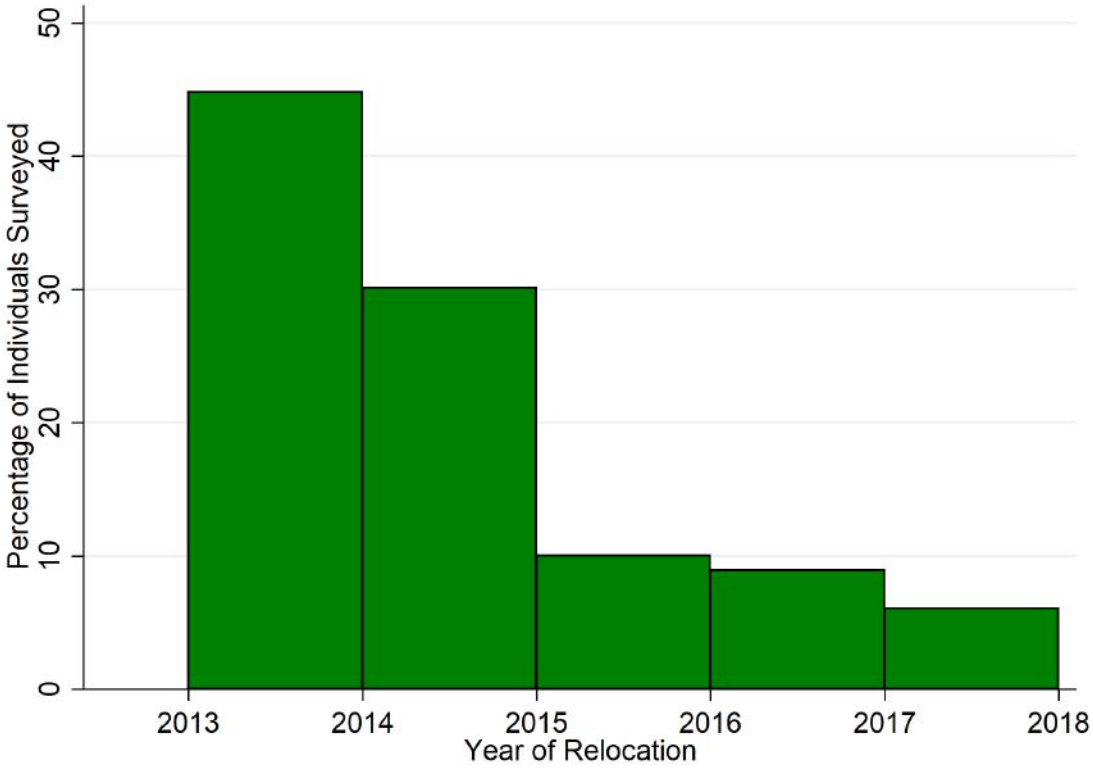


Figure 1.3: Relocation Site

Figure 1.4: Distribution of Participating and Assigned Households

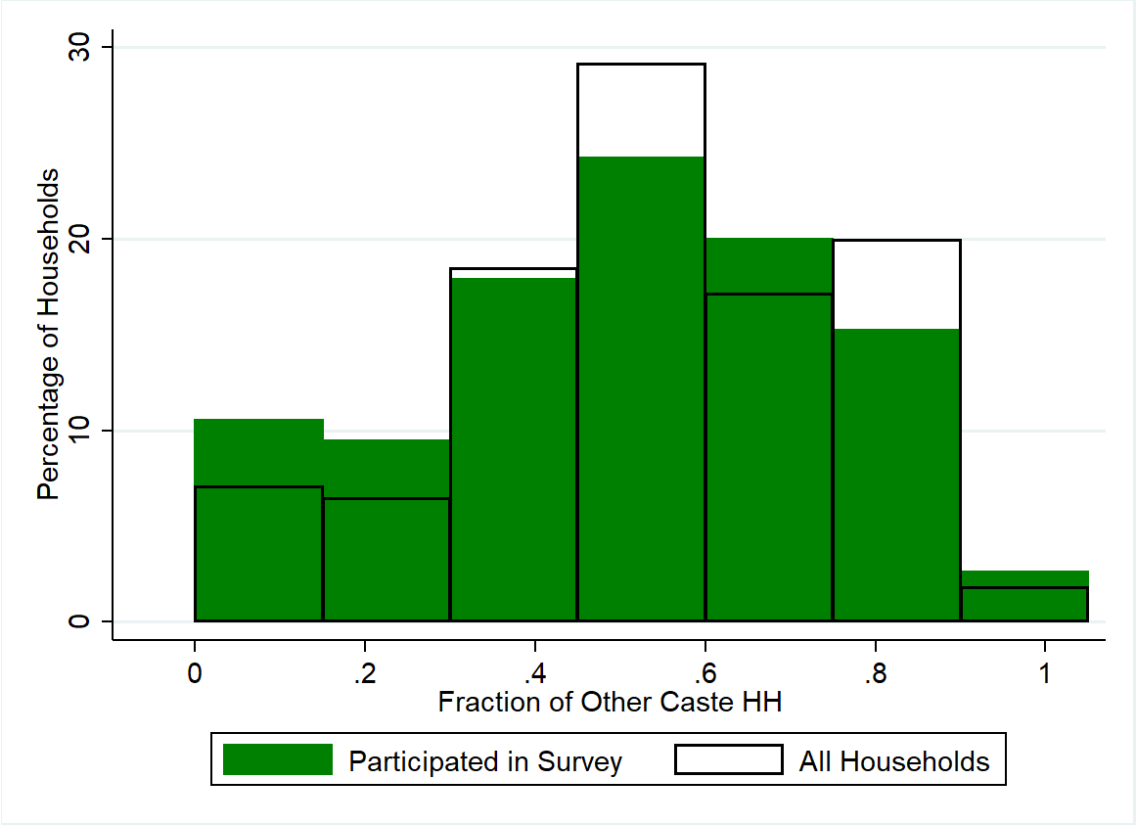


Figure 1.5: Distribution of Surveyed Individuals Exposed to Fraction of Other Caste Households

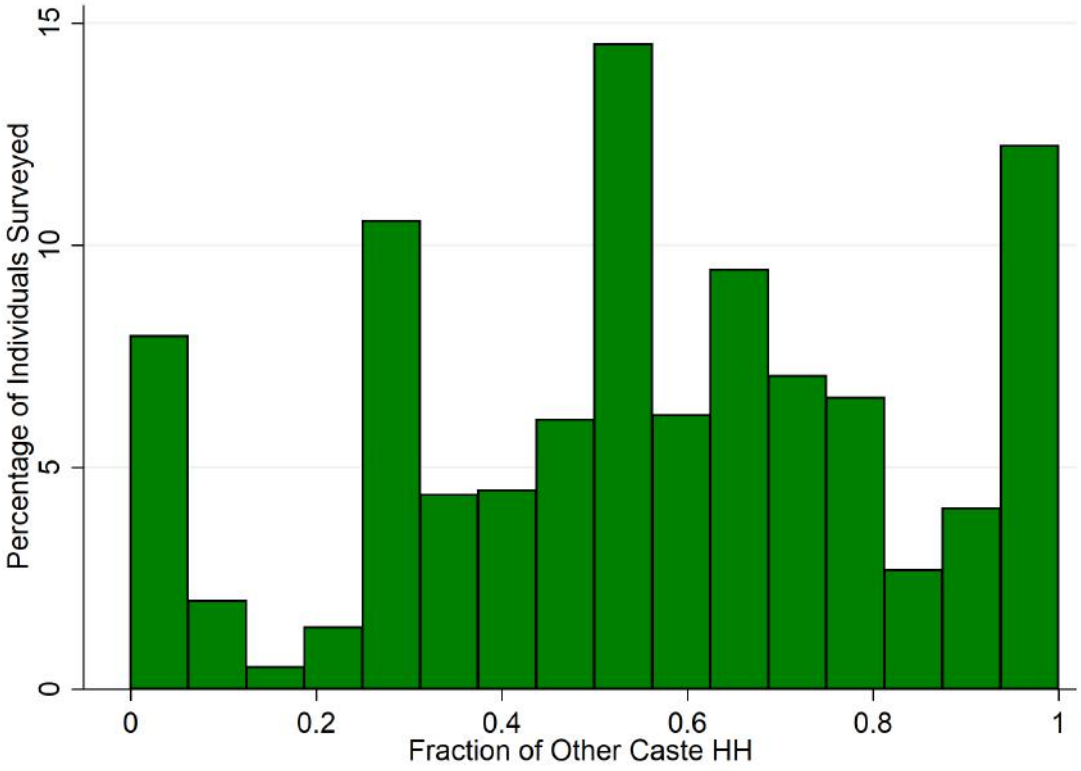
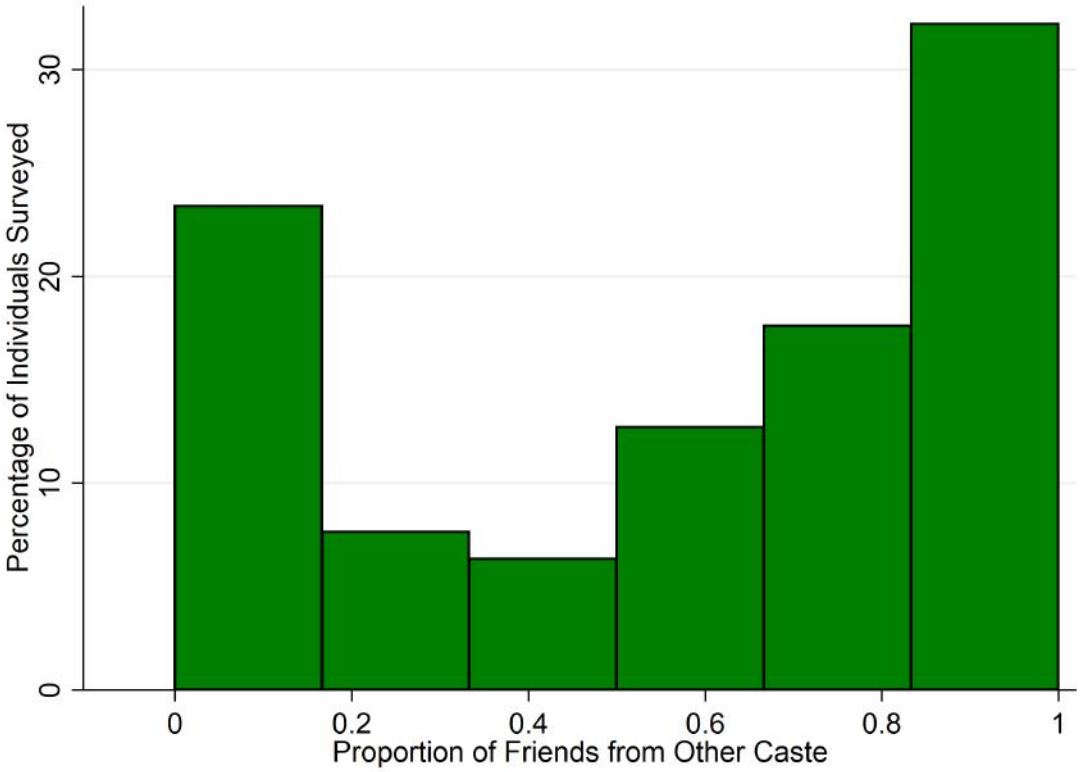
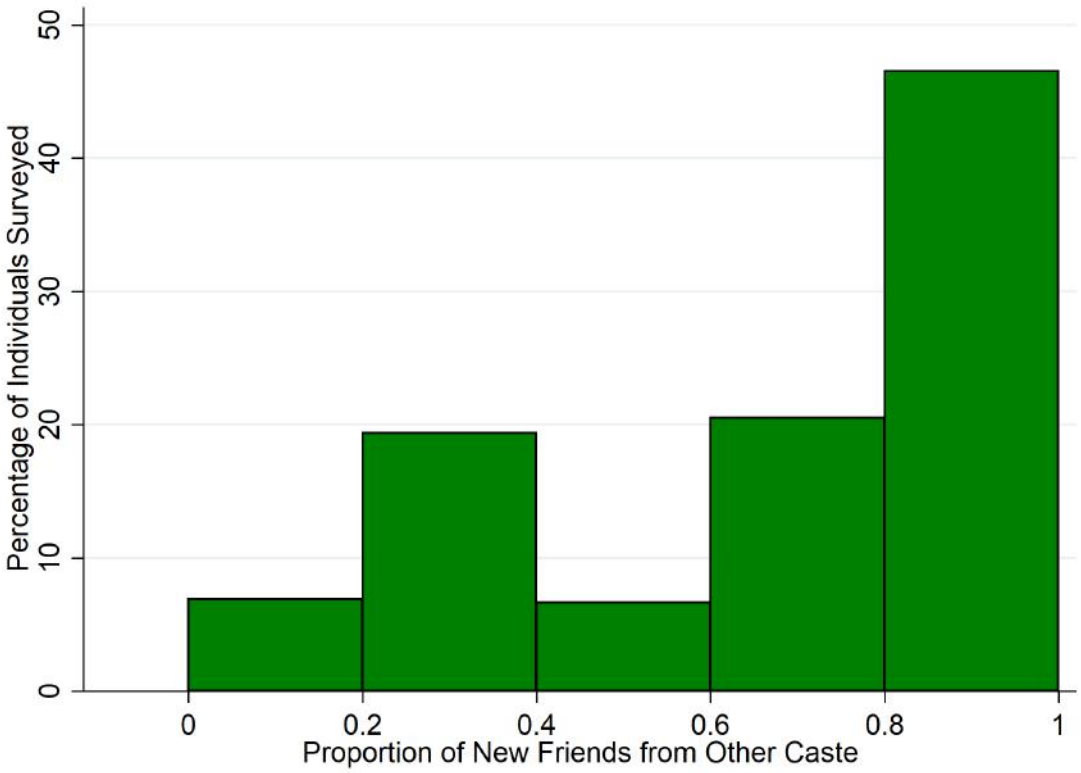


Figure 1.6: Distribution of Friends



Notes: This figure represents the fraction of friends belonging to another caste. Values range from 0-Having no friends from another caste to 1-Having all 5 friends from another caste.

Figure 1.7: Distribution of New Friends



Notes: This figure represents the fraction of new friends belonging to another caste. Values range from 0-Having no new friends from another caste to 1-Having all 5 new friends from another caste.

1.11 Appendix

1.11.1 Informed Consent Form

1. **Why am I being invited to take part in a research study?**

   I invite you to take part in a research study which studies the effect of social connections on employment and outcomes related to discrimination. My goal is to examine interpersonal relationships within the slum relocation site. Approximately 4,000 people (=1,000 households) will participate in this study. As an adult living in this slum relocation site, your view is extremely important. If you agree to be in this study, this is what will happen:

   - You will be asked to participate in filling up two questionnaires for the duration of one hour at your residence
   - You may be contacted for another interview within 15 days of filling up the questionnaires, if required. I will ask your permission before I begin the interview so that you can decide not to participate at any time.

2. **Why is this research being done?**

   This research is being done to learn more about how people's lives are shaped by where they live and their interactions with their neighbors and friends.

3. **How long will the research last?**

   We expect that you will be in this research study for a total of one hour. You may be contacted for another interview within 15 days of filling up the questionnaires. Your consent will be taken again for the interview, and you can refuse to participate, if you wish to do so.

4. **How many people will be studied?**

   We expect to enroll about 4000 people in this research study.

5. **What happens if I say yes, I want to be in this research?**

   If you take part in this study, I will ask you to respond to two questionnaires at your residence, on one occasion. This should take about one hour. You may be interviewed again within 15 days of giving the first interview, if required. Your consent will be taken again in such a case and you are free to refuse participation in the follow up round. I will read through the questions, to ensure the questions are clear, and will record your responses in an electronic software. The questions that you will be asked will be used to help me:

   - Learn more about you
   - Learn more about your employment and standard of living
   - Understand how you feel towards your neighbors and friends staying at the relocation site

   I will ask you questions about your family members, employment and attitudes towards friends and caste.

6. **What happens if I do not want to be in this research?**

   You can choose not to take part in the research and it will not be held against you. Choosing not to take part will involve no penalty or loss of benefit to which you are otherwise entitled.

7. **Is there any way being in this study could be bad for me?**

   There are no foreseeable risks related to the procedures conducted as part of this study. If you choose to take part and undergo a negative event you feel is related to the study, please inform your study team.

8. **Will I get anything for being in this study? / Will being in this study help me in any way?**

   There is no compensation for being part of this study. You are not likely to benefit directly from participating in the study. However, we hope that the information gained from the study will help future residents in relocation sites like you.

9. **What happens to the information collected for the research?**

   There is a risk that someone could see your responses or personal information by mistake but I will try my best to keep your information confidential. I will not share any of your personal information in public and you will not be named in any reports. To minimize the risks to confidentiality, I will enter your individual responses directly into a computer and the data will be protected by a password on the computer. Only the research team and institutional review boards reviewing this study will have access to the study data. When the research is completed, I may save your responses (without any personally identifiable information) for use in future research done by me.

10. **Who can I talk to?**

    If you have questions, concerns, or complaints, or think the research has hurt you, you can email me at sbhattacharya3@uh.edu or call me at (713) 743-3800. You can also contact Naim Keruwala, Independent Researcher at naimkeruwala@gmail.com or call him at +91 9909 180 356. This research has been reviewed and approved by the University of Houston Institutional Review Board (IRB). You may also talk to them at (713) 743-9204 or cphs@central.uh.edu.

1.11.2 Baseline Questionnaire

Note to enumerator: This is to be asked to all households where atleast one adult respondent has granted consent to administer the survey. This survey is expected to be completed in 30 minutes. For households where there are more than 2 consenting adults, the team will split up and administer the survey separately to each adult. Begin with the following script: We will begin by asking you some questions about your family, employment, and your experiences living in this location.

A. General Information

1. What is your name? (Name of the Respondent)
2. What is the name of the household head? (Name of Head of the Household)
3. Relationship of Respondent to Household Head
4. Age of Respondent
5. Gender of Respondent

   1 Male

   2 Female

6. Which slum were you moved from? (*For renters, record their original address*)
7. Year of Relocation
8. How many family members live with you? (From 1,...n)

   Note to enumerator: For all family members listed in Question 8, Questions 9-30 seek to record details of each family member. The respondent is to answer these questions for each family member.

B. Family Composition

9. Name of family member

10. Age of family member

11. Gender of family member

    1 Male

    2 Female

12. What is family member's relationship to respondent?

    1 Head of Household

    2 Wife/Husband

    3 Child

    4 Grandchild

    5 Niece/Nephew

    6 Father/Mother

    7 Sister/Brother

    8 Other Relative

13. What is member's educational level?

    1 Illiterate

    2 Primary

    3 Middle

    4 Secondary

    5 Senior Secondary

    6 Graduation

    7 Post Graduation

    8 Diploma/Technical Education

14. Description of member's work

    1 Self employed

    2 Skilled Construction labor

    3 Skilled Labour

    4 Unskilled Labour

    5 Private Service

    6 Government Service

    7 Miscellaneous

    8 Professional

    9 Not Applicable

C. Employment, Income and Schooling

15. Location of member's workplace

16. Nature of Employment of member

    1 Regular: Daily Work at the same firm

    2 Casual: Work only on demand less than five days a week

17. Member's status if regular

    1 Part time-Less than 8 hours

    2 Full Time: 8 hours or more

18. Number of days worked in a week if member does casual work

19. How long has member been at the present job?

    1 Only 1 month

    2 1-2 months

    3 2-3 months

4 3-6 months

5 6-12 months

6 More than 12 months

20. Frequency of income for member

    1 Daily

    2 Weekly

    3 Monthly

    4 On Completion of Work

21. Income earned by member per month/per day

22. How did member obtain/find this job?

    1 Through advertisement/formal process

    2 Through recommendations by friends and family

    3 Contractor

    4 Local Agent

    5 Personal Scouting

    6 Labour *Mandi*

    7 Others

23. For members who are children, which area of city is school of each child in?

24. Mode of travelling to work/school for member

    1 Cycle

    2 2 Wheeler

    3 3 Wheeler(Auto)

4 Bus

5 Train

6 Walking

25. Cost of Travel per month/per day for member

26. Time taken to travel for member one way to work or school

27. Has member been unemployed at any time since shifting to this location?

1 Yes

2 No

28. If yes, for how long has member been unemployed?

1 Only 1 week

2 1-2 weeks

3 2 weeks-1 month

4 1-2 months

5 2-3 months

6 3-6 months

7 6-12 months

8 More than 12 months

29. Reason for member's unemployment

1 Present work does not pay well

2 No job satisfaction

3 Lack of job security

4 Workplace too far

5 Ill health

6 Wants a regular salary

7 Other reasons

D. Miscellaneous

Note to enumerator: Questions 30 and 31 are open ended questions. Allow anywhere between 10-12 minutes for these questions to be answered.

30. How do you feel about the current work situation?

31. How do you feel about work opportunities in this area?

32. Colour of Ration Card

    1 Yellow

    2 Orange

    3 White

1.11.3 Attitudes Questionnaire

Note to enumerator: This is to be asked to only those households where the family residing in the household matches the details mentioned in the administrative roster. Begin by thanking the respondent for providing information in the baseline survey and introduce the attitudes module as follows: 'Now I will ask you some questions regarding your attitudes towards caste and your interactions with people in this building.'

A.Interactions

Note to enumerator: For Question 1, please enter the apartment number of the friend mentioned, after verifying this from the copy of the roster provided.

1. Who are your five closest friends within this building?

2. Have you borrowed/lent money to any of the five people mentioned in question 1 in the past?

1 Borrowed

2 Lent

3 Borrowed and Lent

4 Neither borrowed nor lent

3. How much money have you borrowed/lent to these people?

1 Less than INR 500

2 INR 500-1000

3 INR 1000-1500

4 More than INR 1500

Note to enumerator: For Question 4, please enter the apartment number of the friend mentioned, after verifying this from the copy of the roster provided. For Questions 5 and 6, please show the copy of the roster provided to you. This list has all information from the original roster except the caste and subcaste of the household

4. Name five people in your building that you do not like to talk to

5. This is a list of the residents in this building. Can you identify those from your caste?

6. From this list, can you tell me the apartment owners who you knew in your previous slum?

7. Did any of the people mentioned in Question 1 help you find a job?

1 Yes

2 No

8. If answer to previous question is yes, which friend recommended you for the job?

Note to enumerator: For Question 8, verify apartment number of friend mentioned from the copy of the roster

B. General Attitudes

Note to enumerator: The order of questions 9 and 10 will be randomized by the survey software. One of these two questions will appear in this section and the other will appear in Section E. Option 5 is to be entered as an answer only if the respondent says so themselves.

9. How much do you trust people in general?

   1 Trust Completely

   2 Somewhat Trust

   3 Do not trust very much

   4 Do not trust at all

   5 Don't Know/Can't Say

10. How much do you trust individuals from another caste/religion?

    1 Trust Completely

    2 Somewhat Trust

    3 Do not trust very much

    4 Do not trust at all

    5 Don't Know/Can't Say

11. In your opinion, should a married woman, whose husband earns a good living, work outside the home or not?

    1 Yes

    2 No

    3 Can't Say

12. When your family has lunch or dinner, do the women usually eat with the men?

    1 Women and men eat together

    2 Women eat first

    3 Men eat first

    4 Nothing is fixed/ Other arrangement

C. Reservations: Women and Low Caste

13. In government colleges and jobs, the government keeps certain openings just for women. In some places, the government also keeps certain openings for those from disadvantaged castes. This is called reservation. Before today, had you heard of reservations?

    1 Yes

    2 No

    Note to enumerator: Questions 14-17 will show up on the software only if the response to Question 13 is 'yes'. If 'no', the software will go to section D directly.

14. In your opinion, how much do you support reservation for women?

    1 Strongly Support

    2 Somewhat Support

    3 Do not Support somewhat

    4 Do not Support at all

    5 Don't Know/Can't Say

15. How much do you support caste based reservation?

    1 Strongly Support

2 Somewhat Support

3 Do not Support somewhat

4 Do not Support at all

5 Don't Know/Can't Say

Note to enumerator: Questions 16 and 17 are open ended questions. Allow 3-5 minutes for answering both questions.

16. Why do you favor/oppose having reservations based on caste?

17. Why do you think the government has reservations?

D. Marriage

Note to enumerator: The order of questions 18 and 19 will be randomized by the survey software. These questions will have two versions: one for caste and the other for subcaste. One of these two questions will appear in this section and the other will appear in Section E. Option 5 is to be entered as an answer only if the respondent says so themselves.

18. How much do you support a law prohibiting inter caste marriage?

1 Do not Support at all

2 Do not Support somewhat

3 Somewhat Support

4 Strongly Support

5 Don't Know/Can't Say

19. How much do you support inter caste marriage within your own family?

1 Do not Support at all

2 Do not Support somewhat

3 Somewhat Support

4 Strongly Support

5 Don't Know/Can't Say

20. Does anyone in your family believe in/practice untouchability?

    1 Yes

    2 No

21. Do you believe in/practice untouchability?

    1 Yes

    2 No

22. Do you have any friends or acquaintances who are Dalits?

    1 Yes, a close friend

    2 Yes, an acquaintance

    3 No, no one

23. In the past few years, have you accepted an invitation for a meal from a member of another caste?

    1 Yes

    2 No

24. In the past few years, has a friend from another caste come to your home to have food?

    1 Yes

    2 No

25. Has anyone in the building disrespected or insulted you because of your caste?

    1 Yes

2 No

26. After moving to this location, has it happened that you were not recommended for a job because of your caste?

    1 Yes

    2 No

27. Has it ever happened that you did not get paid as much as you were supposed to be paid for work because of your caste?

    1 Yes

    2 No

28. Have you faced improper treatment at work because of your caste?

    1 Yes

    2 No

29. In your opinion, has caste injustice decreased, increased, or stayed the same as compared to ten years ago?

    1 Decreased

    2 Increased

    3 Same as Before

    In your opinion, is caste as important in people's lives today as it was 10 years ago?

    1 Yes

    2 No

    3 Can't Say/Don't Know

E. Safety and Transport

30. How safe do you feel safe in this neighborhood?

    1 Not at all safe

    2 Somewhat safe

    3 Very Safe

31. What time do you usually get back home?

32. Is there any reason for not staying out of the house after a particular hour in the evening? If so, what is the reason?

    1 Work is done before

    2 To take care of family

    3 Lack of affordable transport options in the evening

    4 Fear of safety

33. Do you have access to transport facilities after it gets dark?

    1 Rarely

    2 Sometimes

    3 Most of the time

    4 Never

Chapter 2

Technology in Agriculture and Religious Conflict

2.1 Introduction

There has been evidence to show that even in ethnic and religious conflict, where violence seems to be instigated due to cultural differences, economic factors play a key role (Mitra and Ray, 2014; Miguel, 2005). The introduction of technology in labor intensive sectors is one such economic channel through which conflict can be influenced. The effect of introducing technology in these sectors is unclear: it may lead to an increase in productivity and thus reduce conflict. However, if the technology displaces labor in these sectors, it may reduce productivity and increase the incentive to engage in conflict instead. I examine the effect of a technological intervention, the Green Revolution, which introduced mechanization and improved cropping methods in the labor intensive Indian agricultural sector, on the onset and severity of Hindu Muslim riots.

The Green Revolution (henceforth GR) was an agricultural transformation introduced in India in 1967, and ushered in an era of heavy mechanization and advanced technology, with the objective of increasing agricultural productivity. A major component of the GR was the introduction of High Yielding Vari-

ety (HYV) seeds, which required large amounts of controlled irrigation Parayil (1992). Therefore, HYV seeds were disseminated more to districts with greater pre-existing irrigation infrastructure. This feature of the policy generates differential dissemination of the technology based on pre- existing irrigation intensity levels, which I use to construct an instrument for the spread of the Green Revolution.

I use the 1966 level irrigation intensity in the district as a measure of suitability to the adoption of HYV seeds. I interact this cross sectional measure of suitability with a time dummy representing introduction of the Green Revolution in India in 1967. This instrument has been used to plausibly identify the effects of the Green Revolution on other outcomes, such as political outcomes and insurance networks (Munshi and Rosenzweig, 2009; Dasgupta, 2018). I look at the effects of the policy on incidence and intensity measures of riots. Incidence measures include the probability of a riot occurring and number of riots in a given year. Intensity measures capture the severity of a riot and include the number of people killed, an indicator variable for whether anyone was killed and the duration of a riot in days. I combine district level datasets on agriculture and riots , which allows me to test the effect of the introduction of GR on religious conflict between 1957-85.

I find a significant increase in the duration of a riot after the introduction of the Green Revolution. The effects on other measures of conflict suggest an increase in the incidence and intensity of conflict. Additionally, I find that in a year with a good rainfall shock, the exacerbating effects of the Green Revolution on conflict reduce. I find suggestive evidence of increased conflict in rice growing districts as well as districts in the northern region. The availability of income or resources may not always have the same effect on conflict (Lyall et al., 2018; Dube and Vargas, 2013; Adhvaryu et al., 2018). My results suggest that as a result of being displaced by technological innovation, people may have greater incentives to grab resources and engage in conflict.

The empirical strategy addresses endogeneity concerns that can arise from examining the effect of area under HYV cultivation on religious riots. It is possible that districts with higher HYV adoption rates may have differential incidence and intensity. The baseline specification includes district fixed effects which controls for all the time invariant district characteristics which are associated with the instrument and which also affect religious rioting. State by year fixed effects control for variation in year wise pattern of riots across states. This identification strategy thus allows me to compare the change in conflict as a result of HYV crop adoption within a district in a given year. I provide evidence on the exclusion restriction as well as robustness of my estimates to alternate specifications.

There is evidence on the ameliorating effects of social welfare programs on conflict. Fetzer (2014) studies the impact of social insurance on conflict, measured by the introduction of a large scale employment guarantee scheme in India, and finds a decline in both the incidence and intensity of conflict. Field et al. (2008) find that imperfect property rights are an important determinant of religious conflict. Khanna and Zimmermann (2014) assess the effect of a large scale employment guarantee scheme in India on insurgency related violence and find that there is more police action and a reduction in the incidence of such violence. Nunn and Qian (2014) study the impact of frequency of US food aid provision as well as wheat production in the US on both the frequency and the incidence of conflict in recipient countries. They find a significant effect on the incidence of conflict but no such effect on the intensity margin. Additional mechanisms may also play a role, such as prosperous farmers being able to invest in protection, which may reduce the incidence of conflict (Mitra and Ray, 2014).

However, the role of technology in influencing conflict has been relatively understudied. Moreover, evidence on the role technology plays is mixed. Pierskalla and Hollenbach (2013) find that the spread of cell phone technology across

Africa allows for better intragroup coordination and significantly increases the probability of violence. Acemoglu et al. (2017) focus on the impact of health technology on the effect of population and social conflict in a cross country analysis and find that countries with higher exogenous increases in population experienced more social conflict. The paper closest to my study is Iyigun et al. (2017), who use the introduction of the potato to study the effect permanent increase in agricultural productivity in the period from 1400-1900 in a cross country analysis. They exploit variation in suitability to potato cultivation to examine the effect on the incidence of conflict, and find that the introduction of the potato reduced conflict in areas more suitable to potato cultivation. My paper adds to the existing literature on the causal effect of agriculture on conflict (Wischnath and Buhaug, 2014; Roy, 2012), as well as the literature on economic factors determining religious conflict in India (Iyer and Shrivastava, 2015; Field et al., 2008; Bohlken and Sergenti, 2010). My paper contributes to the growing literature on the introduction of new technology in agriculture, as well as the literature on adaptation to climate shocks (Burke et al., 2015).

The paper is organised as follows: Section 2 provides background information on the Green Revolution and religious conflict in India, Section 3 discusses the empirical strategy, Section 4 describes the data, Section 5 and 6 discuss results, Section 7 examines the validity of the exclusion restriction, Section 8 provides a discussion on the results and Section 9 concludes.

2.2 Background

2.2.1 Riots in India

Religious violence between Hindus and Muslims in India dates back to the period before Partition. After India gained independence, religious riots have been sporadic but occur at regular intervals. While these riots are often attributed to underlying religious tension, there is evidence to show that they

have also been instigated by economic conditions. Income shocks make it easier for elites to gain support, particularly if Hindus and Muslims blame each other for unemployment or falling incomes (Esteban and Ray, 2011; Mitra and Ray, 2014; Bohlken and Sergenti, 2010). Figure 1 shows the average number of religious riots in India which occurred between 1950 and 1990. In the period corresponding to the Green Revolution, that is between 1967 and 1985, the figure shows a sudden spike in the incidence of conflict, which makes the case for examining the potential effect of the Green Revolution on religious conflict.

2.2.2 The Green Revolution

The Green Revolution ushered a technological revolution in Indian agriculture in 1967 as a response to the famine in 1965-66. It aimed to increase the output of wheat and rice in the country through the introduction of High Yielding Variety (HYV) seeds as well as the introduction of double cropping methods (Janaiah, 2005). These genetically engineered seeds allowed for significantly greater production of foodgrains than had been possible earlier. It was introduced in the districts which had adequate pre existing irrigation infrastructure. The program led to a huge increase in yields from 1966-1985, with 17 million tons of wheat produced in 1968 compared to 6 million tons of wheat produced in 1947 (Moscona, 2017). HYV crops were taken up widely across India over the next two decades, but the takeup rate depended on the water intensity of the district (Dasgupta, 2018). The effects of the Revolution began to dissipate after 1985, with agricultural yields declining as a result of diminishing returns to land. Moreover, the program was highly selective in spread effects and was largely restricted to the original treatment districts. By the 2000's, investment in agriculture saw a sharp decline (Pingali, 2012). This is also the reason I restrict the sample for my study to 1985, in order to capture the effect of the Green Revolution while it was in still in operation. There have been several studies which have studied the effects of the Green Revolution in

India on outcomes such as agricultural productivity (Moscona, 2016), single party dominance in electoral politics (Dasgupta, 2018), insurance (Munshi and Rosenzweig, 2009) and social networks (Munshi, 2004). However, to the best of my knowledge, there has been no study to examine the causal relation that the Green Revolution may have with religious conflict in India.

Figures 2 and 3 show the average share of land under HYV wheat and rice cultivation respectively. The mean share of land used for HYV cultivation sees an increase post 1967, and these increases are more pronounced for rice and wheat. The same holds true for the mean share of land under HYV cultivation for jowar, bajra and maize. Figure 4 depicts the spread of the share of agricultural land under HYV cultivation by the years 1973 and 1985. The maps depict the gradual increase in area under HYV cultivation after the Green Revolution in 1967.

2.3 Empirical Strategy

The OLS specification regresses a measure of conflict on the share of agricultural land in a district under HYV cultivation. The specification for the same is as follows:

$$y_{dt} = \beta_0 + \beta_1 HYVshare_{dt} + \gamma_d + \delta_{st} + \theta_t + \phi X_{dt} + \epsilon_{dt} \tag{2.1}$$

where d represents district, s represents state and t represents year. β_1 is the coefficient of interest, which shows the marginal effect of land under HYV on conflict. I include district level demographic controls. The specification also includes district fixed effects, γ_d, year fixed effects, θ_t as well as a state time year trend, δ_{st}. This allows me to look at changes in the share of area under HYV cultivation within a district and its resulting impact on conflict. To control for correlation between errors within districts over time, I cluster standard errors at the district level.

There may be unobservables which affect both HYV and conflict. More-

over, there is an issue of sampling error in agricultural surveys from which HYV adoption data is compiled. Hence, I use the variation in pre existing irrigation intensity across districts to address potential bias. This approach also minimizes the aforementioned measurement error (Dasgupta, 2018).

This approach allows me to exploit one of the key features of the Green Revolution: areas which already had the requisite irrigation infrastructure in place prior to the Green Revolution had a greater share of agricultural area under HYV cultivation. This is because HYV seeds were water intensive and delivered high yields only in areas with access to controlled irrigation facilities. This makes irrigation intensity a stronger predictor of area under HYV cultivation, as compared to other instruments such as the presence of groundwater or aquifers (Dasgupta, 2018). I test the correlation between the pre existing irrigation intensity measure and area under HYV cultivation using the following regression:

$$HYVShare_{dt} = \alpha_0 + \alpha_1 Int_d \times After_t + \alpha_2 Int_d + \alpha_3 After_t + \gamma_d + \delta_{st} + \theta_t + \phi X_{dt} + \epsilon_{dt} \tag{2.2}$$

where d represents district, s represents state and t represents time. $HYVShare_{dt}$ is the share of agricultural area in a district under HYV cultivation. $After_t$ is the dummy which takes the value of 1 for the years post 1967, when the Green Revolution was introduced. Int_d is the cross sectional measure of irrigation intensity in 1966. Irrigation intensity is defined as the share of net cropped area that is under irrigation. $Int_d \times After_t$ is the instrument, which is the interaction of irrigation intensity in 1966 interacted with a time dummy that 'switches on' for the year 1967 and after. α_1 is the coefficient of interest, which measures the correlation between the instrument and the instrumented variable. The equation includes district fixed effects, γ_d as well as a state time year trend, δ_{st} and district level demographic controls,X_{dt}.

The reduced form specification estimates the effect of the instrument on the

outcome of interest in a difference in differences framework. The reduced form equation assesses whether the GR affected religious rioting more in districts which were more suitable for adopting it. The reduced form equation takes the form:

$$y_{dt} = \pi_0 + \pi_1 Int_d \times After_t + \pi_2 Int_d + \pi_3 After_t + \gamma_d + \delta_{st} + \theta_t + \phi X_{dt} + \epsilon_{dt} \quad (2.3)$$

where d represents district, s represents state and t represents time. $After_t$ is the dummy which takes the value of 1 for the years post 1967, when the Green Revolution was introduced. Int_d is the cross sectional measure of irrigation intensity in 1966. Irrigation intensity is defined as the share of net cropped area that is under irrigation. The equation also includes district fixed effects, γ_d as well as a state time year trend, δ_{st}. $Int_d \times After_t$ is the instrument, which is the interaction of irrigation intensity in 1966 interacted with a time dummy that 'switches on' for the year 1967 and after. The identifying assumption for this specification exploits the fact that exposure to HYV seeds was more in districts with higher investment in irrigation before the GR was introduced. This provides the necessary cross sectional variation to estimate the causal effect. I include district level demographic controls in all specifications.

The second stage regression is the specification in equation 1. In equations 1 and 3, y_{dt} is an outcome variable which measures a different dimension of conflict. I divide these dimensions of conflict into incidence and intensity measures. Incidence measures include an indicator variable for whether a riot took place in a particular district in a give year, and the number of riots that a district experienced in a given year. Intensity measures include an indicator variable for whether anyone was killed in a riot, the number of people killed in a riot and the number of days over which a given riot was spread out. The exclusion restriction requires that areas with greater 1966 irrigation intensity experienced an increase in conflict after 1967 only through differentially higher rates of HYV crop adoption over time and not due to other factors. I provide

evidence on this assumption with robustness checks, following the results.

2.4 Data

The variables on conflict have been constructed using the Varshney and Wilkinson (2006) dataset, which is an exhaustive dataset of religious riots in India covering the period from 1950 to 1995. This dataset provides information on all Hindu-Muslim riots reported in the The Times of India, a major national Indian newspaper, from January 1950 through December 1995. The dataset contains district wise information on location, number of casualties, duration of the riot, reported causes, among other characteristics. A total number of 1192 riots were reported over the entire timeline of the dataset. In this paper, I look at riots between 1957 and 1985, which correspond to the pre GR period, introduction of the GR and diffusion periods. Despite being a comprehensive dataset, it has its shortcomings: since it is based only the *reported* number of riots, it could potentially be an underestimate of the *actual* number of riots which occurred in this time period.

The agricultural technology and climate variables are derived from the Evenson and McKinsey dataset, compiled by Sanghi et al. (1998). It covers 270 districts in 13 states of India from the period of 1957-1985. This dataset contains detailed district level data on crops grown, area under HYV and non HYV cultivation, soil characteristics, area of land under irrigation as well as demographic factors such as population density, labor employed in agriculture and percentage of literate males in the district.

2.4.1 Descriptive Statistics

Table 1 displays descriptive statistics for both independent and dependent variables. Column 1 represents the period before the GR, from 1957-66. Column 2 represents the period after the GR period, from 1968-85. There is an increase

in net irrigated area as well as the share of land under HYV cultivation, both in terms of area as well as percentage share. The share of land under HYV cultivation increases by 23% in the period from 1968-85. The average district had about 21% of its cropped land under irrigation in 1966. There is an increase in both the average incidence and intensity measures of riots. The average number of riots in a district increased by 0.22 riots per year after the Green Revolution. The average duration of a riot also increases by 0.03 days per riot in a year. Table 1 shows an increase in various measures of riots after the introduction of the Green Revolution.

2.5 Results

2.5.1 OLS Results

Tables 2 and 3 report the OLS estimates from equation 1. The estimates show positive but insignificant effects of the GR on whether a riot took place, the number of riots, number of people killed, whether anyone was killed and the duration of a riot in days. The OLS estimates may be driven by unobservables that affect both conflict and the spread of HYV seeds, thus leading to bias in the estimates. There may also be a problem of reverse causality, wherein conflict could influence the district wise adoption of HYV seeds. Therefore, I exploit the variation in suitability to HYV seeds as an instrument, which allows for isolation of the causal effect of the GR on conflict.

2.5.2 First Stage

Table 4 displays results from the first stage regression of HYV share on the instrument, which is the dummy for the post GR period ($After$) interacted with the 1966 irrigation intensity. The results show a strong and positive first stage relationship, which is robust to the addition of controls as well as inclusion of a state time trend. Areas with higher 1966 irrigation levels also had a higher

share of area under HYV cultivation, with a 34.7 percentage point increase in area under HYV seed cultivation for districts with greater pre existing irrigation infrastructure.

2.5.3 Reduced Form and IV Estimates

Tables 5 and 6 report the reduced form estimates, wherein the instrument is regressed on the outcomes of interest. This is analogous to a differences in difference estimation, where I exploit the variation in irrigation intensity across districts and interact it with the post GR dummy. To account for the excess number of zeros in both the count variables, I add a small number of 0.01 to the log of the count variable, as done by Mitra and Ray (2014). This allows for a percentage point interpretation of the coefficients. I find a significant increase in the duration of riots in days. The length of a riot increases by about 0.40 percent in areas with greater pre existing irrigation intensity after the introduction of the Green Revolution. The estimates on other measures of conflict show an increase, but these estimates are imprecise.

The IV results are reported in Tables 5 and 6. There is a positive and significant effect on the number of days a given riot occurs, with a 1 percent increase in the length of a riot (measured in days) post the Green Revolution. On other margins, however, the effects are greater than those in the reduced form estimates but are imprecise. The IV estimates represent effects in areas which are more conducive compared to areas which are less conducive to HYV crop adoption.

The Varshney-Wilkinson dataset has recorded more urban than rural riots, and hence these results indicate that an increase in productivity in rural areas may not have had big spillovers into urban areas. This is consistent with evidence provided by Roy (2012), who finds that studying the effects of land reform in rural India did not influence Hindu Muslim rioting. There may be variation in conflict occurrence and severity across districts based on rainfall

received, primary crop grown and geographical area. I explore some of these heterogeneous results in the next section.

2.6 Additional Results

2.6.1 Rainfall Shocks

Rainfall shocks have been shown to reduce religious and ethnic conflict(Miguel et al., 2004; Bai and Kung, 2011), where areas with higher rainfall are shown to have higher incomes and hence a lower incidence and intensity of conflict. Rainfall shocks may also affect mobilization of individuals towards a cause. The presence of rainfall may reduce the local strength of a collective action initiative (Madestam et al., 2013). I estimate the instrumental variable regression with an interaction term for the rainfall shock. The baseline specification for this regression:

$$y_{dt} = \beta_0 + \beta_1 HYVshare_{dt} \times RainShock_{dt} +$$
$$\beta_2 HYVshare_{dt} + \beta_3 RainShock_{dt} + \gamma_d + \delta_{st} + \theta_t + \phi X_{dt} + \epsilon_{dt}$$

where β_1 is the coefficient of interest, which gives us the effect of the Green Revolution interacted with a yearly rainfall shock in a district. I use two measures of rainfall shocks, both of which account for seasonality in rainfall. The first measure is the fractional deviation of rainfall from its average level (calculated from 1957 to 1985) summed over all months, used previously by Sarsons (2015) and Duflo and Pande (2007). I then sum over all 12 months to find a district's yearly shock. I construct the second measure as follows: for a particular month, I compare the actual amount of rainfall to the average amount and define a positive shock as rainfall that is above the eightieth percentile and a negative shock as rainfall below the twentieth percentile (Sarsons, 2015; Jayachandran, 2006). I then take the average of this measure over all months.

I interact the rainfall shock measures with my instrument and find that some of the exacerbating effects of the Green Revolution are countered in a district in a year with a positive rainfall shock. There is a 0.3 percent decrease in the duration of a riot post the Green Revolution in a year with greater rainfall than normal (Table 9). I find similar results for the other measures of conflict, where in a year with greater than normal rainfall, there is a reduction in conflict. However, these results are imprecise.

2.6.2 Heterogeneity across Crops and Regions

The Green Revolution increased yields for five crops, and in particular, for wheat and rice. Wheat growing regions may have different trends due to geographic characteristics from rice growing regions, and the relative importance of the crop grown may influence the direction of conflict. Furthermore, there is documented evidence on the ineffective dissemination of HYV rice seeds as compared to HYV wheat seeds, which led to more protests from farmers employed in rice cultivation (Pingali, 2012). TI split my sample to compare wheat and rice growing districts to see if there was a differential increase in conflict based on crop cultivated. I find that increased HYV crop adoption is associated with greater conflict in rice growing districts rather than wheat growing districts.

To test heterogeneity in treatment effects across the country in response to the Green Revolution, I split my sample into regions, North and non North to examine heterogeneous effects across countries. The argument for doing so stems from the fact that the northern part of India is culturally different from the other regions. The northern region of India comprises of the Hindi speaking states of Bihar, Madhya Pradesh, Haryana, Uttar Pradesh, Rajasthan and Punjab. The non North regions include the South (Andhra Pradesh, Karnataka, Tamil Nadu), East (West Bengal and Orissa) and the West(Gujarat and Maharashtra). I find a significant increase in the probability of a riot taking place

in the northern regions post the Green Revolution, which are also the areas where the Green Revolution had a larger coverage.

2.7 Robustness Checks

2.7.1 Evidence on the Exclusion Restriction

The exclusion restriction requires that district wise 1966 irrigation intensity levels interacted with a time dummy for the Green Revolution should not affect conflict through any other channel other than its effect on the HYV share of agricultural land. The reduced form results rule this effect out and the inclusion of fixed effects and state year time trends rule out any time invariant characteristics or state time trends that may threaten the exclusion restriction. However, if districts with higher levels of 1966 irrigation intensity would have had higher levels of conflict even without the introduction of the Green Revolution in 1967, the exclusion restriction could have been violated. I use several tests to provide evidence in support of the exclusion restriction.

2.7.2 Parallel Trend and Pre Trend Results

To identify the timing of the emergence of a positive reduced form relationship between irrigation intensity in 1966 and conflict, I estimate a regression of the form:

$$y_{dt} = \sum_{k=1957}^{1985} \theta_k Int_d \times Year_t^k + \epsilon_{dt} \tag{2.4}$$

where y_{dt} is a measure of conflict, $Year_t^k$ is a dummy variable representing a particular year between 1957 and 1985 and Int_d is the district level irrigation intensity in 1966. This specification includes district fixed effects and year fixed effects. For the parallel trend assumption to hold, unobservable trends should not be driving the increase in conflict after the introduction of the Green Revolution. That is, θ_k for any k in the pre Green Revolution period should

not be significant. Figure 5 displays the coefficients θ_k for the indicator variable representing whether a riot took place, which suggest that trends unrelated to area under HYV cultivation do not drive the results on any of the measures of conflict. There is no detectable positive pre trend in areas with greater 1966 irrigation intensity.

2.7.3 Placebo Test

I also construct a placebo test in Tables 12 and 13, where I interact the 1966 irrigation intensity measure with year dummies for the period from 1957-1966, since these years are unrelated to the introduction of the Green Revolution in India. The specification for the placebo test takes the form:

$$y_{dt} = \beta_0 + \beta_1 Int_d \times PseudoAfter_t + \beta_2 Int_d + \beta_3 PseudoAfter_t + \gamma_d + \delta_{st} + \theta_t + \phi X_{dt} + \epsilon_{dt} \tag{2.5}$$

where $PseudoAfter_t$ represents the year 1966, a year prior to the introduction of the Green Revolution and hence unrelated to the introduction of HYV crops in India. β_1 is the coefficient of interest, which shows the correlation between the period before the introduction of the Green Revolution. If the exclusion restriction is valid, β_1 should have no effect on any of the measures of conflict. I see no effect of the pre period on conflict. This indicates that districts with higher irrigation intensity saw greater conflict only after the Green Revolution took place, and not before it was introduced, thus providing further evidence in support of the exclusion restriction.

2.7.4 Alternate Specifications

Count variables suffer from the problem of over dispersion and an excess number of zeros, and a negative binomial regression provides an adjusted estimate for the log count of a variable. My results for the count variables are robust to

an alternative negative binomial regression. I include the reduced form results from the estimation of this functional form in Table 14, and the estimates from these regressions also indicate an increase in conflict with larger pre existing irrigation intensity.

2.8 Discussion

My results show that the differential spread of the Green Revolution increases the length of a riot, and is associated with an increase in Hindu Muslim conflict. The introduction of HYV seeds, as well as mechanization in agriculture (E. Evenson and W. McKinsey, 1999) may have perpetuated inequalities between more irrigated and less irrigated districts, which reduce the opportunity cost of engaging in conflict.

I explore whether the Green Revolution displaced labor in agriculture, which may have led to the increase in conflict. I estimate the effect of the instrumented HYV share on total agricultural labor [1] and labor employed in cultivation. I find a decrease in the labor whose primary job is cultivation as well as a decrease in the total agricultural labor post the Green Revolution (Table 15). This shows that a decrease in agricultural employment is associated with the onset of the Green Revolution, and may have resulted in reducing the opportunity cost of fighting for resources.

2.9 Conclusion

In this paper, I examine the effect of the introduction of the Green Revolution on the incidence and intensity of religious conflict between Hindus and Muslims in India. I use suitability of land to HYV seeds as an instrument to estimate its causal effect on conflict. I find a statistically significant increase

[1] The quantity of labor is defined as the weighted sum of labor involved in agriculture and labor involved in cultivation, multiplied by the number of days worked in the state by farm workers.

in the duration of riots and suggestive evidence of an increase other measures of religious conflict. Districts which had higher pre existing irrigation intensity experienced longer riots than districts with less irrigation intensity prior to the Green Revolution. Additionally, in years of good rainfall, the effects of the Green Revolution are countered. This is in line with existing evidence that shows that rainfall reduces ethnic conflict (Miguel et al., 2004; Burke et al., 2015). The Green Revolution introduced mechanization in agriculture, which led to labor displacement, hence reducing the opportunity cost od engaging in conflict.

This demonstrates that the inequality channel may be at play here: since the Green Revolution was known to increase rural inequality (Pingali, 2012), it may have led to increased incentives to grab resources from those who benefited more from the availability of the new seeds. Due to data limitations, examining the religious composition of farmers benefiting from the Green Revolution and estimating share of HYV seeds for Hindu and Muslim farmers is out of the scope of this paper. However, this paper sheds light on the unintended consequences of agricultural policy and has implications for introducing technology that may be labor displacing rather than labor augmenting.

2.10 Tables

Table 2.1: Descriptive Statistics

	1957-66 (1)	1968-85 (2)
Whether Any Riot Took Place	0.022	0.031
	(0.147)	(0.173)
Number of Riots	0.348	0.563
	(2.742)	(3.588)
Anyone Killed	0.009	0.018
	(0.096)	(0.133)
Number Killed	0.037	0.227
	(0.49)	(8.754)
Duration of Riot in Days	0.026	0.054
	(0.191)	(0.397)
Net Irrigated Area ('000 hectares)	82.14	123.5
	(90.33)	(119.1)
Total Area Under HYV ('000 hectares)	1899.4	112208.8
	(8994.4)	(114615.3)
Share Under HYV Cultivation	0.004	0.234
	(0.018)	(0.187)
1966 Irrigation Intensity	0.213	0.213
	(0.199)	(0.199)
Total Agricultural Area ('000 hectares)	438603.3	472838.2
	(231790.2)	(235456.4)
N	3005	4911

Notes: Table 1 shows means of the dependent and independent variables, before and after the Green Revolution. Column 1 represents the period before the introduction of the Green Revolution and Column 2 represents the period after the introduction of Green Revolution. Standard errors are in parentheses. A unit of observation is a district year. There are 270 districts in the dataset, covering the years from 1957-1985. *Whether Any Riot Took Place* is an indicator variable which takes the value of 1 if a riot took place in a district in a year. *Number of Riots* is a numerical count of riots in a district in a year. *Anyone Killed* is an indicator variable which takes the value of 1 if anyone was killed in a riot in a district in a year. *Number Killed* is a numerical count of the number of people killed in a riot in a district in a year. *Duration of Riot in Days* represents the number of days over which a riot takes place in a district in a year. *Net Irrigated Area* is the net cropped area under irrigation in thousand hectares. *Total Area under HYV* is the total cropped area cultivated with HYV seeds. *Share Under HYV Cultivation* is defined as the proportion of the total cropped area in a district which is under HYV cultivation. *1966 Irrigation Intensity* is the cross sectional measure of district level irrigation intensity. *Total Agricultural Area* is the total area under cultivation in a district in a year.

Table 2.2: OLS Estimates: Incidence of Riots

	I(Riot) (1)	Number of Riots (2)
HYV Share	-0.035	-0.262
	(0.027)	(0.207)
Controls	Y	Y
District Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
State Time Trend	Y	Y
Observations	6831	6831

Notes: Table 2 shows the OLS estimates of incidence measures of riots. The coefficients in each cell represent the result from a separate regression. *I(Riot)* is an indicator variable for whether a riot took place in a particular district in a particular year. *Number of Riots* is a count variable which represents the number of riots in a district in a year. To adjust for excess zeros, I add 0.01 to the count and take the log, which provides a percentage interpretation to the coefficients. A unit of observation is a district year from the period 1957-85. Standard errors are in parentheses and clustered at the district level. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 2.3: OLS Estimates: Intensity of Riots

	Number Killed (1)	I (Killed) (2)	Duration (3)
HYV Share	-0.024	-0.004	-0.088
	(0.106)	(0.018)	(0.132)
Controls	Y	Y	Y
District Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State Time Trend	Y	Y	Y
Observations	6831	6831	6831

Notes: Table 3 shows the OLS estimates of intensity measures of riots. The coefficients in each cell represent the result from a separate regression. *Number Killed* is a count variable which represents the number of people killed in a riot in a district in a year. *I(Killed)* is an indicator variable for whether anyone was killed in a riot in a particular district and year. *Duration* is a count variable representing the duration of a riot in days. To adjust for excess zeros, I add 0.01 to the count variables and take the log, which provides a percentage interpretation to the coefficients. A unit of observation is a district year from the period 1957-85. Standard errors are in parentheses and clustered at the district level. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 2.4: First Stage: Effect of Instrument on HYV Share

Dependent Var: HYV Share	(1)	(2)	(3)
After×1966 Irrigation Intensity	0.347***	0.364***	0.43***
	(0.035)	(0.037)	(0.043)
R^2	0.879	0.871	0.84
Controls	Y	N	Y
District Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State Time Trend	Y	Y	N
Observations	6815	7961	6815

Notes: Table 4 presents results from the first stage regression. Each column represents a separate regression. *HYV Share* is the dependent variable, which is defined as the proportion of agricultural land cultivated with HYV seeds. The independent variable, *After × 1966 Irrigation Intensity*, is the instrument, the interaction between the time dummy which switches on for years greater than 1967 and the cross sectional measure of district level irrigation intensity in 1966. Irrigation intensity is defined as the proportion of net cropped area that is irrigated. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 2.5: Instrumental Variable and Reduced Form Estimates: Incidence of Riots

	I (Riot)	Number of Riots
	(1)	(2)
Instrumented HYV Share	0.203*	1.479*
	(0.113)	(0.83)
After×1966 Irrigation Intensity	0.071*	0.516*
	(0.039)	(0.287)
Controls	Y	Y
District Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
State Time Trend	Y	Y
Observations	6831	6831

Notes: Table 5 shows the IV and reduced form estimates for the incidence of riots. The coefficients in each cell represent the result from a separate regression. I measure incidence of riots using two outcome variables. *I(Riot)* is an indicator variable for whether a riot took place in a particular district in a particular year. *Number of Riots* is a count variable which represents the number of riots in a district in a year. To adjust for excess zeros, I add 0.01 to the count and take the log, which provides a percentage interpretation to the coefficients. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset Standard errors are in parentheses and clustered at the district level. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 2.6: Instrumental Variable and Reduced Form Estimates: Intensity of Riots

	Number Killed (1)	I(Killed) (2)	Duration (3)
Instrumented HYV Share	0.66	0.114	1.13**
	(0.491)	(0.085)	(0.559)
After×1966 Irrigation Intensity	0.228	0.039	0.395**
	(0.171)	(0.297)	(0.192)
Controls	Y	Y	Y
District Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State Time Trend	Y	Y	Y
Observations	6831	6831	6831

Notes: Table 6 shows the IV and reduced form estimates for the incidence of riots. The coefficients in each cell represent results from a separate regression. The coefficients in each cell represent the result from a separate regression. I measure intensity of riots using three outcome variables. *Number Killed* is a count variable which represents the number of people killed in a riot in a district in a year. *Duration* is a count variable representing the duration of a riot in days. *I(Killed)* is an indicator variable for whether anyone was killed in a riot in a particular district and year. To adjust for excess zeros, I add 0.01 to the count variables and take the log, which provides a percentage interpretation to the coefficients. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. Standard errors are in parentheses and clustered at the district level. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels respectively.

Table 2.7: Instrumented HYV Share Interacted with Rainfall Shock

	I(Riot)	
	(1)	(2)
Instrumented HYV Share	0.148	0.215*
	(0.131)	(0.12)
Rain Shock	-0.026	0.0001
	(0.02)	(0.001)
Instrumented HYV Share × Rain Shock	0.089	-0.032
	(0.084)	(0.036)
Controls	Y	N
District Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
State Year Time Trend	Y	Y
Observations	6831	7916

Notes: Table 7 shows results from the regression of the interaction of the instrumented HYV share and rainfall shock on the probability of a riot taking place. Each column represents the results from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. *Instrumented HYV Share* is the coefficient on the instrument for HYV share. The coefficient of interest is *Instrumented HYV Share* × *Rain Shock*, which interacts the IV estimate with a rainfall shock in a given district in a given year. *Rain Shock* is calculated as the monthly deviation of a district's rainfall above or below its average amount, summed over all months. *I(Riot)* is an indicator variable for whether a riot took place. I control for district level male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels

Table 2.8: Instrumented HYV Share Interacted with Alternate Rainfall Shock Measure

	I(Riot)	
	(1)	(2)
Instrumented HYV Share	0.190*	0.186*
	(0.114)	(0.108)
Rain Shock	-0.126	-0.126
	(0.121)	(0.128)
Instrumented HYV Share × Rain Shock	-0.050	-0.054
	(0.056)	(0.056)
Controls	Y	N
District Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
State Year Time Trend	Y	Y
Observations	6831	7916

Notes: Table 8 shows results from the regression of the interaction of the instrumented HYV share and alternate rainfall shock measure on the probability of a riot taking place. Each column represents the results from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. *Instrumented HYV Share* is the coefficient on the instrument for HYV share. The coefficient of interest is *Instrumented HYV Share* × *Rain Shock*, which interacts the IV estimate with a rainfall shock in a given district in a given year. *Rain Shock* is measured as a categorical variable which takes the value 1 if the district's average rainfall is above the 80th percentile, −1 if it is below the 20th percentile, and 0 otherwise. *I(Riot)* is an indicator variable for whether a riot took place. I control for district level male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.9: IV Estimates for Other Measures with Rainfall Shocks

	Number of Riots (1)	Number Killed (2)	I(Killed) (3)	Duration (4)
Instrumented HYV Share	1.695*	0.938	0.157	1.308**
	(0.902)	(0.588)	(0.103)	(0.606)
Instrumented HYV Share×Rain Shock	-0.416	-0.325	-0.51	-0.324
	(0.411)	(0.221)	(0.382)	(0.267)
Rain Shock	-1.912***	-0.449***	-0.059**	-1.233***
	(0.371)	(0.177)	(0.030)	(0.244)
Controls	Y	Y	Y	Y
District Fixed Effects	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y
State Year Time Trend	Y	Y	Y	Y
Observations	6831	6831	6831	6831

Notes: Table 9 shows results from the regression of the interaction of the instrumented HYV share and rainfall shock on other measures of incidence and intensity of riots. Each column represents the results from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. *Instrumented HYV Share* is the coefficient on the instrument for HYV share. The coefficient of interest is *Instrumented HYV Share* × *Rain Shock*, which interacts the IV estimate with a rainfall shock in a given district in a given year. *Rain Shock* is calculated as the monthly deviation of a district's rainfall above or below its average amount, summed over all months. *Number of Riots* is a count variable which represents the number of riots in a district in a year. *Number Killed* is a count variable which represents the number of people killed in a riot in a district in a year. *I(Killed)* is an indicator variable for whether anyone was killed in a riot in a particular district and year. *Duration* is a count variable representing the duration of a riot in days. To adjust for excess zeros, I add 0.01 to the count variables and take the log, which provides a percentage interpretation to the coefficients. I control for district level male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.10: IV Estimates for Wheat and Rice Growing Districts

	I(Riot) (1)	Number of Riots (2)	Number Killed (3)	I(Killed) (4)	Duration (5)
Panel A: Wheat Growing Districts					
Instrumented HYV Share	0.178*	1.292*	0.623	0.106	0.963**
	(0.095)	(0.702)	(0.407)	(0.070)	(0.485)
Observations	6488	6488	6488	6488	6488
Panel B: Rice Growing Districts					
Instrumented HYV Share	0.268*	1.959*	0.836	0.145	1.476*
	(0.157)	(1.160)	(0.665)	(0.114)	(0.795)
Observations	6125	6125	6125	6125	6125
Controls	Y	Y	Y	Y	Y
District Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
State Year Time Trend	Y	Y	Y	Y	Y

Notes: Table 10 shows results from the regression of riot measures on the instrumented HYV share, by crop grown in the district. The coefficient in each cell represents the result from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. *I(Riot)* is an indicator variable representing whether a riot took place in a district in a year. *Number of Riots* is a count variable which represents the number of riots in a district in a year.*Number Killed* is a count variable which represents the number of people killed in a riot in a district in a year. *I(Killed)* is an indicator variable for whether anyone was killed in a riot in a particular district and year. *Duration in Days* is a count variable representing the duration of a riot in days. To adjust for excess zeros, I add 0.01 to the count variables and take the log, which provides a percentage interpretation to the coefficients. I control for district level male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.11: IV Estimates for North and Non North Districts

	I(Riot) (1)	Number of Riots (2)	Number Killed (3)	I(Killed) (4)	Duration (5)
Panel A: Northern Districts					
Instrumented HYV Share	0.268*	1.818*	1.786**	0.29*	1.469***
	(0.159)	(1.107)	(0.89)	(0.154)	(0.072)
Observations	3774	3774	3774	3774	3774
Panel B: Non Northern Districts					
Instrumented HYV Share	0.105	0.834	-0.48	-0.067	0.68***
	(0.135)	(1.047)	(0.388)	(0.067)	(0.064)
Observations	3057	3057	3057	3057	3057
Controls	Y	Y	Y	Y	Y
District Fixed Effects	Y	Y	Y	Y	Y
Year Fixed Effects	Y	Y	Y	Y	Y
State Year Time Trend	Y	Y	Y	Y	Y

Notes: Table 11 shows results from the regression of riot measures on the instrumented HYV share, by crop grown in the district. The coefficient in each cell represents the result from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. *I(Riot)* is an indicator variable representing whether a riot took place in a district in a year. *Number of Riots* is a count variable which represents the number of riots in a district in a year *Number Killed* is a count variable which represents the number of people killed in a riot in a district in a year. *I(Killed)* is an indicator variable for whether anyone was killed in a riot in a particular district and year. *Duration in Days* is a count variable representing the duration of a riot in days. To adjust for excess zeros, I add 0.01 to the count variables and take the log, which provides a percentage interpretation to the coefficients. I control for district level male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.12: Placebo Test for Incidence of Riot Measures

	I(Riot) (1)	Number of Riots (2)
Pseudo Instrumented HYV Share	-0.030	-0.197
	(0.051)	(0.335)
Controls	Y	Y
District Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
State Year Time Trend	Y	Y
Observations	6831	6831

Notes: Table 12 shows results from the placebo regression, where the pseudo-after period is 1966. Each column in the table represents the results from a separate regression. *I(Riot)* is an indicator variable for whether a riot took place in a particular district in a particular year. *Number of Riots* is a count variable which represents the number of riots in a district in a year. To adjust for excess zeros, I add 0.01 to the count and take the log, which provides a percentage interpretation to the coefficients. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.13: Placebo Test for Intensity of Riot Measures

	Number Killed	I(Killed)	Duration
	(1)	(2)	(3)
Pseudo Instrumented HYV Share	-0.254	-0.037	-0.164
	(0.233)	(0.386)	(0.247)
District Fixed Effects	Y	Y	Y
Year Fixed Effects	Y	Y	Y
State Year Time Trend	Y	Y	Y
Observations	6831	6831	6831

Notes: Table 13 shows results from the placebo regression, where the pseudo-after period is 1966. Each column in the table represents the results from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. I measure intensity of riots using three outcome variables. *Number Killed* is a count variable which represents the number of people killed in a riot in a district in a year. *I(Killed)* is an indicator variable for whether anyone was killed in a riot in a particular district and year.*Duration* is a count variable representing the duration of a riot in days. To adjust for excess zeros, I add 0.01 to the count variables and take the log, which provides a percentage interpretation to the coefficients. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.14: Reduced Form Estimates Using Negative Binomial Regressions

	Number of Riots	Number Killed	Duration
	(1)	(2)	(3)
After×1966 Irrigation Intensity	0.182	5.937***	4.959***
	(0.466)	(1.738)	(1.073)
Controls	Y	Y	Y
District Fixed Effects	N	N	N
Year Fixed Effects	Y	Y	Y
State Year Time Trend	Y	Y	Y
Observations	6759	6759	6759

Notes: Table 14 shows reduced form estimates for the count dependent variables using negative binomial regressions. Standard errors in parentheses and clustered at district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. Controls include male literacy rate, agricultural income and population density. The dependent variables which are counts have been estimated using the negative binomial regressions. ***,** and * denote significance at the 1, 5 and 10% levels.

Table 2.15: Effect of Instrumented HYV Share on Labor in Agriculture

	Labor in Cultivation	Total Agricultural Labor
	(1)	(2)
Instrumented HYV Share	-0.176	-0.013
	(0.170)	(0.162)
Controls	Y	Y
District Fixed Effects	Y	Y
Year Fixed Effects	Y	Y
State Year Time Trend	Y	Y
Observations	6831	6831

Notes: Table 15 shows the effect of the instrumented HYV share on labor employed in agriculture. Each column in the table represents the results from a separate regression. Standard errors are in parentheses and clustered at the district level. A unit of observation is a district year from the period 1957-85. There are 270 districts covered in the dataset. *Instrumented HYV Share* is the coefficient on the instrument for HYV share. *Labor in Cultivation* is the log transformation of the number of rural males whose primary job classification is cultivation. *Total Agricultural Labor* is the log transformation of the total number of people working in agriculture, weighted by the number of days worked on the farm. Controls include male literacy rate and population density. ***,** and * denote significance at the 1, 5 and 10% levels.

2.11 Figures

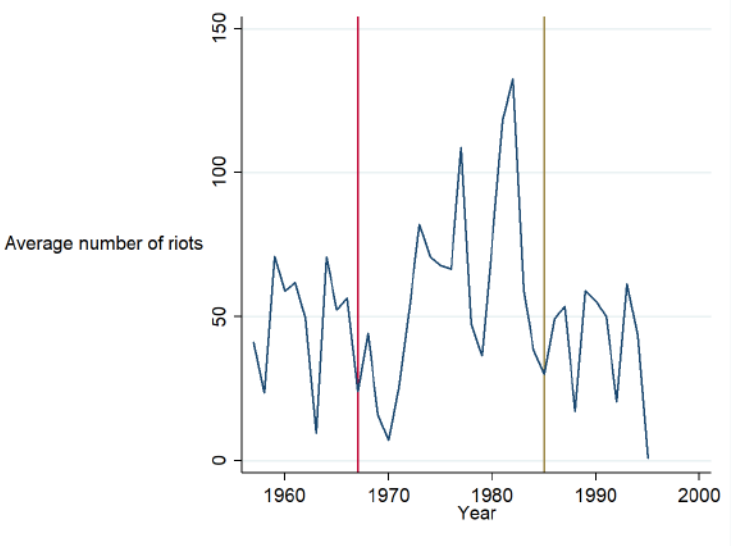


Figure 2.1: Total number of riots

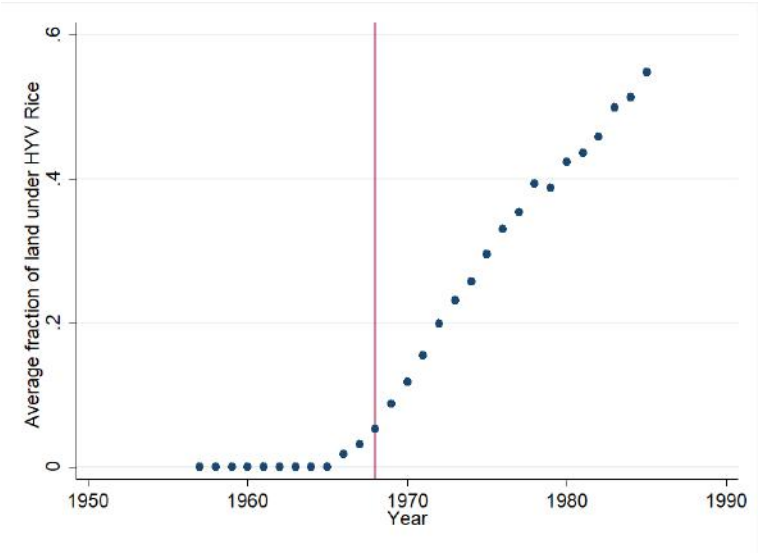


Figure 2.2: Area of land under HYV Rice cultivation

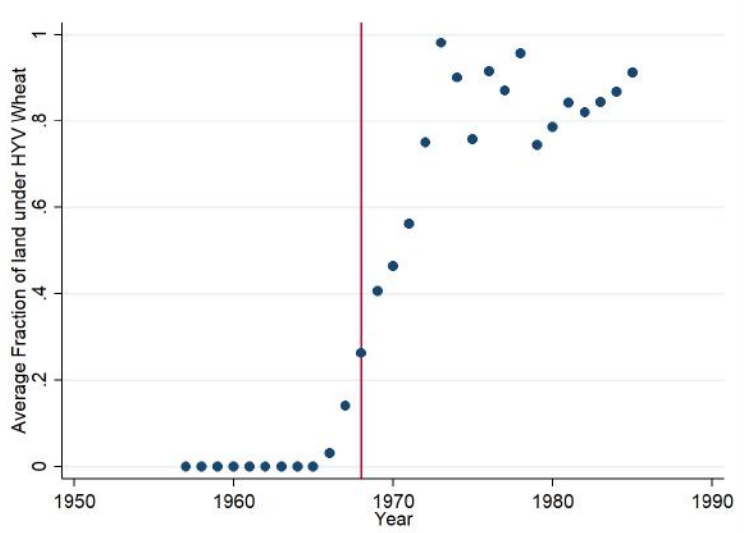


Figure 2.3: Area of land under HYV Wheat cultivation

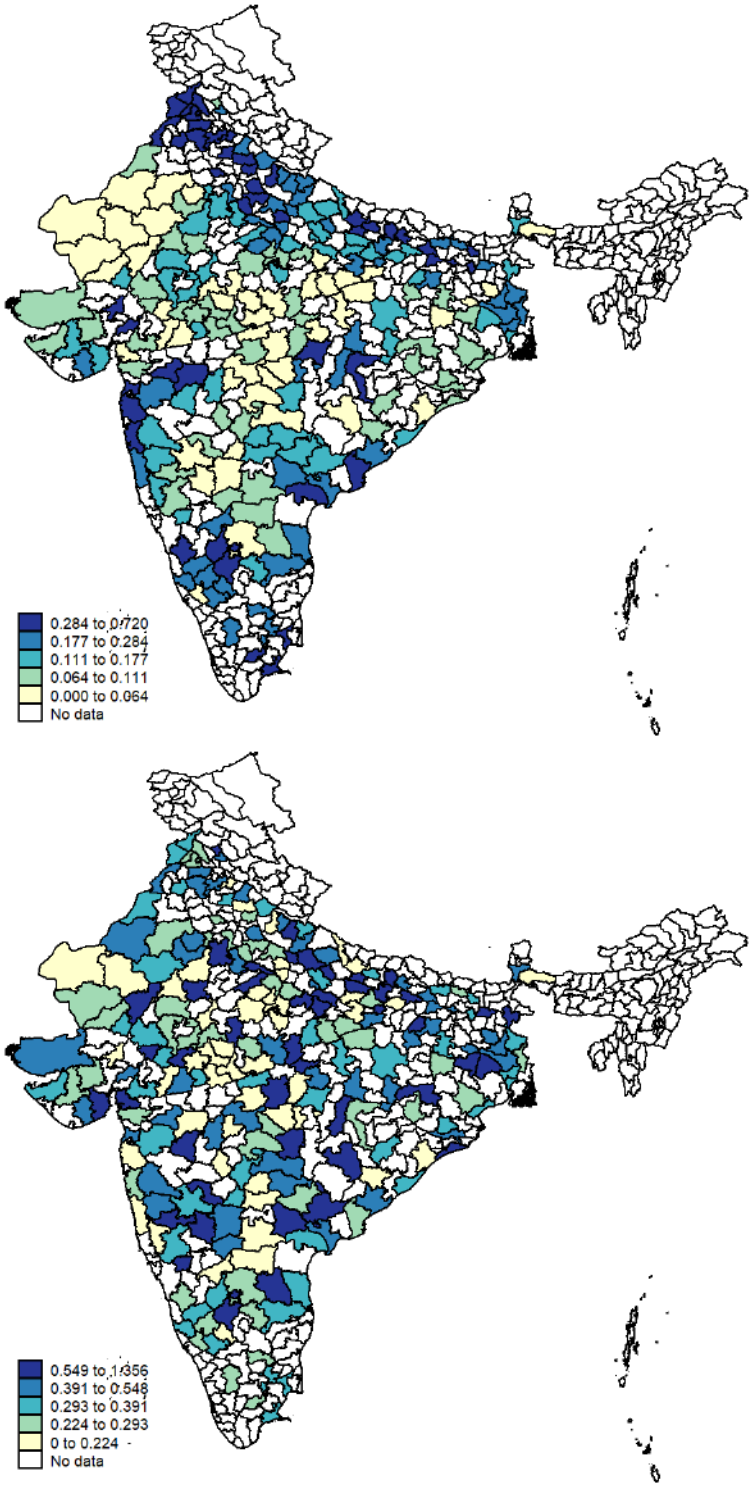


Figure 2.4: District Wise Share of HYV Cultivation in 1973 and 1985

Notes: The panel at the top represents the mean share of HYV seeds in districts across the country in 1973 and the panel at the bottom represents the corresponding share in 1985.

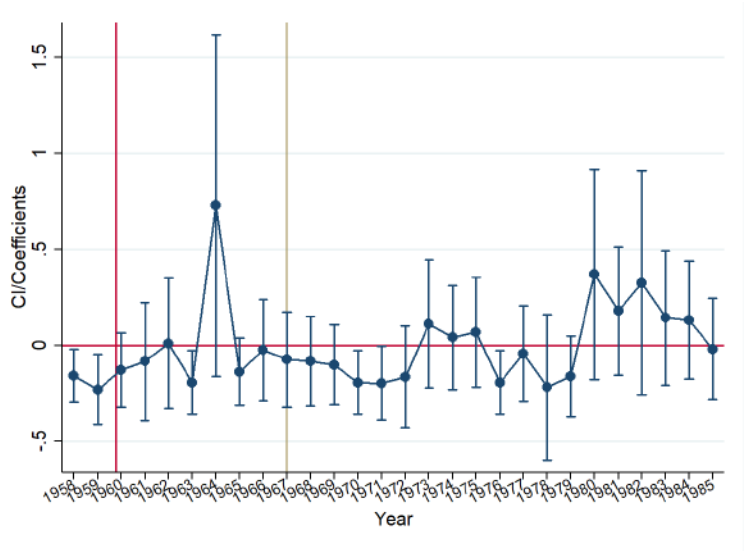


Figure 2.5: Parallel Trend Assumption

Notes: The Y axis represents the coefficients for the indicator variable for whether a riot took place. The brown line represents 1967, the year that the Green Revolution was introduced.

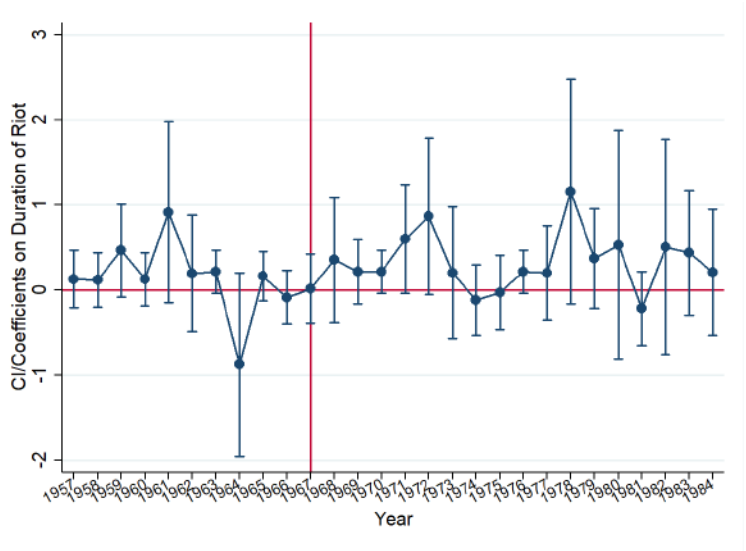


Figure 2.6: Parallel Trend Assumption Using Duration of Riot

Notes: The Y axis represents the coefficients on the count variable for the duration of a riot in days. The red line represents the year 1967, which is when the Green Revolution was introduced.

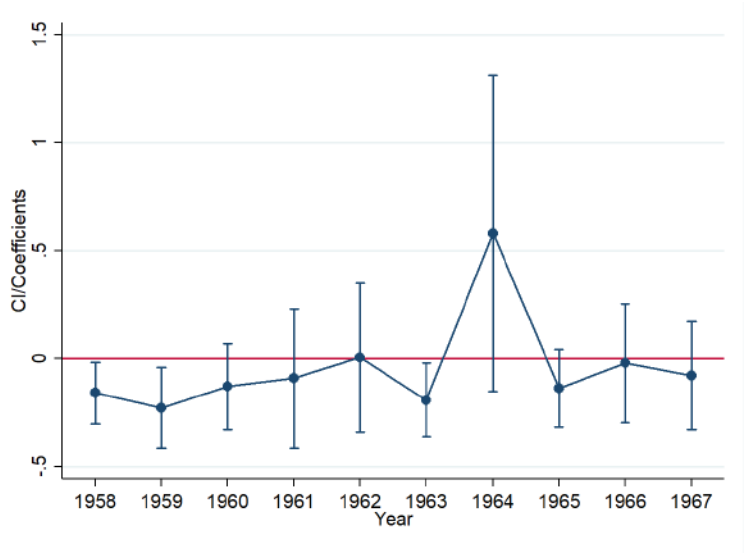


Figure 2.7: Pre Trend

Notes: The Y axis represents the coefficients on the indicator variable for whether a riot took place.

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