Essays on Crime and Gender in India

Sofia Amaral

Department of Economics

University of Birmingham, UK

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This thesis is dedicated to André, my sister and my parents.

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Synopsis

This thesis investigates the relation between legal institution, strengthening of legal rights and criminal behaviour in India with a focus on the gender gap in access and welfare.

In Chapter 1 I provide an overview of the determinants of violence against women in India using micro-level data. First, using police-reported data at the district-level I analyse the role of urbanization, literacy rates and population heterogeneity in explaining this type of violence. I also consider the role of police and female police strength, income per capita and political factors. Results suggest that factors correlated with development and growth explain violence against women while evidence of a deterrence hypothesis is mixed. I find that correlates that explain police-reported domestic violence are similar to those that explain intimate-partner violence. Results obtained for violent and property crimes are supportive of economic and deterrence theory hypothesis.

In Chapter 2 I investigate how strengthening women's legal rights affects women's position within the household. Using a legal change in inheritance law in India, this chapter estimates the effect of women's improved access to inheritance on violence committed against them. I use the staggered implementation of the Hindu Succession Act across states to identify the causal impact of the legislative amendments on police-reported violence against women and on self-reported intimate partner violence. I find a decrease in reported violence following the amendments and argue that this effect does not appear to be due to changes in reporting behaviour. Women eligible for inheritance are 17 percent less likely to be victims of domestic violence. These findings can be explained by an improvement in husbands' behaviour and in marriage market negotiations. I find little evidence of changes in women's participation in household decision-making. This suggests that while inheritance legislation improves women's security, this may not necessarily be improving their autonomy.

Finally, in Chapter 3 of this thesis, I analyse the implications of missing women on overall crime and on violence against women by investigating the relationship between uneven sex ratio and illegal behaviour. Using district-level information of age-specific sex ratios, I estimate the effect of a surplus of males at crime and marriage prone-ages on violence against women, general violence, acquisitive crime and aggregate gender-specific juvenile delinquency. I find a negative relation between sex ratio of the crime-prone age cohorts and violence against women. I do not find evidence of an effect on general violence, property crimes, male or female juvenile delinquency. A 0.1 decreases in the female to male ratios

increases the rate of crimes against women by 0.76 percent. These results explain 12 percent of the rise in violence against women for the period considered. Comparing North-Western districts and the rest of India shows that the violence against women effect is concentrated in northern districts. These results are robust to different population decompositions, different specifications and to the inclusion of different controls.

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Chapter 1

Determinants of violence against women, violent and acquisitive crime in India

1.1 Introduction

Gender-based violence is estimated to be more costly than any other form of interpersonal violence. Violence against women and children, particularly intimate partner violence (IPV), child abuse, female genital mutilation and "honor crimes" are estimated to cost 17% of the world's GDP (Fearon and Hoeffler, 2014). Nevertheless, there is no clear understanding of what exactly causes this type of violence and what can prevent it.

In India the gender gap runs across several areas that affect economic development (WEF, 2014). One important dimension that impinges on women's well-being and consequently their economic performance is the risk and incidence of violence against them. There is a extensive research establishing a relationship between crime, law and order and socio-economic factors. The main objective of these papers is to identify the driving forces that explain the rise and fall in violence and crime (Nagin, 2013). This paper follows this literature with the objective of identifying the most relevant factors among those previously identified causal relationships in the literature.

In particular, I use linear and non-linear fixed-effects models to estimate the determinants of gender-based, violent and property crime using different measures for these variables collected at the lowest available level of aggregation available together with extensive information of economic, demographic and political factors. I first present the main effects that have been previously identified in the literature as causal determinants of gender-based

and general violence. Second, I use micro-level data collected at the district and individual-level to estimate the relation between gender-based violence and these common factors identified in the literature. I repeat the analysis for non-gender based violence and property crimes to compare the relation between explanatory factors of gender and other types of crime and violence. Finally, I test for heterogeneous effects of the mandatory female political representation in local governance. This has been previously shown to empower women in different dimensions such as in increasing reporting behaviour and educational attainment (Beaman et al., 2012; Iyer et al., 2012).

The main results can be summarised as follows. While there is some explanatory power in socio-economic factors in explaining all types of crime and IPV, the effect of police strength as a source of deterrence is ambiguous. Urban, male and scheduled castes (SC) population are positively correlated with both gender and non-gender based violence. Further, state-level police strength is negatively correlated with non-gender based violence. The relation with gender-based violence is mixed. Finally, I do not find evidence that women as Chief Ministers of the state or higher shares of females in law enforcement affect gender-based violence any differently than states without gender political quotas at the local level.

In the next section I identify the main factors in the literature that affect gender-based violence and domestic violence against women (section 1.2.1) and overall illegal activity (section 1.2.2). In section 1.3 I describe the data and empirical procedures and in section 1.4 I present the results on determinants of gender-based violence and non-gender based violence in section 1.5. Section 1.6 looks at the heterogeneous effects considered and Section 1.7 concludes.

1.2 Review of the literature

1.2.1 Gender-based violence

Economic determinants

Gender-based violence is defined as acts of violence committed against a person on the basis of gender. The World Health Organization defines it as all forms of violence (physical, sexual or emotional) performed by a husband or male partner within the common life of the household (WHO, 2002). I take this definition of gender-based violence given the fact that most inflicted violence on the basis of gender is usually committed by men against women

and girls[1].

The aim of the economics literature is to understand the effect of women's empowerment on the incidence and risk of violence against them, in particular on domestic violence. In this respect, the primary focus has been in identifying the effect of changes in the economic position of individual household members (usually women relative to men) on incidence of domestic violence.

Aizer (2010) finds that decreases in the gender wage gap, measured by increases in sex-specific labour demand changes, decrease domestic violence[2]. Similarly, Bobonis et al. (2013) show that targeting income to women reduces domestic violence. However, the authors suggest that the use of physical violence is replaced by increases in the use of emotional abuse. This latter effect contrasts with household bargaining models (Manser and Brown, 1980; McElroy and Horney, 1981) and instead suggests that violence is an instrumental behaviour used by men in order to increase the relative position within the household (Bloch and Rao, 2002).

The main theoretical prediction in economic models that incorporate the use of violence (Aizer, 2010; Farmer and Tiefenthaler, 1997; Tauchen et al., 1991) is that increases in women's income improve women's outside option and consequently reduce the level of violence as it increases women's bargaining power. The empirical findings of the relationship between women's empowerment and gender-based violence are consistent with situations in which women have outside options (or have credible outside options). However, when women do not have available outside options (or have infinite costs to having) the possibility of reducing violence through this change is no longer available. As a result, with improvements in female labour conditions or improved legal rights of women, the probability of ending relationships may not increase even with increases in domestic violence as women's bargaining power does not increase. This is the main prediction in the economic

[1]The Council of Europe provides an alternative definition (Council of Europe et al., 2011). It considers violence against women as 'all acts of gender-based violence that result in, or are likely to result in, physical, sexual, psychological or economic harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or in private life.' I use these two terms (i.e., gender-based violence and violence against women) interchangeably.

[2]Earlier evidence that does not take into account the endogenous relation between women's earnings and domestic violence also shows a negative relation between the two variables (Farmer and Tiefenthaler, 1997; Tauchen et al., 1991)

and criminology studies[3]. In contrast, the sociology literature argues that domestic violence increases as it challenges the prevalent culture (Macmillan and Gartner, 1999). This result has also been found in the economics literature in particular in developing countries where male dominance defines gender-roles. One example is Angelucci (2008) which finds that large transfers of income to poor women increase aggressive behaviour for low levels of the partner's education.

Studies of the effect of relative wage and income of women show that improvements in women's economic position decrease domestic violence. Nevertheless, female mortality and the propensity to use violence increases in the aftermath of exogenous income shocks (Oster, 2004). Miguel (2005) shows that homicides of elder women increase in the aftermath of negative rainfall shocks. The use of violence within household towards women can be driven by stress factors linked with negative income shocks and/or psychological triggers of violence. In fact, Card and Dahl (2011) find that IPV increases following unexpected emotional losses.

Taken together, these results show that policies that increase women's empowerment may decrease IPV. However, the risk of violence may increase when relative income position of women within the household threatens the position of the men. Interventions that reverse the latter effect are expected to be more successful.

Non-economic determinants

Women's bargaining power can also be improved through changes in non-income based interventions. This can occur with improvements in deterrence and punishment of violence against women as posited in the pioneer crime model of Becker (1968). Stevenson and Wolfers (2006) find that following the introduction of unilateral divorce laws in the U.S., IPV and female suicides decreased. Iyengar (2009) finds that following mandated arrest laws for domestic violence in the U.S., IPV decreased. However, female homicides committed by the intimate-partner increased. The author argues that this is a result of an escalation of conflict within the household as a punishment due to the initial reporting. Miller and Segal (2013) show that following the introduction of gender affirmative action in the police force in the U.S., reported gender-based violence increased while, intimate-partner

[3]The criminology literature (Dugan et al., 1999) argues that female employment reduces the spouses leisure time which is associated with a reduction in domestic violence.

homicides decreased. These studies provide evidence of the deterrent effect of policies that are external to the household and that increase female empowerment.

Finally, causal evidence on the effect of education and gender-based violence is scarce. Exceptions are Angelucci (2008) and Hidrobo and Fernald (2013) which look at the heterogeneous impacts of income transfers to women and different sides of household education i.e., of each spouse and the educational gap between them. Both studies find evidence that cash-transfers decrease IPV. In addition, their findings suggest a convex relation between education and violence. The authors find that for low levels of education of either spouse, the effects on IPV are positive and reverse for higher levels of education of the spouses.

Evidence from India

Data on IPV from the National Family Health Survey (2005) reveals that more than a third of women (34%) were victims during their marital lifetime. Emotional violence rates are experienced by 16% of women. The Indian Human Development Survey, (2004) discloses that 50% of women says that it is a customary practice for husbands to beat their wives. Tracking incidence of violence against women over time is only possible through the analysis of police-reported cases which are available from the National Crime Record Bureau. This reveals an increasing trend in reporting of gender-based crimes which can be due to a change in reporting behaviour (Figure 1.1). However, this does not invalidate the effects on incidence. In addition, the lack of reliable information on IPV across-countries makes it difficult to draw comparisons between India and the rest of the World [4]. However, one important face of violence against women is the fact that tolerance of IPV is high amongst women in India and in comparison to other countries (see Figure 1.4). The latest World Values Survey reveals that 46% of the surveyed population (N=1,754) justifies wife-beating. This gives a broad picture as to why it is important to understand the causes and consequences of gender-based violence in the context of India.

Poverty and adverse income shocks are positively related to gender-based violence. Regarding the most severe form of violence, deaths, Rose (1999) finds that favourable rainfall

[4]The United Nations Office on Drugs and Crime provides information of reported rape statistics across countries. India in comparison to other countries ranks below countries as the UK. However, these comparisons may not reveal an accurate cross-country comparison due to several factors such as differences in reporting behaviour.

shocks improve the rate of survival of girls in comparison to that of boys. The literature on the causes of female mortality generally supports the relation between different forms of expressions of son preference on the increase in gender gap in mortality at birth and in adulthood (Anderson and Ray, 2010; Bhalotra and Cochrane, 2010; Jayachandran and Kuziemko, 2011). Finally, dowry related violence and deaths are a specific form of violence against women prevalent in India (not exclusively, though) which is mostly economically driven. Dowry payments are estimated to be a large share of parents income and this, by itself, helps to explain the son preference culture and gender gap in female mortality (Das Gupta et al., 2003). In the context of intra-family bargaining over dowry, Bloch and Rao (2002) show that the use of violence against women is higher among high-income families as violence is used as a means of extortion from the wife's family. Similarly, as divorce is frowned upon for both husbands and wives, families have incentives to terminate marriages by killing women and generating incentives for a new marriage with a new dowry payment made to the groom's family. These crimes, commonly known as wife-burning, can also take the form of accidental deaths or suicides. Sekhri and Storeygard (2014) find that dry shocks due to rainfall deviations from the local means increase reported dowry deaths. The authors do not find evidence of this effect on any other forms of gender-based violence.

Regarding marital violence, Luke and Munshi (2011) use a sample of women in tea plantations from South India and find evidence that increases in women's income increase domestic violence among low castes without any similar effect found on other castes. This supports the *male backlash* hypothesis argued in the sociology literature. Eswaran and Malhotra (2011) show that domestic violence impinges on female autonomy for husbands with low outside options. Alternatively, Chin (2012) finds that female employment decreases domestic violence and that an empowerment effect is larger than the male dominance effect.

Finally, Iyer et al. (2012) provide evidence on the incentives to report a crime and the role of institutions. The authors find that the introduction of gender political quotas at the local level increased the reporting of crimes committed against women. In addition, this effect is driven by exposure to females at the local level rather than higher-order political representation of women. Overall, the literature points to mixed effects on what causes gender-based violence in India.

1.2.2 Non-gender based violence

The seminal model of crime due to Becker, (1968) takes individuals as rational decision-makers that consider whether to engage in one of two mutually exclusive activities i.e., work in the legal or in the illegal sector. This decision is based on the expected net benefits of crime versus those in the legal sector. The net gains from the illegal sector are accounted for the expected costs of punishment for a certain detection level and gain from the legal sector. As a result, individuals decide to commit a crime if:

$$(1-p)\pi - p \times c > w + \varepsilon \tag{1.2.1}$$

where p is the probability of detection, π is the return from crime, c are costs of punishment and $(w+\varepsilon)$ is the individual legal wage and idiosyncratic term. Comparative statics of (1.2.1.) show that the utility of the individual from crime varies positively with the returns from crime and negatively with punishment, deterrence and gains from the legal sector. The deterrence hypothesis based on the supply side of offences states that policies that increase the probability or severity of punishment make crime a less attractive activity thus, crime falls. Policies that increase market opportunities also have a deterrent effect.

Generally, empirical evidence supports the theoretical predictions of Becker (1968). Findings on the probability and severity of punishment are generally supportive of the deterrence hypothesis[5]. The most effective deterrent appears to be police strength (measured as police per capita) (Nagin, 2013). The effect of policing on crime is difficult to disentangle due to the simultaneity bias that arises from the relation police-crime. Di Tella and Schargrodsky (2004) and Draca et al. (2011) use terrorist attacks as a natural-experiment that increases the deployment of police, that is uncorrelated with crime, and in this way solve the endogeneity problem. Results point to negative elasticities which support the deterrence hypothesis. Levitt (1997) uses the timing of elections to estimate the effect of police on crime. The argument is that the probability of re-election is determined by improvements in public spending (such as police force which is highly visible to voters)[6]. Effects of severity

[5]The measures used to capture the probability of punishment include probability of arrest, detection and conviction. The measures used to capture the severity of punishment are length of sentencing, prison population or type of sentencing.

[6]This paper to which later the empirical results were challenged (Levitt, 2002; McCrary, 2002) raised an important hypothesis on police electoral cycles.

of punishment are modestly supportive of Becker (1968).

A number of studies have addressed the relation between income inequality and crime and posit a positive relation between the two (Chiu and Madden, 1998). Nonetheless, most empirical studies are plagued with endogeneity problems and although the use of panel data controls for part of the omitted variable bias problem, these studies do not address reverse causality between the two variables (Fajnzylber et al., 2002). Although the relation between income and crime is well understood, evidence on the mechanisms that explain this relation are scarce. Mehlum et al. (2006) show that exogenous rainfall that affected the price of major crops in Germany increased property crimes and decreased violent crime. In contrast, the literature on climate change and violent conflict finds that rises in temperature above the median and extreme rainfall shocks increase violence (Harari and La Ferrara, 2013; Hsiang et al., 2013). The mechanisms for this relationship could be due to an income effect or a decrease in deterrence, as posited in Becker (1968). Alternatively, it could be due to increased changes in psychological status of individuals following extreme weather shocks.

As per (1.2.1.), labour market changes that increase the returns from legal activities are expected to reduce crime i.e., higher unemployment reduces the expected returns to legal activity. The literature focused on two distinct mechanisms: i) crime-prone age unemployment and, ii) crime and timing of labour-market entry. Both strands of the literature find support of the posited effect in (1.2.1.). Specifically, Fougère et al. (2009) find that crime-prone age unemployment increases crime specifically for burglary, thefts and drug offences. Bell et al. (2014) find that young cohorts who enter the labour market during recessions are more likely to engage in crime.

A recent dimension that has been explored is population density and diversity. Following Becker's approach, population growth that is not accompanied by labour supply growth increases the return from crime. Glaeser and Sacerdote (1999) find that cities have higher crime rates as they attract more crime-prone individuals. Chandrasekhar and Mukhopadhyay (2010) show that in Indian cities employment conditions among the urban poor decrease the well-being of this segment of the population. This may affect the opportunity cost of engaging in criminal activities. Further, Montalvo and Reynal-Querol (2005) find that ethnic diversity affects inter-personal violence. However, this mechanism is not yet well understood. One the one hand, marginalised groups are also poorer and thus, have lower opportunity costs from crime which could raise incidence of violence. On the other hand, increases in conflict can be due to a retaliation effect due to improved economic conditions

of poorer groups (Mitra and Ray, 2013). It is worth noticing that the mechanisms that underlie models of non-gender based violence are very similar to those of intra-household conflict models. Finally, Edlund et al. (2013) look at sex-imbalance in China and find a positive relationship between property and violent crimes and increases in the number of males. In Becker (2010), the association between improved economic conditions of discriminated groups and violence against them can be positive due to a backlash effect or, negative if it increases positive social interactions.

Finally, the trade-off between investments in education and crime are also considered a major factor that affects crime. Considering (1.2.1.), individuals make a decision between the net returns from crime and the expected future wage of a legal activity. Lochner (2004) shows that investments in human capital increase the opportunity cost of crime as well the costs of punishments. Garoupa (2003) considers the role of investment in education as a positive externality that increases the share of law-abiding individuals in the population and consequently, reduces crime. Empirical evidence is generally supportive of this effect. Specifically, Deming (2011) finds that random allocation of students to high quality schools reduces arrest rates and incarceration period (with effects concentrated in high-risk individuals). Similarly, Machin et al. (2011) suggest that increases in years of education reduce property crimes.

Evidence from India

Iyer and Topalova (2014) examine the link between poverty and crime by looking at the rainfall-crime relationship and investigate the effects on crime following the reduction in import tariffs after trade liberalization reforms of 1991. The authors find that both violent and property crimes increase (without any effect on gender-based violence). Prasad (2012) finds that following the 1991 reforms murders decreased.

Regarding the role of institutional factors and crime, Chemin (2012a) finds that court-backlog affects economic performance. This can be one indirect channel of the effect of a poor justice system on crime and violence. Further, Chemin (2012b) finds that criminal politicians in office increase corruption, crimes against public order and general interpersonal violence (including gender-based violence).

Finally, one important factor to consider is population heterogeneity which, in India, is observed across several dimensions (e.g., religious, caste and gender imbalance). Sharma (2012) shows that upper-castes punish low-caste by committing more crimes against sched-

ules castes/scheduled tribes (SC/ST) if the relative economic position between caste groups decrease. Dŕeze and Khera (2000) show that increases in the male-female ratio are positively correlated with homicides.

1.3 Data and Empirical strategy

The Code of Criminal Procedure (CCP) in force as of 1974 is the main legislation on procedures for the implementation of criminal law in India and it provides the basis for the criminal justice system. As per the CCP, the police must collect all information and file a First Information Report (FIR). Following this, the police should proceed with any required investigations of the crime and maintain detailed reports of this process and of any arrests made on suspects. Under the *habeas corpus* all arrested suspects are presented to the magistrate court and charged with a specific crime within 24 hours or released. After this, the police must inform the courts on specific information related to the crime after which the decision to proceed or not against the accused is made. If the accused is not released a formal charge-sheet is issued with the details of the accusation. If there are no grounds for accusation the person is released. The FIR's are the main measure of crime incidence. The information provided by the NCRB is the most comprehensive and detailed database of law and order information in India and is available from 1953.

The India Penal Code considers cognizable and non-cognizable crimes. The first relate to offences for which an arrest can be made without a court mandated warrant. The non-cognizable cases are those in which a police officer can only proceed with an arrest after being granted a warrant. Generally, non-cognizable offences are less severe. The National Crime Records Bureau (NCRB) only reports cognizable offences. Finally, the NCRB provides separate information on India Penal Code (IPC) offences and Special Local Laws crimes (SLL). The latter are reported at the state and district-level whereas the former is only available at the state-level and at the district-level for a shorter time period. In the thesis Appendix, I provide a description of all crime types used in the estimations and its availability. For this chapter I use only IPC cognizable offences records from FIR's.

I obtained information from 14 different crime categories which I use to calculate crime rates of the main variables of interest: crimes committed against women, violent, property and economic crimes. The information on definitions of each crime and the category it belongs to, is obtained from the Indian Penal Code (see the thesis Appendix). The NCRB does not report special-local laws crime statistics at district-level. For this reason the analy-

sis only pertains to crimes that fall under the category of cognizable crimes[7]. I collect this information from 1991-2011. In order to make the data comparable with other variables considered in the analysis the crime area information was matched with the respective district area. Districts where re-organized several times throughout the period considered in the analysis. Thus, to make the information comparable across time, all district information is defined as per the 1991 Census definitions for districts and states. This information was obtained from the codes provided by Kumar and Somanathan (2009) for the period 1990-2001 and corrected for newly created districts after 2001.

Control variables included in the analysis are collected from several sources. First, district-level population data is collected from the Census 1991, 2001 and 2011. The variables included in the empirical analysis are the percentage of urban population, literacy rates, percentage of SC and ST population and percentage of males aged 15-24. This information is interpolated for the intervening years across the three Census waves. These population variables were included following the results found in the literature as discussed in the previous section (Edlund et al., 2013; Glaeser and Sacerdote, 1999; Machin et al., 2011; Sharma, 2012). In addition to the district-time varying factors I include state-time varying factors that can affect the outcomes of interest. Unfortunately, there is no information at the district-level to directly test the deterrence hypothesis in Becker (1968). Thus, in order to test the deterrence hypothesis I use police strength i.e. the ratio of actual police force in a state-year per 100,000 population. Further, I collect information on female police force and calculate the share of female officers in the total actual police force. To the best of my knowledge, this is the first study to consider this determinant of crime as suggested in Miller and Segal (2013). Moreover, I include a dummy for whether the Chief Minister in a state is female. This information is collected from the Election Commission publications. Finally, I collect GDP per capita information from the statistics reports of the Reserve Bank of India.

Figures 1.1-1.3 show the trend in crime rates of the different crime types. There is a steady growth both in gender and non-gender-based violence. Property crime rate has been relatively stable (Fig. 1.3) while economic crimes have been increasing. Within gender-based violence, domestic violence is the single largest contributor and this has been increas-

[7]More recent reports of the NCRB already contain some information at the district-level for SLL crimes. In this paper the main objective is to provide a district-time series variation of determinants. For this reason, these crime categories were not included in the analysis.

ing from 1995 to 2011 (see Figure 1.5). A similar decomposition of total property and violent crime rates show that theft and hurt have the highest incidence within these crime categories (Figures 1.6 and 1.7). Table 1.1 presents descriptive statistics. On average there are 0.25 crimes against women per 1000 females, 0.28 violent crimes per capita and 0.34 property crimes. The rate of domestic violence is of about 1 crime per 10,000 females. The police force is mostly male. Further, roughly half of the population is literate and lives in rural areas.

I employ the following estimation strategy:

$$Crime_{dst} = \alpha_0 + X_{dt}\beta + Z_{st}\beta + \gamma_d + \delta_t + \varepsilon_{dst} \tag{1.3.1}$$

where $Crime_{dst}$ is the incidents per population in district d of state s at time t. I include a vector of time-varying district variables X_{dt}, and a time-varying vector of state variables, Z_{st}. In addition, all specifications include district fixed-effects γ_d, to account for unobserved district specific time-invariant characteristics that could be correlated with the main outcome of interest (e.g. geographic location, reporting behaviour, invariant cultural factors). Moreover, I include a vector of time-specific effects δ_t, to account for year specific effects that could affect the estimations (e.g., world price changes). α_0 is a constant term and ε_{dst} is the error term. Standard-errors are clustered at the district-level to account for heteroskedasticity and the fact that crime rates can be correlated across time (Cameron and Trivedi, 2005).

1.3.1 Addressing measurement error

One of the major problems in the crime literature specifically, the literature related to gender-based violence is measurement error. The common variables available are police-reported crimes, surveyed domestic violence and hospitalization of household assaults. These measures reflect different stages of the household conflict and different levels of empowerment of women [8]. As true incidence is not observable and under-reporting is likely to be high (Soares, 2004), I can only refer to any conclusions as regards to police-reported crimes (the

[8] A possible direction for future research is to investigate determinants of reporting incentives. Soares (2004) shows that crime reporting is correlated with development. In the context of developing countries, reforms that improve law enforcement institutions could have a positive impact on reporting incentives as shown in Iyer et al. (2012).

main dependent variables in this analysis) as a possible lower-bound for true incidence. I also include results from surveyed domestic violence using the gold-standard in health surveys, the Demographic and Health Surveys. While the bias in survey responses is expected to be smaller and may measure incidence with more accuracy it is nonetheless a reported measure. Finally, to the best of my knowledge there are no publicly-available information on hospitalization of females due to household related assaults in India. Iyer et al. (2012), Dŕeze and Khera (2000) and Sekhri and Storeygard (2014) argue that deaths are less likely to be under-reported as these are difficult to hide. Following this, dowry deaths and murders can be considered more reliable measures of incidence.

1.4 Determinants of gender-based violence

I estimate the different determinants of gender-based violence based on what has previously been identified as important factors that affect gender-based violence. In addition, while I follow the crime and domestic violence literature to select the most relevant determinants I include two additional factors that could affect women's security: female police employment and gender of Chief Ministers. First, women police officers can improve deterrence if they are more efficient and thorough investigating gender-based violence. It can also increase reporting if there is an identity effect between women officers and victims as suggested in Iyer et al. (2012) and Miller and Segal (2013). Therefore, the effect of this variable is ambiguous. Moreover, while female employment in law enforcement in India has been increasing it remains a largely male-dominant area.

Second, as India is a federation with decentralized decision-making power over law and order, state-level politicians have considerable influence on public finances. The Chief Ministers are the highest political decision-makers at the state-level and I consider the effect their gender has on crimes against women. There are several reasons why this could affect gender-based violence. First, through its impact on public finances, in specific non-development expenditures as increasing police recruitment (Clots-Figueras, 2011). Second, there can also exist an empowerment effect that could affect reporting behaviour of women (Iyer et al., 2012). I analyse these two additional features by including in the estimations the state-year share of female police strength and a binary variable for women Chief Ministers.

In Table 1.2 I present district fixed-effects estimations for total gender-based violence and separately for domestic violence, rape and dowry-deaths. All specifications include year dummies to account for aggregate time-varying shocks that could be correlated with

violence and crime. Across specifications, an increase in the percentage of young males (aged 15-24) is positively correlated with any form of gender-based violence. In addition, increases in the percentage of urban population in a district are positively related to crimes against women except for, dowry deaths. Further, literacy is inversely related to gender-based violence except dowry deaths. This is consistent with the findings of Bloch and Rao (2002) that indicate that women from high-income families have higher risk of facing dowry-related violence. If female education and household income are positively correlated then as per Bloch and Rao (2002) husbands families have incentives to increase the use of violence towards their wives if they are from more wealthy households. This bargaining incentive may not exist when explaining the remaining results on other gender-based violence categories. Moreover, these estimates are also consistent with the posited relations in Edlund et al. (2013), Glaeser and Sacerdote (1999) and Machin et al. (2011). The relation between SC/ST and gender-based violence is weaker. The higher the percentage of SC in a district, the higher total violence. This effect is captured almost entirely by the estimates on rape. There is no information disaggregated by caste and crime-type. Therefore it is difficult to ascertain whether SC/ST affect crime or if instead, crime is affected by the incidence of crimes against SC/ST. Rape is often considered a hate-crime. Thus, this result is consistent with the hypothesis that increased exposure of low and marginalized caste women increases crimes against them. However, as per the NCRB statistics most rape cases are committed by offenders known to the victims. As a result, with residential segregation between SC and non-SC this indicates that women from low-castes would be more at risk. The effect of ST is not significant across all specifications.

State-varying factors provide ambiguous predictions. Having a woman in the highest decision-making position in the state decreases total violence and rape though it has no effect on domestic violence or dowry deaths. The effect of income per capita is mixed i.e. it is positively correlated with total violence and rape and negatively related with domestic violence and dowry deaths. Finally, I consider the deterrence effect of police force on gender-based violence by first considering total police strength and then the effect of relative female police force strength. An increase in police strength in the previous year in the state is positively associated with dowry deaths. It is suggestive that the effect of female police force (lagged one period), increases reporting for both rape and dowry deaths. These coefficients are significantly different from zero and positive for both measures of detection. The effect of female political leadership is negatively related to total violence but this relation is not consistent across categories.

In Tables 1.5 I present the characteristics of the sample and estimations using individual-

level data. The dependent variables are binary measures of violence committed against women. These are self-reported measures of violence for ever-married women aged 15-49 at the time of the survey[9]. Domestic violence accounts for about 85% of assaults committed by anyone and thus, I also present results separately for violence committed only by the husband. It is worth mentioning that this is also consistent with the decomposition of crimes committed against women shown in Figure 3. The prevalence of assaults is 21% and domestic violence accounts for almost all incidence in violence of any form. Incidence of domestic violence occurs among 19% of women in the sample. Further, 37% of women were married before the age of 18. Most women in the sample live in rural areas and are Hindus.

In Table 1.6 I present Probit fixed-effect estimations for both assaults and domestic violence. As in the reported-violence estimations, educational attainment is negatively related to IPV. In particular, the relation between non-primary education of both women and men is significantly different from zero and decreases IPV. In addition, IPV is positively related to women who exhibit high son preference (ratio of desired number of sons per desired number of daughters) and who married below the legal marriageable age. Moreover, anecdotal evidence suggests that household family structures affect domestic violence i.e., women in larger households are more likely to be victims of domestic violence. However, I do not find that women in non-nuclear families are more likely to be victims of IPV or any other form of assault. Furthermore, Body Mass Index (BMI) is a measure of health status of women which correlates with the income status of the household. I do not find any effect of this measure on any form of violence against women. Finally, SC women are more likely to be victims of domestic violence. This result implies that low-caste are more at risk of IPV possibly due to an income status rather than an exposure hypothesis as posited before. Overall, individual-level correlates of IPV and aggregate correlates of domestic violence are similar.

As a robustness test I repeat the estimation of (1.3.1) using a counts model for police-reported crimes. The distribution of crime is skewed to the right and exhibits over-dispersion (the conditional variance is larger than the mean- see Table 1.1). This violates the OLS assumptions. I first estimate the determinants of gender-violence model using a conditional

[9]The sample consists of all districts included in the NFHS-2 (1998-1999) survey for states of Andhra Pradesh, Assam, Bihar, Goa, Gujarat, Haryana, Himachal Pradesh, Jammu & Kashmi, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Mizoram, Nagaland, Orissa, Punjab, Rajasthan, Sikkim, Tamil Nadu, West Bengal, Uttar Pradesh, New Delhi and Arunachal Pradesh. Results including the states included in the police-reported estimations yield similar results.

fixed-effects Poisson model with robust standard-errors clustered at the district-level. However, the data exhibits over-dispersion and this may cause the standard-errors in this specification to be too low (Cameron and Trivedi, 2013). Thus, I also present results using a negative binomial estimation. Specifically, I use an unconditional negative binomial model with clustered robust standard-errors at the district-level with district dummies. The combination of district dummies with clustered standard-errors yields unbiased estimates and is preferred to a fixed-effects negative binomial with robust standard errors (Allison and Waterman, 2002). This is the preferred non-linear specification. Further, I include the population measure as an additional independent variable hence, the interpretation of the effects is per population rather than incidents (Cameron and Trivedi, 2013). Results are presented in Tables 1.3 and 1.4. The direction of the coefficients are similar to those presented in linear-fixed effects estimations for all variables considered except share of youth male population. It is worth mentioning that negative binomial models correct for over-dispersion thus, prevent rejections of the null hypothesis to be *over* rejected in some cases. I leave the effect of male population for future research and will attempt to analyse this problem taking care for the simultaneity problem between crime and factors that affect male-biased sex ratios.

1.5 Determinants of Violent and Acquisitive Crime

In Table 1.7 I present results of estimations of (1.3.1) for violent and property crimes. The urban population effect found in gender-based violence is also positively correlated with both violent and property crimes. This is consistent with Glaeser and Sacerdote (1999). Further, the effect of a surplus of males is also positively correlated with violent and property crimes. This is likely to be due to a behavioural effect (i.e males are more likely to engage in illegal activities) as well as an opportunity cost of crime. An increase in the surplus of males in the labour market can decrease the opportunity cost of crime specially, if the constraints for females to enter the labour market are high and deterrence is low. In contrast with gender-based violence, literacy does not seem to play a role in explaining either type of crime. The coefficients are negative across specifications but not significantly different from zero except for burglary. Similar to the results in section 4, the size of SC population is positively related to violent and property crimes. This may reflect group tension as suggested in Sharma (2012). It is worth noticing that consistent with this author's hypothesis, income per capita is also positively correlated with violent and property crime. Although I

am not isolating the determinants of crimes committed against SC, these would be part of the violent categories. Moreover, the effect of having a woman in the highest state political office is negatively related to violence and property illegal activities. Finally, there is no evidence of a deterrence effect from police strength. Although the coefficients are negative across specifications of violent and property crimes, the coefficient is only significant for total violent crime (at 10%). Results using a Poisson model and a negative binomial are similar to those for the linear fixed-effects model (Tables 1.10 and 1.11).

1.6 Heterogenous effects of the 73^{rd} Amendment

Iyer et al. (2012) use the staggered implementation of the 73^{rd} Amendment Act across states to estimate the effect of improved female leadership on crimes against women. This Act introduced a 33% gender quota among rural local-level political leaders[10]. The authors find that after the sharp increase in women political leaders, reported crimes against women increased. The authors do not find that more women in political offices increased deterrence of crimes against women. Instead, the findings favour an increased *empowerment* effect that led to more reported crimes following the increased exposure to female leadership i.e., an increase in women in local-level political positions increased the willingness of women to report crimes.

Using this exogenous source of variation in female empowerment, I repeat the estimations in Table 1.2 comparing the differential effects of the 73^{rd} Amendment Act across different measures that affect decision-making and deterrence of crimes against women. I consider police force and high-level female decision-making power. Regarding police, as predicted in Becker (1968) increased policing improves deterrence. However, when considering gender-based violence or violence against marginalized groups this effect may not hold. First, if the productivity of law enforcement professionals differs across crime types or across the identity of the victim who reports the crime, a deterrence effect may not exist. This is likely to occur if male police officers do not handle gender and non gender-based complaints similarly due to stigma or prevalent social norms. On the other hand, if victims do not report, then a deterrence effect may not occur as crimes are not prosecuted.

[10]The equivalent Act for urban areas is the 74^{th} Amendment Act which was implemented in a similar way after 1994.

I analyse the effect of female law enforcement across the 73^{rd} Act. I expect that where reporting behaviour is higher (i.e. after the implementation of the Act) there is a deterrence effect from a higher share of female police officers. Similarly, a deterrence effect is also likely to persist if there is *maximum* exposure to women in political office i.e., exposure both at the lower and higher levels of decision-making. I estimate the following specification:

$$Crime_{st} = \alpha_0 + Z_{st}\beta + \gamma_s + \delta_t + \lambda \times z_{st} \times 73^{rd}_{st} + \delta 73^{rd}_{st} + \theta z_{st} + \varepsilon_{st} \tag{1.6.1}$$

where all parameters are as defined in (1.3.1) and where z is either the share of women in law enforcement in a state s at time t or a dummy for the gender of the Chief Minister in state s and time t. I include in all specifications a vector of state-specific effects γ_s. The coefficient of interest is λ which captures the effect of the measures of exposure to female positions Post-73^{rd} Amendment. Standard-errors are clustered at the state-level.

First, I repeat the estimation as in Iyer et al. (2012) using the district-level data of the previous section. I find similar effects in gender-based violence, including domestic violence and not in other types of crime (see Table 1.8). This is consistent with the findings of the authors. Moreover, it shows that at a more disaggregated level the effects of the 73^{rd} Amendment also hold.

Results from estimating (1.6.1.) are presented in Table 1.9. The effect of female police officers is statistically insignificant. Across specifications the effect seems to suggest a deterrent effect but, this is only significant for kidnappings of women and girls and not other categories. This suggests that where female empowerment is highest, female police representation does not act as a deterrent. The effect of the reservation could have created incentives for crime reporting in which case I would expect to find a positive coefficient. Yet, it could also be that female police officers have higher incentives to investigate and even become more effective towards crimes against women after the reservations. In this case I would expect to find a negative coefficient. This seems to be the case only for kidnappings. Finally, the effect of the reservations does not seem to have increased reporting in states where women are Chief Ministers. When state-linear trends are included in the model, the effect on total gender-based violence suggests that there is a reporting effect in states where women are Chief Ministers. Yet, this effect is not consistent across crime types.

1.7 Discussion and conclusion

This paper provides an overview of the main determinants of gender-based violence, non-gender violence and property and economic crimes in India. It provides a detailed literature review on determinants of gender-based violence and crime and relates it to the Indian context. In addition, I provide a broad description of what are the main factors driving crime in India in the post-liberalization period.

Specifically, I identify the main drivers of police-reported gender crimes and IPV. I find that these do not differ substantially. Furthermore, the results obtained for violent and non-violent crime are in line with the theoretical predictions in the literature. Moreover, evidence of gender-based crime deterrence through police strength or female deployment require more research particularly, in identifying causality as results are not conclusive as to whether there is a deterrence or a reporting effect. This could have several policy implications for institutional development of law and order institutions.

Appendix A

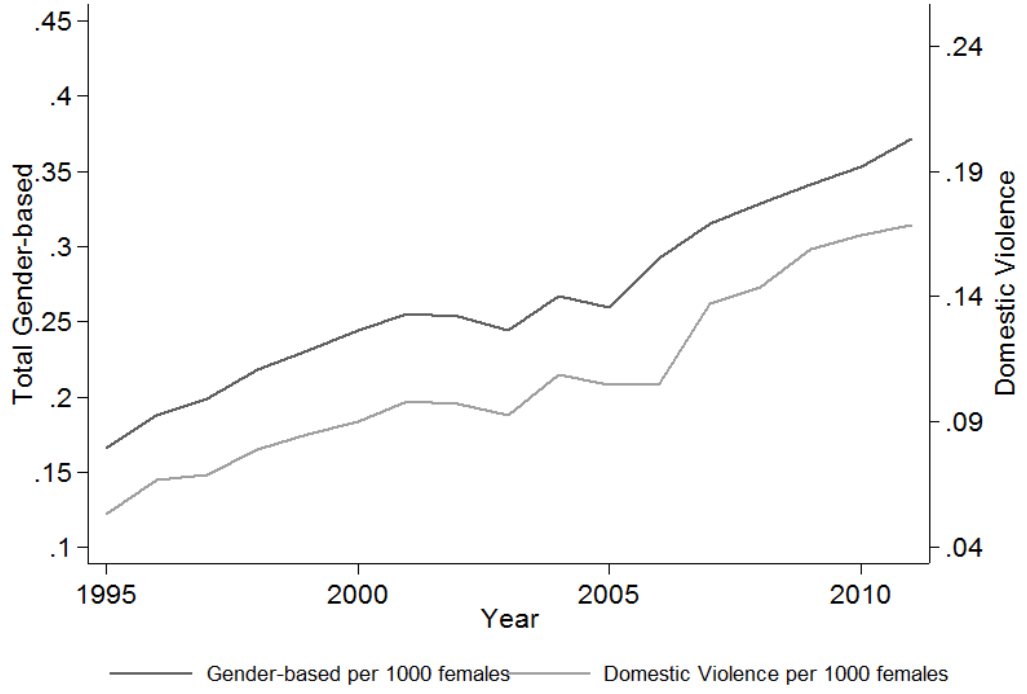


Fig. 1.1 Trend of gender-based violence

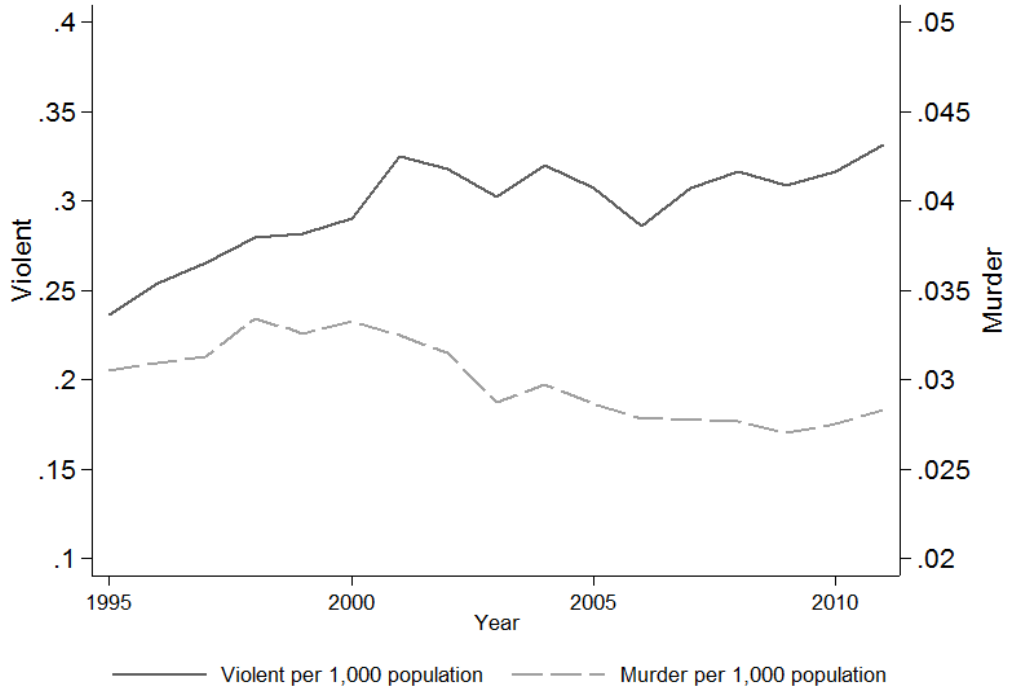
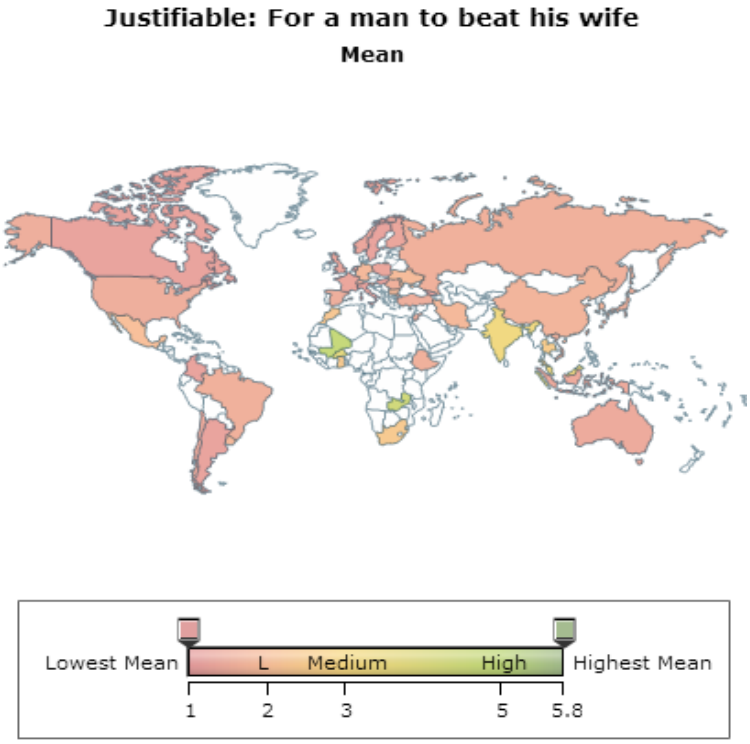


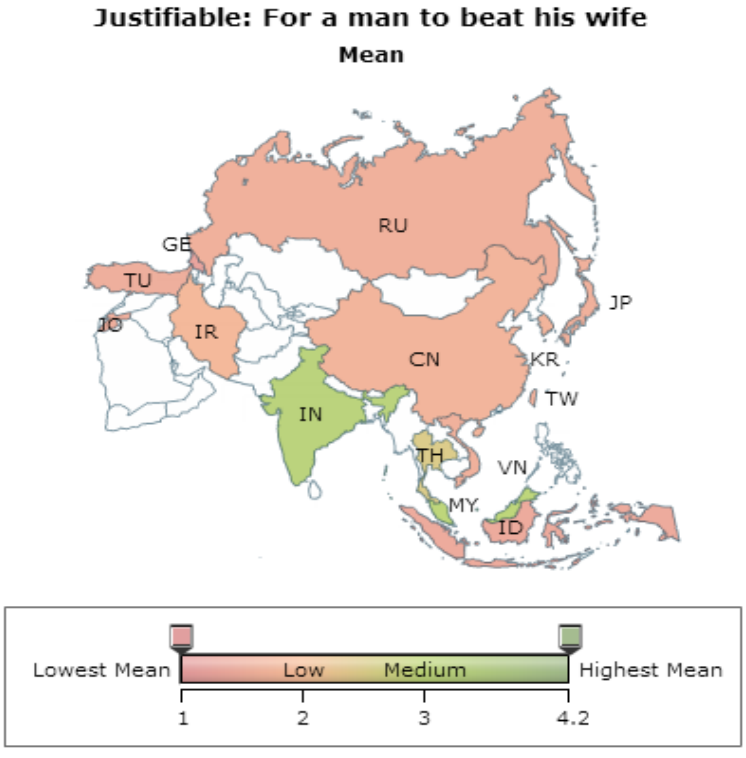
Fig. 1.2 Trend of violent crimes



Fig. 1.3 Trend of economic crimes



(a) Tolerance of domestic violence in the World



(b) Tolerance of domestic violence in Asia

Fig. 1.4 Tolerance of Intimate Partner Violence

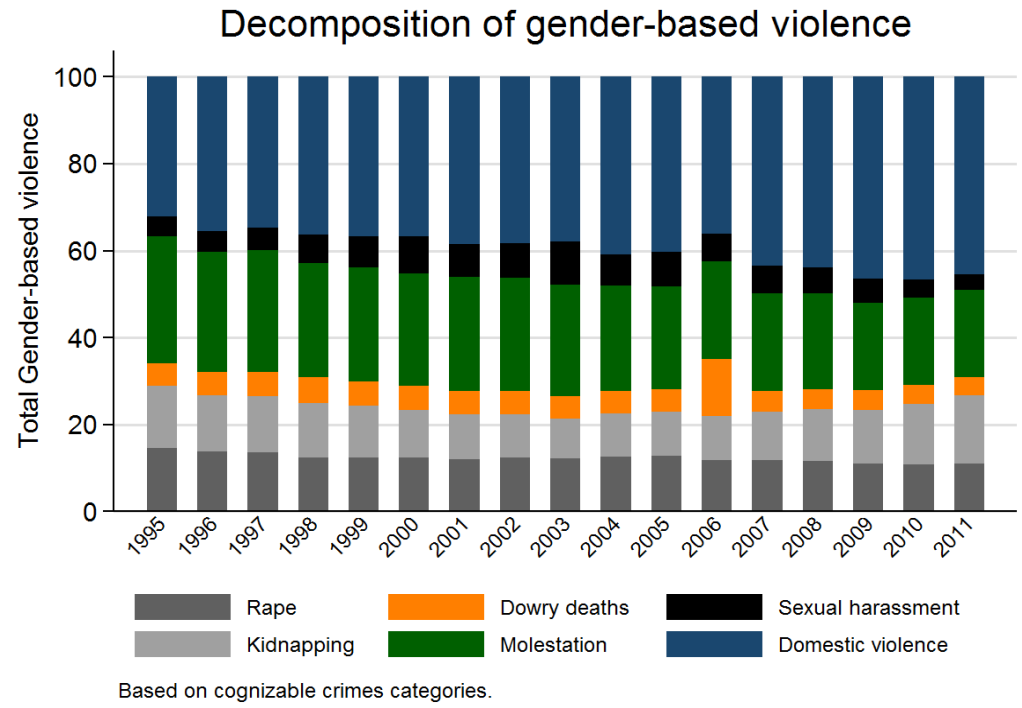


Fig. 1.5 Yearly decomposition of gender-based violence

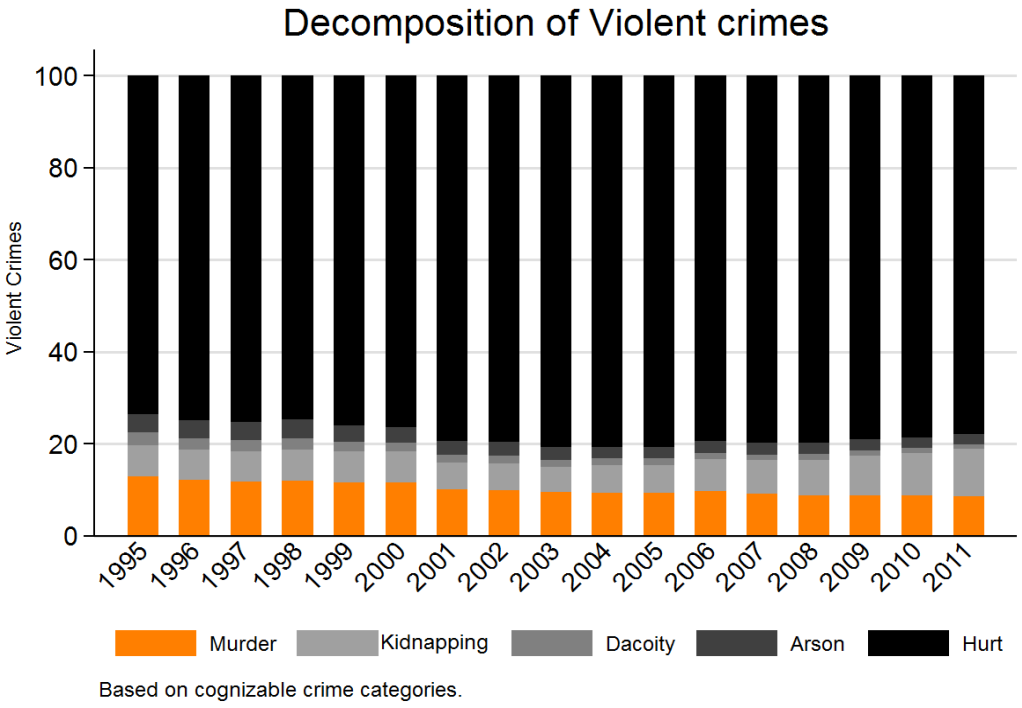


Fig. 1.6 Yearly decomposition of violent crime

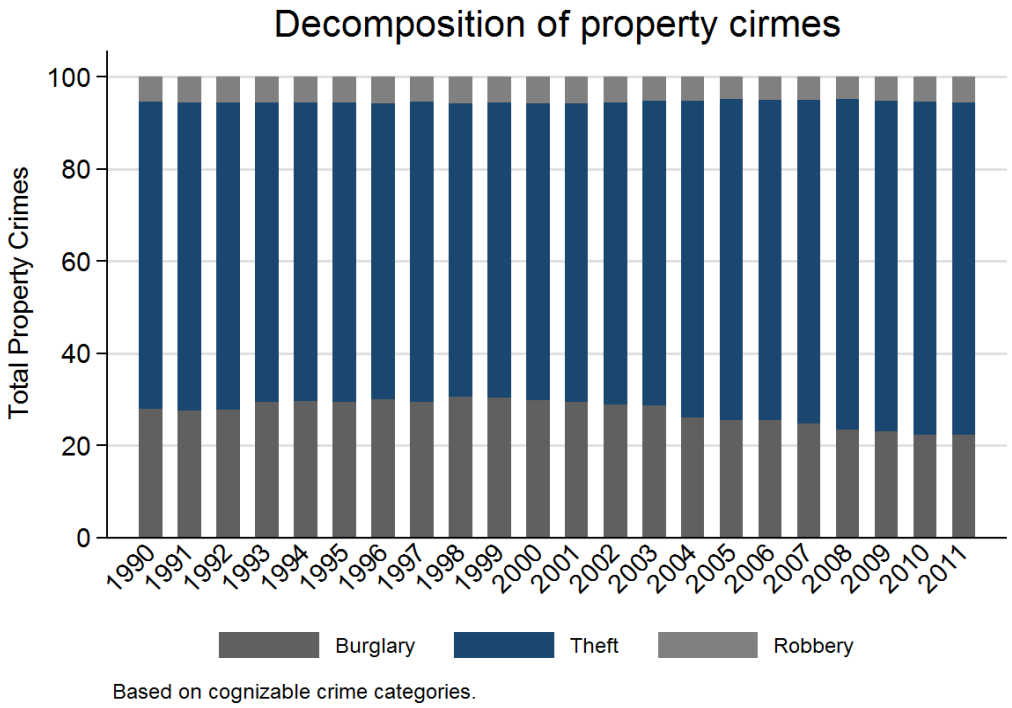


Fig. 1.7 Yearly decomposition of economic crimes

Table 1.1 Summary Statistics

	N	Mean	SD	Min	Max
District-varying variables					
Total gender-based	7,433	0.252	0.206	0	2.395
Domestic Violence	7,433	0.090	0.108	0	1.311
Rape	7,433	0.039	0.036	0	0.295
Violent	7,433	0.285	0.266	0	2.676
Property	7,433	0.339	0.268	0.006	3.150
Economics	7,433	0.054	0.057	0	1.139
Urban	7,428	22.95	16.29	0	100
SC	7,438	16.59	7.352	0.435	51.76
ST	7,438	9.346	15.29	0	71.83
Literacy	7,438	52.51	13.13	14.54	88.74
Young of Males	7,343	10.41	12.75	0.679	247.5
State-varying variables					
Income p.c.	8,638	2.099	1.377	0.426	7.007
Female police	8,638	2.165	2.061	0	13.24
Gender of CM	8,638	0.164	0.370	0	1
Police strenght	8,638	1.238	0.446	0.312	3.22

Crime figures are are the ratio of incidence of crimes per 1000 female/total population. Police strength is per 100,000 population and Female police is the share of women in the total police force. Socio-economic factors are in %.

Table 1.2 Determinants of Gender-based violence

	Total		Domestic Violence		Rape		Dowry deaths	
% Urban	0.022***	0.022***	0.036***	0.036***	0.022***	0.021***	0.005	0.004
	(0.005)	(0.005)	(0.006)	(0.006)	(0.007)	(0.006)	(0.007)	(0.007)
Literacy	-0.020**	-0.021**	-0.032**	-0.031**	-0.026***	-0.026***	0.014	0.015
	(0.009)	(0.009)	(0.013)	(0.013)	(0.007)	(0.007)	(0.010)	(0.010)
SC	0.032*	0.033*	0.010	0.011	0.035**	0.033*	0.002	0.002
	(0.017)	(0.017)	(0.020)	(0.020)	(0.017)	(0.017)	(0.021)	(0.020)
ST	0.011	0.012	-0.010	-0.011	0.008	0.006	-0.013	-0.015
	(0.013)	(0.013)	(0.023)	(0.023)	(0.014)	(0.014)	(0.018)	(0.018)
Young Males	0.081***	0.081***	0.055***	0.054***	0.087***	0.087***	0.058***	0.057***
	(0.011)	(0.011)	(0.014)	(0.014)	(0.011)	(0.011)	(0.012)	(0.012)
Gender of CM	-0.139***	-0.138***	0.033	0.017	-0.049*	-0.043*	0.006	-0.009
	(0.021)	(0.021)	(0.032)	(0.032)	(0.026)	(0.026)	(0.029)	(0.028)
Income p.c.	0.054**	0.059***	-0.124***	-0.122***	0.056***	0.045**	-0.099***	-0.108***
	(0.023)	(0.022)	(0.034)	(0.034)	(0.021)	(0.021)	(0.034)	(0.035)
Police_{t-1}	-0.029		0.192*		-0.084***		0.176*	
	(0.034)		(0.112)		(0.032)		(0.094)	
Share_{t-1}		-0.010		0.007		0.014*		0.023**
		(0.006)		(0.011)		(0.008)		(0.009)
N	7,322	7,322	5,797	5,797	7,298	7,298	5,338	5,338
R^2	0.843	0.844	0.741	0.741	0.783	0.783	0.697	0.698
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the log of crime rate (per 1000 female population). Estimations based on a linear fixed-effects model. Standard errors are clustered at the district-level. Police strength is per 100,000 population (in logs) and Share is the share of women in the total police force. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Table 1.3 Determinants of Gender-based violence- Negative Binomial

	Total		Rape		Dowry deaths	
	Total		Rape		Dowry Deaths	
Urban	6.163***	6.440***	0.485**	0.492**	-0.093	-0.102
	(1.447)	(1.424)	(0.200)	(0.197)	(0.160)	(0.161)
Literacy	-4.955*	-5.251*	-0.606**	-0.618**	0.167	0.166
	(2.748)	(2.752)	(0.284)	(0.284)	(0.223)	(0.222)
SC	1.899	2.056	0.793	0.763	-0.361	-0.392
	(4.915)	(4.857)	(0.520)	(0.520)	(0.372)	(0.363)
ST	-0.575	-0.094	0.155	0.163	-0.918***	-0.942***
	(4.826)	(4.777)	(0.596)	(0.594)	(0.345)	(0.345)
Young Males	1.872	1.774	0.157	0.172	-0.213	-0.178
	(3.012)	(2.962)	(0.372)	(0.368)	(0.263)	(0.257)
Gender of CM	-12.634*	-8.597	0.630	1.243	1.371**	1.556**
	(6.592)	(6.720)	(0.915)	(0.926)	(0.619)	(0.637)
Income p.c.	-37.859***	-35.778***	-0.581	-0.626	-2.567***	-2.759***
	(7.272)	(7.319)	(0.779)	(0.773)	(0.677)	(0.672)
Share_{t-1}		-6.109***		-0.329		0.191
		(2.003)		(0.267)		(0.173)
Police_{t-1}	-2.329*		-0.537***		-0.042	
	(1.225)		(0.143)		(0.277)	
Female pop (000)	391.758**	363.554**	17.045	19.259	6.920	8.903
	(179.835)	(178.394)	(29.046)	(28.642)	(18.060)	(17.846)
N	5,940	5,940	5,940	5,940	5,940	5,940
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the district-year counts per crime-head. Robust standard errors in parenthesis. Police strength is per 100,000 population (in logs), Share is the share of women in the total police force and Female Pop in 1,000 are in logs. Marginal effects reported. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Table 1.4 Determinants of Gender-based violence- FE Poisson

	Total		Domestic Violence		Rape		Dowry Deaths	
Urban	0.017***	0.018***	0.025***	0.026***	0.014**	0.014**	-0.001	-0.002
	(0.005)	(0.005)	(0.007)	(0.007)	(0.006)	(0.006)	(0.008)	(0.008)
Literacy	-0.011	-0.012	-0.021	-0.022	-0.005	-0.006	0.000	0.001
	(0.011)	(0.011)	(0.015)	(0.015)	(0.011)	(0.011)	(0.012)	(0.012)
SC	-0.007	-0.006	-0.035	-0.033	0.010	0.009	-0.021	-0.029
	(0.023)	(0.023)	(0.028)	(0.028)	(0.019)	(0.019)	(0.020)	(0.021)
ST	0.005	0.006	0.004	0.006	0.000	0.000	-0.046***	-0.052***
	(0.017)	(0.017)	(0.020)	(0.019)	(0.017)	(0.017)	(0.015)	(0.016)
Young Males	-0.005	-0.005	-0.004	-0.004	0.006	0.006	-0.004	-0.000
	(0.012)	(0.012)	(0.016)	(0.016)	(0.011)	(0.011)	(0.014)	(0.013)
Gender of CM	-0.065***	-0.050***	0.005	0.001	-0.015	0.015	0.003	0.023
	(0.020)	(0.019)	(0.028)	(0.028)	(0.024)	(0.024)	(0.035)	(0.036)
Income p.c.	-0.115***	-0.112***	-0.233***	-0.226***	0.002	-0.002	-0.081**	-0.094**
	(0.025)	(0.026)	(0.034)	(0.035)	(0.022)	(0.022)	(0.037)	(0.037)
Female pop. (000)	1.583	1.473	2.136	2.061	0.577	0.594	0.736	1.009
	(0.915)	(0.902)	(0.135)	(1.340)	(0.812)	(0.818)	(1.056)	(1.035)
Police_{t-1}	-0.026*		0.007		-0.048***		-0.034*	
	(0.014)		(0.019)		(0.013)		(0.018)	
Share_{t-1}		-0.041***		-0.027		-0.021		0.046**
		(0.014)		(0.017)		(0.008)		(0.021)
N	5,935	5,935	5,935	5,935	5,935	5,935	5,918	5,918
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the district-year counts per crime-head. Robust standard errors in parenthesis. Police strength is per 100,000 population (in logs), Share is the share of women in the total police force and Female Pop in 1,000 are in logs. Marginal effects reported. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Table 1.5 Summary Statistics NFHS-2

	Mean	SE	N
Bmi	20.743	0.098	82,724
Ever-beaten (0/1)	0.213	(0.003)	82,891
Ever-beaten by the Partner (0/1)	0.191	(0.003)	82,884
Under-age Bride (0/1)	0.373	(0.004)	82,897
Unemployed (0/1)	0.027	(0.001)	82,897
Primary Partner	0.192	(0.003)	82,708
Secondary Partner	0.349	(0.003)	82,708
Higher Partner	0.176	(0.004)	82,708
Employed(0/1)	0.397	(0.005)	82,686
Primary	0.173	(0.002)	82,877
Secondary	0.223	(0.003)	82,877
Higher	0.079	(0.003)	82,877
Radio(0/1)	0.409	(0.004)	82,891
Hindu (0/1)	0.848	(0.005)	82,897
Muslim(0/1)	0.121	(0.005)	82,897
SC (0/1)	0.184	(0.004)	82,897
ST(0/1)	0.089	(0.004)	82,897
Urban (0/1)	0.263	(0.010)	82,897
Daughter-in-law(0/1)	0.199	(0.002)	82,897
Son Preference	0.382	(0.005)	78,743

All variables collected from NFHS-2 for all states. Using survey weights.

Table 1.6 Determinants of Gender-based violence- self-reported

	Ever Beaten:	
	by anyone	by the husband
Bmi	-0.000	-0.000
	(0.000)	(0.000)
Primary	0.007	0.001
	(0.005)	(0.005)
Secondary	-0.052***	-0.062***
	(0.006)	(0.006)
Higher	-0.112***	-0.138***
	(0.010)	(0.010)
Under-age	0.029***	0.031***
	(0.004)	(0.004)
Son Pref.	0.013***	0.013***
	(0.003)	(0.003)
Daughter-in-law	-0.055***	-0.055***
	(0.005)	(0.005)
Unemployed	-0.001	-0.003
	(0.011)	(0.010)
Primary Husband	-0.007	-0.004
	(0.005)	(0.005)
Secondary Husband	-0.044***	-0.036***
	(0.005)	(0.005)
Higher husband	-0.096***	-0.091***
	(0.008)	(0.007)
Radio	-0.013***	-0.011***
	(0.004)	(0.004)
Hindu	-0.017	-0.001
	(0.015)	(0.014)
Muslim	-0.002	0.014
	(0.016)	(0.015)
SC	0.047***	0.044***
	(0.005)	(0.005)
ST	0.019**	0.020**
	(0.009)	(0.008)
Urban	0.010	0.006
	(0.008)	(0.007)
N	78,344	78,142
District FE	Yes	Yes
Pseudo R^2	0.09	0.11

Estimations of a probit model using survey weights. Marginal effects reported. Standard-errors are clustered at the district-level. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Table 1.7 Determinants of Violent and Acquisitive Crime

	Violent	Property	Economics	Burglary	Theft	Murder
% Urban	0.014**	0.022***	0.022***	0.011***	0.026***	0.006
	(0.006)	(0.005)	(0.004)	(0.004)	(0.006)	(0.004)
Literacy	-0.005	-0.006	-0.008	-0.010*	-0.005	-0.001
	(0.011)	(0.006)	(0.007)	(0.006)	(0.006)	(0.005)
SC	0.035**	0.045***	0.052***	0.042***	0.051***	0.003
	(0.016)	(0.011)	(0.019)	(0.014)	(0.012)	(0.010)
ST	0.015	-0.001	0.020	-0.010	0.002	0.003
	(0.010)	(0.007)	(0.013)	(0.010)	(0.006)	(0.007)
Young Males	0.065***	0.068***	0.068***	0.068***	0.069***	0.066***
	(0.010)	(0.008)	(0.011)	(0.008)	(0.008)	(0.008)
Gender of CM	-0.251***	-0.085***	0.009	-0.113***	-0.078***	-0.120***
	(0.032)	(0.018)	(0.023)	(0.019)	(0.021)	(0.016)
Income p.c.	0.085***	0.115***	-0.025	0.182***	0.086***	0.102***
	(0.023)	(0.018)	(0.027)	(0.018)	(0.021)	(0.015)
Police_{t-1}	-0.056*	-0.029	0.073**	-0.004	-0.019	-0.013
	(0.032)	(0.019)	(0.035)	(0.030)	(0.022)	(0.016)
N	7,326	7,328	7,304	7,323	7,328	7,315
R^2	0.747	0.812	0.747	0.848	0.802	0.781
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the log of crime rate (per 1000 population). Estimations based on a linear fixed-effects model. Standard errors are clustered at the district-level. Police is the log of police per capita. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Table 1.8 Iyer et al. (2012) at the district-level

	Violent	Property	Economic	Women	DV	Rape	Kidnap. F
Post 73^{rd}	0.058	0.027	0.019	0.090**	0.119*	0.063*	0.119***
	(0.045)	(0.024)	(0.033)	(0.039)	(0.069)	(0.038)	(0.038)
N	7,326	7,328	7,304	7,322	5,797	7,298	7,164
R^2	0.741	0.810	0.748	0.842	0.741	0.783	0.721
District FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the log of crime rate (per 1000 population). Estimations based on a linear fixed-effects model. Standard errors are clustered at the district-level. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively. Control variables included in the estimations are literacy rates, urban population, percentage SC/ST, young male population measured at the district-level and lagged police strength and income per capita measured at the state-level.

Table 1.9 Heterogenous effect of the 73^{rd} Amendment of Crime

Panel A						
	Domestic Violence		Kidnapping		Total	
Post 73^{rd} *Police	-0.095		-0.157**		-0.050	
	(0.113)		(0.053)		(0.066)	
Post 73^{rd} *CM		-0.194		-0.261**		0.092
		(0.255)		(0.121)		(0.180)
R-squared	0.83	0.82	0.93	0.93	0.94	0.94
Panel B						
Post 73^{rd}*Police	0.096		-0.086*		-0.039	
	(0.255)		(0.041)		(0.067)	
Post 73^{rd}*CM		-0.085		-0.024		0.312*
		(0.211)		(0.087)		(0.156)
State Trends	Yes	Yes	Yes	Yes	Yes	Yes
N	205	205	271	271	271	271
R-squared	0.88	0.88	0.96	0.96	0.96	0.96
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the log of crime rate (per 1000 population). Estimations based on a linear fixed-effects model. Standard errors are clustered at the state-level. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively. Control variables included in the estimations are literacy rates, urban population, percentage SC/ST, young male population, lagged police strength and income per capita.

Table 1.10 Determinants of Violent and Acquisitive Crime- Negative Binomial

	Violent	Property	Economic	Burglary	Theft	Murder
Urban	6.423**	17.166***	2.608***	1.933**	13.692***	0.157
	(3.097)	(4.325)	(0.570)	(0.933)	(3.308)	(0.318)
Literacy	10.055*	1.812	-0.103	-0.803	1.396	0.693**
	(6.094)	(4.283)	(0.955)	(1.195)	(3.243)	(0.320)
SC	23.354**	35.530***	5.528**	8.547***	25.966***	0.488
	(9.616)	(10.855)	(2.224)	(2.807)	(8.173)	(0.679)
ST	15.055**	5.372	4.247**	-1.149	5.877	0.920*
	(5.949)	(6.163)	(1.820)	(2.294)	(4.360)	(0.497)
Young Males	-9.748	6.624	1.473	0.595	7.661*	-1.549*
	(8.749)	(5.345)	(1.258)	(1.615)	(4.016)	(0.853)
Gender of CM	-166.606***	-50.034***	5.455*	-23.284***	-28.173**	-6.762***
	(20.239)	(16.736)	(3.072)	(4.116)	(12.680)	(1.151)
Income p.c.	8.839	49.743***	-11.283***	28.547***	18.565	2.490**
	(15.382)	(15.659)	(3.508)	(4.068)	(11.936)	(1.215)
Police_{t-1}	-5.614**	-4.174**	1.457**	424.472**	1552.506***	-51.418
	(2.654)	(2.079)	(0.630)	(135.478)	(357.394)	(57.833)
Pop.(000)	195.432	1892.307***	337.908***	-0.842	-1.666	-0.309**
	(737.113)	(483.893)	(100.972)	(0.855)	(1.530)	(0.0934)
N	7,328	7,328	7,328	7,328	7,328	7,328
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the district-year counts per crime-head. Standard errors are clustered at the district-level. Pop(000) and Police force are in logs. Marginal effects reported. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Table 1.11 Determinants of Violent and Acquisitive Crime- FE Poisson

	Violent	Property	Economic	Burglary	Theft	Murder
Urban	0.004	0.019***	0.015***	0.001	0.024***	0.005
	(0.004)	(0.007)	(0.004)	(0.006)	(0.007)	(0.005)
Literacy	0.010	-0.010	-0.004	-0.010	-0.011	0.008*
	(0.008)	(0.008)	(0.008)	(0.009)	(0.010)	(0.005)
SC	0.028*	0.020	0.032**	0.020	0.018	0.014
	(0.016)	(0.016)	(0.016)	(0.016)	(0.019)	(0.012)
ST	0.011	0.003	0.042***	-0.009	0.004	0.008
	(0.016)	(0.008)	(0.012)	(0.009)	(0.009)	(0.006)
Young Males	-0.033*	0.012	0.012	0.001	0.024**	-0.026**
	(0.017)	(0.009)	(0.012)	(0.009)	(0.010)	(0.013)
Gender of CM	-0.016	-0.012	0.039*	-0.095***	0.013	-0.078***
	(0.028)	(0.027)	(0.023)	(0.019)	(0.031)	(0.018)
Income p.c.	-0.110***	0.051**	-0.101***	0.130***	0.024	0.031*
	(0.028)	(0.024)	(0.035)	(0.025)	(0.027)	(0.017)
Police_{t-1}	0.022**	-0.003	0.017**	-0.002	-0.001	-0.008***
	(0.009)	(0.002)	(0.008)	(0.003)	(0.003)	(0.002)
Pop.(000)	-0.610	1.802***	2.484***	1.334*	2.452	-0.851
	(1.405)	(0.681)	(0.785)	(0.790)	(0.792)	(0.191)
N	7,319	7,319	7,319	7,319	7,319	7,319
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the district-year counts per crime-head. Robust standard errors in parenthesis. Pop(000) and Police are in logs. Marginal effects reported. Significant values are denoted with ***, ** and * if significant at the 1%, 5% and 10%, respectively.

Chapter 2

Do improved property rights decrease violence against women in India?

2.1 Introduction

Violence against women is prevalent in both developed and developing countries. The World Health Organization estimates that globally about a third of women experienced some form of violence inflicted by their partner (WHO, 2002). Yet, the gender gap in terms of economic conditions, legal rights and the presence of strong social norms that constrain women's activity is most marked in developing countries. In India, the latest survey of intimate partner violence (IPV hereafter) shows that 39% of married women were victims of spousal abuse (Kishor and Gupta, 2009). In addition, crime rates against women in India are among the fastest growing crimes. This makes violence against women in India a major public health concern that affects women's well-being and thus, can induce several adverse consequences that range from lowered well-being, increased health expenditures to intergenerational negative effects (Ahmed, 2005; Ahmed et al., 2006; Aizer, 2011; Campbell, 2002; Pollak, 2004).

Several development programs have been designed to make women the focal point of change as it has been found that targeting resources to women has implications for female empowerment, fertility, higher infant-survival rates, improved labour and political participation and reducing the gender income gap (Doepke et al., 2011; Duflo, 2012). The effect of such economic improvements may reduce violence. Theoretically, in a collective household model that takes the household as composed of members with distinct utility functions, it is possible to show that improving women's economic conditions decreases domestic vi-

olence as it improves outside options. This finding has been empirically corroborated by Aizer (2010). However, when strong social norms make outside options that are common in developed countries unavailable (e.g. divorce), this result may not hold.

This paper uses an exogenous change in inheritance legislation to estimate the effect of improved outside options of women on violence committed against them. Inheritance is a form of non-labour income. The use of a change in this form of income is relevant as when considering a two-unit household, changes in non-labour income are Pareto improving for the household i.e., improve the utilities of both spouses, whereas an increase in the female labour-income improves the utility of the female alone (Anderson and Eswaran, 2009). Regards labour-income, I argue that where women's access to the labour-market is constrained and views on gender-roles impinge on women's economic participation, income changes derived from labour-income may induce a male-backlash effect as it affects the relative income of spouses within the household and consequently, affects household dynamics which may be conflicting with existing social norms (Bertrand et al., 2013). This is not likely to occur with changes in non-labour income.

In this paper, I make use of the state-time variation in legal amendments introduced to the Hindu Succession Act (HSA hereafter), interpreted here as an improvement in women's access to property rights, to estimate the causal effect of the amendments on violence committed against them. The HSA of 1956 was amended in five states of India at different points in time and eliminated various sources of inheritance inequality between sons and daughters i.e., laws that formerly would exclude women from having equal access to inheritance were abolished in some states. Inheritance rights are a form of property right and affect intergenerational investments, across-siblings investments, marriage transfers and quantities of inheritance itself. As a result, an increase in women's access to inheritance may improve women's bargaining power either directly through an increase in inheritance or indirectly through other mechanisms.

The findings of this paper can be summarised as follows. First, the effect of the amendments to the HSA reduced gender-based violence[1] by about 36%. However, this result could

[1]In the first part of the paper I use reported gender-based violence as the main dependent variable of interest. This is a measure of police-reported cases under the crime categories considered crimes against women as per the Indian Penal Code. This definition is comparable to the definition in the United Nations Declaration on the Elimination of Violence Against Women of 1993, which defines gender-based violence as all crimes involving: physical, sexual and psychological violence within the family; child sexual abuse; dowry-related violence; marital rape; female genital mutilation; rape and sexual abuse; sexual harassment in

be due to changes in the reporting behaviour of victims that could reflect a loss of welfare. In order to ascertain whether the effect of the amendments is caused by changes in reporting or incidence, I first analyse the effect on accidental deaths and non-gender specific crimes. I find that female accidental deaths which are likely to be subject to lower reporting bias also decreased. Further, I do not find evidence of an effect either on non-gender specific crimes or on male accidental deaths. Together, this suggests that the decrease in gender-based violence following the amendments to female inheritance rights in reform states is not a result of changes in reporting or changes in general criminal activity. Thus, these findings point to a decrease in incidence of gender-based violence in states that amended the female inheritance rights law.

Second, I investigate the effects of the legislative changes on IPV using survey data which is likely to suffer from less reporting bias than police recorded crime. Using a difference-in-differences strategy, I estimate the probability of facing domestic violence among beneficiary women i.e., *Hindu* women that married after the amendments in their state in comparison to *Hindu* women who were not eligible to benefit from the amendments. I find that IPV decreased among beneficiary women by about 17%. This effect is solely due to changes in domestic violence towards *Hindu* women.

Finally, I analyse two mechanisms through which these results can be explained. Specifically, I ascertain whether this effect is driven by changes in husbands' behaviour and in marriage negotiations. The results suggest that husbands' behaviour improved. In particular, alcohol consumption (which is related to domestic violence) decreased among husbands of beneficiary women. Further, I find that parents married their daughters closer to their "own" residence and to grooms of the same residential area. Together, these findings show that beneficiary women were more likely to marry higher-quality husbands and had better outside options. Nevertheless, I do not find consistent evidence that women's decision-making power improved, particularly in marriage negotiations.

The main contributions of this paper are threefold. First, this paper contributes to crime literature, in particular domestic violence, by analysing both reported and surveyed violence against women in an attempt to disentangle the effects of reporting and incidence of violence. Second, I provide causal evidence of how legislation that improves endowments of wealth of women affects violence committed against them. Finally, by analysing the ef-

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the workplace and educational institutions; trafficking in women and forced prostitution.

fect of a policy that affected women prior to marriage, I am able to establish a causal relation between women's conditions at the time of marriage and post-marriage outcomes.

This paper is related to the recent literature on the HSA and on violence against women. In particular, it is related to Roy (2011) who shows that following the HSA amendments, parents increased dowry payments for older cohorts of daughters while younger cohorts benefited from increased investments in education. As a result, the amendments triggered changes in terms of assets daughters could bring to the marriage and in other forms of intergenerational-transfers. Further, Deininger et al. (2013) show that the probability of inheriting did increase following the HSA amendments without any concomitant effect on non-beneficiaries. I exploit the variation of the amendments on the older cohorts of women and therefore, the findings taken together show that increasing the assets women bring to the marriage, either in the form of inheritance or dowry payments, improve women's security.

Finally, in a closely related paper, Panda and Agarwal (2005) use cross-sectional data from villages of Kerala and show that the ownership status of women is correlated with the risk of marital violence. Although these estimates do not take into account the endogenous relation between property ownership and incidence of violence, I find results consistent with the findings of the authors.

The remainder of this chapter is organised as follows. Section 2 reviews both the theoretical literature on intra-household distribution of resources with violence and the related empirical evidence on violence against women. Section 3 describes the HSA, the legislative changes introduced with the amendments and the plausible exogeneity of the Act. Section 4 describes the data used in the analysis for gender-based reported violence, the empirical strategy and presents the results. Section 5 examines the effect on intimate partner violence. Section 6 analyses the possible mechanisms by which the change occurs and discusses the evidence supporting them. Section 7 concludes.

2.2 Related Literature

2.2.1 Theoretical models of intrahousehold distribution and violence

Theoretical models of intra-household inequality show that the distribution of resources within the household depends on the conditions that rule the functioning of the marriage market. In the pioneer model of Becker (2009), spouses negotiate upfront the distribution of expected gains from marriage. Competition in the marriage market ensures that those with

higher resources are matched. This mechanism assumes that enforceability of contracts is perfect and that an ex-ante negotiation is possible. The failure of these assumptions implies that the decision-making process depends on the level of bargaining power held by each spouse.

Manser and Brown (1980) and McElroy and Horney (1981) model household bargaining as dependent on threat points. Consequently, the decision-making process within marriage depends on the incentives to maintain a utility higher than the reservation utility among spouses. The more credible the threat of divorce is, the better are the legal and economic conditions that facilitate divorce. However, if the threat of divorce is not credible, as can be the case in India, a non-cooperative solution within the marriage may be more realistic, (Lundberg and Pollak, 1993)[2]. Understanding the mechanisms that explain the effect of an improvement in inheritance rights of women and how these impinge on violence against them requires a consideration of the effects of the prevailing threat scenarios. In standard bargaining models, empowering women with improvements in women's outside options, will increase their well-being in the cooperative equilibrium. Cooperative bargaining models assume that the outcome of decision-making process is Pareto efficient (Chiappori et al., 2002; Manser and Brown, 1980; McElroy and Horney, 1981). However, when considering both a low threat of divorce and the use of violence as an option available to the husband, the cooperative equilibrium is not a realistic option. Thus, when analysing violence within the household considering a developing country context, the equilibrium level of violence may be best described as a non-cooperative behaviour as in Tauchen et al. (1991), Farmer and Tiefenthaler (1997), Bloch and Rao (2002), Bobonis et al. (2013) and Eswaran and Malhotra (2011).

In the non-cooperative equilibrium of the *separate spheres* model of Lundberg and Pollak (1993), spouses do not coordinate their actions and maximize each individual best-response function. An internal solution to the marriage allows both spouses to negotiate the level of bargaining power and welfare. The autonomy in decision-making process is determined by the spouse's financial autonomy, the amount of resources that each brings to the marriage, the conditions of labour market and the share of time devoted to household public

[2]Data on divorce rates in India are not available but several newspapers report an increase in divorce rates among upper-middle classes and in urban areas. An example can be found in: http://www.nytimes.com/2008/02/19/world/asia/19iht-divorce.1.10178712.html?pagewanted=al. However, notwithstanding the upward trend, the rate of women who report being divorced in the pooled surveys of the NFHS 1998 and 2005 is negligible.

good production (Anderson and Eswaran, 2009; Fafchamps et al., 2009). Therefore, the relevant threat scenario varies according to whether divorce is a credible threat or not as in Lundberg and Pollak (1993). The credible threat scenario that would imply the breakdown of the bargaining process is a non-cooperative behaviour which could involve for example, the use of violence.

The implications for domestic violence are as follows. In the first case, with divorce as a credible threat, an increase in inheritance rights of women improves her position in the case of a breakdown of the marriage. As a result, the probability of divorce increases and this may bring down the use of violence. In the second case, if the threat of divorce is not credible, the use of violence may increase or decrease depending on whether the husband is willing to use violence as an instrument of control. In this case, the use of violence would increase (Bloch and Rao, 2002). If it is the case that the husband uses violence as a trade-off between violence and transfers to the wife, as in Tauchen et al. (1991) and Farmer and Tiefenthaler (1997), then the use of violence would decrease. In this paper I take the view that the threat point affects the behaviour within the partnership and that violence can be used, typically by the husband, as a source of control and an instrument of resource allocation (Bloch and Rao, 2002; Bobonis et al., 2013; Eswaran and Malhotra, 2011; Farmer and Tiefenthaler, 1997; Tauchen et al., 1991)[3].

In a non-cooperative model of intrahousehold decision-making, Tauchen et al. (1991) show that the equilibrium level of violence depends on the level of income of the household. In poor households where both spouses contribute to the total household income, an increase in the wife's income decreases violence whereas decreases in the husband's income increase the use of violence in order to increase his welfare. In high income families when the husband's relative income position is higher, changes in the income of either spouse decrease the use of violence. The husband *purchases* violence with transfers and thus, an improvement in the wife's economic conditions increases her share of consumption within the household which decreases the marginal utility from consumption. As a result, the value attributed to transfers decreases and the use of violence must also decrease in order to maintain utility at the reservation level. Hence, the main prediction of the model is that violence decreases with improvements in women's threat points. In a similar framework, Farmer and Tiefenthaler (1997) show that with increased female income the probability of divorce

[3]This is in contrast with views of the use of violence as a factor of increased utility as in Aizer (2010) and Card and Dahl (2011).

increases bringing the level of violence to a lower level.

In contrast, Bloch and Rao (2002) model inter-household bargaining over dowry and show that an increase in income of the wife generates incentives for the husband to increase the use of violence in order to obtain the control of the household resources and decision-making. Violence is a signal to the in-laws of the level of disappointment with the marriage and it is used as means of extortion. In a similar vein, Bobonis et al. (2013) take an asymmetric information model and show that transfers of funds to the female partner increase the threats of violence used by the husband but not the use of violence. The threat of violence is used to *purchase* transfers and a marginal increase of women's economic condition increase the amount of transfers the husband will want to extract. This substitution mechanism replaces the use of violence with threats, which brings the use of violence to a lower level but does not remove a *male backlash* effect due to the rise in the use of emotional violence.

Finally, in a related paper, Eswaran and Malhotra (2011) analyse how domestic violence impinges on female autonomy[4]. They argue that the use of violence ensures that the allocation of resources is aligned with the preferences of the husband (measured by the extent the wife can allocate resources more towards her preferences) and therefore, is correlated with an increase in violence. The level of violence exerted can be non-monotonic in the wife's reservation utility. Hence, an increase in the wife's income could increase incidence of spousal violence, in particular if the husband's reservation utility is low. Similarly, Angelucci (2008) shows that there is a non-monotonic relation between cash-transfers and domestic violence and indicates that while smaller transfers may decrease the use of violence there is also a backlash effect associated with larger transfers due to the increased threat to husbands with strong views about gender-roles.

2.2.2 Empirical evidence

The causal effect of improved outside options of women on violence against women is empirically ambiguous and results diverge significantly across studies which consider developed and developing countries.

Evidence from the U.S. shows that improvements in outside options reduce violence

[4]On a related paper Anderberg and Rainer (2013) show that husbands may strategically sabotage the wives economic performance in order to keep the upper hand in the bargaining process.

against women (Aizer, 2010; Farmer and Tiefenthaler, 1997; Stevenson and Wolfers, 2006). One exception is Iyengar (2009) which shows that improved reporting incentives increase violence against women due to a reprisal effect. Conversely, Aizer and Dal Bó (2009) show in the context of household conflict that an increase in prosecutions decreases incidence. In addition, Bertrand et al. (2013) show that an increase in the relative income of women is not favourable to women's outcomes prior to marriage and within the marriage.

Evidence from developing countries is mixed. Eswaran and Malhotra (2011) and Chin (2012) find contradictory results regarding the role of access to the labour market. While the former show that domestic violence impinges on female autonomy (in particular for women working outside the house), the latter shows that female employment reduces domestic violence with an empowerment effect dominating the male backlash effect.

Coming to the effects of conditional cash transfers programs, Bobonis et al. (2013) show that the use of physical violence is replaced by increase in the use of emotional violence. In Hidrobo and Fernald (2013), emotional violence changes in favour of the wife depending on the relative bargaining power of the between spouses.

Pronyk et al. (2006) analyse the effect of integrating an anti-domestic violence training program with microcredit meetings in a randomized control trial among poorer women in South Africa and find a decrease in IPV. Garikipati (2012), suggest that the effect of access to microcredit loans improves the status of the financial position and the status of the husband. This result shows that the distinction between ownership and control of assets is important in determining the effects of economic conditions on women's empowerment. Further, the literature points to differential effects on violence against women depending on whether an increase in womens' income position within the household comes from changes in labour or non-labour income (Agarwal and Panda, 2007).

Another aspect to consider is that tolerance towards violence may change as a result of improved property rights. Hence, economic empowerment can also decrease women's tolerance of violence and increase reporting. Jensen and Oster (2009) find that the introduction of cable television in India improved women's status. Indeed, the authors show that reported tolerance towards domestic violence decreased. Accordingly, this might be triggering the increase of levels of reporting of violence against women as argued in Iyer et al. (2012) who show that the introduction of gender political quotas at the rural local level increase reporting of crimes committed against women rather than leading to greater violence.

This paper is also related to the literature on property rights which show that improved property rights affect investment decisions, productivity and, when allocated to women, im-

prove credit access and the bargaining power of women (Besley and Ghatak, 2010; Besley, 1995; Field, 2007; Wang, 2014). The effect of inheritance rights on human capital has also been analysed in Ferrara and Milazzo (2012) and Roy (2011).

Finally, the amendments to the HSA have been analysed in Heath and Tan (2014), Anderson and Genicot (2014), Rosenblum (2013), Deininger et al. (2013), Brulé (2012) and Roy (2011). The evidence of the effect of the amendments on women's conditions is mixed. Heath and Tan (2014), Deininger et al. (2013) and Roy (2011) show that there is an improvement in access to the labour-market, in inheritance received and in female human capital investments. However, Roy (2011) looks at rural older cohorts of women and finds that the Act did not increase inheritance per se. Instead, the author argues that parents were circumventing the new legislation by increasing dowries for the older cohorts and education for the younger cohorts. I argue that the findings related to violence against women in this paper reinforce the findings of these authors. Anderson and Genicot (2014) and Rosenblum (2013) find evidence of unintended effects. Namely, Anderson and Genicot (2014) finds an increase in male suicides and female suicides with a gap that favours women, while Rosenblum (2013) shows that there is an increase in the gender gap in infant-mortality.

2.3 Background

2.3.1 The Hindu Succession Act

In India inheritance laws are contingent on religion. The HSA governs inheritance laws of *Hindus* i.e, of Buddhists, Hindus, Jains and Sikhs[5]. The religious population of this group was 83.6% of the total population of India in the 2001 Census. This makes the HSA the most important inheritance legislation of India. It lays down succession rules of *Hindu* males and females dying intestate. The Act, passed in 1956, was primarily created to unify inheritance laws that governed *Hindus*[6]. In addition, it aimed to reduce gender inequalities

[5]The act is not applicable in the state of Jammu and Kashmir and in the North-Eastern states of Arunachal Pradesh, Manipur, Meghalaya, Mizoram and Nagaland because these states are mainly ruled by customary laws (Agarwal, 1995). These states are not included in the analysis.

[6]The Act of 1956 unified the systems of *Mitakshara* and *Dayabhaga*. The *Dayabhaga* system was mainly followed in the states of West Bengal and Assam while the *Mitakshara* system was followed in the remaining states. The main difference between these two systems was that for those who followed the *Dayabhaga* system,

in inheritance and thus, allowed females to have full ownership and testamentary rights over all property. However, it did not address several inequalities in succession law of daughters in relation to sons.

The property of a male dying intestate under the HSA is divided into separate and joint family property (Agarwal, 1995). Separate property refers to all property that was self-acquired throughout the life-time of the individual. Joint family property consists of ancestral property i.e., property inherited from ancestral members of the family. This property, in particular in rural areas, would mostly consist of land which is often family owned.

Under the Act of 1956, daughters of a male dying intestate had rights to an equal share in separate property along with their brothers but not over joint family property. On the one hand, daughters had a right over their share of separate property and to the share of the joint family property. On the other hand, sons had the right to their share of separate property, their share of joint family property and an additional independent share on joint family property by virtue of birth (Agarwal, 1995). Sons would be given this additional share by being part of the *Hindu male coparcener*. The *Hindu male coparcener* consisted of male members of Class I, II and III heirs which were entitled to an individual share in the joint family property (Agarwal, 1995). Consequently, sons would, in addition to the amount of the daughters' share, inherit an individual share of the total inheritance because they were part of the male coparcener.

Besides this source of discrimination, a father could declare his separate property as part of the joint family property in order to ensure that the daughter does not get any share of this part of the property. Furthermore, a male coparcener could renounce his rights in the coparcener. This would not have any repercussions for his son which would still have his independent share of the ancestral property. However, this would exclude daughters and Class I female heirs in this share of the property.

The HSA amendments as of 1956 created these three forms of inequalities between sons and daughters which greatly affected inheritance rights of daughters and ultimately their economic conditions. Agarwal (1995) emphasizes the implications of unequal inheritance laws and states several reports of women who claimed that the lack of land ownership greatly

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all property was considered as self-acquired property. However, the act of 1956 unified these two system and the rules of the *Mitakshara* system were those which prevailed. For a deeper discussion of inheritance rights previous to 1956 refer to Agarwal (1995)

affected their well-being [7].

2.3.2 The HSA amendments as a natural experiment

In India state governments have legislative authority and thus, were allowed to make amendments to the HSA. Kerala was the first state to amend the Act in 1976, abolishing the joint family property system among *Hindus*[8]. Andhra Pradesh amended in 1986, Tamil Nadu in 1989 and Maharashtra and Karnataka simultaneously in 1994. These states gave daughters a birth-right in the coparcenary and in this way abolished the inequalities in ancestral property division. However, daughters were only granted an individual share in the joint family property if they were unmarried at the time of the amendments.

In 2005, the central government amended section 6 of the HSA, 1956, allowing daughters of males dying intestate equal rights with sons. In this amendment, the restriction regarding the marital status was also abolished. These amendments are now in force for all the remaining states which the law applies, making a daughter entitled to the same liabilities as if she would have been a son.

These amendments where passed with considerable variation in time amongst reform states and also in comparison to the national amendment. For example from the first amendment in Kerala to the second in Andhra Pradesh there is a 10 year gap followed by 3 and 5 years between the remaining amendments in other states. To the best of my knowledge, the reason why some states amended the law in the first place and the choice of timing is not known. It can be argued that these states are more female-friendly in comparison to the northern and other central states of India and therefore, were the pioneers in these amendments. This would invalidate the empirical strategy. However, if these states are more female-friendly then it is reasonable for them to have inserted other female-friendly reforms in close proximity with this amendment. For instance, the introduction of gender quotas at the lower level of governance was made with considerable variation in comparison to the

[7] One those descriptions point to the importance of legal rights where a women argues for individual rights over land instead of joint rights (with the husband) by saying: “For retaining the land we would be tied to the man, even if he beat us", [Agarwal (1995)- pp. 20].

[8] The amendments passed in Kerala were in line with the later amendments passed in India. However, on the contrary to other states it considered that all ancestral property was to be divided by “all surviving matrilineal joint family estates”, (Agarwal, 1995)-pp.176.

inheritance amendments [9]. If these states were indeed more progressive on their views of gender then the timing of other similar female-friendly reforms should have been similar to the HSA amendments. This was not the case for state legislative changes and it was also not the case when considering reform states as a group and in comparison to other non-reform states.

Consequently, I take the HSA amendments to be an exogenous variation as good as a natural experiment and make use of these state amendments to estimate the causal impact of improved inheritance legal rights on violence against women. Empirically, I conduct several tests to show that this is valid.

2.4 Gender-based violence

2.4.1 Data

The National Crime Record Bureau (NCRB) records report the number of crimes for several violent, property and economic crimes[10]. The NCRB records cognizable crimes i.e., police-reported felonies which are in the first-stage of the criminal justice system and for which the police can take legal actions. In the analysis I use information on first-stage reports (FIR) to the police. This information captures reported crimes though it does not capture the effectiveness of the justice system i.e., a deterrence effect arising from punishment (prosecution, arrest, etc).

I make use of the yearly publications of crime statistics for the period 1975-2004. This information is obtained for the 16 major states of India for which the HSA applies[11]. The

[9] Karnataka introduced female quotas in 1987 although it only passed the inheritance reform in 1994. Similarly, Kerala amended the inheritance law in 1976 and only introduced female quotas in 1991. Punjab introduced female quotas in 1991 and did not make amendments to the inheritance reform independently.

[10] Crimes are categorized under the Indian Penal Code (IPC) crimes and under the Special and Local Laws (SLL). The latter refers to all punishable offenses regarding the practice of social customs that are reprehensible under special enactments.

[11] The states used in the analysis are Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Himachal Pradesh, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh and West Bengal. In 2001 the states of Chhattisgarh, Jharkhand and Uttarakhand were carved out of the states of Madhya Pradesh, Bihar and Uttar Pradesh respectively. In order to make the results comparable across time the data for these states was merged with the original states.

dependent variable, total rate of crimes against women, is the state-year sum of the crime-categories considered under crimes against women by the Indian Penal Code. These are cruelty by husband and relatives, dowry deaths, importation of women and girls, kidnapping of women and girls, molestation, rape and sexual harassment. In addition, I also include crimes under Dowry Prohibition Act, Immoral Traffic (Prevention) Act and Indecent Representation of Women (Prevention) Act[12].

In the analysis I also examine the effect on low reporting bias crimes and non-gender specific crimes. In detail, I first use information for the above described sample on accidental deaths disaggregated by gender. The analysis is conducted for per 1000 female/male population total accidental deaths; accidental deaths due to natural events and; accidental deaths due to non-natural events [13] . Finally, I use non-gender specific rates of property and public disorder crimes rates to analyse if the effect is due to a decrease in generalised illegal activities. The information was obtained from the NCRB yearly publications for the state-year sample period of interest.

In the empirical analysis I also control for several socio-demographic, economic, and law and order factors. I include literacy rate, sex ratio and proportion of rural population. This information was collected from the Census of 1971, 1981, 1991 and 2001 and was interpolated for the intervening years. I also include data on per capita net state domestic product collected from various publications from the Reserve Bank of India. Law and order effectiveness is controlled by including strength of police force measured by the number of total police force (both civil and armed) per 100,000 inhabitants, collected from the yearly publications of the NCRB. Further, in India, law and order decision-making are decentralized from the central government. Consequently, determination of the level of policing and the level of expenditures in law and order are subject to some level of discretion and vary across the states and according to the preferences of the policy-makers. Moreover, Iyer et al. (2012), Clots-Figueras (2011) and Brulé (2012) show that political factors are an important determinant in influencing reporting behaviour, legislation changes and on legislation implementation. Thus, in order to control for the effect that political identity might have on

[12]By 2004, 44.5% of crimes against women were in the categories of domestic violence and dowry in particular, the former represented 38% of total incidents against women.

[13]Accidental deaths attributable to natural events are due to lightning, heat strokes, floods, earthquake, landslides, cold exposure, cyclone, avalanche, starvation, epidemic, torrential rains and others. Accidental deaths attributable to non-natural events are sub-categorized into deaths due to air-crashes, collapse of structures, drowning, explosion, falls, fire, sudden deaths, poisoning, traffic and miscellaneous.

criminal behaviour and reporting behaviour, I include a gender dummy variable for female Chief Ministers in office and include the proportion of seats held by women in the Legislative Assembly to account for the fact that women from lower castes are more likely to pass laws that increase gender legal balance (Clots-Figueras, 2011). This information is collected from several Statistical Reports of Legislative Assemblies Elections.

Table 2.1 presents the descriptive statistics for the variables used in the police-reported analysis. The mean crime rate against women is of 1.6 crimes per 10000 women; reform states have higher incidence in crimes against women (Figure 2.1). On average reform states have higher income per capita, higher literacy rates and lower rural population but, they have lower police force per 100,000 inhabitants, lower robbery rates and higher riot rates in comparison to non-reform states. Prior to the HSA amendments reform states were different in observables, namely HSA states had higher rural population, police strength, income per capita and female political representation. Gender-based violence was not different between HSA and non-HSA amendment states prior to the legal changes. Yet, accidental deaths for both genders due to non-natural events were lower in HSA amendment states. The empirical specifications control for these observable differences.

2.4.2 Identification strategy

A common problem in the empirical crime literature is under-reporting or misreporting of crimes which can lead to measurement error. As mentioned in the anthropological and sociological literatures this problem is likely to be more salient in developing countries. As a result, reporting behaviour could be a function of social norms, gender equality and institutional quality[14]. Nonetheless, the literature has identified that in India, reporting issues arise in non-lethal crimes as it is difficult to held a death unaccountable (Drèze and Khera, 2000). Hence, crimes such as dowry related deaths and accidental deaths would be less likely to suffer from misreporting. However, the remaining crime categories could be subject to reporting changes and this is a caveat of this study.

As a result, in estimating the effect of improved access to inheritance on violence against women it is important to distinguish between reported violence and incidence. Reported vio-

[14]See Soares, (2004) and Banerjee et.al, (2013). See also, (Prasad, 2013) on the comparison between victim-reported property crime and police-recorded property crime in India.

lence depends on both incidence and the probability of reporting a crime. Thus, the effect of the amendments could have an effect on both factors. In particular, the amendments could have triggered an increase (decrease) in violence against women or could have led to an increase (decrease) in reporting of crimes without implying an increase in incidence. However, I cannot disentangle these two effects as only police-reported violence is observed. In fact, if reporting behaviour differs across states and in time and in particular, between reform and non-reform states, this could contaminate the results. I address this issue by performing several robustness tests on low reporting bias crimes, other types of crimes which can be thought as non-affected categories. In addition, in the next section I use IPV as a measure of intrahousehold conflict between spouses. Altogether, these results attempt to disentangle a reporting effect from an incidence effect.

I use the staggered implementation of the HSA amendments to analyse the effect of inheritance rights on violence against women using a difference-in-differences estimator to retrieve causality. The main assumption required to analyse the effect of the state amendments on violence against women is that in the absence of the legal amendments, the difference in reported violence against women in reforming states would have been the same as in non-reforming states only differing by a linear trend. I employ the following double difference estimation strategy:

$$y_{st} = \lambda_t + \alpha_s + \delta_1 \text{HSA}_{st} + X_{st}\beta + \varepsilon_{st} \tag{2.4.1}$$

where y_{st} is the natural logarithm of total reported violence against women per 1000 female population occurring in state s in year t. The estimation includes year-fixed effects to account for common country-wise year changes, λ_t. In addition, it also controls for state-specific unobserved time-invariant characteristics that could affect the incidence of violence by including state-fixed effects, α_s. HSA_{st} is a dummy variable that is equal to one if the state s at time t amended the HSA and takes the value zero otherwise. Thus, δ_1 is the coefficient of interest which captures the effect of the amendments on reported violence against women. I also include a vector of several time and state-specific time-varying socio-economic and demographic variables. In order to mitigate potential serial correlation problems in the error term and heteroskedasticity problems, I use robust standard errors clustered at the state-level in all specifications (Bertrand et al., 2004)[15].

[15]Results obtained with wild bootstrap standard-errors that account for the reduced number of clusters

The common time-effects assumption underlying a difference-in-difference estimation holds if any difference that is to exist between reform and non-reform states is captured by λ_t and α_s. This assumption is advantageous as it controls for unobserved time-invariant state-level heterogeneity but, it does not control for time-varying unobserved state-level heterogeneity. This is important as it could be that states that had lower rates of violence against women in the first place, could have also been those who first passed the law. This could invalidate the required assumption under the difference-in-differences. Nonetheless, even though the assumption is not directly testable I include several robustness checks and ensure that the results are not driven by unaccounted time-varying unobserved state-level heterogeneity. Namely, I include state-specific linear trends and perform several placebo tests to understand if there are any confounding effects that would exhibit time-varying unobserved state-level heterogeneity if it exists.

Another issue to address is the effect of female political representation. Iyer et al. (2012) explore the effect of the *Gram Panchayat* reform that introduced female quotas in rural village councils on crimes against women. Hence, one might be concerned that the plausible exogenous reform of the HSA may in fact be endogenous or correlated with female-friendly reforms as the 73^{rd} amendment for political representation of women. However, out of the five states that amended the inheritance law only the states of Karnataka and Maharashtra did so after the introduction of female political quotas at the lower level of governance, i.e. 7 and 2 years before, respectively. As a result, for these 2 states the amendments could have been endogenous to female representation. In order to circumvent this problem I estimate equation 5.1. with and without these states. The results do not change.

Finally, state policies affecting law and order that are correlated with the passage of the reform would invalidate the estimation strategy by omitted variable bias. Even though I do not find evidence of this mechanism or of these policies, I cannot discard this. However, the inclusion of state-specific linear trends would mitigate the issues raised above[16].

On what concerns the validity of the identification I identify two problems. First, I cannot identify violence reported by religious groups. As mentioned in section 3 the reform

(Cameron et al., 2008) are consistent with those presented in the main tables of results and do not affect the significance of the main coefficients of interest.

[16]One other potential problem could be post-marriage migration. However, as mentioned in Roy (2011) and in Drèze and Khera, (2000), post-marriage migration is within-state migration and hence, I discard this possibility as a concern for the identification strategy.

would have benefits for the *Hindu* women but not others. Thus, even though *Hindu* religious population is 83.6% as per the Census 2001, I cannot rule out the identification problems that arise from this. Second, the existence of the marital status requirement in the state-level amendments cannot be observed in this data. Yet, it is plausible to assume that reporting is a function of individual and couple characteristics which are not observed in this data. In fact, it has been widely documented in the criminology literature that age, experience in marriage etc, are likely to influence a woman's decision to report a crime to the police. Thus, I assess these problems in section 8 where I am able to handle some of these issues using an IPV measure.

2.4.3 Results

Figure 2.2 presents the unconditional estimates of the time to/since the event on gender-based violence. Prior to the amendments, the coefficient is stable around zero which shows that there are no pre-existing differences between reform and non-reform states. After the HSA amendments the estimates falls and stabilises after 5 years of the amendments.

I report the coefficient of interest, δ_1, in (2.4.1) which captures the effect of the amendments on reported total violence committed against women. Table 2.2 presents the results. Across all specifications the effect is negative. Column (1) presents the unconditional estimations which points to a significant negative effect of the amendments on total crimes against women. The coefficient of about -1.3 suggests that total reported crimes decrease by approximately 73%. When including socio-economic time-varying covariates in column (2), the magnitude increases slightly and points to a negative effect of about 1.4. Adding the different control variables (i.e., police force and literacy rates) does not change the direction of the effect. When controlling for the full set of control variables the coefficient is of about -1.5, which amounts to a decrease of 77% in total crimes reported against women in reform states.

However, the difference-in-differences estimator does not control for time-varying unobserved state-heterogeneity. Thus, the effect presented in columns 1-6 could be due to unobserved differences across states that vary across time. One possible way to mitigate this problem is to allow for state-specific time trends. When accounting for state-linear trends in columns 7 and 8, the coefficient of the post-HSA amendments is much smaller in magnitude then in previous estimations. The coefficient of about -0.44 and would amount to a decrease of about 36%. The magnitude of the effect is reduced but the significance remains

at 10% significance level. Any concerns relative to the plausible endogeneity of the reform are mitigated as even after controlling for state-linear trends the effect of the amendments maintain a highly relevant magnitude and statistical significance within the conventional levels.

2.4.4 Robustness

In order to circumvent some of the problems raised in section (2.4.2.) I include several robustness tests to ensure that the effect found is not due to i) specific states characteristics which are time-variant and unobserved; ii) due to factors correlated with other reforms as the 73^{rd} amendment for increased female political representation.

First, I repeat the estimation of (2.4.1.) as in columns 6 and 7 of Table 2.2 excluding the state of Kerala. This state is peculiar in respect to several development outcomes. Also, this state was the first to introduce the reforms in 1976 which implies that the number of pre-reform observations for this state is 1 as the series starts in 1975. Excluding this state from the analysis does not change the results (columns 9 and 10 in Table 2). Second, the other potential concern is the fact that for the states of Karnataka and Maharashtra, the reform might be endogenous. In Table 2.2, columns 11 and 12, the coefficients of the effect of the amendments remain negative and significant after excluding these states from the analysis. The effect of the amendments for the states of Andhra Pradesh, Kerala and Tamil Nadu are of a decrease of about 59% less violence against women.

I estimate (2.4.1.) using as main variables of interest pre-reform years in reform states. Results are presented in Table 2.3. In columns 1-4 the effect on 3 and 4 years pre-reform is not significant. In addition, in the preferred estimation in column 4 the pre-reform coefficients are also smaller in magnitude.

Finally, to ensure that the estimated effects are not driven by changes in reporting behaviour or misreporting I analyse the effect of the amendments on gender specific crimes that are less likely to be subject to misreporting and on non-gender specific crimes. As mentioned before, I cannot identify incidence of crimes or the probability of crime reporting and this cannot be disentangled using as dependent variable reported crime rates. In spite of this, unless misreporting is systematically correlated with the amendments, the estimations are still valid.

First, I estimate the effect of the amendments on female and male accidental deaths. If accidental deaths are random events (i.e., not subject to changes in inheritance rights or

changes in reporting behaviour) then the effect of the amendments should be negligible. I expect that there is no effect on accidental deaths due to random events. However, accidental deaths which can disguise violent crimes against women should decrease as well if the effect is indeed due to a change in incidence. If instead accidental deaths are increasing then there could be a reporting effect that could reflect a loss in the welfare of women. The total accidental deaths are divided into deaths due to natural causes and other non-natural causes. I expect both female and male accidental deaths due to natural causes not to be affected by the amendments as these are random. However, if there is a change in reporting behaviour[17] this could have changed the reporting of accidental deaths due to other causes. I inspect this hypothesis using the NCRB yearly publications on accidental deaths of females and males. I use this information for the same state-year sample as in the previous section.

Figures 2.3 and 2.4 present unconditional estimations on both female and male accidental deaths for the 3 dependent variables. The trend in natural accidental deaths is not correlated with the pre-post HSA for both genders. For females, accidental deaths post-HSA decrease and the variation in total accidental deaths is explained completely by the variation in accidental deaths due to non-natural events.

Table 2.4 and 2.5 present the results of conditional estimations. Table2.4 presents the results for female accidental death rates and Table 2.5 for male accidental deaths. Results suggest that the amendments decreased total accidental death rates of females and this result is entirely driven by a decrease in accidental deaths due to non-natural events. This reinforces the results presented in the previous section showing that there is no change in reporting behaviour rather the effect is most likely to be due to a change in incidence. The results for accidental deaths of males and do not show conclusive evidence that the amendments had an effect on males. The negative effect of the amendments on accidental deaths of males is not consistent (Table 5). As expected, I do not find any effect on random accidental deaths for both females and males.

In Table 2.6 I report the results on non-gender specific crimes: robbery and riots per 100,000 total population. The amendments do not have any effect on these crime categories. The reform did not have an impact on overall violence [18].

[17] It could be the case that perpetrators families report the death of a female as an accident in order to avoid the charges from other crimes with higher penalties.

[18] Other results on lower reporting bias types of violence against women show ambiguous results. Female suicides due to quarrels with family and spouse increased with the reform but, female suicides due to love

Taken together, the legal amendments had an effect on reported crimes committed against women without any concomitant effect on crimes that would not have been directly affected by the Act. In addition, deaths that are less likely to be affected by reporting behaviour also decreased. I take this as suggestive evidence that there was a decrease in incidence of violence against women rather than a decrease in reporting behaviour.

2.5 Self-reported intimate partner violence

2.5.1 Data and Empirical Strategy

To overcome some of the identification problems outlined in the previous sections, I use individual-level surveyed IPV to estimate the effect of the HSA in the stock of domestic violence of women who were beneficiaries of the changes.

The state amendments established that only women who were not married at the time of the reform in reform states could have benefited from the amendments to the HSA. Therefore, I construct the treatment group using these criteria i.e., state of residence of a woman and timing of marriage. Further, because the *Hindu* sample is approximately 85% of the full pooled sample (Table 2.7), I analyse the effect of the changes introduced to the HSA on the full sample of women taking into account the state and time variation of *Hindu* religiosity and separately for *Hindu* women only.

I compare the probability of IPV of women who were unmarried relative to the reform years in reform states with those who were already married relative to the reform year in reform states in relation to women in non-reform states. Women who were not yet married in reform states would be those who would benefit from the HSA amendments. Women in reform states who were already married were legally the same as women in non-reform states. Hence, the effect of the reform on incidence of domestic violence for this group of women should not differ from those in non-reform states.

I use the National Family Health Survey (NFHS) rounds 2 and 3 of 1998-99 and 2005-06 as these are the only surveys available which contain information on domestic violence. The NFHS is a comprehensive survey which comprises detailed health information of women

affairs and property disputes decreased with the reforms. Results are available upon request. For a deeper explanation on the effect of the reform on suicides refer to Anderson and Genicot (2014).

and is representative at the state-level.

I estimate the following equation:

$$y_{isk} = \alpha_s + \lambda_k + \delta_2 HSA_{is} + X_i'\beta + \zeta_{isk} \tag{2.5.1}$$

where y_{isk} is the incidence of domestic violence for women i in state s born in year k. The dependent variable is a dummy that reflects the incidence of violence committed by the husband throughout the length of the marriage until the survey year. I include state-fixed effects for similar reasons to those in section 2.4. I also include birth-year fixed effects to control for cohort country-wise specific changes. The term HSA_{is} is a dummy variable that takes the value 1 if a woman living in a reform state s, married in a year after the reform, relative to the reform year in her state. This group of women had the full benefits of the reform and therefore, constitutes the treatment group in the reform states. Thus, δ_2 is the coefficient of interest. The identification strategy assumption is that women in reform states who married after the amendments would not differ from women in non-reform states in linear trends, in the absence of the amendments[19].

The dependent variable used is a stock of incidence of violence. The NFHS-2 and NFHS-3 have different sets of questions regarding domestic violence. The NFHS-2, asked “Since you completed 15 years of age, have you been beaten or mistreated physically by any person?" and "Who has beaten you or mistreated you physically?". I identify through these questions the incidence of IPV for women interviewed in the NFHS-2. The NFHS-3 asked “(Does/did) your (last) husband ever do any of the following things to you?" listing nine different types of physical and sexual violence[20]. The binary variable was obtained by attributing the value 1 if a woman responds affirmatively any of these types of violence. Then, I combined this information with the information provided by the NFHS-2 to obtain a similar measure of domestic violence across surveys. These questions are in line with the

[19]This specification is considerably different from the approach taken in Anderson and Genicot (2014) and follows the literature on difference-in-differences with a state-time variation in the policy implementation, by accounting for unobserved confounding factors with the inclusion of time-varying fixed-effects and state-specific time-factor trends (Wolfers, 2006).

[20]These are: slap; twist arm or pull hair, push, shake, or throw something at the respondent; punch with his fist or with something that could hurt the respondent; kick, drag or beat the respondent up; try to choke or burn on purpose; threaten or attack with a knife, gun, or any other weapon; physically force the respondent to have sexual intercourse with him even when the respondent did not want to and force to perform any sexual acts the respondent did not want to.

practice advised by international organizations WHO (2002) and allow to obtain a reliable measure of IPV.

However, this variable is a reported measure and can be a threat to this identification strategy due to measurement error if the misreporting is correlated with the treatment definition. The lack of an ideal measure of violence against women is a common problem in this literature as this is not observable. Yet, regardless of whether the main variable is a police-reported, self-reported or even hospitalization measures each of these would be subject to some form of measurement error (Aizer, 2010). Nonetheless, this is a plausible limitation of the paper as I rely on self-reported IPV. I employ a wide range of sample selection criteria and robustness tests to remove any potential source of bias deriving from misreporting. First, I restrict the sample to women who were surveyed for the domestic violence questionnaires in the NFHS. The data consists of women who are currently married and were selected and interviewed without interruptions from any adult member of the household for the domestic violence section of the questionnaires. In addition, I keep only women who are wives of the household head to reduce intra-household dynamics that could affect the dependent variable through this link. Further, I keep only keep observations from which there are no missing variables from all the explanatory variables used in the estimations. Women married after 2005 are excluded from the analysis as the HSA was amended at the national level in 2005. Finally, as in the previous section, the sample includes women from the 16 major states of India[21]. The sample after these restrictions ends up with 40,884 women born between 1949-1991 and married between 1962- 2004. I estimate (2.5.1.) using a linear probability model[22].

I also include a vector of several women, couple and household control variables which could otherwise capture some of the effects of the amendments and influence the incidence of domestic violence, X_i. I include age and educational gap to capture the relative bargaining power of spouses. I include household size as exposure towards violence may also depend on whether other family members tolerate or encourage this practice, a rural household dummy and son preference as a measure of perceptions of gender-roles and social norms of the wife. In addition, I add a dummy for whether the household has a television to control for exposure to media devices as this may alter the behaviour of criminals, women's

[21]This sample represents approximately 82% of the wives sampled by the pooled surveys.

[22]Estimates with a logit model are consistent with the findings of the paper.

attitudes towards domestic violence, female autonomy and fertility choices (Card and Dahl, 2011; Ferrara et al., 2012; Jensen and Oster, 2009). Table 2.7 presents descriptive statistics. Women in states where the HSA was amended are more likely to live in urban areas, have lower son preference, age and education gap and are more likely to be exposed to television contents. In the sample, 45% of women have been subject to some form of domestic violence and this is lower in HSA states in comparison to non-HSA states with means 39% and 49%, respectively.

I address two issues that may call into question the validity of (2.5.1.) Clots-Figueras (2011), shows that having lower caste women in State Assemblies increases non-development expenditure. In addition, states with more low caste female representatives at the state-level are more likely to pass women-friendly laws such as the inheritance law. Thus, it could be that lower caste women in reform states are more effective at influencing policy decisions that affect domestic violence through for example, increases in expenditure in policing that could have a deterrence effect on husbands. Yet, it is not clear whether the increase in non-development expenditures would directly affect violence against women as opposed to an increase in any other form of non-development expenditure that is not related to violence against women. In any case, this remains a problem for the estimations. I include in the robustness tests of the estimates state-specific birth cohort linear trends in order to mitigate omitted variable bias problems. Finally, as per the previous section I separately estimate all results for the full sample of states without Kerala and simultaneously without Karnataka and Maharashtra.

2.5.2 Results

The impact of the legal amendments is shown in Tables 2.8 and 2.9. In Table 2.8 I present the results for the full sample of women and in Panel A I include all states of the sample. The estimated effect points to a decrease in the probability of facing domestic violence in the marriage of 6.7 percentage points (column 1). This amounts to a decrease in the probability of facing domestic violence by 17% for beneficiary women in comparison to non-beneficiaries. Further across specifications (columns 2 and 3 of Panel A) the estimated coefficient remains negative and significantly different from zero at the 1% level. The inclusion of state-cohort linear trends increases magnitude of the effect to about 9.9 percentage points which remains stable after including state-*Hindu* specific effects and *Hindu*-specific linear trends (column 3). Moreover, the exclusion of Kerala (Panel B) and the exclusion of Karnataka and Maharashtra (Panel C) do not affect the direction of the effect and the mag-

nitude remains stable. In Table 2.9, I repeat the estimations restricting the sample to *Hindu* women (Columns 1-7) and Muslim (columns 8-10). The majority of the population in India and within the states is *Hindu* and the reform should only have an effect for this religious group. Hence, I expect the effect on *Hindu* women to be similar to the estimated effect in Table 2.8. Women affected by the HSA are 6.5 percentage points less likely to be a victim of domestic violence. This effect is significantly different from zero and is also within the magnitude of the coefficient found in Table 8. Additional robustness tests, columns 4-5 and 6-7 for the exclusion of Kerala and Karnataka and Maharashtra show that the estimates remain negative and significant. Further, I test for the effect on non-beneficiary women (i.e. Muslim women) and expect to find no effects due to the HSA amendments as these rules out the hypothesis that HSA states have time-variant unobservable factors that differently affect women in these states. The failure to reject this hypothesis causes concerns on the validity of the identification strategy. Columns 8-9 of Table 2.9 show that there is no differential effect among Muslim women in HSA states in comparison to non-HSA Muslim women. The effect is negative across all specifications and it is not significant. This effect rules out a contagion effect across religions and reassures the validity of the difference-in-differences strategy.

Women who married after the amendments have lower probability of facing marital violence. These results are consistent with the findings of Panda and Agarwal (2005) and thus emphasise the role of property ownership which in this case is likely to take the form of inheritance on women's welfare. However, this result can be due to an empowerment effect or instead, a result of a marriage market effect which may not necessarily be in favour of women. In the following section, I identify the possible mechanisms by considering first the effect on the husband's behaviour and second on the marriage market.

2.6 Mechanisms

2.6.1 The effect on the husband's behaviour

Women affected by the HSA amendments increased their premium in the marriage market and therefore were more likely to marry a higher quality groom. I examine the previous section mechanism by studying the effect of the HSA legislative changes on men who married eligible women. To measure of the husband's quality I use alcohol consumption. Angelucci (2008) shows that an increase in income transfers to women decreases husband's

alcohol consumption and associated aggressive behaviour. Further, the literature has found a positive relationship between alcohol consumption and aggressive behaviour (Corman and Mocan, 2013; Mehlum et al., 2006). In particular, Wang (2014) finds that transferring property rights to women decreased household consumption of alcohol. I use this measure of husbands behaviour to retrieve a plausible mechanism through which domestic violence decreased post-HSA amendments. I expect that if domestic violence decreased through a change in husbands' behaviour, then alcohol consumption of a husband of a woman married post-HSA amendments should decrease.

I use the men's questionnaire of the NFHS-III[23] to collect information on husbands. I then combine men's survey with the women's data, considered in the previous section. The sample consists of information on 18,577 *Hindu* couples. The main dependent variable is a binary variable for alcohol consumption. In addition, I also inspect the effect on the sample of drinkers using a binary variable for the frequency of alcohol consumption that takes the value 1 if the self-reported consumption is "daily" and 0 if "weekly or less often". I use a similar empirical specification to the one employed in the previous section to model alcohol consumption as a function of the post-HSA effect in reform states in comparison to non-reform states. As before, all estimations include state-fixed effects, husband's birth-year fixed effects and other individual, marriage and household specific control variables. Results are presented in Table 2.10.

The probability of being an alcohol consumer among men who married eligible women after the HSA legislative changes decreases by about 4.3 percentage points. This effect is significant and the inclusion of state-specific cohort trends does not affect the magnitude of the effect and the coefficient remains significant at a conventional level. Moreover, among consumers, the frequency of consumption decreases by about 3 percentage points. This result is consistent with the initial hypothesis that women married higher quality husbands who have lower probability of engaging in addictive behaviours that are highly correlated with the use of violence.

In addition, I inspect the effect on decision-making. I test for the effect of being an HSA beneficiary on women having any say in household financial decisions i.e., either jointly with the husband or solely on their own. I find suggestive evidence of an increase in decision-making by about 2 percentage points. This result is no longer significant when I

[23]Men's questionnaires were not conducted in previous survey rounds.

include state-cohort linear trends but, the coefficient is stable.

2.6.2 The effect on marriage negotiations

I exploit the effect on the marriage market in order to assess whether parents marital decisions regarding their daughters also changed as a result of the HSA amendments. In particular, I look at this mechanism by analysing the effect of the amendments on marriage negotiations. I posit that a reduction in domestic violence could have been a consequence of better marriage market negotiations that improved women's outside options.

I use the Indian Human Development Survey (IHDS) of 2004, a representative survey of women at the state-level that contains several indicators of marriage practices in India. I estimate a similar equation to (2.5.1), on several outcomes related to marriage negotiations. I analyse the effect of a woman being married post-HSA changes on i) proximity of current residence to natal village/town; ii) husband being from the same natal village/town and iii) involvement of brides in the marriage negotiation. The first two measures are capturing the changes in marriage negotiations directly. There are several ways through which these could have changed following the HSA. First, I expect that if parents improved the marriage allocations of the daughter (as per the previous result), they would also be more likely to marry their daughter to a husband whom they were previously acquainted with. Second, if parents inherit their daughters with a share in ancestral property (e.g., immovable property as land) it is also more likely that they marry the daughters closer to where they can still exert control, monitor or share the property. Finally, I also investigate the effect on women's agency by looking at whether women have any say in the choice of husband.

Table 2.11 presents the results. Women married after the HSA amendments in reform states are less distant from the natal village by about 0.3-0.6 hours i.e., 18-36 minutes. Further, women have a higher probability of marrying someone from their natal residence by about 5 percent-age points. These results point to an improvement in women's outside option or even security if parents can protect their daughters from domestic violence. Roy (2011) shows that older cohorts who were beneficiary of the HSA changes had higher dowries which were intentionally to compensate daughters for disinherit them. The findings this study are in line with the authors' conclusions and with previous research that show that dowry payments under certain conditions are not necessarily harmful to women (Ambrus et al., 2010; Suran et al., 2004).

Further, I do not find an effect on women being more involved in marriage negotiations.

Taken together the effects on decision-making in Tables 2.10 and 2.11 show weak results on women's empowerment, here measured by having any say in decisions that affect women's utility.

2.7 Conclusion

This paper shows empirically that female inheritance legislation has important implications for women's well-being. It establishes the relation between inheritance rights of women and violence against them. The results contribute to a growing literature on the effects of women's economic conditions on violence against them and on the importance of policies targeted specifically to women.

Using the staggered implementation of legal amendments in the major inheritance law in India, the Hindu Succession Act, this paper analyses the effect of improved legislation that improved property rights of women on violence against them, using both police-reported aggregated violence and self-reported intimate partner violence. I show that the amendments reduced gender-based violence. In addition, I do not find a causal effect on non-gender based police-reported crimes and on crimes less subject to reporting behaviour changes. Thus, the Act triggered a decrease in crimes committed against women rather than a change in reporting behaviour.

In order to overcome some of the identification issues that arise when looking at reported violence, I estimate the effect of self-reported incidence of intimate partner violence. I find that domestic violence decreased for women who would be beneficiaries of the amendments without any effect found for women who would not be legally eligible. Finally, I estimate the effect on husband's behaviour that is closely related to the aggressive behaviour and on marriage practices. I find that violence decreased through a reduction in the probability of marrying an alcohol consumer and on the frequency of alcohol consumption. Further, post-marriage residence of beneficiary women is closer to the natal family and the husbands are more likely to be from the pre-marriage residential area. This provides evidence that marital outcomes of women improved by both marrying better husbands and improved outside options. I do not find evidence that eligible women had higher decision-making power over financial issues within the household or that they were more involved in marriage negotiations.

In terms of policy analysis, these results underscores the importance of legal conditions in economic development and on the effects of well-defined property rights from a welfare

perspective. The 2005 amendments of the HSA Act in India, guarantee that daughters in all other states governed by *Hindu* inheritance law are now legally entitled to inheritance rights at par with sons regardless of their marital status. The implications of this are yet to be fully understood, this paper suggests though that this might improve women's security. Future research should aim to analyse the overall effect of the amendments addressing whether the reforms are Pareto improving or to the contrary if while they may benefit some women, may also trigger negative externalities within families or across religions.

In the *Women, Business and the Law* report in 2012, the indicators on legal gender parity of women show that about a third of the surveyed developing countries in Asia and Africa do not have equal inheritance rights over movable and immovable property between sons and daughters. This points to the importance of taking India's experience in amending property rights legislation where they are yet to be amended. This paper highlights the importance of well implemented and designed legal reforms that reduce gender inequalities.

2.8 Appendix A

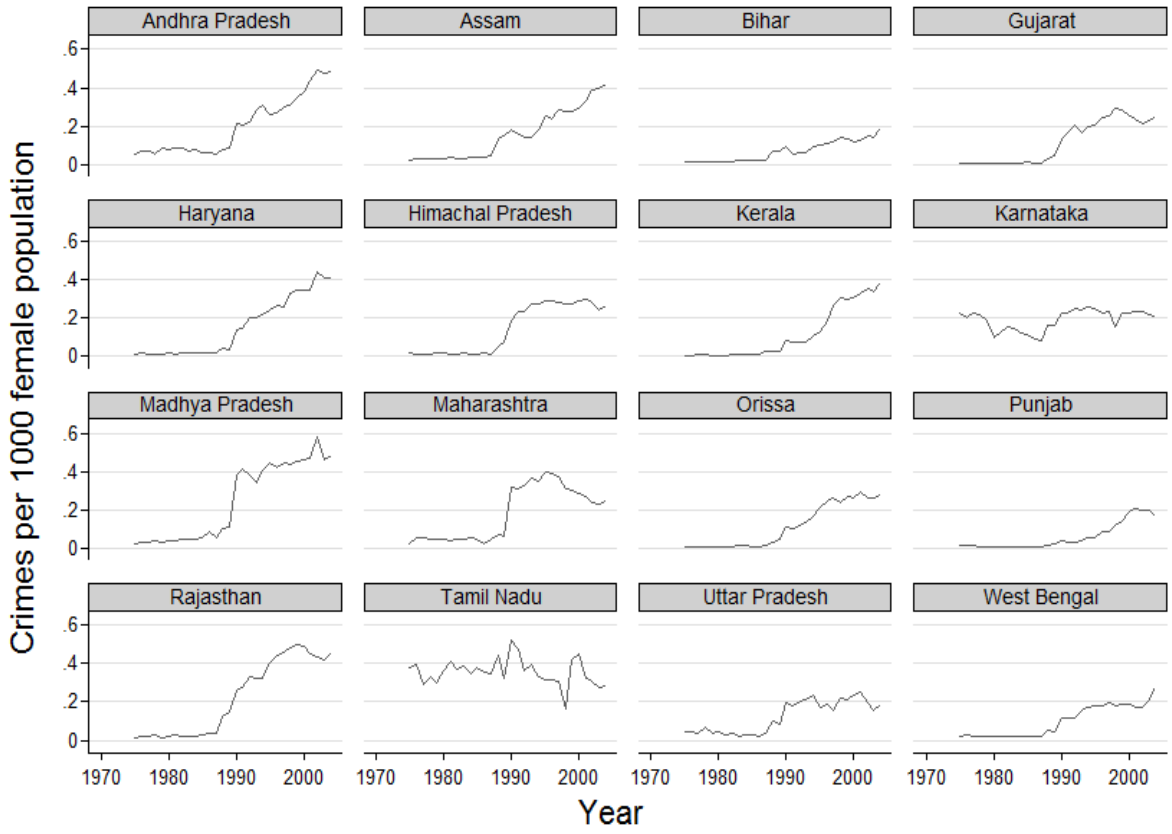


Figure 2.1: Crimes against women across states between 1975-2004. The rate of crimes against women is the state-year sum of the crime-categories considered under crimes against women by the Indian Penal Code. These are cruelty by husband and relatives, dowry deaths, importation of women and girls, kidnapping of women and girls, molestation, rape, sexual harassment and crimes under the Dowry Prohibition Act, Immoral Traffic (Prevention) Act and Indecent Representation of Women (Prevention) Act.

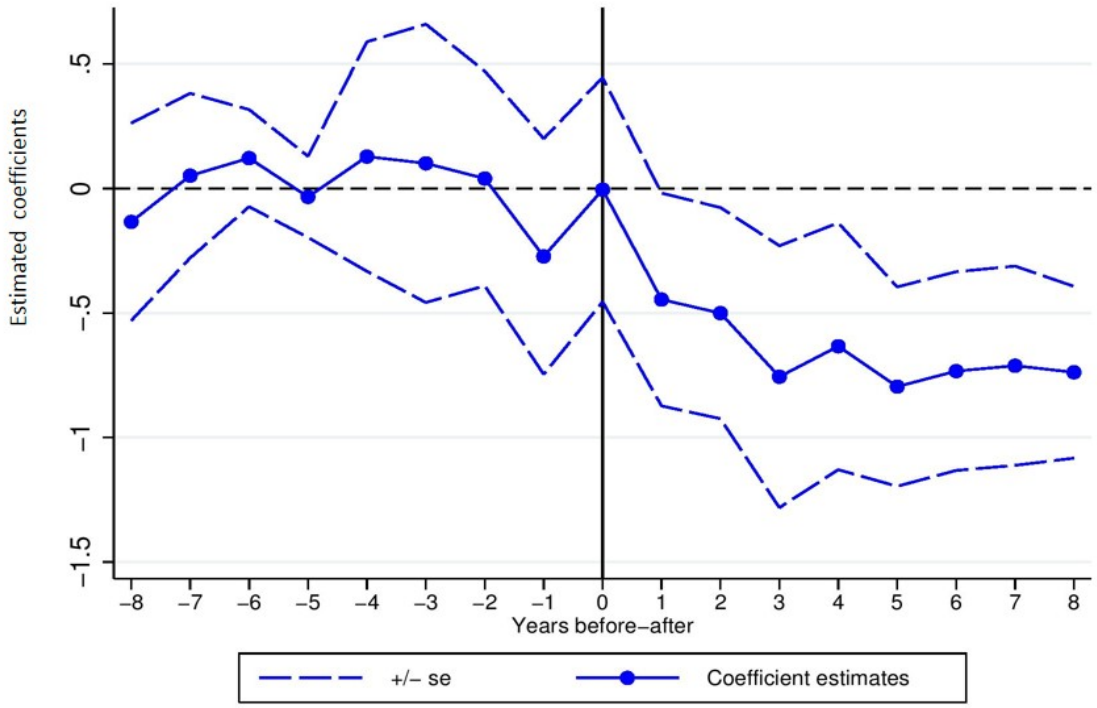


Figure 2.2: Gender-based violence event-study. Estimated coefficients and standard errors of the pre and post effect of the HSA on gender-based violence. Robust standard errors are clustered at the state level. The total rate of crimes against women is the state-year sum of the crime-categories considered under crimes against women by the Indian Penal Code. These are cruelty by husband and relatives, dowry deaths, importation of women and girls, kidnapping of women and girls, molestation, rape, sexual harassment and crimes under the Dowry Prohibition Act, Immoral Traffic (Prevention) Act and Indecent Representation of Women (Prevention) Act.

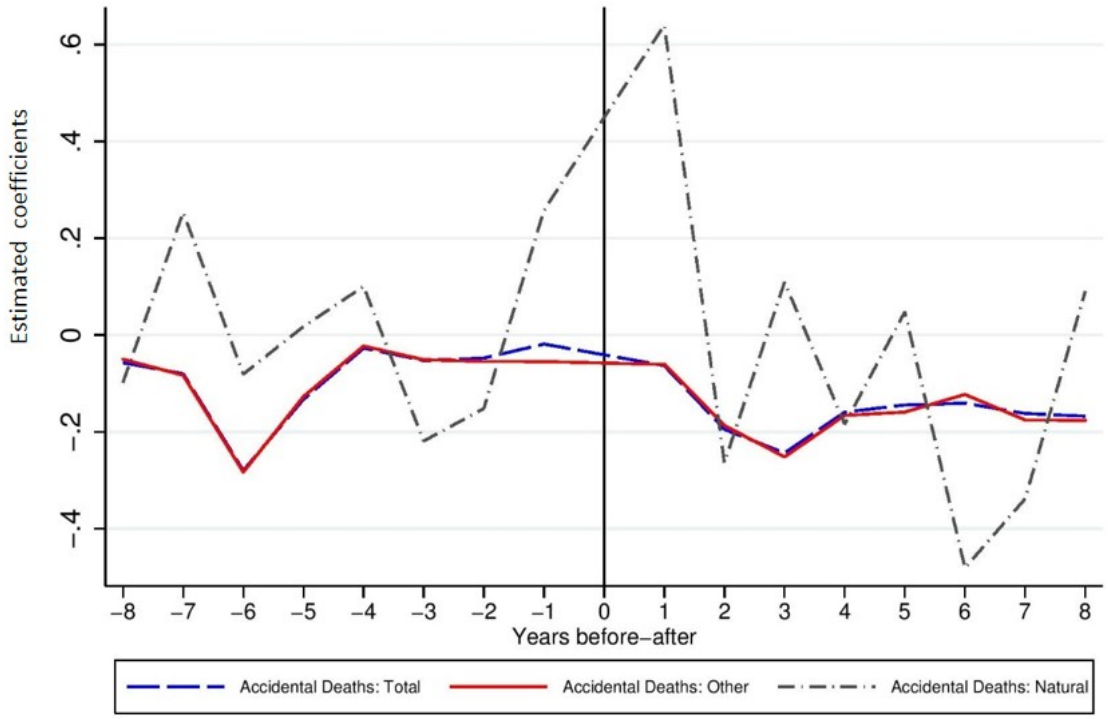


Figure 2.3: Female accidental deaths event-study. Estimated coefficients and standard errors of the pre and post effect of the HSA on female accidental deaths. Robust standard errors are clustered at the state level. Accidental deaths attributable to natural events those that are due to lightning, heat strokes, floods, earthquake, landslides, cold exposure, cyclone, avalanche, starvation, epidemic, torrential rains and others. Accidental deaths attributable to non-natural events are sub-categorized into deaths due to air-crashes, collapse of structures, drowning, explosion, falls, fire, sudden deaths, poisoning, traffic and miscellaneous.

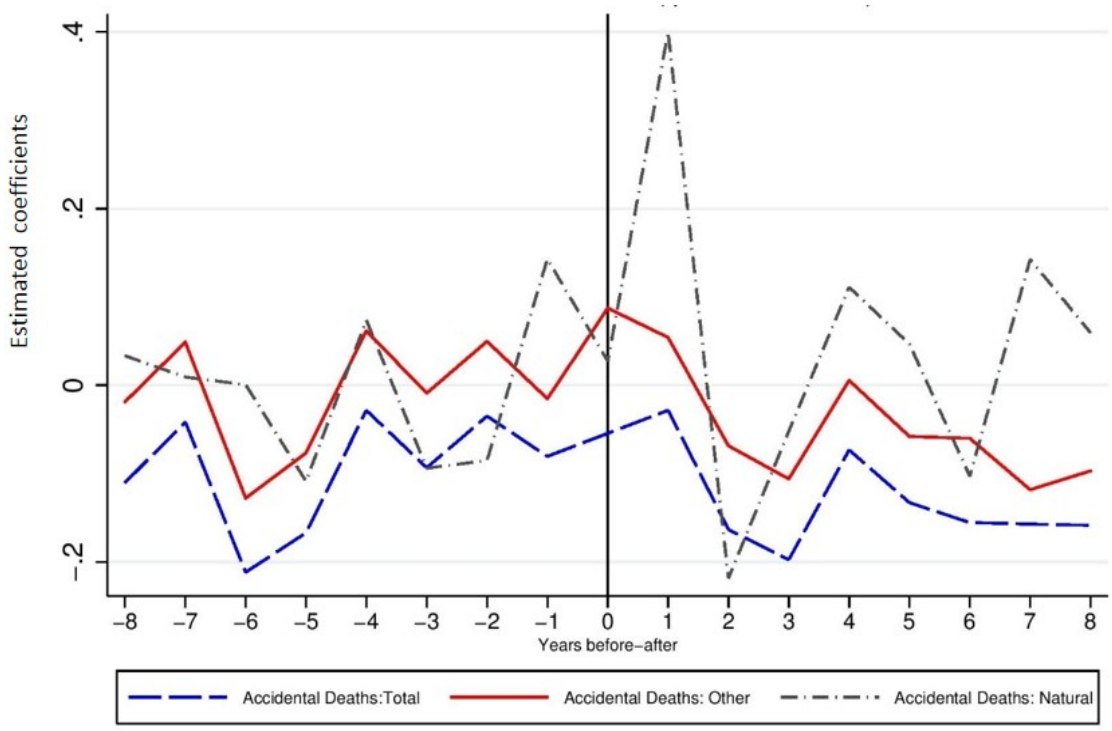


Figure 2.4: Male accidental deaths event-study. Estimated coefficients and standard errors of the pre and post effect of the HSA on male accidental deaths. Robust standard errors are clustered at the state level. Accidental deaths attributable to natural events those that are due to lightning, heat strokes, floods, earthquake, landslides, cold exposure, cyclone, avalanche, starvation, epidemic, torrential rains and others. Accidental deaths attributable to non-natural events are sub-categorized into deaths due to air-crashes, collapse of structures, drowning, explosion, falls, fire, sudden deaths, poisoning, traffic and miscellaneous.

Table 2.1 State Descriptive Statistics

	Total[a]	Accidents (F)[a]	Other (F)[a]	Natural (F)[a]	Accidents (M)[a]	Other (M)[a]	Natural (M)[a]	Robbery[b]
All-N	480	480	480	480	480	480	480	480
All- Mean	0.160	0.127	0.119	0.007	0.280	0.264	0.016	0.022
All- SD	0.142	0.083	0.078	0.020	0.146	0.137	0.022	0.018
HSA-N	150	150	150	150	150	150	150	150
HSA- Mean	0.210	0.172	0.165	0.007	0.371	0.357	0.014	0.017
HSA-SD	0.139	0.099	0.092	0.018	0.165	0.153	0.026	0.014
Non-HSA-N	330	330	330	330	330	330	330	330
Non-HSA- Mean	0.137	0.106	0.099	0.007	0.239	0.222	0.017	0.025
Non-HSA- SD	0.137	0.066	0.060	0.020	0.114	0.105	0.021	0.019
Diff.[c]	0.073†	-0.065†	0.066†	0.00	-0.280†	0.135†	-0.003	-0.008†
Diff.- SE	0.014	0.008	0.007	0.020	0.007	0.012	0.002	0.002
Pre-HSA Diff.[d]	-0.017	-0.088†	-0.089†	0.001	-0.0866†	-0.095†	0.008†	0.000
Pre-HSA Diff.-SE	0.019	0.011	0.010	0.003	0.019	0.018	0.003	0.002
	Riots[b]	Income per cap.	Police Force[b]	Rural Population	Women Seats	Sex ratio	Gender CM	Literacy
All-N	464	480	480	480	480	480	480	480
All- Mean	0.115	0.790	0.353	0.763	0.046	0.934	0.075	0.538
All- SD	0.092	0.774	0.347	0.091	0.026	0.045	0.264	0.151
HSA-N	145	150	150	150	150	150	150	150
HSA- Mean	0.127	0.904	0.179	0.692	0.043	0.974	0.060	0.625
HSA-SD	0.066	0.838	0.222	0.068	0.031	0.034	0.238	0.158
Non-HSA-N	319	330	330	330	330	330	330	330
Non-HSA- Mean	0.110	0.738	0.431	0.796	0.047	0.916	0.082	0.498
Non-HSA- SD	0.102	0.739	0.365	0.081	0.023	0.038	0.275	0.130
Diff.[c]	0.017*	0.166‡	-0.438†	-0.104†	-0.004	0.058†	-0.022	0.127†
Diff.- SE	0.009	0.076	0.073	0.008	0.003	0.004	0.025	0.014
Pre-HSA Diff.[d]	-0.006	0.553†	0.166†	0.082†	0.019†	-0.024	0.069*	0.027
Pre-HSA Diff. -SE	0.013	0.101	0.046	0.012	0.003	0.006	0.035	0.02

HSA stands for states which have Hindu Succession Act Amendments. Accidents are total accidental deaths, Natural is accidental deaths due to natural causes and Other are accidental deaths due to other causes. Gender CM is a gender dummy for the state Chief Minister. a) Rates per 1000 gender-specific population. b) Rates per 100,000 total population. c) The difference in means between reform and non-reform states is an hypothesis test of the difference in means is equal to zero. d) Means difference test between reform and non-reform states for pre-HSA years. Significance values at the 10% is marked with $*$, at 5% with ‡ and 1% with †.

Table 2.2 Difference-in differences estimations on gender-based violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Mean of Dep. Var.						0.16						
Post- HSA	-1.323***	-1.436***	-1.438***	-1.449***	-1.451***	-1.452***	-0.437*	-0.439*	-1.136***	-0.477*	-1.650***	-0.887***
	(0.363)	(0.252)	(0.249)	(0.269)	(0.268)	(0.258)	(0.215)	(0.236)	(0.243)	(0.266)	(0.343)	(0.221)
Controls	No	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Police Force	No	No	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Literacy Rate	No	No	No	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Political Controls	No	No	No	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Linear Trends	No	No	No	No	No	No	Yes	Yes	No	Yes	No	Yes
N	480	480	480	480	480	480	480	480	450	450	420	420
No. of States	16	16	16	16	16	16	16	16	15	15	14	14
Adj. R^2	0.86	0.88	0.88	0.88	0.88	0.88	0.95	0.95	0.91	0.95	0.91	0.96

Dependent variable is the natural logarithm of the ratio of the incidence of total reported crimes per state per female population (measured in thousands). Robust standard errors are clustered at the state-level. Coefficients significant at the 10%, 5% and 1% level are marked with $*$,$**$,$***$. Controls include female-male ratio, literacy rate, proportion of rural population and per capita net state domestic product. Strength of police force is per hundred thousand of population. Political controls include the proportion of seats held by women in the state legislature and a gender of the Chief Minister dummy. Columns 9 and 10 exclude Kerala and 11 and 12 exclude Karnataka and Maharashtra.

Table 2.3 Difference-in differences estimations on gender-based violence

	(1)	(2)	(4)	(5)	(6)
Post-HSA	-1.363***	-1.518***	-0.413*	-0.455*	-0.818***
	(0.382)	(0.280)	(0.211)	(0.242)	(0.219)
-3 years	-0.305	-0.408	0.083	0.06	0.202
	(0.305)	(0.283)	(0.169)	(0.161)	(0.168)
-4 years	-0.230	-0.352	0.074	0.060	0.327***
	(0.326)	(0.315)	(0.183)	(0.174)	(0.102)
Controls	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
State-Linear Trends	No	No	Yes	Yes	Yes
F-test	1.11	2.61	0.12	0.07	21.17
p-value	0.354	0.107	0.88	0.932	0.000
N	480	480	480	450	420
No. of states	16	16	16	15	14
Adj. R^2	0.86	0.88	0.95	0.95	0.96

Dependent variable is the natural logarithm of the ratio of the incidence of total reported crimes per state per female population (measured in thousands). Robust standard errors are clustered at the state-level. Coefficients significant at the 10%, 5% and 1% level are marked with $*$,$**$,$***$. Controls include female-male ratio, literacy rate, proportion of rural population and per capita net state domestic product. Strength of police force is per hundred thousand of population. Political controls include the proportion of seats held by women in the state legislature and a gender of the Chief Minister dummy. Columns 5 excludes Kerala and 6 excludes Karnataka and Maharashtra.

Table 2.4 Difference-in differences estimations: Female Accidental Deaths

	(1)	(2)	(3)	(4)	(5)
	Total Accidental Deaths				
Post-HSA	-0.011	-0.178**	-0.124***	-0.118**	-0.117
	(0.115)	(0.0735)	(0.0330)	(0.0521)	(0.0715)
Adj. R^2	0.07	0.21	0.41	0.41	0.42
	Other Causes Accidental Deaths				
Post-HSA	0.020	-0.164**	-0.113***	-0.104*	-0.139*
	(0.121)	(0.0743)	(0.0384)	(0.0513)	(0.0747)
Adj. R^2	0.04	0.25	0.50	0.48	0.50
	Natural Causes Accidental Deaths				
Post-HSA	0.294	0.111	-0.032	-0.075	0.392
	(0.228)	(0.184)	(0.286)	(0.287)	(0.335)
Adj. R^2	0.34	0.35	0.43	0.44	0.46
Controls	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
State Linear Trends	No	No	Yes	Yes	Yes
N	480	480	480	450	420
No. of States	16	16	16	15	14

Dependent variables are the natural logarithm of the rate of accidental deaths by per female population (measured in thousands). Accidental deaths attributable to natural events those that are due to lightning, heat strokes, floods, earthquake, landslides, cold exposure, cyclone, avalanche, starvation, epidemic, torrential rains and others. Accidental deaths attributable to non-natural events are sub-categorized into deaths due to air-crashes, collapse of structures, drowning, explosion, falls, fire, sudden deaths, poisoning, traffic and miscellaneous. Robust standard errors are clustered at the state-level. Coefficients significant at the 10%, 5% and 1% level are marked with $*$,$**$,$***$. Controls include female-male ratio, literacy rate, proportion of rural population and per capita net state domestic product and strength of police force per hundred thousand of population.

Table 2.5 Difference-in differences estimations: Male Accidental Deaths

	(1)	(2)	(3)	(4)	(5)
	Total Accidental Deaths				
Post-HSA	0.06	-0.130*	-0.076***	-0.083	-0.062
	(0.100)	(0.077)	(0.022)	(0.052)	(0.054)
Adj. R^2	0.431	0.573	0.748	0.748	0.753
	Other Causes Accidental Deaths				
Post-HSA	0.069	-0.130	-0.079***	-0.082	-0.090
	(0.107)	(0.075)	(0.021)	(0.048)	(0.059)
Adj. R^2	0.381	0.553	0.754	0.746	0.758
	Natural Causes Accidental Deaths				
Post-HSA	0.356	0.132	0.129	0.115	0.385
	(0.213)	(0.156)	(0.229)	(0.229)	(0.358)
Adj. R^2	0.490	0.505	0.574	0.570	0.605
Controls	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
State Linear Trends	No	No	Yes	Yes	Yes
N	480	480	480	450	420
No. of states	16	16	16	15	14

Dependent variables are the natural logarithm of the rate of accidental deaths by per male population (measured in thousands). Accidental deaths attributable to natural events those that are due to lightning, heat strokes, floods, earthquake, landslides, cold exposure, cyclone, avalanche, starvation, epidemic, torrential rains and others. Accidental deaths attributable to non-natural events are sub-categorized into deaths due to air-crashes, collapse of structures, drowning, explosion, falls, fire, sudden deaths, poisoning, traffic and miscellaneous. Robust standard errors are clustered at the state-level. Coefficients significant at the 10%, 5% and 1% level are marked with $*$,$**$,$***$. Controls include female-male ratio, literacy rate, proportion of rural population and per capita net state domestic product and strength of police force per hundred thousand of population.

Table 2.6 Difference-in difference estimations on gender neutral crimes

	(1)	(2)	(3)	(4)	(5)
	Robery per 100,000 population				
Post-HSA	0.338	0.130	0.298	0.381*	0.099
	(0.242)	(0.278)	(0.181)	(0.198)	(0.145)
N	480	480	480	450	420
Adj. R^2	0.05	0.11	0.46	0.44	0.46
	Riot per 100,000 population				
Post-HSA	0.242	0.008	0.094	0.123	-0.042
	(0.232)	(0.264)	(0.137)	(0.196)	(0.109)
Controls	No	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes
State FE	Yes	Yes	Yes	Yes	Yes
State Linear Trends	No	No	Yes	Yes	Yes
N	462	462	462	433	404
Adj. R^2	0.23	0.33	0.65	0.65	0.65
Number of States	16	16	16	15	14

Dependent variables are in logarithms. Coefficients significant at the 10%, 5% and 1% level are marked with $*$,$**$,$***$.Controls include female-male ratio, literacy rate, proportion of rural population and per capita net state domestic product and strength of police force per hundred thousand of population.

Table 2.7 Descriptive Statistics - Intimate partner violence

	All	HSA^a	Non-HSA^b	Diff.$^{(b-a)}$
Intimate-Partner Violence	0.452	0.390	0.485	0.095
	(0.067)	(0.054)	(0.040)	(0.067)
Hindu	0.852	0.840	0.858	0.019
	(0.024)	(0.041)	(0.030)	(0.051)
Muslim	0.120	0.106	0.128	0.022
	(0.021)	(0.035)	(0.026)	(0.044)
Rural	0.574	0.469	0.630	0.161***
	(0.025)	(0.043)	(0.032)	(0.054)
Son Pref.	0.294	0.120	0.386	0.266***
	(0.027)	(0.046)	(0.034)	(0.057)
Household size	4.930	4.492	5.163	0.671***
	(0.108)	(0.181)	(0.135)	(0.226)
Spousal education gap	2.087	1.385	2.460	1.075**
	(0.200)	(0.335)	(0.250)	(0.418)
Spousal age gap	6.067	6.659	5.754	-0.906
	(0.296)	(0.495)	(0.369)	(0.618)
Television	0.488	0.600	0.429	-0.171**
	(0.035)	(0.058)	(0.043)	(0.072)
N	40,884	14,160	26,724	

This table presents the means and standard errors clustered at the state-level, in parenthesis. The Diff. is the means test difference between Non-HSA and HSA states. Significance levels at the 5% and 1% level are denoted by ** and ***, respectively.

Table 2.8 Difference-in- differences estimations on intimate partner violence

	(1)	(2)	(3)
Mean of Dep. Variable		0.452	
	Panel A		
Post-HSA	-0.067***	-0.099***	-0.098***
	(0.013)	(0.012)	(0.011)
N	40,884	40,884	40,884
No. of States	16	16	16
Adj.R^2	0.12	0.12	0.12
	Panel B		
Post-HSA	-0.065***	-0.097***	-0.096***
	(0.013)	(0.012)	(0.012)
N	39,790	39,790	39,790
No. of States	15	15	15
Adj.R^2	0.11	0.11	0.11
	Panel C		
Post-HSA	-0.055***	-0.092***	-0.091***
	(0.010)	(0.015)	(0.014)
N	34,552	34,552	34,552
No. of States	14	14	14
Adj.R^2	0.11	0.11	0.11
State FE	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes
Controls	Yes	Yes	Yes
State-Cohort Linear Trends	No	Yes	Yes
Hindu*State	No	No	Yes
Hindu*Cohort	No	No	Yes

Using the sample of wives of the pooled NFHS. The dependent variable is a stock of domestic violence dummy that equals to 1 if the wife was ever subject to violence committed by the husband and 0 otherwise. Control variables include a *Hindu* dummy, a rural household dummy, son preference of the wife, household size, spousal education and age gap and a dummy for television ownership. The explanatory variable of interest is a dummy that takes the value 1 if a woman resident in a reform state married after the reform relative to the reform year in her state. Robust standard-errors are clustered at the state-level. Significance levels at the 10%, 5% and 1% level are denoted with $*$,$**$,$***$.

Table 2.9 Difference-in- differences estimations on intimate partner violence

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mean of Dep. Variable				0.448					0.504	
Post-HSA	-0.094***	-0.065***	-0.099***	-0.064***	-0.099***	-0.057***	-0.057***	-0.077	-0.071	-0.040
	(0.017)	(0.016)	(0.015)	(0.016)	(0.015)	(0.017)	(0.017)	(0.044)	(0.050)	(0.048)
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Cohort Linear Trends	No	No	Yes	No	Yes	No	Yes	Yes	Yes	Yes
N	34,824	34,824	34,824	34,139	34,139	29,350	29,350	4,916	4,716	4,213
No. of States	16	16	16	15	15	14	14	16	15	14
Adj. R^2	0.07	0.12	0.12	0.12	0.12	0.12	0.12	0.10	0.09	0.10
Religious Sample	*Hindu*	*Hindu*	*Hindu*	*Hindu*	*Hindu*	*Hindu*	*Hindu*	Muslim	Muslim	Muslim

Using the sample of *Hindu* and Muslim wives of the pooled NFHS, respectively. The dependent variable is a stock of domestic violence dummy that equals to 1 if the wife was ever subject to violence committed by the husband and 0 otherwise. Control variables include a rural household dummy, son preference of the woman, household size, spousal education and age gap and a dummy for television ownership. The explanatory variable of interest is a dummy that takes the value 1 if a woman resident in a reform state, married after the reform relative to the reform year in her state. Robust standard-errors are clustered at the state-level. Significance levels at the 10%, 5% and 1% level are denoted with $*$,$**$,$***$.

Table 2.10 Difference-in-differences estimates for *Hindu* husbands

	(1)	(2)	(1)	(2)	(1)	(2)
	Alcohol consumer		Frequency		Decision	
Mean of dep. var.	0.406		0.117		0.844	
Post-HSA	-0.043***	-0.044*	-0.033**	-0.050***	0.024*	0.022
	(0.010)	(0.024)	(0.013)	(0.009)	(0.014)	(0.021)
State FE	Yes	Yes	Yes	Yes	Yes	Yes
Cohort FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	Yes	Yes	Yes	Yes	Yes	Yes
State-Cohort Linear Trends	No	Yes	No	Yes	No	Yes
N	18,577	18,577	8,400	8,400	14,301	14,301
Adj. R^2	0.06	0.06	0.04	0.04	0.06	0.06

Using the sample of *Hindu* husbands of the NFHS-III. The dependent variables are (in order of appearance): a) a binary variable for alcohol consumers; b) a binary variable for frequent alcohol consumers and, c) a binary variable that takes the value 1 if the wife has any role in decision-making. Control variables include the respondent's education in groups (the omitted category is no education), urban household dummy, household size, age and age squared. The specification on Decision contains spouse age gap instead of husband's age and age squared.

Table 2.11 Difference-in-differences for *Hindu* women

	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Dep. Variable		Distance			Husband from Natal Village			Involved in Marriage Negotiation	
Mean of Dep. Variable		3.397			0.112			0.424	
Post-HSA	-0.279**	-0.561***	-0.294**	0.050**	0.047*	0.050**	0.002	-0.017	0.002
	(0.101)	(0.076)	(0.100)	(0.023)	(0.025)	(0.022)	(0.029)	(0.033)	(0.029)
Controls	Yes	No	Yes	Yes	No	Yes	Yes	No	Yes
State FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
State-Cohort Linear Trends	No	Yes	Yes	No	Yes	Yes	No	Yes	Yes
N	15,061	15,061	15,061	15,061	15,061	15,061	15,061	15,061	15,061
Adj. R^2	0.02	0.01	0.02	0.05	0.05	0.05	0.17	0.17	0.17

Using the sample of *Hindu* wives of the IHDS. The dependent variables are (in order of appearance): a) distance from the the post-marriage household to the natal house (in hours); b) a binary variable that takes the value 1 if the respondent grew up in the same village as the current husband and, c) a binary variable to whether the respondent had any say in the choice of husband. Control variables include women's education (in years), urban household dummy, household size, a dummy variable for land ownership of the household and son preference of the woman.

Chapter 3

Less is More: Sex Ratios and Crime in India

3.1 Introduction

India's sex imbalance is large and has been increasingly more male biased with about 940 females per 1000 males in the total population[1]. Moreover, in India between the period 1975 to 1997 the sex ratio at birth is on average of 52.2% boys [2], [3]. The biological normal male to female ratio at birth ranges between 103 to 106. In India, the Census 2011 revealed that the male to female sex ratio of those aged 0 to 6 was 927 girls to 1000 boys. Natural evolution dictates that after birth girls have lower survival rates in comparison to boys. In adulthood males have a higher mortality rate then females and this off-sets the initial infant-mortality gap. This implies that at marriage, the sex ratio is in equilibrium. Sen (1992) first recognized that there was a population gap in India. The number of *missing women* is explained through a disproportionately high mortality of females at birth, infant-hood and even in adulthood (Anderson and Ray, 2010, 2012; Bhalotra and Cochrane, 2010; Rose,

[1]This paper defines sex ratio as the ratio of females to males following the Census of India definition.

[2]This chapter is part of an ongoing project. These calculations are based on this ongoing work based on birth-histories of mothers collected from health-surveys of India (National Family Heath Surveys rounds 1 and 2 and District Level Household Survey-2.

[3]China performs worse than India yet, while the cases of India and China are outliers males still account for 50.4% of the global population (Hesketh and Xing, 2006)

1999). In India, the consequences of skewed sex ratios at birth along with a gender-gap in mortality are likely to have severe long-term consequences. Bhaskar (2011) shows that sex imbalances decrease social welfare as in the long-run it creates distortions in the marriage market.

In recent years, along with a decrease in sex ratio, general violence and violence against women have been increasing in India (Figures 1-3). Violence has been increasing mainly due to the recent upbringing of internal conflicts as the Maoist conflict (Amaral et al., 2014; Iyer, 2009). The rise in violence against women is less well understood. Explanations of this recent rise have been attributed to changes in reporting-behaviour (Iyer et al., 2012), and also associated with groom prices (Bloch and Rao, 2002).

While there is extensive research on the causes of excess of males, the consequences of demographic alterations have been less investigated. The causes of excess males per females have been attributed to persistent son preference (Almond et al., 2013; Bhalotra and Cochrane, 2010; Lin et al., 2008), marriage payments (Rao, 1993) and poor health (Oster, 2005). The economics literature has shown that changes in sex ratios have effects on the marriage market (Abramitzky et al., 2011; Lafortune, 2013), on the persistence of culture (Grosjean and Khattar, 2014) and labour market outcomes (Angrist, 2002). However, the consequences of sex imbalances on crime and on intra-household welfare of women have received less attention.

This paper closely follows Edlund et al. (2013) who investigate the relation between male-biased sex ratio and crime in China. The authors find that an increase in the male to female ratio increases crime rates (measured by arrest rates of property and violent crimes). China and India are outliers in sex imbalances mostly due to strong son preference. The introduction of ultrasound technology increased parental choice over children's sex in both countries in mid $1980's$. In China, the availability of sex-selection technology along with the constraints imposed by the one-child policy is now proving to be damaging for social welfare. This paper along with investigating the effects on general violence, property and economic crimes also considers gender-based violence to investigate the relationship between sex imbalances and women's welfare which was not previously considered.

Prakash and Vadlamannati (2014) look at the relation between child sex ratio (ages 0 to 6) in Indian states and illegal trafficking of girls. The authors find that a 100 unit increase in child-sex ratio is associated with 0.64% increase in illegal trafficking of girls. This finding is in line with the results found in this paper. However, the advantage of our paper is that it considers district-level information rather than state-level. This allows us to account

for high heterogeneity in sex ratios within states where, even amongst the Northern states there are districts with sex ratio comparable to those of the "best" districts in the South. Carranza (2014) finds that the ratio of female to males increases with the value attributed to female labour in agriculture in districts that have higher demand for female labour. This may explain the large variability in sex ratios across districts in India[4]. We use district-level information to measure sex imbalances given the high variability of sex ratios within states as well as across states. Further, the use of Census sex ratios of ages 0-6 may be subject to measurement error as female mortality occurs mostly before the age of 5 and this accounts for most of female mortality (Oster, 2009).

The effect of demographic changes on homicides have been analysed in Dŕeze and Khera (2000) and Chiapa and Viejo (2012). Dŕeze and Khera (2000) use cross-sectional information and find that the female to male ratio is negatively associated with murders in Indian districts. However, this may occur due to the factors that affect culture associated with son preference, patriarchy and crime. Chiapa and Viejo (2012) finds that a decrease in the ratio of males to females in Mexico, associated with income-migration from Mexican municipals to the U.S. decreases homicide rates.

This paper contributes to this stream of the literature by considering the consequences of a surplus of males in India on gender-based violence; non-gender based violence; property crime and; juvenile delinquency. Son preference in India is strong, persistent and has been associated with missing women (Anukriti, 2014; Bhaskar and Gupta, 2007; Gupta, 2014; Sen, 1992). The approach used in this paper, which follows Edlund et al. (2013), uses a district-year panel to estimate the effect of age-specific sex ratios on crime rates. This approach takes into account that sex ratio and crime can be simultaneously determined due to unobserved factors such as transmission of culture (Grosjean and Khattar, 2014) or factors that are associated with both son preference and law-bindingness.

I find that sex imbalances affect gender-based violence but not other types of violence or acquisitive crime. Consistent with economics, psychology and criminology literature, this paper finds that it is the surplus of males in the crime and marriage prone-age that affects illegal behaviour rather than a general population surplus. This is consistent with a surplus of males in crime-prone age who are unable to find a bride becoming more likely to be

[4]According to the Census 2011, the child sex ratio in Thrissur, Kerala was 948 and in Jalandhar, Punjab was 874.

violent. This result is supported by the fact that I find weak results of the effects of sex ratios of non-marriageable-age cohorts on crime. This is important as it provides evidence that it is the surplus of males that generates a change in crime rates rather than other factors such as culture, that run across the population. The consequences of a decreasing sex ratio explain 12% of the recent rise in gender-based violence. Specifically, a 0.1 unit decrease in sex ratio (i.e. an increase in males) increases gender-based violence by 0.76%. The effect is only present for crimes against women and not other types of violence or property and economic crimes. Further, I do not find evidence of an effect on the relation between youth sex ratio and male or female delinquency.

There are several ways through which sex ratios can affect crime rates. Population imbalances along the gender dimension are relevant in explaining crimes as there are several dimensions in which behaviour differs across gender. First, there are gender differences in delinquent behaviour and law-abindingness (Dollar et al., 2001; Rivas, 2013). Moreover, there are large gender differences in disruptive behaviour that affect occupational choices that are highly correlated with criminal decision-making. Bertrand and Pan (2011) show that non-cognitive skills that affect schooling and labour decisions are more likely to have negative effects for boys in poor home-environments.

The excess of males in crime and marriage prone-ages is what drives crimes committed against women rather than a surplus of males in older or younger cohorts. First, I provide evidence that a surplus of men in the marriage market increases the rate of single men and decreases the rate of single women. In addition, the psychology and health literature provide evidence that marriage has a sobering effect and therefore, married individuals are less likely to engage in criminal activities[5]. Men in particular are more likely to become more responsible following marriage (Sampson et al., 2006; Siennick et al., 2014) . These findings are even more relevant when considering that the marriageable age coincides with crime age-profiles. In fact, following Becker (1968), as long as the opportunity costs of crime for married individuals are higher than for single individuals, the later would be more likely to engage in criminal activities than the former.

Alterations in the sex ratio of marriageable ages increase competition in the marriage market for the gender in surplus and this can have several implications in terms of social

[5]It can be the case that partnerships also have a sobering effect yet, given that the context of the paper is India where partnerships without a marriage are not common this is not a concern.

welfare. Bhaskar (2011) shows that when parents have strong son preference and have access to sex-selection methods, in the long-run welfare decreases due to imbalances in the marriage market. However, the predictions of what an excess of males in the marriage market does for women's welfare are ambiguous. Standard economic theory predicts that this could increase women's welfare as quantity-price are inversely related (Becker, 2009). A déficit of women in the marriage market may improve their bargaining power and intra-household allocations (Angrist, 2002; Becker, 2009; Chiappori et al., 2002). However, if there is a *marriage squeeze* in the marriage market (i.e., an excess of women in the marriage market following an increase in cohort sizes and the fact that men marry younger women) this can off-set the initial imbalance depending on the growth of cohort size Bhaskar (2012). In this case, the welfare implications for women are different depending of the sex ratio at marriageable age. With a positive growth in cohort sizes (e.g., due to decreases in infant-mortality) women can be worse-off in marriage market even with lower female to male ratio at birth. Finally, even if cohorts size growth is zero or negative, if legal rights do not ensure that women are secure a shortage of women, may still not translate into better marriage and intra-household outcomes for women.

This paper finds that an excess of males in the marriage market increases gender-based violence. This is consistent with the theoretical prediction as long as cohort sizes are increasing. If cohort sizes are decreasing or age gap at marriage is shortened the findings of this paper are more consistent with the lack of enforcement of legal rights of women. d'Albis and De La Croix (2012) estimate that 4% of men in India would not find a bride. A the same time, Bhaskar (2011) shows that cohort sizes in India are growing. Yet, at the state-level there is an excess of males in the North-West of India whereas in the rest of the country there is an excess supply of girls. This paper finds that the gender-based effect is present only in the Northern states. This is consistent with a déficit of women in the North and the shortages of women in the North as in Bhaskar (2011).

Finally, borrowing from Becker (1968) with gender-labour specialization and low female labour participation, a decrease in the female to male ratio may decrease the opportunity cost of engaging in criminal activities if the expected return from crime are higher than those in a congested labour market. This hypothesis is investigated by looking at property and economic crimes.

The rest of this paper is organised as follows. Section 2 provides a description of the data. Section 3 explains the empirical specification. Section 4 presents the results and in section 5 the robustness exercises conducted. Section 6 discusses the results, considers

possible extensions and concludes.

3.2 Data

3.2.1 Crime

Crime statistics information is collected from yearly publications of the National Crime Records Bureau (NCRB) of India[6] The NCRB publishes information at the crime area level for cognizable-crimes prescribed under the Indian Penal Code. I converted this information to district-level in order to make this information comparable with the remaining data used in the analysis[7]. I construct four major categories of crime rates using information on 18 categories of cognizable crime. These are property, economic, violent and crimes against women (see the thesis Appendix for definitions and categorisation of these variables). I take the district boundaries definitions of the Census of 1991 in order to make the data comparable across time. The final data set is a district-level panel of 369 districts from 1991 to 2011.

I also collect information on juvenile offences. The NCRB does not publish information on juvenile delinquency at the state-level or disaggregated by crime category. However, it reports information of juvenile offences disaggregated by gender. The measure of juvenile delinquency considered in the analysis are crime incidents committed by boys/girls of ages 12-18 per capita. Male juvenile delinquency accounts for over 90% of total juvenile offences. The rate of male juvenile offences has been increasing and is of about 0.57 per capita per whereas the rate of female juvenile delinquency has a stable trend. In 2001 there was an average of 1 female arrest per 19 males arrested. This is consistent with the posited

[6]The collection of the data used in this paper is similar to the one presented in "Determinants of gender and non-gender based violence in India". I provide further details of some of the procedures followed in forming the database used.

[7]In order to match a given crime area to its district I used general information from the web and government websites. For most cases crime areas are large metropolitan cities or rural areas around large metropolitan cities. For example, Kochi is a city in the district of Ernakulam in Kerala (http://en.wikipedia.org/wiki/Kochi and http://ernakulam.nic.in/history.htm). Thus, crime area statistics of Kochi belong to the district-level statistics of Ernakulam. This was process was done twice and any mistakes in coding errors were corrected when cross validating the information. Coding errors may exist and this will be addressed in the robustness section of the results.

hypothesis that males are more crime prone.

Figures 1.1-1.3 (Appendix A-Chapter 1) show crime trends of gender-based and general violence and property crime. Gender-based crime has been increasing as well as violent crime, though the later at a faster rate. Property crime has been decreasing.

3.2.2 Census sex ratios

In order to obtain yearly-variation in the sex ratio I compute projections of age-specific sex ratio using a similar method as the one in Edlund et al. (2013). I collect population information from the Census 2001 at the district-level. This information was used to compute sex ratio projections. Projections were based on year variation, variation in the cohort age over the yearly variation and other age-groups sex ratio[8]. The Census of India does not provide population information disaggregated by age. Instead, the information available is presented by different cohorts staring from 0 to 80^{+} in groups of 5 years. To make projections I used the full sample of sex ratio information for all cohorts starting from 5 years of age. I do not use the 0-4 sex ratio due to the high gender gap in infant mortality in this cohort. For the main analysis, I consider sex ratios for 10 year age-groups which are the 5-14; 15-24; 25-44 and 45-64. Figure 3.1. presents the total population and child (ages 0-6) sex ratio trend across Census years. As argued before there is an increasing number of males to females in India. Figure 3.2. presents the trend in the 15-24 sex ratio using a lowess smoother estimation. The sex ratio of this crime-prone sex ratio has been decreasing i.e. there is a increase in the surplus of males at the crime-marriage age.

Research on age profiling of criminals has identified that there is an inverted-U shape relation between crime and age i.e., the probability of engaging in criminal activities rises in early teenage years and falls in early adulthood. Hirschi and Gottfredson (1983) argue that this crime-age profile is time-invariant and persistent across areas. Although this is an empirical regularity, there can be differences within the 16-25 cohort that explain why differences across-individuals in criminal behaviour (Hansen, 2003). In this paper, I follow the criminology literature and identify that the 16-25 cohort is the crime-prone cohort. As mentioned above, the Census of India does not provide population information disaggregated by age. Thus using the information available I consider that the crime-prone age cohort is the

[8]Appendix B provides a more detailed explanation of the forecasting method followed to obtain a yearly variation in sex ratio.

15-24.

Table 1 present summary statistics. There are on average 931 females per 1000 males in the total population. The lowest sex ratio is on the [5-14] cohort with an average of 912 females per 1000 males. The highest is on the oldest cohort. In Appendix B I provide state-level locally weighted smoothing estimations of the 15-24 sex ratio. There is a similar trend in the sex ratio [15-24] across states. In Appendix C I provide state-level trends of the [15-24] sex ratio trend which overall confirm a similar trend across states.

3.2.3 Additional variables

Other factors may be correlated with parental choices and son preference as well as with crime levels in a district. I control for observed time-variant factors that could otherwise be affecting the estimations. I include socio-demographic factors that vary at the district-level as urban population, literacy rates and the share of SC and ST population in a district. These variables are collected from the the rounds of Census 1991, 2001 and 2011 and linearly interpolated for the intervening years.

There are no measures of police enforcement available at the district-level. Therefore, I rely on state-level measures. I include the share of women in the police force and police strength per capita. This information was collected from the NCRB publications. Moreover the electoral cycle is likely to influence crime rates (either through incidence or increases in deterrence) hence, I include an election year binary variable to account for this. Further, I add a gender dummy of the head of state government. Both of these variables are collected from the Election Commission state reports. Finally, I include net state domestic product per capita as a measure on income levels which is likely to affect crime rates. This information is collected from the Central Bank of India. Summary statistics are presented in Table 3.2.

In order to establish the relation between single rates (i.e, the ratio of unmarried population of each gender) and sex ratio I collect information on age-specific single rates and age-specific sex-ratios at the district-level from the Census 1991. Table 3.1 presents descriptive statistics. The information related to Census 1991 used in the paper is collected from the Indian District Database available from the University of Maryland.

3.3 Empirical Specification

I estimate a linear fixed-effects model of crimes per population in district d, in state s in year t as a function of age-specific sex ratios in district d, in state s at time t so that,

$$Crime_{d,s,t} = \alpha_0 + \sum_{i=1,k_j}^{i=4} \beta_i sr_{d,s,t}^{k_j} + X_{d,t} + X_{s,t} + \gamma_d + \lambda_t + \varepsilon_{d,s,t} \tag{3.3.1}$$

where the dependent variable is the crime rate of district d, in state s at time t. Further, sr is the sex ratio of cohort k_j where j=$[5-14, 15-24, 25-44, 45-64]$. The inclusion of district fixed-effects control for persistence in institutional and cultural determinants of illegal and reporting behaviours and son preference. Time fixed-effects control for shocks common to all districts in India as shocks in gold prices, inflation, etc. The vectors of district and state time-varying observed factors controls for common factors in the crime literature that would otherwise create a misspecification in the results. α_0 is a constant term.

The main hypothesis is that the relationship between the sex ratio of the [15-24] cohort is inversely related to crime rates. A decrease in the number of females per males (i.e., increase in males) increases crime. Therefore, I expect the coefficient of interest $\beta_2 < 0$. As explained, a surplus of males should only explain crime rates in the crime-prone cohort thus, coefficients β_1, β_3 and β_4 are expected to not be different from 0. This is an implicit falsification exercise in the sense that if there are other factors which are not accounted for in the model that affect the relationship between sex ratio of the crime-prone age and crime this is captured by inclusion of the *falsification* sex ratios. In specific, if there are omitted factors due to time-invariant unobserved heterogeneity in districts this would not be accounted for in the model specified in (4.1.). Thus, this could lead to β_1, β_3 and β_4 to be different from 0. Son preference is one of the causes attributed to the surplus of males. If this factor is time-variant these would not be taken into account by the inclusion of district fixed-effects and this is captured by the non-crime prone sex ratio i.e., coefficients β_1, β_3 and β_4. Similarly, if gender views that could be correlated with dowry practices, dowry violence, rape or domestic violence are time-variant these would be different across the population shares and would cause β_1, β_3 and β_4 to be different from zero.

3.3.1 Standard-errors

In order to account for the potential correlation in the error term within districts standard-errors are clustered at the district-level. Cameron et al. (2011); Cameron and Miller (2010) argue that if errors are correlated both across time within the same district and across district for the same year, the inclusion of $X_{d,t}$, $X_{s,t}$ and λ_t can mitigate unobserved factors that can cause the error terms to be correlated in the yearly variant components that affect crime rates but not if there are factors that are correlated across time in the same district such as culture, traditions or gender-role views. This would lead to incorrect inferences. To account for this, I also report standard-errors double-clustered at the district and year level of the fixed-effects panel estimations. Standard-errors that vary considerably across the two specifications are suggestive that there are omitted variable factors that were not being taken into account.

3.4 Results

3.4.1 Marriage Rates

One of the mechanisms through which sex ratios may affect crime rates is through its effect on marriage rates. A surplus (déficit) of males (females) at marriageable age will decrease (increase) the rate of married males (females). Specifically, I analyse this hypothesis using information on marriage rates by age cohort and gender. I use district-level information from the Census 1991 on marriage rates of different cohort groups between the ages of 10 to 40. There are 407 district across 26 states of India. Table 3.1 presents descriptive statistics. As expected single rates are higher for males across cohorts. Moreover, single rates are higher among the younger cohorts and increase with age. I first estimate the following specification:

$$Unmarried_d^{g,k} = \alpha_0 + \gamma_1 sr_d^k + X_d'\beta + \lambda_s + \varepsilon_d \tag{3.4.1}$$

where $Unmarried_d^{g,k}$ is the rate of unmarried individuals of gender g, of cohort k in district d. The sex ratio, sr_d^k, is the ratio of females to males of cohort k in district d and the coefficient γ_1 captures the relationship between cohort sex ratio and single rates. X_d is a vector of district characteristics. λ_s is a vector of state dummies which capture unobserved-state factors. We expect that decreases in sex ratio raise the fraction of never married men and lowered the percentage of unmarried women.

Table 3.1 presents summary statistics for the data used to estimate (4.1.) The rate of single males is higher than the rate of single females across cohorts. This is consistent with a surplus of males. Column (1) of Table 3.2 presents results of (3.4.1) for females and column(3) for males. A decrease in the sex ratio of the [15-24] cohort is decreases the rate of single women and increases the rate of single men. Both relationships are statistically significant at the 1% level. The coefficients on male single rates show an inverse relation with sex ratio which is consistent with a surplus of males across cohorts. The remaining coefficients on female single rates are not significant and in fact, a decrease in sex ratio [25-29] is positively related with more single females. This could be due to the fact that men tend to marry younger women.

The marriage market is endogenous to sex ratios so these results should be interpreted with caution. It is nonetheless suggestive of the hypothesis that a surplus of males is associated with more single males at the crime-prone age. I now turn to analyse the effect of sex ratios on crime.

3.4.2 Crime

First, I present unconditional estimations of sex ratios and crime. Figures 3.3 present linear estimations of the relationship between crime-prone sex ratio gender-based violence (a), general violence (b) and property crime (c). These correlations show a strong negative association between sex ratio and violent crimes (significant at the 1% level with negative coefficients). The estimation in relation to property crime are also negative but the coefficient is much smaller (p= 0.07). Figures 3.4. show similar estimations using state-year juvenile delinquency rates for boys and girls and the crime-prone sex ratio. Relationships of the latter show a weakly negative relation between sex ratio and male delinquency (not significant) and no clear relation to female delinquency (not significant). Appendix C provides additional correlation estimations of the intra and inter state relationship between gender-based and crime-prone sex ratio. Overall, across states crime-prone sex ratio and gender-based crime are negatively related.

Table 3.4 present the results of a similar estimation to (3.3.1) where I only include one of the age-specific sex ratios. I investigate this hypothesis in a model that does not address unobserved time-variant heterogeneity thought it provides some insights as to which age cohorts are correlated with crime. In columns (1) I present coefficients with standard errors clustered at the district-level and in columns (2) I present the sample size and R^2 for each regression. The crime-prone sex ratio and the youngest sex ratio are negatively related

to crimes against women whereas older age-groups do not have a statistically significant effect. This reinforces the initial hypothesis that it is the younger (more crime-prone) sex ratio that affects crime. However, the fact that the youngest cohort is also correlated suggests that there may be other unobserved factors that are correlated with crimes against women. Similarly, the sex ratio of the cohort 5-14 is also negatively related to violent crime as well as the the sex ratio of the cohort 45-64. The sex ratio of the cohort 25-44 is only negatively related to property crime.

I present results from specification (3.3.1.) in Table 3.5. A decrease in the sex ratios increases crimes against women and this effect is significant at the 1% level[9]. I interpret the effect given the decreasing trend in sex ratio. A decrease in 0.1 units in the crime-prone sex ratio (the sex ratio [15-24] fell by 0.098 from 1991 to 2011) increases gender-based violence by approximately 0.76%. I re-estimate a fixed-effect regression of (3.3.1) using two-way clustering following Cameron and Miller (2010)[10]. Standard-errors increase slightly which is consistent with initial concerns of omitted variable bias that are not accounted for by the inclusion of year fixed-effects and time-varying controls. Nonetheless, results are robust to the latter specification.

The effect of the sex ratio of the cohort of [45-64] is also negatively related with a coefficient of -0.57, significant at the 5% level. This effect is only present in the estimations which account for other population ratios. The fact that a change in sex ratio of cohorts affects gender-based violence outside of the crime-prone ratio is in contrast with the initial hypothesis. As suggested in Grosjean and Khattar (2014) this may be associated with culture factors which are not taken into account by the inclusion of district and year-fixed effects. The significance of this effect drops to 10% when standard-errors are double clustered. The effect on violent crimes is not significant among the younger and middle cohorts but, the effect is negative and significant at the 1% level for the older cohort of [45-64]. This is consistent with the result for gender-based violence and suggest that may be other factors that explain the relationship between an increase in the number of males per females and violence regardless of the whether it is a surplus in the cohort with higher incentives to commit violent crimes.

[9]Results do not change on varying the inclusion of control variables. Results are available upon request.

[10]In order to compute fixed-effects estimations with standard-errors clustered at the district and year-level I used the code provided by Gow et al. (2010) which available from Daniel Taylor's web page: http://acct.wharton.upenn.edu/ dtayl/code.htm .

Regarding acquisitive crimes, I find a negative and statistically significant effect between the sex ratio of the group 25-44, but not in any other cohort. Similarly, regarding economic crimes I find that the crime-prone cohort is also negatively associated with economic crimes. This effect is significantly different from zero regardless of the clustering method followed. This is consistent with an opportunity cost of crime hypothesis.

3.4.3 Juvenile Delinquency

I investigate the effect of the youth sex ratio on male and female juvenile delinquency[11]. As juvenile delinquency information in only available at the state-level therefore, I cannot account for district heterogeneity in sex ratios to explain juvenile delinquency. I estimate the following state fixed-effects specification:

$$Delinquency^{g}_{st} = \alpha_0 + \sum_{i=1,k_j}^{i=3} \beta_i sr^{k_j}_{s,t} + X_{s,t} + \gamma_s + \lambda_t + \varepsilon_{st} \tag{3.4.2}$$

where $Delinquency^{g}_{st}$ is the ratio of juvenile incidents per capita committed by gender g in district s and year t. Juvenile delinquency are incidents committed by females or males aged 12 to 18. The sex ratio, $\sum_{i=1,k_j}^{i=3} \beta_i sr^{k_j}_{s,t}$ is the ratio of females to males of cohort k in a state-year. The estimations include a vector of state-year controls $X_{s,t}$ and a vector of year effects. I expect that if a surplus of males in youth is associated with juvenile delinquency then $\beta_1 < 0$ among male delinquents.

Table 3.6 present these results. The effect of sex ratios on male juvenile delinquency is not statistically different from 0. This suggests that a surplus of males is not associated with an increase in crimes committed by male-youth. The coefficients on female juvenile delinquency are also not statistically significant and this is consistent with the initial hypothesis that males are more crime-prone than females.

In the previous section I show that the younger cohort is associated with gender-based violence and economic crimes but not with general violence or property crimes. The NCRB does not provide information on the type of crimes committed by juvenile delinquents. However, the NCRB reports that the profile of crimes committed by juveniles are mostly

[11] Juvenile delinquency are crimes committed by males or females aged less than 18 years old. Punishments of juvenile offences are prescribed by the The Juvenile Justice (Care and Protection of Children) Act, 2000.

IPC crimes and 19% of offences where due to theft. Together theft, hurt and burglary explain about half of total juvenile delinquency (NCRB, 2011). This would make these results consistent with the findings in the previous section. Another concern is the fact the sample size is small which may bias the estimations due to small sample bias[12].

3.5 Robustness

I conduct several robustness tests which include the inclusion of additional control variables, different sex ratio decomposition and the removal of outliers.

Table 3.7 present the first set of robustness tests. Columns (1) include as an additional control the post 73^{rd} Amendment policy change that was previously shown to affect reporting-behaviour (Iyer et al., 2012). After accounting for this effect results are unchanged which is particularly important for gender-based violence.

Columns (2) repeat the estimation of (3.3.1) and include the younger cohort (5-14). The inclusion of this cohort reduces the number of available year observations to 1991-2006 (see Appendix B for a more detailed explanation). The inclusion of this additional sex ratio does not change the results of the relation between the sex ratio [15-24] and gender-based violence. However, it does remove significance in the relation between the sex ratio of the [45-64] cohort and gender-based violence.

Results for general violence are mixed. The relationship between sex ratio [5-14] is negative and significant while the relation between the crime-prone ratio and violence is now positive with a coefficient which is much larger than in previous estimations. Results on property crimes also point to a reversed relation between crime-prone sex ratio and gender-based violence and a significant association between the sex ratio of the [5-14] cohort and property crime.

Finally, columns (3) presents results of the preferred specification. It includes district level trends which would account for time-variant unobserved factors specific to each district as time-variant views of gender. This is a considerable improvement as culture and views of women are likely to vary with time and would not be taken into account with the

[12]Work in progress is extending this data set by collecting information prior to 2000 and to the extent that it is available, by crime type.

inclusion of district fixed-effects. Regarding gender-based violence, the coefficient on [15-24] remains significant at conventional levels with a point estimate of -0.844. None of the other coefficients remains significant. This effect amounts to an increase in gender-based crime of -0.59% as a result of a decrease in the crime-prone sex ratio of 0.1 units. Regarding general violence, the crime-prone sex ratio has no effect and only the older cohort has a negative a statistically significant effect at the 5% level. This suggests that an increase in the surplus of older males increases violence. Regarding property and economic crime, there is no evidence of crime-prone effect. However, the effect of the younger cohort on property crime remains significant at the 1% level. This is consistent with the juvenile delinquency reports from the NCRB.

I find that a decrease in the number of females per males increases gender-based violence but has no effect on general-violence. This is consistent with the initial hypothesis that a surplus of males at the crime-marriage age affects crime behaviour. However, I would expect that if there is indeed an effect, it would be also affecting violent crime due to an increase in the pool of more violent individuals in the population. Yet, I only find that such mechanisms operate on gender-based violence and not on total violence. In order to further establish this result I repeat the main estimation in (3.3.1) by changing the denominator of crime rates. That is, I investigate the effect of sex ratios on violent crimes per male population and gender-based violence per total population. Table 3.10 presents these results. Sex ratio does not have an effect on violence per males and it has a similar effect on gender-based violence per population.

There can be extreme values in crime which do not reflect the average crime rate in a district-year and could bias the estimations. I repeat the estimations removing the top-bottom 1% observations from the sample of the dependent variables considered[13]. Results are presented in Table 3.8 and do not vary across specifications. This shows that results obtained are not due to the presence of potential outliers due to possible coding errors or extreme values in district-year crimes.

[13]This removes 1.8% of the sample in gender-based violence, 2.8% of general violent crime, 2.8% of property crime and 1.7% in economic crimes.

3.6 Testing for heterogenous effects

There is substantial heterogeneity within and across Indian states in culture and socio-economic factors that can determine son preference and its exercise by parents. The Northern and North-Western states of India have similar trends in sex ratios and are different in comparison to the rest of India. I investigate whether an excess of males affects crime any differently between districts in the North-Western states and the rest of India. I augment the main estimation (3.3.1.) by including an interaction term between age-specific sex ratio and a North-Western district binary variable. North-Western districts are in the states of Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh (as per the state definitions of 1991).

Table 3.9 presents these results. Across specifications, the effect of sex ratio of the [15-24] group is negative for the North-Western districts and is indistinguishable from zero for gender-based violence and general violence. Regarding gender-based violence, for non-Northern West states the effect is no longer present. This suggests that a surplus of males is particularly damaging for women in the North of India and this effect raises gender-based violence by about 0.82%. This is consistent with traditional gender-roles differences in the Northern states of India where the relative returns to female labour productivity are lowes. Bardhan (1974) attributes the gender differences in the returns from labour between Northern and South of India to the fact that wheat (the most common commodity in the North of India) is typically a male-dominated labour whereas rice (most common in the South) is mostly dominated by female labour. Similar arguments have been used in Rosenzweig and Schultz (1982) and Qian (2008) to explain the differences in gender-roles and to the relative value of females (Alesina et al., 2013).

In this specification, the effect on general violence is present in the North. This effect is large with a coefficient of approximately -2.9 significant at the 5% level which amounts to an increase in violence of about 0.95%. For other cohorts the effect is reversed, that is an increase in the surplus of males is positively associated with less violence crimes. This is not consistent with previous results. There could be several explanations for this effect. It could be that Central and Central-Southern states are more likely to report violent crimes rather than have higher incidents, or it could be that the excess of males is providing for an increase in security associated with less violence in comparison to other Northern states. Finally, as per the previous results I do not find evidence of an effect on property or economic crimes.

3.7 Discussion and Conclusion

In recent years, sex imbalances in several populations in East Asian countries have been increasing as parents are able to exercise their strong son preference. In India, the diffusion of ultrasound technology in the mid 1980's increased sex imbalances. These cohorts are almost all reaching adulthood and some of these males will not be able to find a bride in the marriage market. Marriage in India is undeniably a value, it is a source of income of groom's families and source of reputation within bride's families. This is likely to have severe repercussions in the marriage market and for women's position within the household.

This paper finds evidence that sex imbalances decrease women's welfare through increases in gender-based violence. This effect is entirely present in Northern states which are states where sex imbalances are most pronounced. The policy implications as per what this paper finds is that gender-based violence will increase. Further, recent increases in illegal trafficking, prostitution and violent behaviour are explained by sex imbalances. This calls upon the importance of strengthening legal rights and deterrence measures that increase women's position within and outside of the household traditional roles.

The results presented are suggestive of an effect of a surplus of males in the crime-prone and marriage-age cohorts on gender-based violence and on general violence in the Northern part of India. However, results presented may suffer from omitted variable bias due to joint determination of male biased sex ratios and violence. This is likely to be particularly valid for gender-based violence. Results presented on gender-based violence are robust to the inclusion of district-specific linear time trends and to several robustness tests. Results on general violence are only present for Northern-States without any concomitant effect for other regions.

However, in some specifications non-crime prone sex ratios have an effect on crime rates. This can be due to other factors that are common across the population in these districts and that are not controlled for in the model, even with the inclusion of linear trends. Future work aims to address this omitted variable bias problem.

In addition, future work will also address some concerns over the measurement of sex ratios itself as in this paper I rely of projections from the Census 2001. Ongoing work uses information on over 1.4 million births collected from the nationally representative health surveys of India to calculate sex ratios at birth. In detail, I combine birth-histories of ever-married women from the National Family Health Surveys of 1992-1993 and 1998-1999 and the District Household Level Surveys of 2002-2004. I then obtain a district-birth-year panel

to calculate sex ratios at birth, sex ratios at 5. I use this information to obtain measures of sex ratios of the contemporaneous crime-prone cohorts. That is, I obtain sex ratios from 1975-1997 and obtain the average sex ratio of the crime-prone cohort in the contemporaneous year of 2000 as the average sex ratio at birth (or at age 5) of those born between 1975-1984. This procedure allows to obtain reasonable proxies for sex ratios of the crime-prone sex ratio under the assumption that the bulk of differential mortality between genders occurs below the age of 5 (Oster, 2009).

3.8 Appendix A

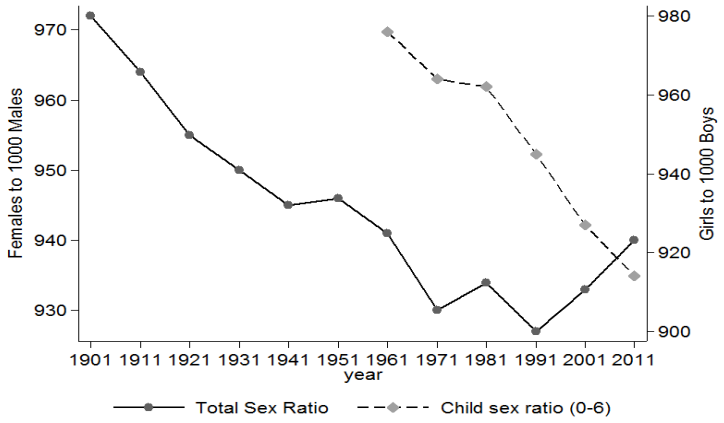


Figure 3.1: Sex ratio across Census years

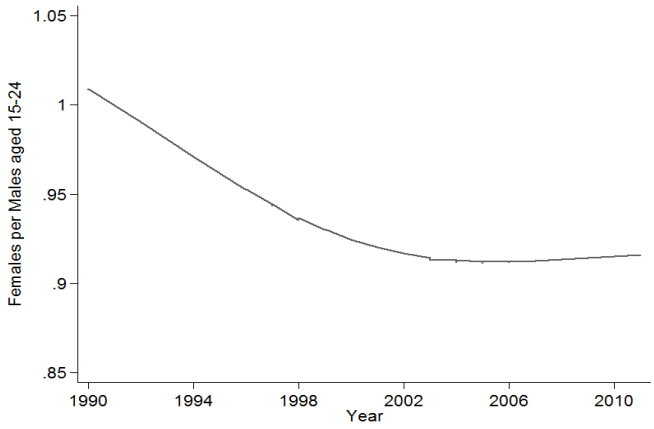
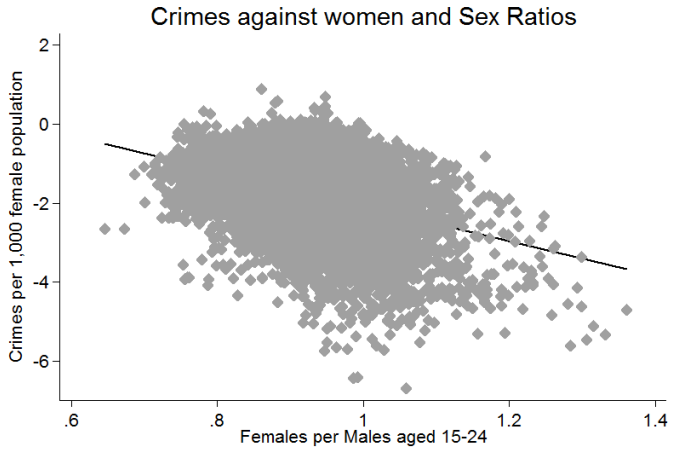
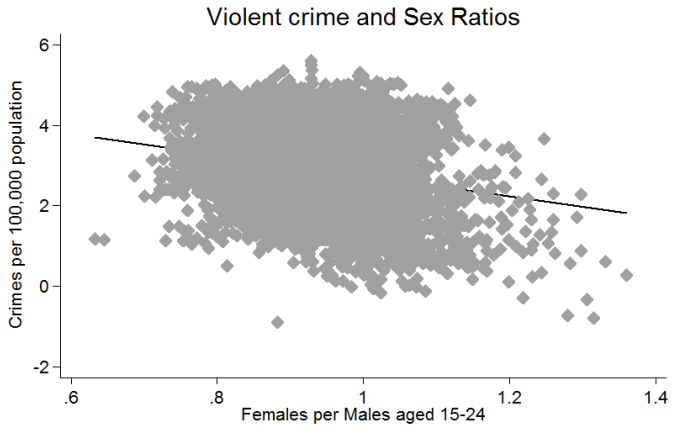


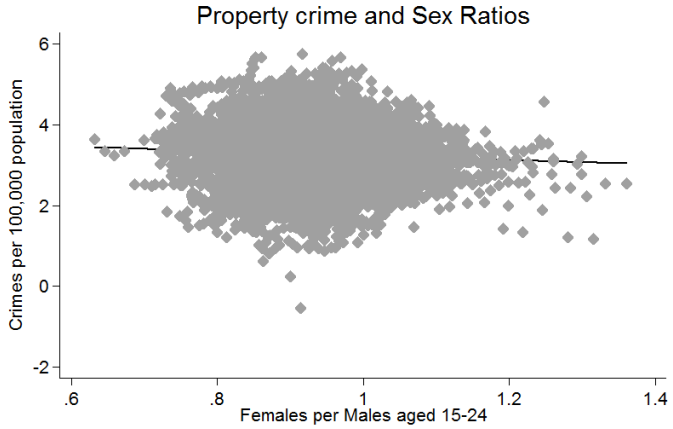
Figure 3.2: Trend in crime-prone sex ratio. Based on projections of the Census 2001. Lowess smoothing using bandwidth of 0.8.



(a) Gender

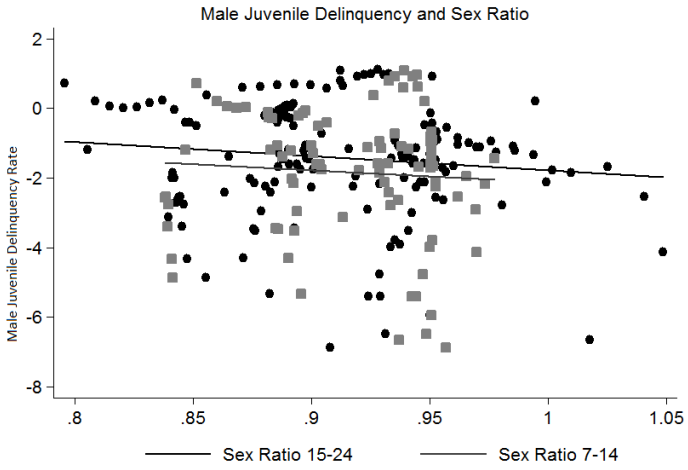


(b) Violent

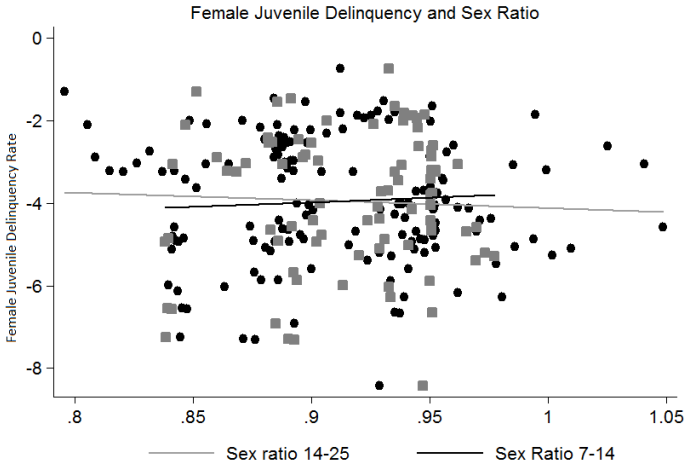


(c) Property

Figure 3.3: Bivariate correlation of crime-prone sex ratio and crime types. Estimated coefficients with robust standard-errors are: (a) -4.43 (t-statistic 13.88, p-value=0.00); (b) -2.58 (t-statistic 7.15, p-value=0.00) and; (c)-0.55 (t-statistic=1.82, p-value(0.07).



(a) Male Juvenile Offenders



(b) Female Juvenile Offenders

Figure 3.4: Bivariate correlation of crime-prone sex ratio and crime types. Juvenile delinquency is the rate of incidents committed by juveniles (male or females) aged between 12 and 18 years old. Estimated coefficients with robust standard-errors are: (a) (SR[15-24] t-statistic 0.98, p-value=0.3), (SR[5-14] t-statistic 1.29, p-value=0.2) ; (b) (SR[15-24] t-statistic 0.76, p-value=0.5), (SR[5-14] t-statistic 0.33, p-value=0.8)

Table 3.1 Descriptive Statistics: Census 1991

Variable	Mean	SD	Min	Max
% Single-Males [10,40]	0.545	0.075	0.326	0.730
% Single-Females [10,40]	0.370	0.076	0.192	0.591
% Single [10,14]	0.965	0.040	0.724	0.998
% Single-Males [10,14]	0.978	0.027	0.789	0.999
% Single-Females [10,14]	0.951	0.057	0.644	0.999
% Single [15,24]	1.120	0.273	0.473	1.851
% Single-Males [15,24]	1.411	0.282	0.664	2.085
% Single-Females [15,24]	0.784	0.303	0.220	1.653
% Single [25,29]	0.133	0.084	0.032	0.448
% Single-Males [25,29]	0.229	0.133	0.061	0.664
% Single-Females [25,29]	0.038	0.043	0.002	0.292
% Single [30,39]	0.036	0.024	0.009	0.145
% Single-Males[30,39]	0.057	0.034	0.016	0.203
% Single-Females [30,39]	0.013	0.016	0.001	0.145
% Single [40,49]	0.019	0.010	0.005	0.102
% Single-Males [40,49]	0.028	0.014	0.008	0.094
% Single-Females [40,49]	0.009	0.010	0.000	0.116
Sex Ratio [10,40]	0.917	0.071	0.752	1.262
Sex Ratio [10,14]	0.901	0.070	0.697	1.057
Sex Ratio [15,24]	0.876	0.116	0.602	1.228
Sex Ratio [25,29]	1.009	0.098	0.644	1.542
Sex Ratio [30,39]	0.936	0.090	0.668	1.445
Sex Ratio [40,49]	0.891	0.096	0.581	1.376
Urban population	0.219	0.168	0.000	1.000
Employed population	0.383	0.071	0.239	0.649
Litertates	0.417	0.136	0.145	0.851
SC	0.162	0.075	0.000	0.518
ST	0.100	0.170	0.000	0.940
Migrant population	0.279	0.068	0.060	0.629

The percentage of singles by gender of cohort k is the ratio between single population of cohort k over total population of the cohort/gender combination. The number of observations/districts is 407.

Table 3.2 Descriptive Statistics: Main analysis

	N	Mean	SD
SR[15-24]	7,328	0.931	0.0816
SR[25-44]	7,328	0.948	0.0798
SR[45-64]	7,328	1.380	0.115
SR[5-14]	6,595	0.912	0.062
Urban	7,328	22.95	16.32
SC	7,328	16.71	7.322
ST	7,328	9.020	15.07
Literacy	7,328	0.525	0.131
Women rate	7,328	0.252	0.206
Violence rate	7,328	28.64	26.69
Property rate	7,328	33.93	26.89
Economic rate	7,328	5.443	5.742
Total rate	7,328	169.3	106.2
Gender CM	7,328	0.166	0.372
Police strength	7,328	1.239	0.448
Income p.c.	7,328	2.147	1.397
Share of Women Officers	7,328	2.243	2.115
Election year	7,328	0.188	0.391
73^{rd} Amendment	7,328	0.719	0.450
Delinquency-Males	150	0.574	0.691
Delinquency-Females	150	0.038	0.052

Delinquency rates are defined at the state-level from the years 2000 to 2011. All other variables vary between 1991-2011. District-varying variables are sex ratios, urban, SC/ST, literacy rates and crime rates. State-varying variables include income p.c., gender of CM-dummy variable, election year-dummy variable, share of females in the police, police strength and the post 73^{rd} Amendment binary variable.

Table 3.3 Single rates and sex ratio: never married by gender and cohort

	(1)		(2)	
	Females	Adj.R^2 - F	Males	Adj.R^2 - F
SR[10-40]	0.0715	0.760	0.0130	0.707
	(0.0448)	36.73	(0.0514)	26.40
SR[10-14]	-0.0219	0.434	-0.0565**	0.315
	(0.0572)	7.203	(0.0282)	3.644
SR[15-24]	0.367***	0.824	-0.341***	0.792
	(0.108)	71.69	(0.109)	27.80
SR[25-29]	-0.0597**	0.827	-0.101**	0.839
	(0.0263)	22.59	(0.0446)	34.28
SR[30-39]	-0.0255	0.700	-0.0556**	0.752
	(0.0202)	13.80	(0.0224)	12.61
SR[40-49]	-0.0258	0.452	-0.0348**	0.390
	(0.0166)	6.384	(0.0145)	3.187

Each cell in columns 1 and 3 are OLS regressions of the sex ratio of the respective cohort and the rate of singles of the same cohort. Sex ratios are defined as females per males. Regressions include state-fixed effects with robust standard errors in parentheses clustered at the district-level. Columns 2 and 3 report Adj.R^2 and below are F statistics. All controls included are urban population, employed, literacy, SC/ST population and migrants (all in percentage of total population in a district). All regressions include 412 observations from 31 states and union territories. *** $p < 0.01$, ** $p < 0.05$, *$p < 0.1$. All data obtained from the Census 1991.

Table 3.4 Age-group sex ratio and crime-Individual estimations

	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
	Women		Property		Economic		Violent	
SR[5-14]	-1.333***	5,221	-0.428	5,225	-0.621	5,206	-1.552**	5,223
	(0.488)	0.734	(0.416)	0.244	(0.456)	0.096	(0.654)	0.603
SR[15-24]	-1.309***	6,974	0.361	6,978	-0.797**	6,955	0.471	6,976
	(0.384)	0.712	(0.306)	0.184	(0.351)	0.200	(0.454)	0.555
SR[25-44]	0.215	6,974	-1.199***	6,978	0.025	6,955	-0.712	6,976
	(0.368)	0.710	(0.399)	0.189	(0.361)	0.198	(0.439)	0.555
SR[45-64]	-0.432	6,974	-0.125	6,978	0.343	6,955	-1.082***	6,976
	(0.282)	0.710	(0.239)	0.183	(0.286)	0.199	(0.295)	0.559
District FE	Yes		Yes		Yes		Yes	
Year FE	Yes		Yes		Yes		Yes	
Dist. Controls	Yes		Yes		Yes		Yes	
State Controls	Yes		Yes		Yes		Yes	

Each cell in columns 1 is a coefficient of a single fixed-effects regression of the respective sex ratio on the denoted dependent variable with the respective standard-error clustered at the district-level in parenthesis. Columns 2 present the number of observations in each regression and the R^2. Sex ratios are defined as females per males. Dependent variables are the log of crime rate per (1000 female population) 100,000 population. District controls are the percentage of urban population, the percentage of SC and ST and literacy rates. State controls are police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy. Regressions for cohorts above 15 years of age include 369 districts and below 15 include 366 districts. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

Table 3.5 Age-group sex ratio and crime - Main specification

	Women	Property	Economic	Violent
SR[15-24]	-1.439	0.419	-0.748	0.318
	(0.387)***	(0.302)	(0.348)**	(0.427)
	[0.478]***	[0.331]	[0.367]**	[0.503]
SR[25-44]	0.397	-1.230	0.061	-0.647
	(0.461)	(0.369)***	(0.393)	(0.505)
	[0.553]	[0.452]***	[0.414]	[0.677]
SR[45-64]	-0.569	-0.052	0.277	-1.037
	(0.278)**	(0.233)	(0.290)	(0.295)***
	[0.308]*	[0.259]	[0.285]	[0.349]***
N	6,974	6,978	6,955	6,976
R^2	0.713	0.190	0.201	0.559
# Districts	369	369	369	369
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
District Controls	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes

Dependent variables are the log of crime rate per (1000 female population) 100,000 population. FE estimations with standard-errors clustered at the district-level in parenthesis and with standard-errors clustered at the district and year level in squared brackets. District controls are the percentage of urban population, the percentage of SC and ST and literacy rates. State controls are police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

Table 3.6 Age-group sex ratio and juvenile delinquency

	Males	Females
SR[15-24]	9.328	11.494
	(21.894)	(17.830)
SR[25-44]	21.806**	14.553*
	(8.390)	(8.000)
SR[45-64]	-16.334	-18.189
	(21.646)	(17.359)
N	150	158
R^2	0.465	0.222
# of States	15	15
State FE	Yes	Yes
Year FE	Yes	Yes

Dependent variables are the log of juvenile delinquency per 100,000 population. FE estimations with standard-errors clustered at the state-level. Controls are the percentage of urban population, the percentage of SC and ST and literacy rates, police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

Table 3.7 Age-group sex ratio and crime- Robustness

	Women			Property			Economic			Violent		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
SR[5-14]		-0.840	1.609		-0.836**	-0.980*		-0.420	-0.228		-2.036***	0.968
		(0.542)	(1.165)		(0.417)	(0.569)		(0.495)	(1.097)		(0.654)	(1.425)
SR[15-24]	-1.447***	-1.488***	-0.844*	0.420	1.138***	-0.112	-0.752**	-0.973**	-0.480	0.321	2.396***	0.958
	(0.387)	(0.534)	(0.483)	(0.302)	(0.376)	(0.335)	(0.349)	(0.485)	(0.524)	(0.427)	(0.694)	(0.588)
SR[25-44]	0.430	0.594	0.531	-1.237***	-1.913***	0.456	0.077	0.430	0.965	-0.661	-2.598***	-0.218
	(0.458)	(0.608)	(0.668)	(0.371)	(0.477)	(0.490)	(0.395)	(0.513)	(0.818)	(0.510)	(0.740)	(0.815)
SR[45-64]	-0.570**	-0.426	-0.122	-0.052	0.358	-0.246	0.277	0.080	-0.097	-1.036***	-0.255	-1.175**
	(0.279)	(0.294)	(0.600)	(0.233)	(0.257)	(0.382)	(0.290)	(0.328)	(0.589)	(0.294)	(0.375)	(0.581)
N	6,974	5,221	5,221	6,978	5,225	5,225	6,955	5,206	5,206	6,976	5,223	5,223
R^2	0.714	0.737	0.830	0.190	0.256	0.615	0.201	0.099	0.416	0.559	0.611	0.775
# Districts	369	366	366	369	366	366	369	366	366	369	366	366
73^{rd}	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes
District T	No	No	Yes	No	No	Yes	No	No	Yes	No	Yes	Yes

Dependent variables are the log of crime rate per (1000 female population) 100,000 population. FE estimations with standard-errors clustered at the district-level in parenthesis. All regressions include year fixed-effects, district and state-level controls. District controls are the percentage of urban population, the percentage of SC and ST and literacy rates. State controls are police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

Table 3.8 Age-group sex ratio and crime-Trimmed sample

	Women	Violence	Property	Economic
SR[15-24]	-1.429***	0.472	0.392	-0.798**
	(0.386)	(0.416)	(0.297)	(0.346)
SR[25-44]	0.252	-0.406	-1.130***	0.025
	(0.470)	(0.493)	(0.347)	(0.391)
SR[45-64]	-0.492*	-0.952***	-0.025	0.322
	(0.282)	(0.290)	(0.233)	(0.290)
N	6,868	6,844	6,854	6,848
R^2	0.715	0.563	0.199	0.203
# Districts	368	368	367	367
District FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
District Controls	Yes	Yes	Yes	Yes
State Controls	Yes	Yes	Yes	Yes
73rd amendment	Yes	Yes	Yes	Yes

The top and bottom 1% of the dependent variables were dropped. Dependent variables are the log of crime rate per (1000 female population) 100,000 population. FE estimations with standard-errors clustered at the district-level in parenthesis and with standard-errors clustered at the district. District controls are the percentage of urban population, the percentage of SC and ST and literacy rates. State controls are police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy and a 73^{rd} Amendment dummy. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

Table 3.9 Age-group sex ratio and crime- Testing for a North effect

	Women		Property		Economic		Violent	
SR[15-24]×N	-1.706*	-1.935**	-1.146	-1.168	-1.285	-1.363	-2.706*	-2.966**
	(0.916)	(0.910)	(0.753)	(0.755)	(0.908)	(0.907)	(1.389)	(1.413)
SR[25-44]×N	-1.309	-1.512	1.819	1.799	0.775	0.704	-2.717	-2.952
	(1.612)	(1.593)	(1.152)	(1.157)	(1.580)	(1.582)	(2.066)	(2.079)
SR[45-64]×N	1.349	0.697	0.530	0.467	5.061***	4.843***	-0.459	-1.200
	(0.907)	(0.904)	(0.685)	(0.691)	(1.016)	(1.017)	(0.975)	(1.009)
SR[15-24]	0.616	0.609	1.060	1.060	-0.280	-0.282	3.463***	3.455***
	(0.941)	(0.937)	(0.693)	(0.696)	(0.911)	(0.913)	(1.236)	(1.258)
SR[25-44]	1.745	2.472*	-1.755	-1.684	-1.707	-1.461	2.801	3.631*
	(1.454)	(1.424)	(1.101)	(1.125)	(1.550)	(1.564)	(2.148)	(2.185)
SR[45-64]	-0.745	-0.488	-0.694	-0.669	-2.073***	-1.986***	-0.585	-0.293
	(0.732)	(0.720)	(0.502)	(0.498)	(0.750)	(0.749)	(0.852)	(0.867)
N	6,974	6,974	6,978	6,978	6,955	6,955	6,976	6,976
R^2	0.820	0.822	0.548	0.548	0.457	0.458	0.731	0.734
# Districts	369	369	369	369	369	369	369	369
73 rd	No	Yes	No	Yes	No	Yes	No	Yes
District Trends	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Dependent variables are the log of crime rate per (1000 female population) 100,000 population. FE estimations with standard-errors clustered at the district-level in parenthesis and with standard-errors clustered at the district. N is a Northern state dummy which is equal to one for the states of Gujarat, Haryana, Himachal Pradesh, Madhya Pradesh, Punjab, Rajasthan and Uttar Pradesh. The time-invariant North coefficient is dropped from all regressions. District controls are the percentage of urban population, the percentage of SC and ST and literacy rates. State controls are police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy and a 73^{rd} Amendment dummy. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

Table 3.10 Age-group sex ratio and crime-Population differences

	Violence per males	Women per population
SR[15-24]	0.337	-1.416***
	(0.427)	(0.387)
SR[15-44]	-0.629	0.413
	(0.501)	(0.456)
SR[45-64]	-1.052***	-0.583**
	(0.295)	(0.278)
N	6,976	6,974
R^2	0.561	0.715
# Districts	369	369
District FE	Yes	Yes
Year FE	Yes	Yes

The top and bottom 1% of the dependent variables were dropped. Dependent variables are the log of crime rate per (1000 female population) 100,000 population. FE estimations with standard-errors clustered at the district-level in parenthesis and with standard-errors clustered at the district. District controls are the percentage of urban population, the percentage of SC and ST and literacy rates. State controls are police per capita (in logs), net state domestic product per capita, share of women in law enforcement, an election year dummy and a gender of the state Chief Minister dummy. Statistical significance is denoted with ***, ** or * for significance levels at 1%, 5% or 10%.

3.9 Appendix B

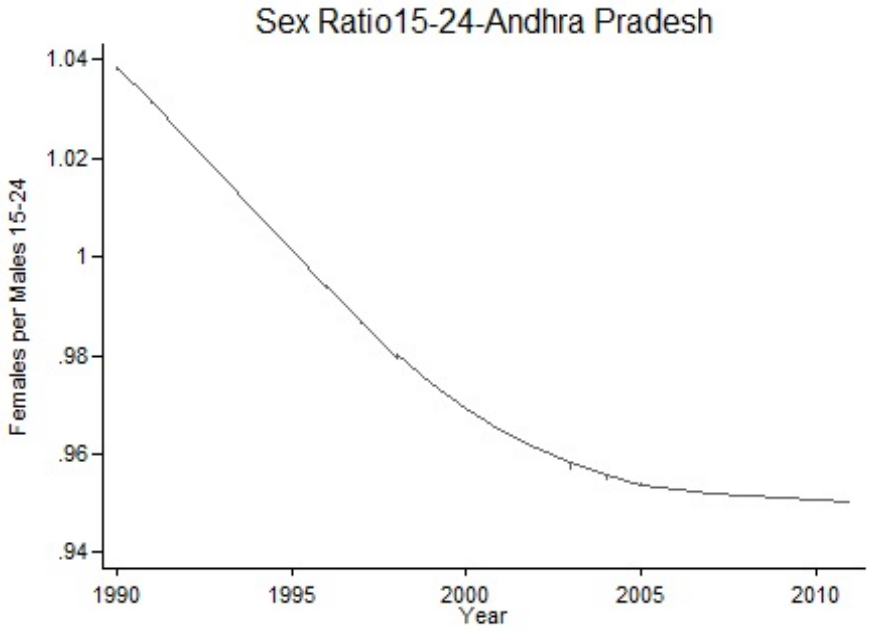
I provide a description of the procedure followed to create projections of sex ratios. In order to obtain yearly sex ratios information we use projections of sex ratios from the Census 2001. We follow the method used in Edlund et al. (2013). We use information on district age-specific sex ratios of the cohorts [5-14], [15-24], [25-44], [45-64] and [65-74] and linearly interpolate a specific cohort sex ratio. This information is then used to obtain cohort sex ratios by year. For example the sex ratio in 2000 of the [5-14] is the sex ratio of the [6-15] in 2001. Table 3.11 exemplifies this method.

There are two clarifications to add given the approach taken. First, migration is not likely to affect our estimates as migration in India is typically within district-boundaries and fairly low Duflo and Pande (2007); Topalova (2010). Second, there is a gender gap in mortality in India (Anderson and Ray, 2010). Thus, relying on age-specific sex ratios is problematic as females are more likely to die than males and this may vary by cohort. This is a caveat in our study. An alternative to this method is to use birth sex ratios and this is currently in progress. Moreover, Oster (2009) argues that most of the gender gap in mortality occurs for those aged less than 5. We intend to complement the caveats of using projections of sex ratio by using sex ratios of births alive at 5 as a proxy for sex ratios in adulthood. Finally, we could consider the use of birth and death certificates in order to calculate flows of population. However, these are likely to be subject to under-reporting.

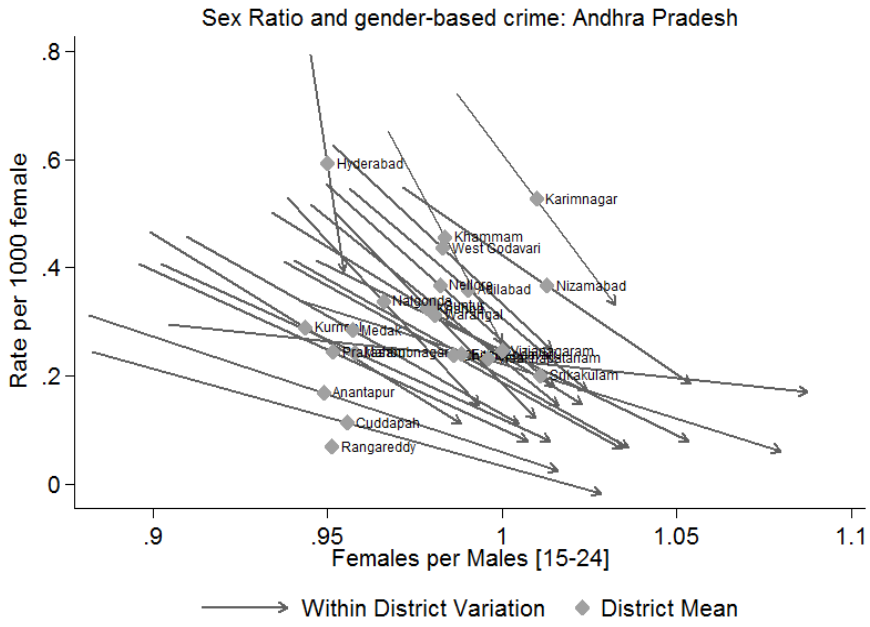
Table 3.11 Ages to forecast sex ratios

Crime-year	Cohort$[5-14]$	Cohort $[15-24]$
1991	15-24	25-34
1992	14-23	24-33
1993	13-22	23-32
1994	12-21	22-31
1995	11-20	21-30
1996	10-19	20-29
1997	9-18	19-28
1998	8-17	18-27
1999	7-16	17-26
2000	6-15	16-25
2001	5-14	15-24
2002	4-13	14-23
2003	3-12	13-22
2004	2-11	12-21
2005	1-10	11-20
2006	0-9	10-19
2007	-	9-18
2008	-	8-17
2009	-	7-16
2010	-	6-15
2011	-	5-14

3.10 Appendix C

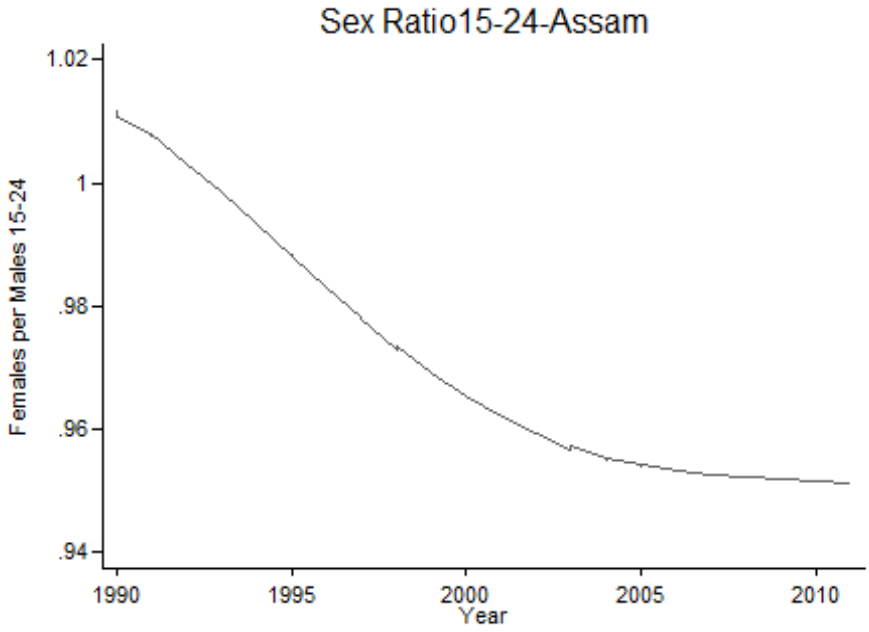


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

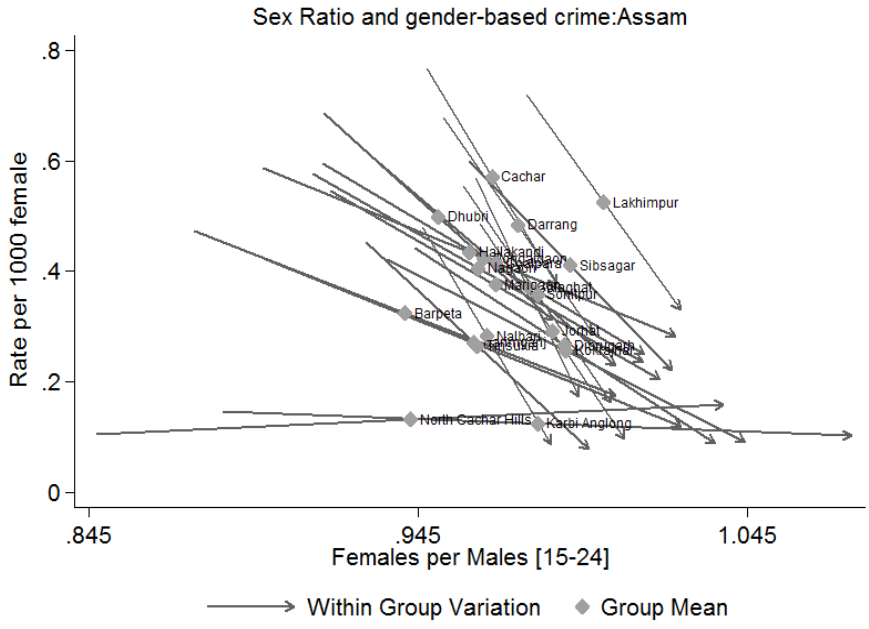


(b) Correlation between sex ratio [15-24] and gender-based violence.

Figure 3.5: Inter state analysis- Andhra Pradesh

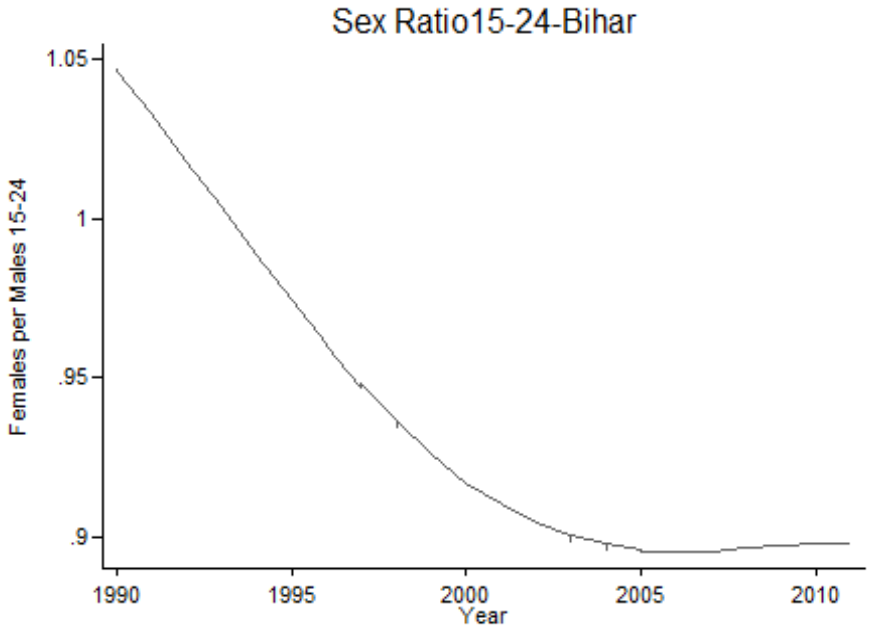


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

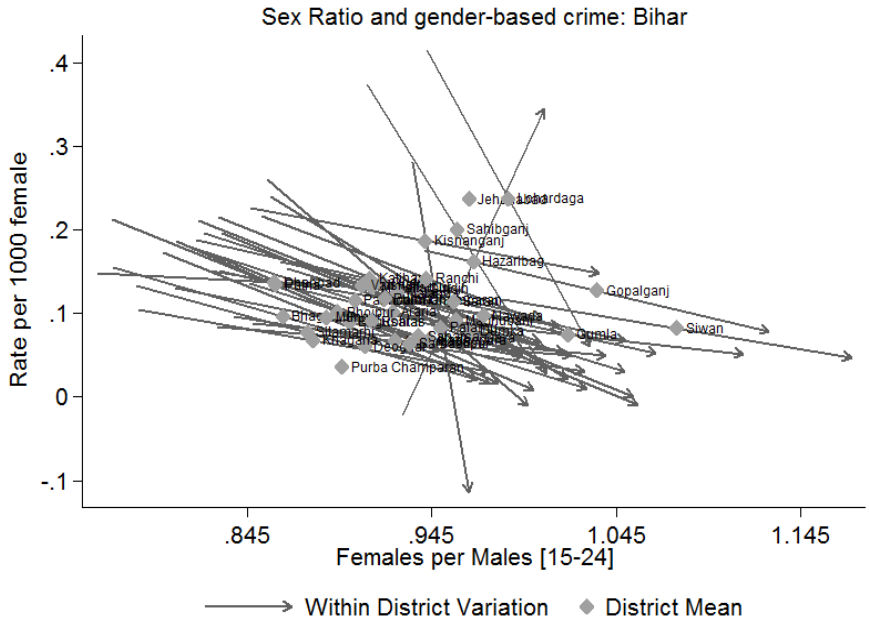


(b) Correlation between sex ratio [15-24] and gender-based violence.

Figure 3.6: Inter state analysis- Assam

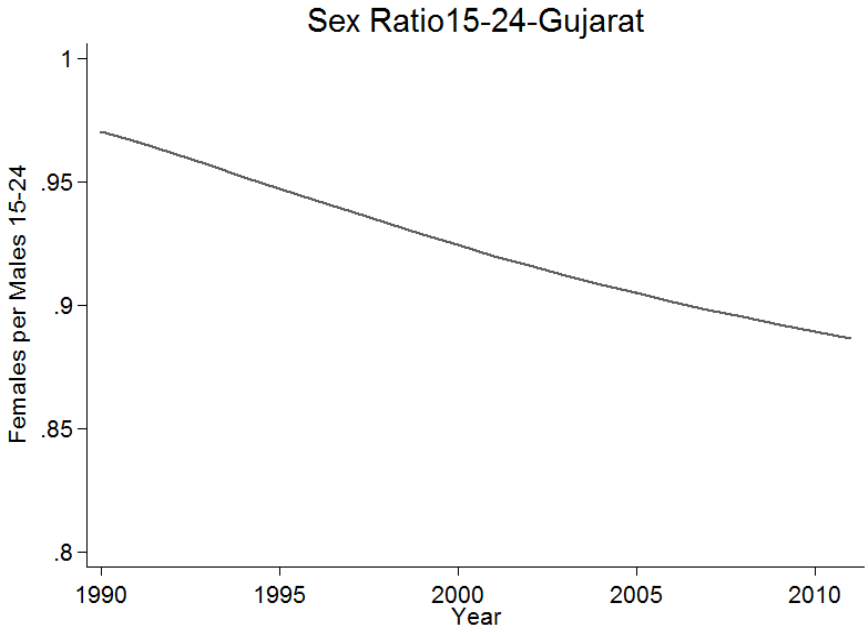


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

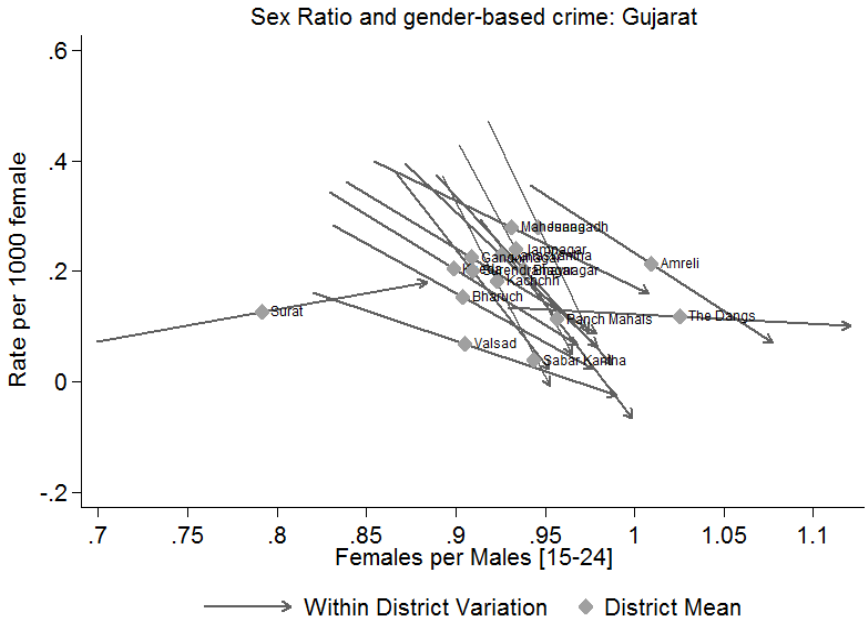


(b) Correlation between sex ratio [15-24] and gender-based violence.

Figure 3.7: Inter state analysis- Bihar

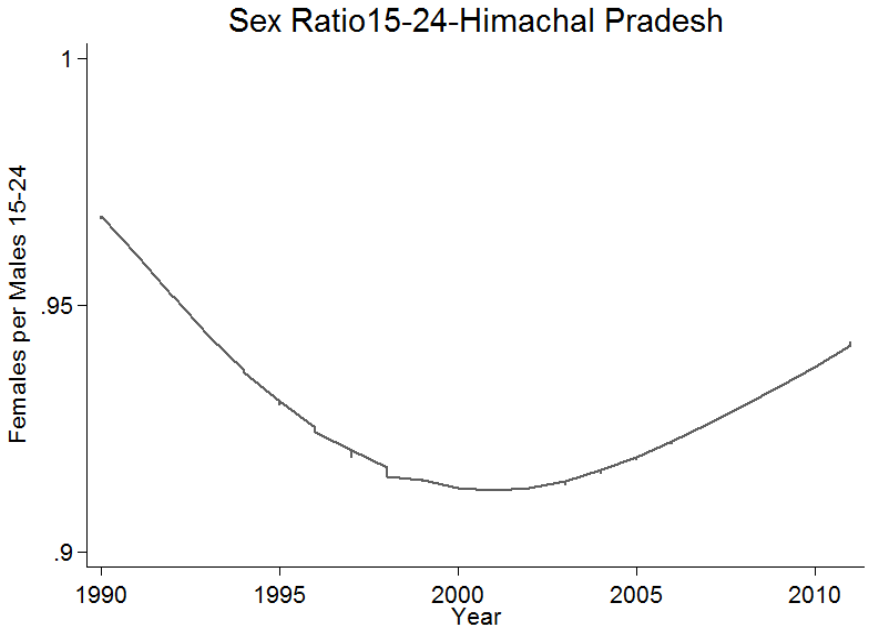


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

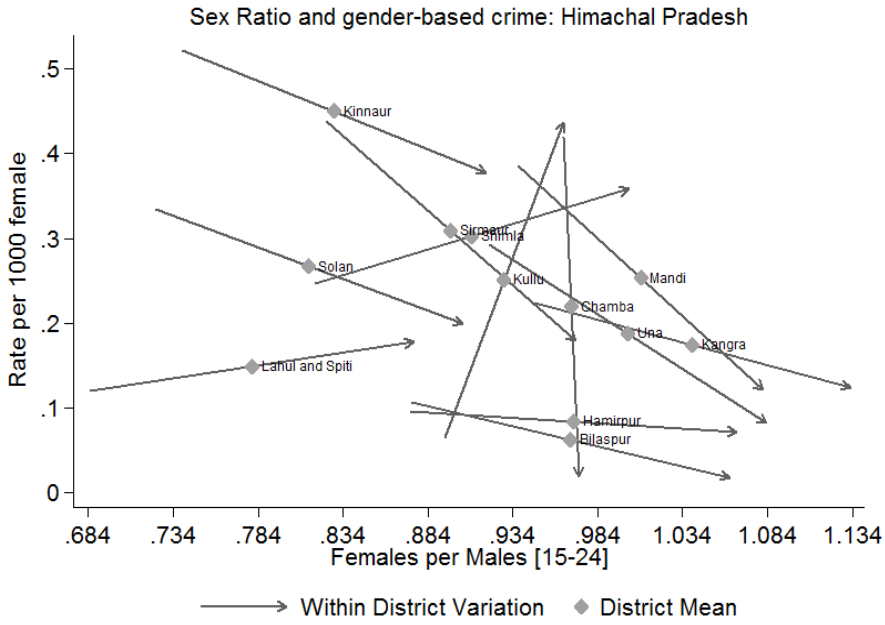


(b) Correlation between sex ratio [15-24] and gender-based violence.

Figure 3.8: Inter state analysis- Gujarat

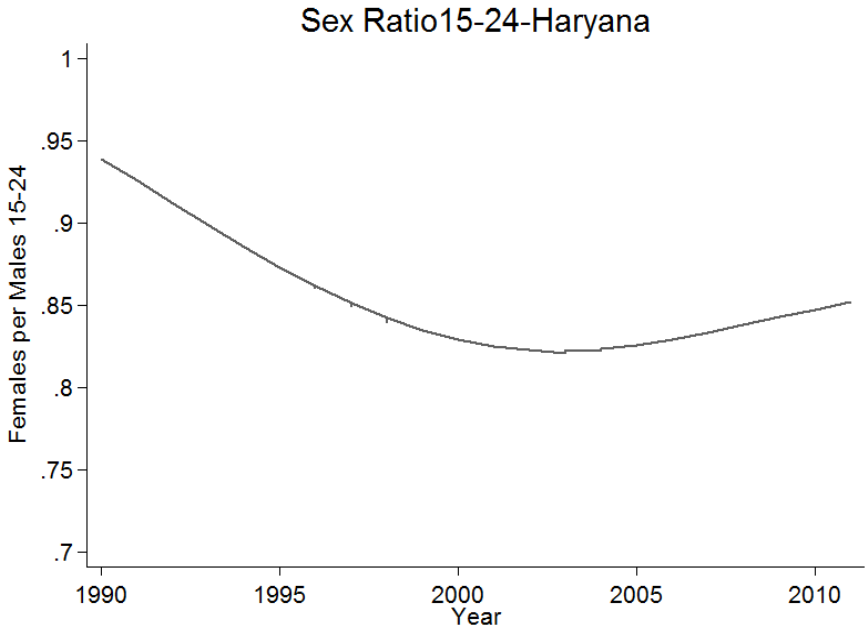


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

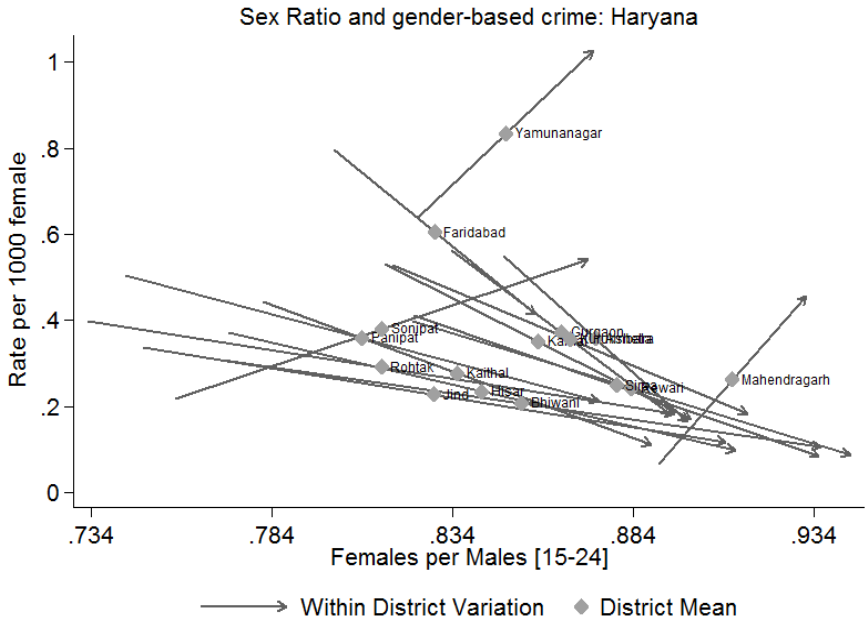


(b) Correlation between sex ratio [15-24] and gender-based violence.

Figure 3.9: Inter state analysis- Himachal Pradesh

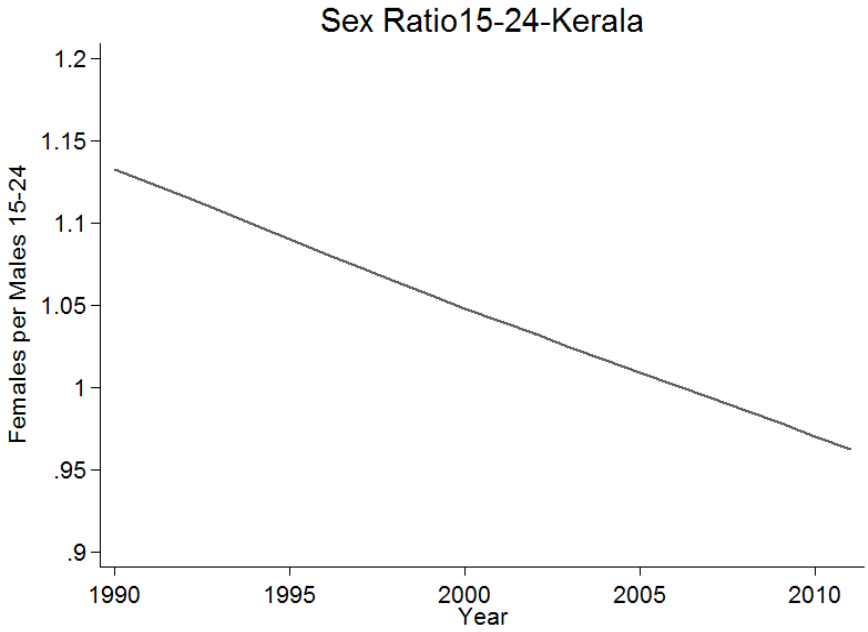


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

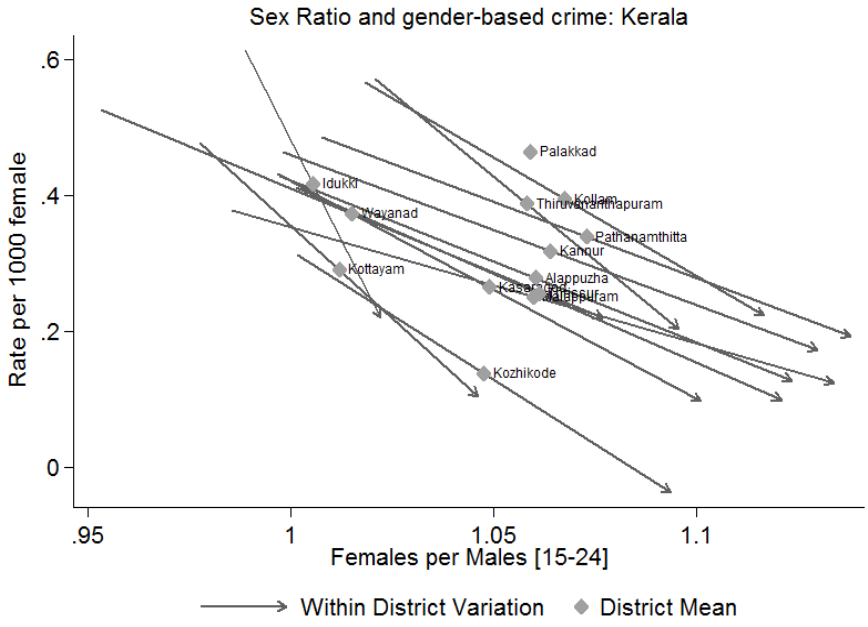


(b) Correlation between sex ratio [15-24] and gender-based violence.

Figure 3.10: Inter state analysis- Haryana

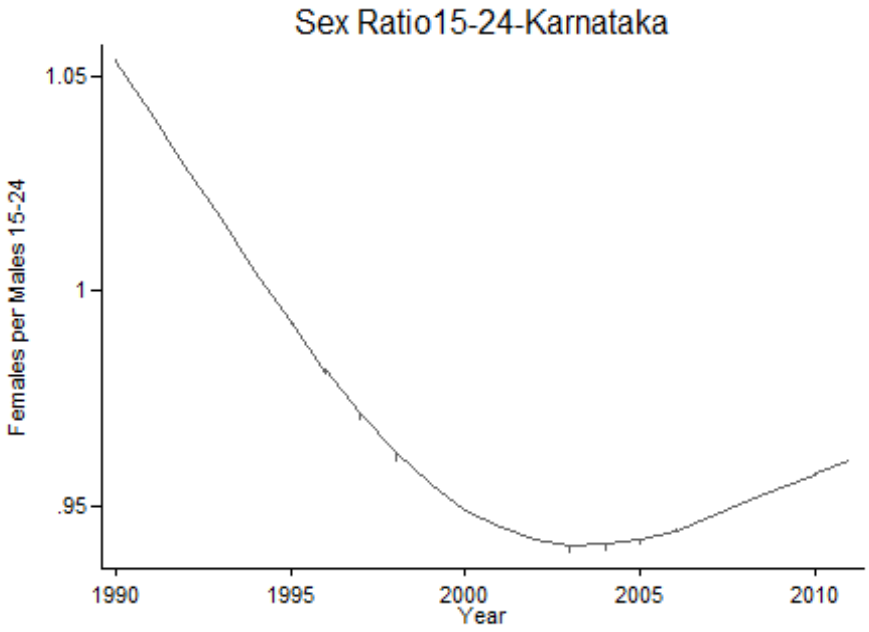


(a) Projection of the sex ratio [15-24] based on data from the Census 2001.

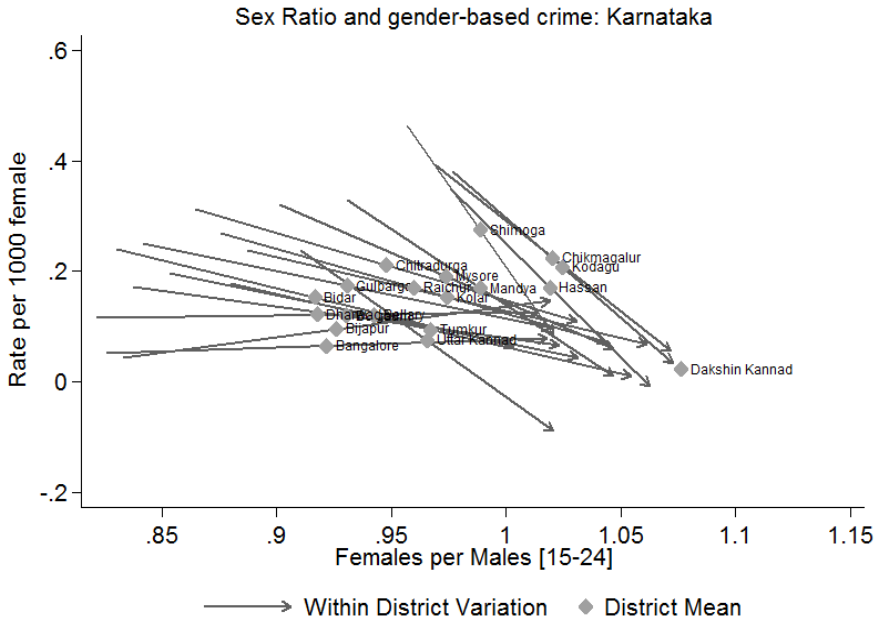


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.11: Inter state analysis- Kerala

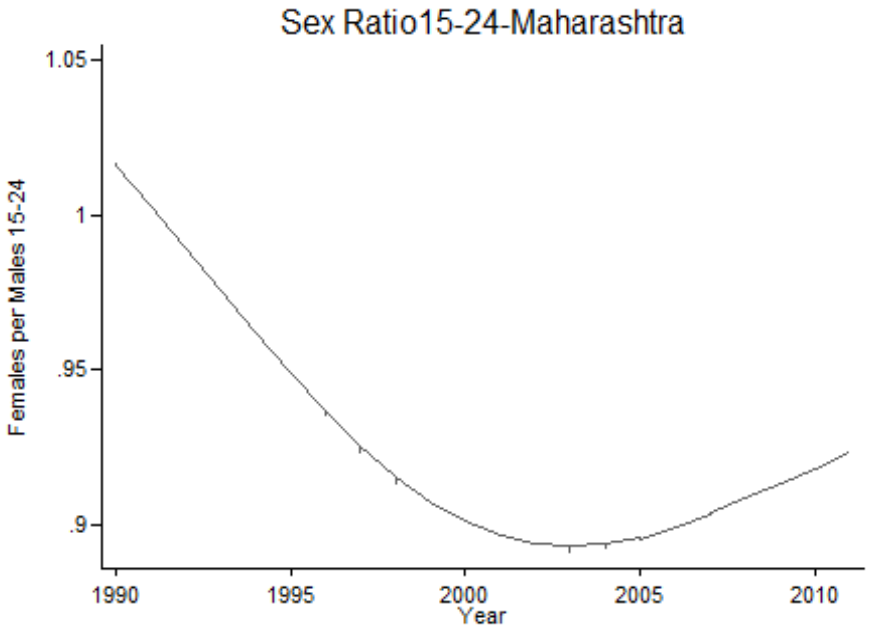


(a) Sex Ratio [15-24] projection

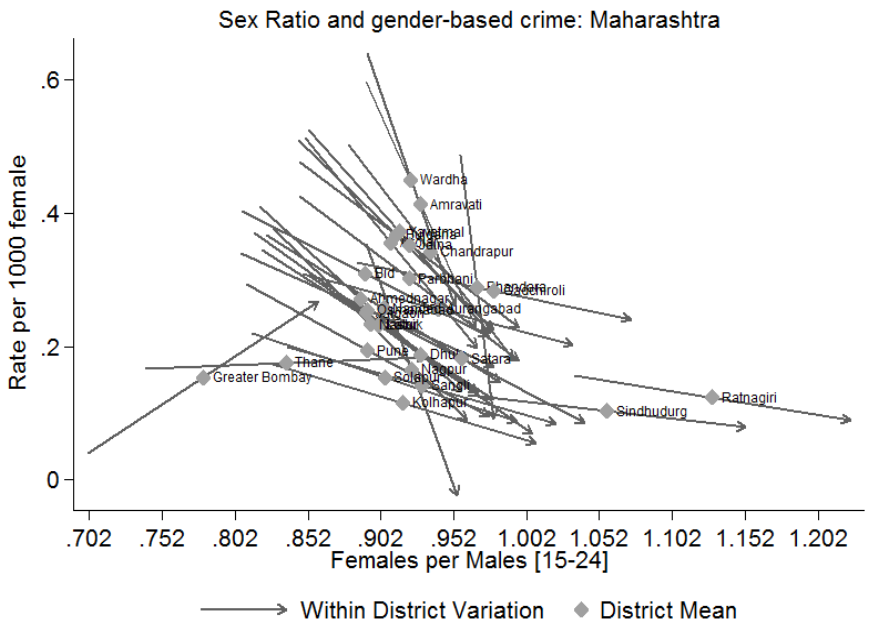


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.12: Inter state analysis- Karnataka

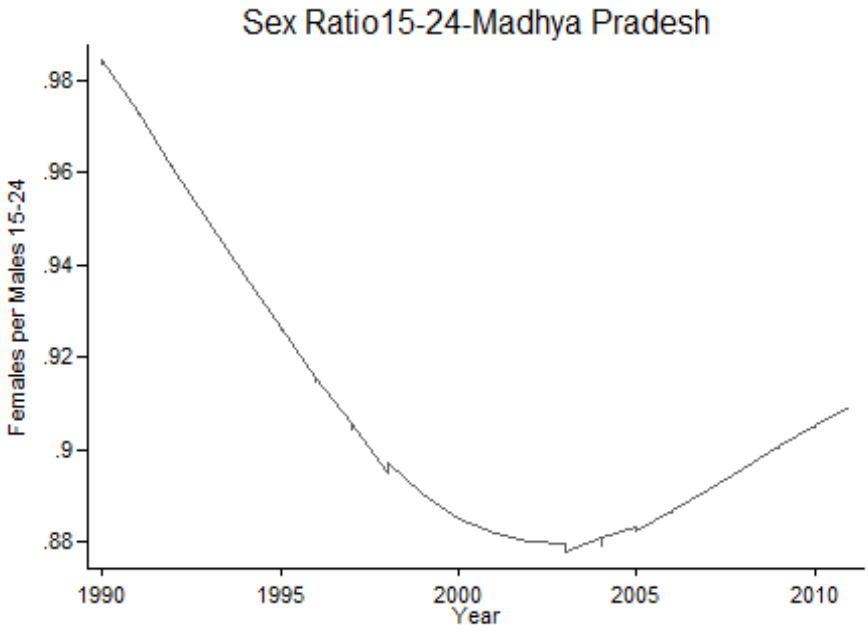


(a) Sex Ratio [15-24] projection

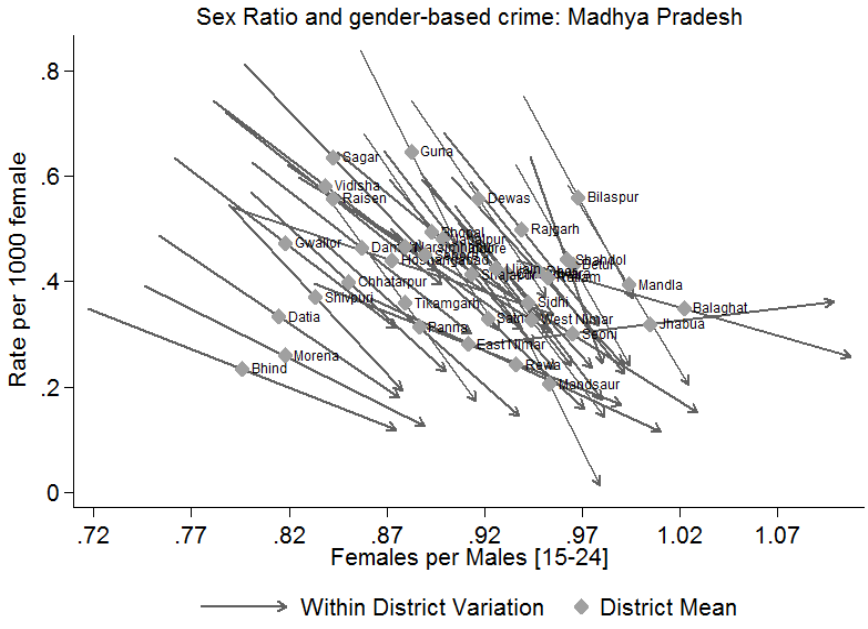


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.13: Inter state analysis- Maharashtra

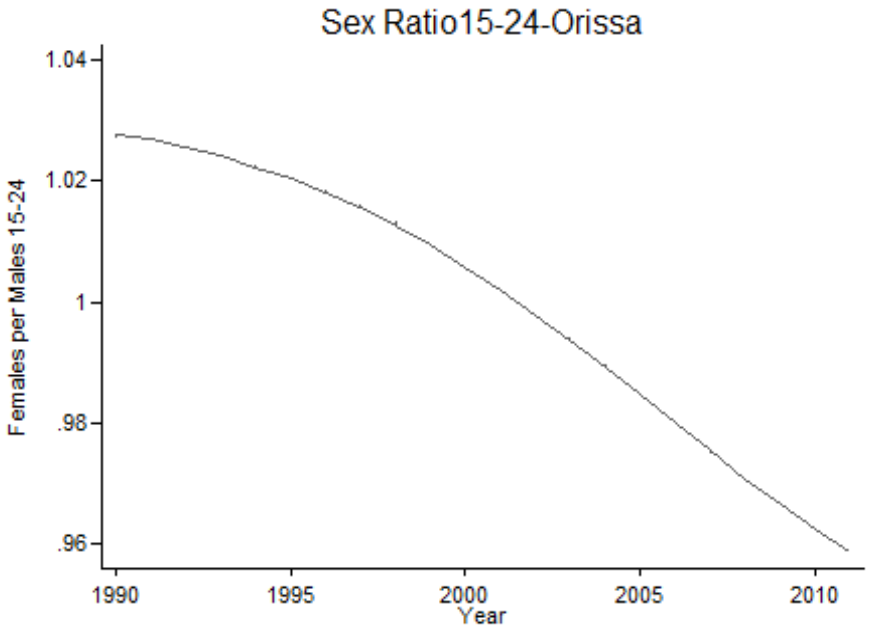


(a) Sex Ratio [15-24] projection

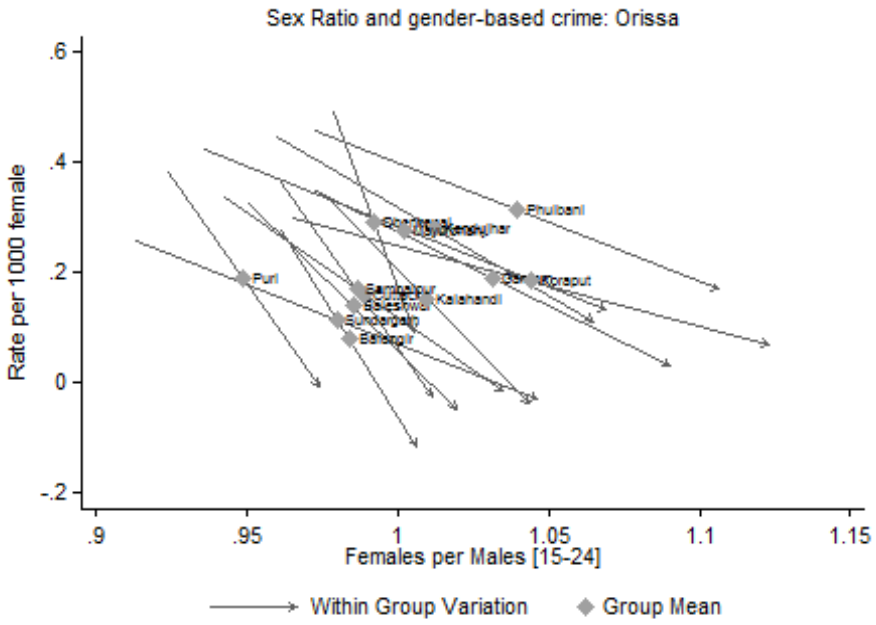


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.14: Inter state analysis- Madhya Pradesh

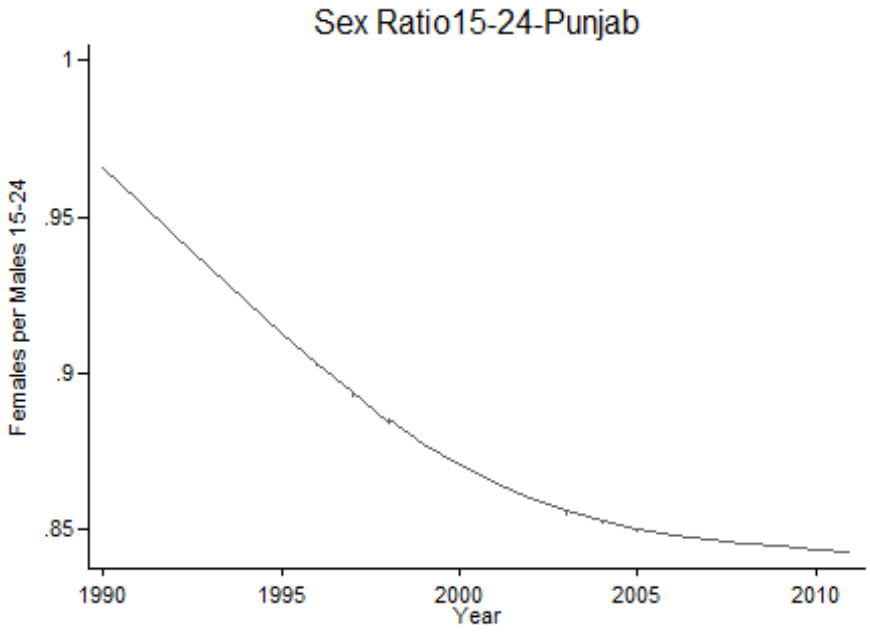


(a) Sex Ratio [15-24] projection

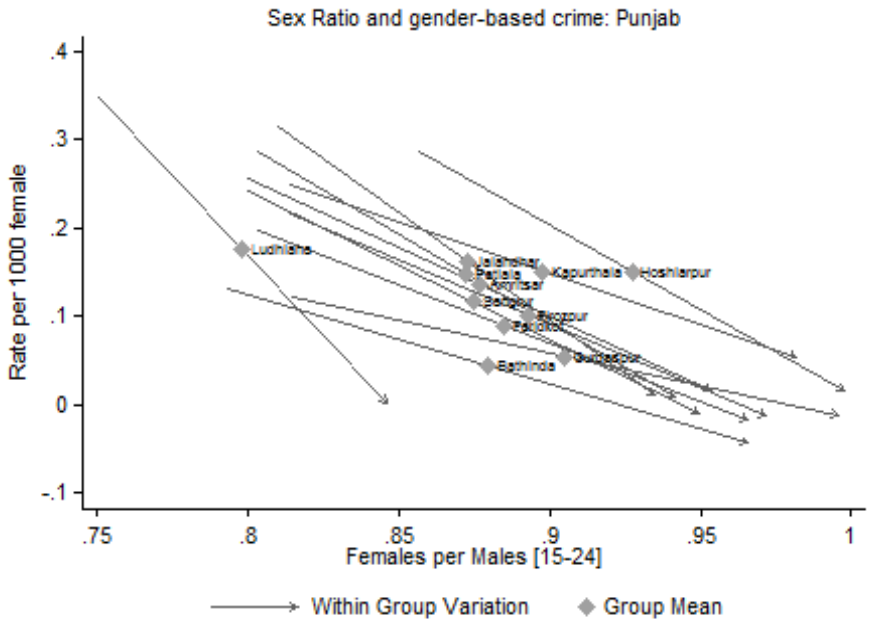


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.15: Inter state analysis- Orissa

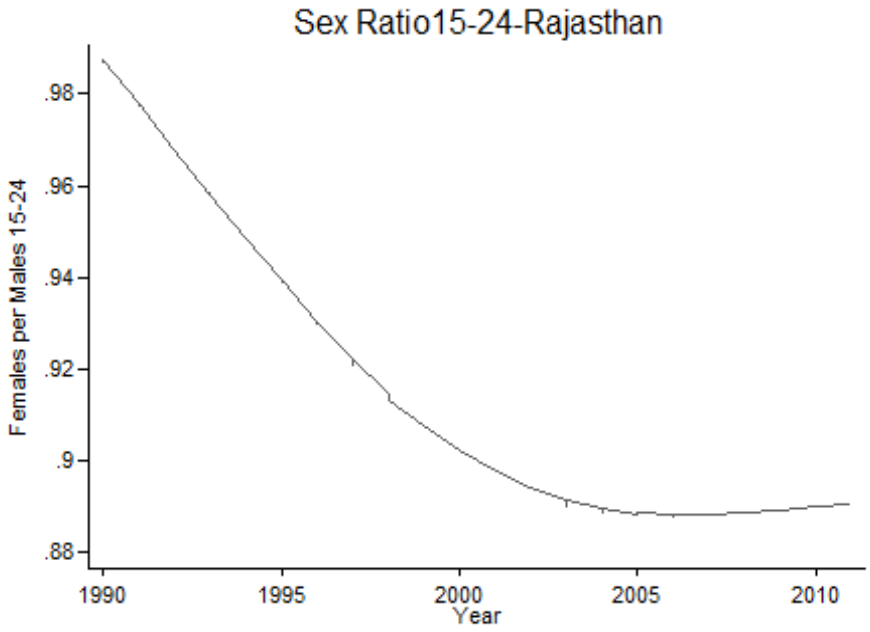


(a) Sex Ratio [15-24] projection

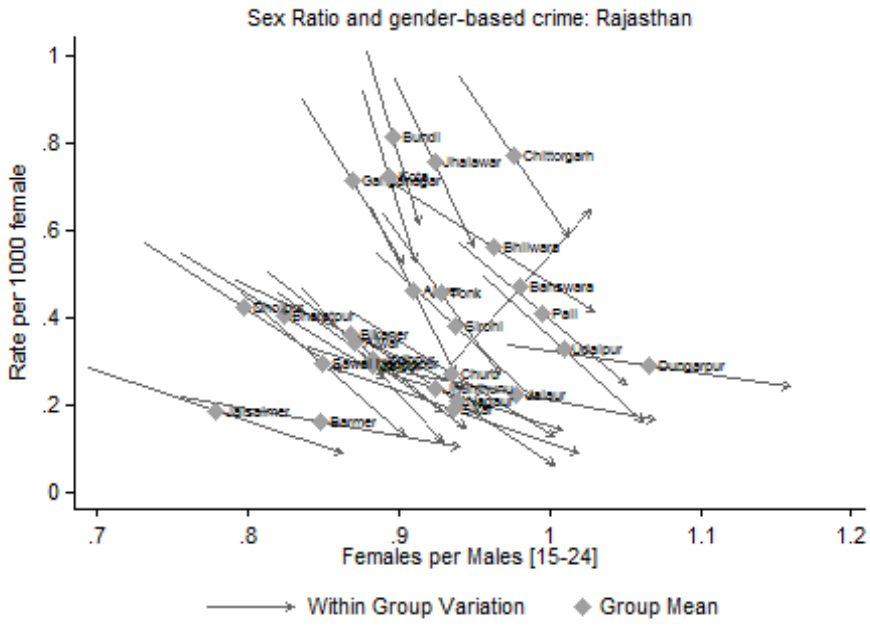


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.16: Inter state analysis- Punjab

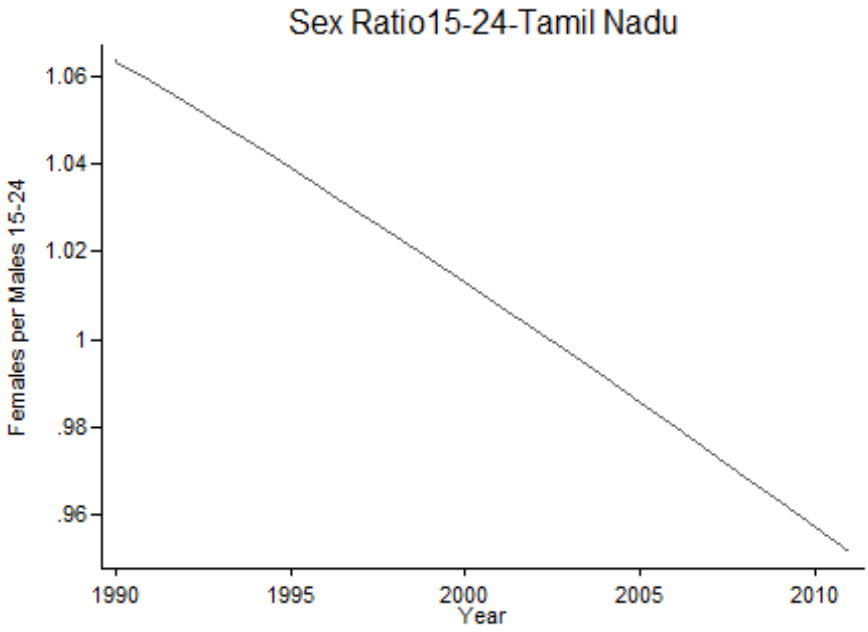


(a) Sex Ratio [15-24] projection

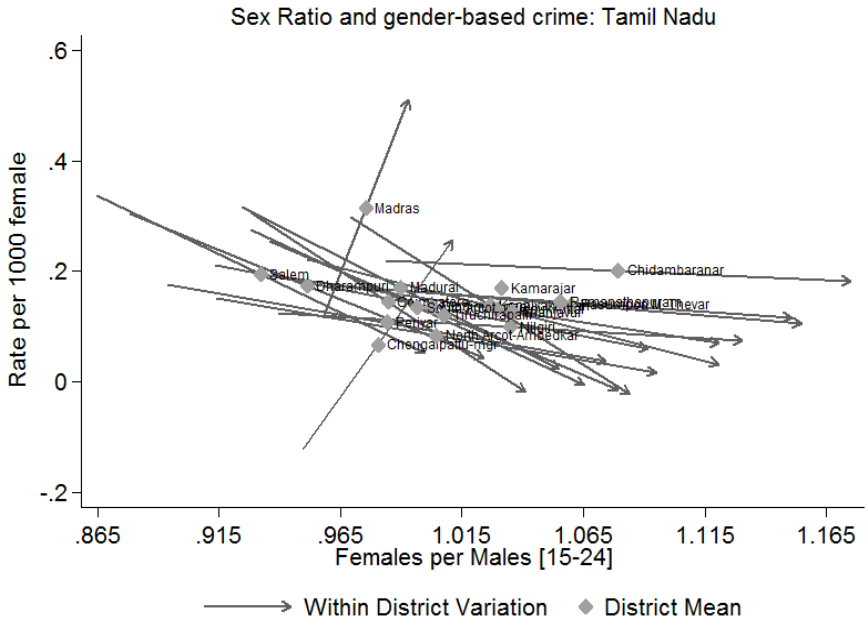


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.17: Inter state analysis- Rajasthan

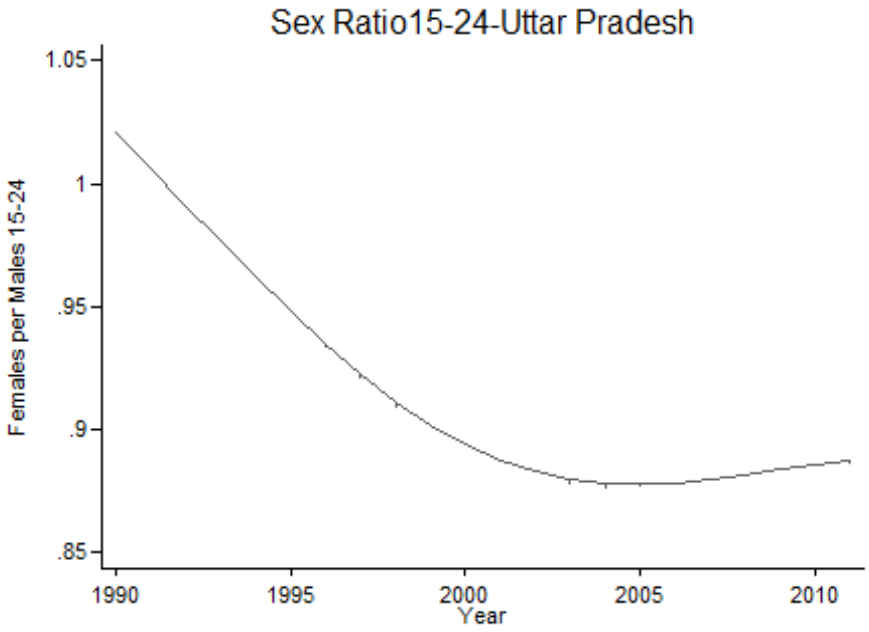


(a) Sex Ratio [15-24] projection

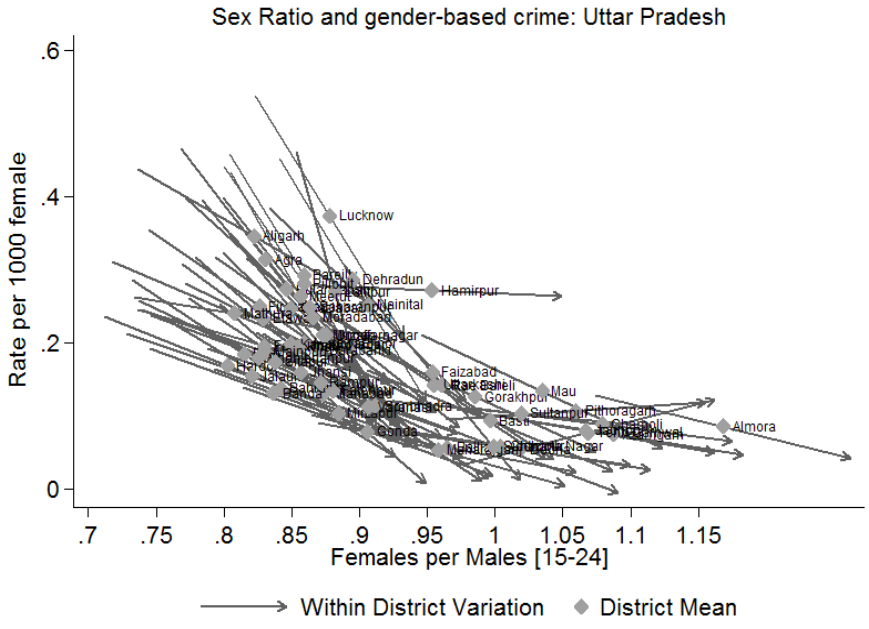


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.18: Inter state analysis- Tamil Nadu

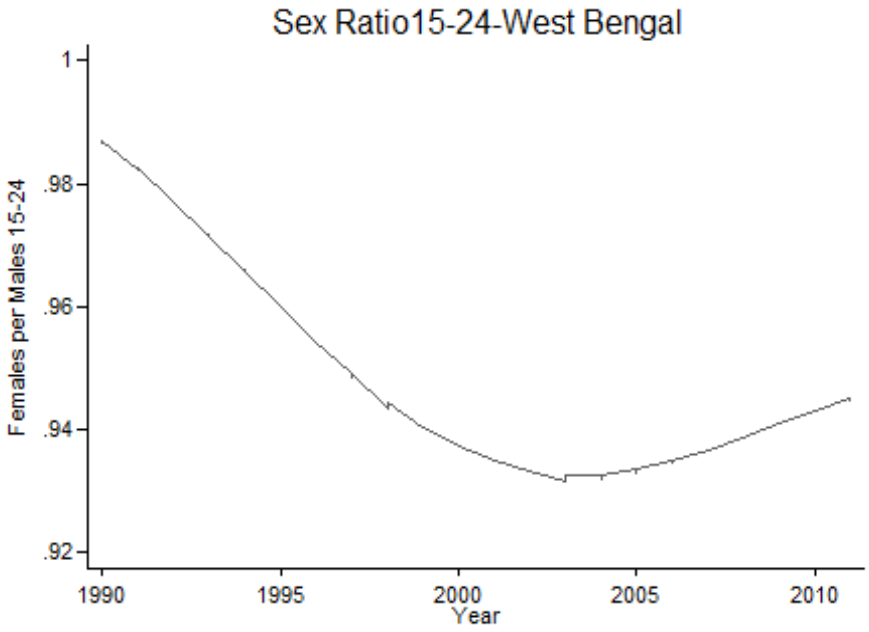


(a) Sex Ratio [15-24] projection

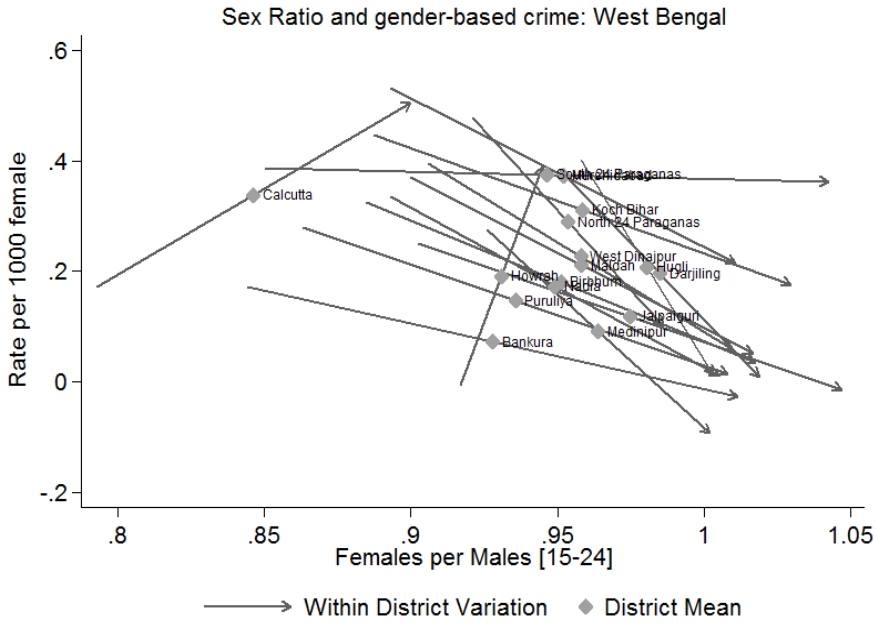


(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.19: Inter state analysis- Uttar Pradesh



(a) Sex Ratio [15-24] projection



(b) Correlation between sex ratio [15-24] and gender-based violence

Figure 3.20: Inter state analysis- West Bengal

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Additional Appendix: Crime definitions, categorisation and data availability

Variable	Definition
Property	Total incidents per 100, 000 population. Includes the incidents registered under burglary, robbery, theft and dacoity.
Violent	Total incidents per 100, 000 population. Includes the incidents registered under total kidnappings, murder, riots, arson and hurt.
Economic	Total incidents per 100, 000 population. Includes the incidents registered under criminal breach of trust, cheating and counterfeiting.
Women	Total incidents per 1000 female population. Includes the incidents registered under rape, dowry deaths, molestation, sexual harassment, cruelty by husband and relatives and kidnapping and abduction of females.

All data collected from the NCRB yearly publications and definitions from the Indian Penal Code. The NCRB reports state-level information on crimes committed under Special Local Laws. Where it applies these are also included in the crimes against women category.

Indian Penal Code and Special and Local Laws Crime Categories Definitions

Category	Definition	Availability
Cruelty by Husband and Relatives	Husband or relative of a husband of a woman subjecting her to cruelty, which means: a)any willful conduct which is of such a nature as is likely to drive the woman to commit suicide or to cause grave injury or danger to life, limb or health (whether mental or physical) of the woman; or b)harassment of the woman where such harassment is with a view to coercing her or any person related to her to meet any unlawful demand for any property or valuable security or is on account of failure by her or any person related to her to meet such demand. Sec. 498-A IPC, (pp.665).	1990-2007
Dowry	Under the Dowry Prohibition Act 1961, it called "dowry death" where the death of a woman is caused by any burns or bodily injury or occurs otherwise than under normal circumstances within seven years of her marriage and it is shown that soon before her death she was subject to cruelty or harassment by her husband or any relative of her husband for, or in connection with, any demand for dowry.	1990-2007
Dowry Deaths	In the following of the Dowry Prohibition Act 1961, Sec. 304-B IPC(pp.428).	1988-2007

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Category	Definition	Availability
Immoral Traffic	Under the Immoral Traffic Act 1956 any person is prosecuted for: (1) keeping a brothel or allowing premises to be used as a brothel, being the tenant, lessee, occupier or person in charge of any premises, uses, or knowingly allows any other person to use, such premises or any part thereof as a brothel, or being the owner, lessor or landlord of any premises or the agent of such owner, lessor or landlord, lets the same or any part thereof with the knowledge that the same or any part thereof is intended to be used as a brothel, or is willfully a party to the use of such premises or any part thereof as a brothel. Any person over the age of eighteen years is proved,to be living with,or to be habitually in the company of, a prostitute; to have exercised control, direction or influence over the movements of a prostitute in such a manner as to show that such person is aiding abetting or compelling her prostitution; or to be acting as a tout or pimp on behalf of a prostitute,it shall be presumed, until the contrary is proved, that such person is knowingly living on the earnings of prostitution of another person; procuring, inducing or taking person for the sake of prostitution. Any person who attempts to procure a person whether with or without his/her consent, for the purpose of prostitution; or induces a person to go from any place, with the intent that he/she may for the purpose of prostitution become the inmate of, or frequent, a brothel; or takes or attempts to take a person or causes a person to be taken, from one place to another with a view to his/her carrying on, or being brought up to carry on prostitution; or (d) causes or induces a person to carry on prostitution.	1975-2007

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Category	Definition	Availability
Importation of Girls	Imports into India from any country outside India or from Jammu and Kashmir any girl under the age of twenty-one years with intent that she may be, or knowing it to be likely that she will be, forced or seduced to illicit intercourse with another person. Sec. 366-B IPC (pp.490)	1994-2007
Indecent Representation of Women	Under the Indecent Representation of Women Prevention Act 1986, no person shall publish, or cause to be published, or arrange or take part in the publication or exhibition of, any advertisement which contains indecent representation of women in any form. No person shall produce or cause to be produced, sell, let to hire, distribute, circulate or send by post any book, pamphlet, paper, slide, film, writing, drawing, painting, photograph , representation or figure which contains indecent representation of women in any form: Provided that noting in this section shall apply to- (a) any book, pamphlet, paper, slide, film, writing, drawing, painting, photograph, representation or figure – i) the publication of which is proved to be justified as justified as being for the public good on the ground that such book, pamphlet, paper, slide , film, writing, drawing, painting, photography, representation or figure is in the interest of science, literature, art, or learning , art, or learning or other objects of general concern; or(ii) which is kept or used bona fide for religious purpose;any representation sculptured, engraved, painted or otherwise represented on or in –i) any ancient monument within the meaning of the Ancient Monument and Archaeological Sites and Remains Act, 1958 (24 of 1958); or ii) any temple, or on any car used or the conveyance of idols, or kept or used for any religious purpose; any film in respect of which the provisions of Part II of the Cinematograph Act, 1952 (37 of 1952).	1990-2007

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Category	Definition	Availability
Sati	Under the Sati Prevention Act 1987, "sati" means the burning or burying alive of:(i) any widow along with the body of her deceased husband or any other relative or with any article, object or thing associated with the husband or such relative; or(ii) any woman along with the body of any of her relatives, irrespective of whether such burning or burying is claimed to be voluntary on the part of the widow or the women or other-wise.	1990-2007
Sexual Harassment	Word, gesture or act intended to insult the modesty of a woman. The insult may be offered in a1)by uttering any word; a2)by making any sound or gesture; a3) by exhibiting any object intending that such word or sound shall be heard or that gesture or object shall be seen by such woman; or b) by intruding upon the privacy of such woman. Sec. 509 IPC (pp.708)	1990-2007
Molestation	Offense provided that there is use of assault or criminal force with the intention for the purpose or knowing it likely that he will thereby outrage her modesty. Sec. 354 IPC (pp.484)	1990-2007
Kidnapping of Women and Girls	Kidnaps or abduction of any woman intent that she may be compelled, or knowing it to be likely that she will be compelled, to marry any person against her will, or in order to that she may be forced or seduced to illicit intercourse. Sec. 363- 369 IPC (pp. 489)	1988-2007

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Category	Definition	Availability
Rape	A man is said to commit rape who, has sexual intercourse with a woman under any of the following descriptions: 1) against her will; 2) without her consent; 3) with her consent, when her consent has been obtained by putting her or any person in whom she is interested in fear of death or of hurt; 4) with her consent, when the man knows that he is not her husband, and that her consent is given because she believes that he is another man to whom she is or believes herself to be lawful married; 5) with her consent, when , at the time of giving such consent, by reason of unsoundness of mind or intoxication or the administration by him personally or through another of any stupefying or unwholesome substance, she is unable to understand the nature and consequences of that to which she gives consent; 6) with or without her consent, when she under sixteen years of age. Sec. 376 IPC. (pp.509)	1975-2007

Information was collected from several publications of the National Crime Records Bureau; Ministry of Women and Child Development, Government of India and from the Indian Penal Code published by Eastern Book Company, B.M.Gandhi,2010.