Do improved property rights decrease violence against women in India?

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Abstract

Limited property rights are a constraint for economic development and even more so for women. This paper uses a legal change in inheritance law in India which improved property rights of women to estimate the effect of women's improved economic conditions of on violence against them. Using the legal amendments introduced to the Hindu Succession Act this paper uses the staggered implementation of the Act to estimate the causal effect of the amendments on violence committed against women. I find that improved inheritance rights decreased violence committed against women. I also distinguish between family and non-family related violence against women and find that improved inheritance rights decrease both types of violence but the effect is larger in magnitude in non-family related violence. This study provides evidence that improved property rights for women may represent an improvement in welfare which need not necessarily be accompanied by an improvement in autonomy.

Keywords: Crime, Property rights, Intrahousehold distribution

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Abstract

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1 Introduction

Violence against women is pervasive in both developed and developing countries. However, the lack of legal rights for women and the prevalence of strong social norms that constraint women's activity is a particular feature of developing countries. Apart from the ethical consequences, the effects of violence against women are several ranging from increased health expenditures, intergenerational negative effects, lower intrahousehold productivity and distorted investment incentives. Moreover, advocates of gender-specific targeting programs claim that targeting resources to women has implications on female empowerment within the household, reduction in fertility, higher infant-survival rates, improved participation and reduced gender inequality, [(Duflo, 2011), (Doepke et al., 2011)]. However, the consequences of improved women's economic conditions on intrahousehold welfare may not only have positive effects. It can also account for negative consequences namely, on the levels of violence committed against women.

This paper uses a legal change in inheritance law in India to estimate the effect of improved economic conditions of women on violence against them. Using the legal amendments introduced to the Hindu Succession Act in India, here interpreted as an improvement in women's legal property rights, this paper uses the staggered implementation of the Act to estimate the causal effect of the amendments on violence committed against women, family-related violence and non-family related violence. We make use of the state and time variation introduced by the various amendments to retrieve the causal impact of this reform using a differences-in-difference identification strategy. The Hindu Succession Act as of 1956 was amended several times and reduced various sources of inheritance inequality between sons and daughters. Thus, gender inequalities that would previously exclude women from inheritance were abolished. The effect of this source of improved economic conditions via improved property rights is not clear in terms of whether it improved women's welfare. Theoretically, improving women's outside options improves household welfare but it can also generate incentives for male spouses to use violence in an attempt to regain the control over household resources. In developed countries, improving property rights of women was effective in increasing the economic position of women[1]. However, in patriarchy, diverse countries such as India, common practices of dowry, dowry-related violence, son

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[1]Combs (2005) shows that the Married Women's Property Act in England improved women's economic conditions.

preference, sex-selective abortions, and others that undermine women's rights were not a common in developed countries. As a result, the consequences of legal reforms that improve women's economic rights may in fact have unintended consequences.

The main contribution of this paper is the use of the exogenous variation that was introduced by the legal amendments to the major inheritance law in India to retrieve the effect on household welfare. Inheritance legislation affects the outcomes of the marriage market. Thus, because the focus is to analyse the effect on welfare the use of this policy is advantageous in the sense that it affects the household decision-process directly. Other contributions (Anderson and Eswaran, 2009), focus on labour market changes as a mean to improve women's outside options. However, while improving women's access to the labour market can induce female autonomy, this does not necessarily reflect the effects on welfare improvements within the household. As a result, because I use a policy change that acts upon the functioning of the marriage market and promotes female empowerment the analysis of the effects of improved economic conditions of women on intrahousehold welfare can be better analysed.

The results can be summarized as follows. First, the effect of the legal amendments to women's inheritance rights in India reduced reported violence committed against women. This effect is negative and it's magnitude increases in the years that follow the reforms. This implies that violence committed against women was reduced not only in the short-run but that also induced a consistent reduction in crimes against women throughout time, suggesting a change in behaviour. Second, distinguishing between family and non-family related crimes committed against women, the effect remains negative and it also increases in magnitude throughout time. The effect is larger for non-family related violence in the year of the reforms. Thus, improving inheritance rights of women reduces the incidence of violence that is more likely to occur within the family but it also induces an external effect since it reduces the non-family related types of violence women are subject to. Finally, these effects are more pronounced in the long-run in family-related violence whereas in non-family related violence the effects are both in the short-run and in the long-run.

The remainder of this paper is organized as follows. Section 2 reviews the literature of theoretical models of intrahousehold distribution of resources with violence and the related empirical evidence. Section 3 describes the Hindu Succession Act and the introduced amendments. Section 4 explains the identification strategy and section 5 describes the data used. Section 6 presents the results, and Section 7 concludes.

2   Literature Survey

2.1   Theoretical models of intrahousehold distribution and violence

Intrahousehold inequality theoretical models 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 (1981), spouses negotiate upfront the distribution of expected gains from marriage. Competition in the marriage market ensures that those with higher resources will match with other potential spouses that also have higher contributions to make to the marriage. If the expectations of the distribution of welfare do not realize the spouses do not match. This mechanism assumes that there is perfect enforceability of contracts 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. Thus, the decision-making process within marriage depends on the incentives to maintain a binding utility among spouses. The threat of divorce is more credible the better are the legal and economic conditions in the case of divorce. However, if the threat of divorce is not credible, as can be the case of marriages in India [2][3], a non-cooperative solution within the marriage may be more realistic, as argued in Lundberg and Pollak (1993). In standard bargaining models, empowering women- with improvements in women's outside options- will improve their well-being in the cooperative equilibrium. However, when considering both a low threat of divorce and the use violence as an option available to the husband, the cooperative equilibrium is not a realistic option. In the *separate spheres* model of Lundberg and Pollak (1993) in the non-cooperative equilibrium spouses do not coordinate their actions and maximize each individual welfare in a Nash- equilibrium form. 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

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[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.

[3] The rate of women who report being diivorced in the pooled surveys of the NFHS 1998 and 2005 is of about 0.48%.

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 good production (Anderson and Eswaran, 2009), (Fafchamps et al., 2009).

In this paper we take the view that the threat point is internal to the marriage and that violence can be used- typically by the husband- as a source of control and an instrument of resource allocation, [(Tauchen et al., 1991), (Farmer and Tiefenthaler, 1997), (Bloch and Rao, 2000), (Eswaran and Malhotra, 2011) and (Bobonis et al., 2012)]. The pioneer paper of intrahousehold models with domestic violence is Tauchen et al. (1991). In a non-cooperative model of intrahousehold decision-making the authors show that the equilibrium level of violence depends of the level of income of the household. In high income families, the relative disadvantage of the male increases the use of violence when the wife's level of income increases. The husband *purchases* violence with transfers and thus, an increase 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 a binding utility. 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) also conclude that with increased female income the probability of divorce increases bringing the level of violence to a lower level. In contrast, Bloch and Rao (2000) argue that an increase in income of the wife generates incentives for the husband to increase the use of violence in order to regain the control of the household resources and decision-making. They focus on explaining dowry-related violence and show, in a model with asymmetric information where violence is a signal to the in-laws of the level of satisfaction with the marriage and it is used as means of extortion. The authors show that women from wealthier families face higher probability of suffering violence. This model contrasts with other theories though, their model focus on intra-family bargaining over transfers rather than intrahousehold bargaining. Bobonis et al. (2012) take the approach used in Bloch and Rao (2000) and explain that transfers of funds to the female partner increases 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 increases the amount of transfers the husband will want to extract. This substitution mechanism replaces threats with the use of violence, bringing the use of violence to a lower level but not the threats.

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. Cooperative bargaining models assume that the outcome of decision-making process is Pareto efficient, Manser and Brown (1980), McElroy and Horney (1981) and Chiappori et al. (2002). When analysing violence within the household the equilibrium level of violence may be best described as a noncooperative behaviour as in Tauchen et al. (1991), Farmer and Tiefenthaler (1997), Bloch and Rao (2000), Bobonis et al. (2012) and Eswaran and Malhotra (2011). Yet, the relevant threat scenario varies according to whether divorce is a credible threat or not as in Lundberg and Pollak (1993) *separate spheres* model where the threat is an internal solution to the marriage. The credible threat scenario that would imply the breakdown of the bargaining process is a non-cooperative behaviour such as, the use of violence. In the first case, with divorce as a credible threat, an increase in inheritance rights of women improves her position in 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 as in Bloch and Rao (2000), in which case the use of violence would increase. If it's 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. Despite the fact that a threat point may or may not be credible, the functioning of the marriage market may change. Improved inheritance rights of women, increases bridal value and relaxes other conditions such as dowry payments. An increase in bridal value, in equilibrium it also increases groom value thus, ensuring higher welfare within marriage. Improving inheritance rights of women may have implications directly in the marriage market, by increasing the share of assets women bring to a union which increases welfare. In this paper, we want to ascertain which mechanisms prevail and the policy implications of inheritance rights of women on violence against them.

Finally, in a closely related paper Eswaran and Malhotra (2011) analyse how domestic violence impinges on female autonomy. In the model, the use of violence ensures that the allocation of resources is aligned with the preferences of the husband arguing that greater autonomy, measured by the extent the wife can allocate resources more towards her preferences, is correlated with an increase in violence rather than a reduction. The level of violence exerted can be non-monotonic in the wife's reservation utility. Hence, an increase in the wife's income could represent a higher incidence of spousal violence, in particular if the husband's reservation utility is low. The authors explain that the trade-off between working outside the house-greater autonomy could represent a higher incidence of marital violence. They suggest the prevalence of an

evolutionary theory explanation spousal violence stems from paternity uncertainty-rather than patriarchy argument. Our paper differs from theirs in the sense that isolates the impact of an improvement in women's autonomy outside the marriage on the welfare outcome within marriage, using an exogenous change in legal inheritance rights amendments rather than focusing on the effects of labour market on female autonomy which may not necessarily have an effect on the marriage market outcomes and ultimately household welfare. We also consider the fact that an improvement in women's economic condition can change the reporting behaviour which has not been previously considered.

2.2 Empirical evidence

The empirical results diverge significantly across studies which consider developed and developing countries. The causal effect of improved outside options of women on violence against women is ambiguous. Evidence from developed countries argues that this effect is negative as in Farmer and Tiefenthaler (1997) and Stevenson and Wolfers (2006). One exception is Iyengar (2009) which shows that improved reporting incentives increases violence against women thus, there is a reprisal effect as a consequence of reported domestic violence.

Evidence from developing countries is less clear. Eswaran and Malhotra (2011) estimate the predictions of the model and show that domestic violence impinges on female autonomy and in particular, for women working outside the house. Bobonis et al. (2012) empirically analyse the effect of conditional cash transfers programs on domestic violence, in the context of the Progressa program and show that there is an increase of threats of violence but accompanied with a decrease in incidence of violence. Ferrari and Iyengar (2010) estimate the effects of incorporating coupling discussion sessions with a micro-financing program to determine the effects on women's empowerment on the incidence of domestic violence. The authors conclude that there is a decrease in marital violence in the short-term but not in the long-term. In a related paper, Panda and Agarwal (2005) analyse the effect of ownership of immovable property women in Kerala on the risk of marital violence and they show that women that own property face lower risks of violence. The results in the present paper are in line with the results found in Panda and Agarwal (2005).

Another aspect to consider is that tolerance towards violence may change as a result of improved property rights. Hence, economic empowerment can also improve women's tolerance of violence decreasing the acceptance of violence against them

and increasing reporting. Jensen and Oster (2009) find that the introduction of cable television in India improved women's status. They find that reported tolerance towards domestic violence, son preference and fertility rates decreased. The exposure to media information improved the role of women in household decision-making, i.e. autonomy. In India, women's formal rights over their own body have been improving extensively[4]. Accordingly, this might be triggering the increase levels of reporting of violence against women as argued in Iyer et al. (2012) rather than potentiating greater violence.

This paper is also related to the literature on property rights and in specific the effects of property rights on gender outcomes. Secure property rights are a condition for economic development. The impact of improved property rights have been shown to improve investment decisions, productivity and credit access, [(Besley, 1995), (Besley and Ghatak, 2009) and (Field, 2007)]. Insecure property rights in developing countries context- mainly through secure access to land - distort incentives to invest since the risk of expropriation reduces effort (Besley, 1995). Udry (1996) showed that insecure property rights for women in relation to their husband's decreases the profitability of land for them, i.e. decreases efficient agricultural productivity. In addition, expropriation risk is also showed to distort effort (Besley and Ghatak, 2009) and this result along with the fact that the fear of expropriation is higher for women may explain the differences in levels of productivity, Goldstein and Udry (2005). Roy (2011) shows that improving inheritance rights of women in India result in increased female human capital investments due to a substitution effect from not inheriting them. Clots-Figueras (2011) shows that there is a shift towards education and health spending and that a female leader is more likely to pass laws that favour women. Iyer et al. (2012) show that having female leader's as Chief Ministers increases crime against women but, because it increases reporting rather than an actual increase in incidence of crimes since the same change is not observed in non-gender specific crimes as would otherwise imply. Hence, there are gender-specific consequences to improving rights of women.

Property rights in developing countries context are often gender-specific and biased towards males. Relaxing these restrictions allowing greater access of rights for women requires may improve women's welfare and participation. This paper argues that improved legal conditions that improve economic conditions improves well-being of

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[4]The Dowry Act passed in 1961 until the most recent Domestic Violence Act of 2005. However, the extent to which legal reforms change the prevailing customs are yet to be investigated. See Aldashev et al. (2012) for formal analysis and conditions under which the law acts as a *magnet* to change customs.

women but not necessarily economic autonomy.

3 Background

3.1 The Hindu Succession Act

In India inheritance laws are applied according to religion. The Hindu Succession Act governs inheritance laws of *Hindus*, that is of Hindus, Buddhists, Sikhs and Jains[5]. It lays down succession rules of *Hindu* males and females dying intestate. The act, passed in, was primarily created to unify inheritance laws that governed *Hindus*[6]. In addition, it aimed to reduce gender inequalities in inheritance and thus, allowed females to have full ownership and testamentary rights over all property. However, it failed in addressing several inequalities in succession law of daughters in relation to sons.

The property of a male dying intestate under the Hindu Succession Act, is divided into separate and joint family property, (Agarwal, 1994). Separate property refers to all property that was self-acquired throughout the life-time of the individuals. 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 and ancestral home 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. This created gender inequalities between sons and daughters' rights. Daughters had a right over their share of separate property and to the share of the joint family property. 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, 1994). Sons would be given this additional share by being part of the *Hindu male coparcener*. The *Hindu male coparcener* consisted of male

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[5] The act is not applicable in the state of Jammu and Kashmir and in the northeastern states of Arunachal Pradesh, Manipur, Meghalaya, Mizoram and Nagaland because these states are mainly ruled by customary laws (Agarwal, 1994). 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, 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 who prevailed. For a deeper discussion of inheritance rights previous to 1956 refer to Agarwal (1994).

members of Class I, II and III heirs which were, by virtue of birth, entitled to an individual share in the joint family property (Agarwal, 1994). Consequently, sons would in addition to the amount of the daughters inheritance, inherit an individual share because they were part of the male coparcener. Roy (2011) suggests that this could imply that sons would inherit twice as much as daughters.

In addition to this source of discrimination, a father could declare his separate property as part of the joint family property and this would will out the daughter in 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 Hindu Succession Act 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 (1994) emphasizes the implications of unequal inheritance laws and states several reports of women who claimed that the lack of land ownership greatly affected their well-being: "For retaining the land we would be tied to the man, even if he beat us", (Agarwal, 1994)- pp. 20.

3.2   Amendments

In India state governments have legislative authority hence, were allowed to make amendments to the Hindu Succession Act. Kerala was the first state to amend the Act in 1976. It abolished the joint family property system among *Hindus*[7]. Andra Pradesh amended in 1986, Tamil Nadu in 1989 and Maharashtra and Karnataka simultaneously in 1994. These states have given 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 the act correcting these inequalities. The Hindu Succession (Amendment) Act of 2005, amended section 6 of the Hindu Succession Act, 1956, allowing daughters of a male dying intestate equal rights with sons. In this amendment, the restriction regarding the marital status was also

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[7]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, 1994)-pp.176.

abolished. These amendments are now in force for all the remaining states for which the law applies to, making daughter's entitled to the same liabilities as if she would have been a son.

I make use of the state amendments, assuming that these are a plausible *natural experiment*, to estimate the causal impact of improved inheritance legal rights on violence against women.

4   Identification strategy

The introduction of the state and central government amendments to the Hindu Succession Act gave rise to a state and time-level variation in inheritance rights of women. I make use of these variations to estimate the causal impact of improved inheritance rights of women on reported violence against them. This amounts to a difference-in-difference estimation strategy under the assumption that in the absence of the legal amendments, the trend in reported violent crimes against women in reforming states would have been the same as in non-reforming states. I employ the following specification:

$$y_{st} = \beta_{0s} + \lambda_t + \alpha_s + \delta \mathrm{T}_{st} + \beta' \mathrm{X} + \epsilon_{st} \tag{4.1}$$

where s is state and t is year corresponding to intervening years. The dependent variable y_{st} is the reported crimes rate per 1000 female population occurring in state s in year t, β_{0s} is a state-specific intercept, λ_t are year-fixed effects terms to account for national year changes, α_s is a state-specific term to account for state-specific unobserved time-invariant characteristics that could affect the incidence of violence. T_{st} is a dummy variable that is equal to one if the state s at time t has amended the Hindu Succession Act and takes the value zero otherwise. Thus, δ is our coefficient of interest which captures the effect of the amendments on reported crime rates against women. We also include a vector of several time and state-specific time-varying controls and ϵ_{st} is the error term. In order to mitigate potential serial-correlation - allowing for intra-state correlation in the error term - and heteroskedasticity problems, robust standard errors clustered at the state-level are used in all specifications, (Bertrand et al., 2004).

The common time-effects assumption is the required assumption for difference-in-difference estimations which holds if any difference that is to exist between reforms and non-reform states is captured by λ_t and α_s. This assumption has the advantage

of controlling for unobserved time-invariant state-level heterogeneity but not time-varying unobserved state-level heterogeneity. This is a critical assumption to make in the sense that, states that had higher rates of violence against women in the first place, could have also been those who first passed the law. This would invalidate the required assumption. Fig. 1 illustrates that there is a secular increasing trend for all states. Fig. 2 shows the different crime rates committed against women across states in India between 1975-2007. It illustrates that total violence against women in southern states - the first states to pass the amendments- do not differ from other central-east states. As a result, it does not seem to be the case that for the reforms where passed due to different trends in violence against women.

The causal effect of the law might have a dynamic effect. Wolfers (2006) shows that the impact of unilateral divorce laws in U.S. have different impacts in divorce rates in the short-run and in the long-run. I also test for this possibility in order to understand whether the amendments caused a short-term impact different from a long-term impact. I conjecture that in order for the amendments to have any effect, the impact must have not only a significant effect in the short-run but more importantly, a long-term effect. In order for the law to have any effect, individuals would need to be informed of these changes and needed to adapt their behaviour. As a result, a post-law coefficient is insufficient to derive these conclusions.

In order to capture for the dynamic effect of the amendments to the law on reported crimes against women the following specification is used:

$$y_{st} = \beta_{0s} + \lambda_t + \alpha_s + \delta \mathrm{T}_{st} + \phi \mathrm{T}_{st} \sum_k \mathrm{Post\text{-}law\ years}_k + \beta' \mathrm{X} + \epsilon_{st} \qquad (4.2)$$

where all variables represent the same as in (5.1) and where ϕ are coefficients that capture the effect of the law amendment after k years of the adoption of the law. We have grouped the years since the law has changed in 1-2 years post-law, 3-4 years post-law and 5 and more years post-law change. As a result, if the effect of the amendments to the law remain unchanged throughout time, the coefficients in ϕ should not differ in direction from those in (5.1). I test the hypothesis that in the short-run and in the long-run improvements in inheritance rights decreased violence against women.

5 Data

The analysis was conducted for the period 1975-2004 for the 16 major states and union territories of India which the Hindu Succession Act applies[8]. The National Crime Record Bureau (NCRB) at the Ministry of Home Affairs records reported number of crimes committed against women in a number of categories[9]. The crimes committed against women considered are cruelty by husband and relatives/torture, rape, dowry related deaths, importation of women and girls, molestation, kidnapping and abduction and sexual harassment. In addition, it is also included crimes under Dowry Prohibition Act, Immoral Traffic (Prevention) Act and Indecent Representation of Women (Prevention) Act.

The effect of improved inheritance rights on welfare of women would ultimately have an impact on total violence and on family-related violence. As a result, I have categorized the data into three main variables: total crimes committed against women, total family-related crimes committed against women and total non-family related crimes committed against women. The dependent variable is rate of crimes per 1000 female population. Table 1 contains the definitions, data availability and classification given to the several crime categories. Amongst them, rape, kidnapping and abduction, dowry related deaths and Immoral Traffic (Prevention) Act have been reported before 1990, whereas the remaining categories were reported only after 1990. As a result, the variable family-related crime committed against women is only available between the periods 1988-2007. Because the amendments where introduced first in 1976 this would limit the availability of some of the pre-reform observation, I will return to this problem in the following section.

In the empirical analysis I also control for several socio-demographic, economic, and law and order factors that can influence the level of crimes committed against women. Demographic variables include literacy rate, sex ratio and proportion of rural population. This information was collected from the Census of 1971, 1981, 1991 and 2001 and interpolated for the intervening years. I include per capita net state

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[8]The states and UT's 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 maintain the comparability of the sample units across time, data for these states was merged with the original states.

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

domestic product which was 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 1000 inhabitants, collected from the NCRB.

The role of political influence on law and order and on legislative authority is very important. 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. Moreover, Iyer et al. (2012) and Clots-Figueras (2011) show that political identity is an important determinant in influencing legislation and reporting behaviour. Thus, in order to control for the effect that political identity might have on 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 are more likely to pass laws that decrease gender legal balance. This information was collected from several Statistical Reports of Legislative Assemblies Elections. Table 4 presents descriptive statistics.

Iyer et al. (2012) explore effect of the *Gram Panchayatt* reform that introduced female quotas in village councils. This reform was firstly passed in the southern states - as was the Hindu Succession Act legal amendments. Hence, one might be concerned that the plausible exogenous reform of the Hindu Succession Act may be in fact endogenous. However, this bill was only introduced in 1993 therefore this hypothesis is discarded though, I recognize that the important effects of political representation on both law and order decisions, reporting and criminal behaviour.

Crimes against women in India have been increasing steadily making India one of the worst performing countries in terms of female security. In Fig 1. it can be seen that this increase is not state-specific. Fig.1 and Fig. 2 show the extent of this increase. The figures also illustrate that the highest rates of crime are in the central and south-eastern states.

6   Results

The effects of the amendments to the Hindu Succession Act are analysed on three dependent variables: total crime rate against women, total family related crime rate against women and total non-family crime rate against women. Fig. 3 shows unconditional estimates of the effect of the amendments in years before and after

they were passed. These are estimated coefficients of the years of the reform interacted with years before and after the reform. It suggests that the amendments may have had a negative effect on total crimes against women after the reform. In the years following the amendments there seems to be a decrease of about 2.3 crimes per 1000 female population up to 18 years following the reform. The effect does not seem to be due to a secular decreasing effect that could have occurred in years before the amendments.

The coefficients of interest are δ in (4.1) and δ and ϕ in (4.2). Table 3 presents the results for total crime rates against women for specifications (4.1) and (4.2). The effect is negative across all specifications. Column (1) presents the unconditional estimations which points to a significant negative effect of the amendments on total crimes against women. It shows a decrease of about 1.1 crimes per 1000 female population which amounts to a decrease of 66%. However, several confounding factors may impinge on thisresults,thus when accounting for several socio-economic and law and order controls it can be seen that the magnitude and significance of this result remains slightly unchanged. Coefficient in column (2) takes into account socio-economic and law and order controls and shows a negative coefficient of -1.2. The preferred estimation is the one presented in column (3) with a coefficient of -1.17. This implies that improved inheritance rights reduced total crimes committed against women.

When accounting for state-specific trends, in column (4), the coefficient is smaller in magnitude then in previous estimations- 3.14% decrease. This is consistent with the upward trend in crime rates against women across states. In addition the coefficient of -0.032 is no longer significantly different from zero. However, despite the importance of the control for state-specific trends (Wolfers, 2006) the state-level trends can be *over controlling* for the effects of the amendments. As pointed out in Iyer et al. (2012) since we are already accounting for year effects and other linearly state varying factors these state-linear trends may be controlling for all the remaining effect of the legal amendments. In addition, the advantage of controlling for state-specific trends variation stems from the fact that this could capture variations specific to each state that could be disguising the effect but, this is a more accurate estimation the more pre-reforms data we have, which is a fault in our specification due to the limited data availability. In column (5) the estimated coefficient is of about -0.83 significant at 5% level. This estimation can act as a alternative to (4) since the control variables are interacted with a time-trend removing the possible biases that trends in these

variables could impinge on δ^{10}. The estimation of specification (5.2) obtains the effects of the legal amendment in years following the policy change hence; it amounts to a dynamic estimation of the effect of the policy.

Columns (6), (7) and (8) present these results. In column (6) I only control for state and year-fixed effects. It can be seen that the coefficient of the effect of the law remains negative and significant (at the 10% level) though of a smaller magnitude in comparison to the coefficients presented in columns (1) - (5). The reason of this is that in specification (1) the total effect of the policy captures the effect that lasts throughout time, thus it is expectable to have a smaller coefficient when the effect is analysed in this dynamic framework. The coefficients of 1-2 years, 3-4 years and 5-and more years post-law change remain negative. For the 3-4 years after the amendments and for 5 and more years the coefficients are significant and the magnitude of these coefficients decreases throughout time. The reason for this is likely to be due to the fact that individuals incorporate these changes with some time difference, making the effect on crimes against women to last but perhaps not inducing a permanent change in behaviour in the following years after the legal changes. However, this implies that the policy was effective throughout time. In column (7) I also include socio-economic and law and order controls to account for confounding factors that could influence the effect of the policy. The results remain slightly the same with an estimated effect of -0.862 in the year of the amendment. In column (8) I include socio-economic controls interacted with a linear time trend and the results in the long-run do not vary in comparison to (7).

The effect of improved inheritance rights may have an effect on family-related crimes but not necessarily on non-family related type of crimes. When separating the crime categories into family and non-family related crimes the hypothesis is to estimate if improving inheritance rights changes only the incidence of violence in household related crimes or if the effect is not distinguishable between household and non-household violence.

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[10] I have included a linear time trend, a quadratic time trend and both in specifications (2) and (3). The results do not vary. Results not shown here.

Table 3: Difference-in difference estimations on total crimes against women

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post-law	-1.083***	-1.161***	-1.172***	-0.032	-0.834**	-0.721*	-0.862*	-0.503
	(0.285)	(0.291)	(0.288)	(0.158)	(0.314)	(0.393)	(0.488)	(0.351)
1-2 years	-	-	-	-	-	-0.170	-0.164	-0.177
	-	-	-	-	-	(0.234)	(0.233)	(0.205)
3-4 years	-	-	-	-	-	-0.487**	-0.477**	-0.470***
	-	-	-	-	-	(0.197)	(0.162)	(0.118)
5-more years	-	-	-	-	-	-0.439*	-0.361***	-0.471**
	-	-	-	-	-	(0.490)	(0.321)	(0.196)
Controls	N	Y	Y	N	N	N	Y	N
Political controls	N	N	Y	N	N	N	N	N
Controls*Trend	N	N	N	N	Y	N	N	Y
Political controls*Trend	N	N	N	N	Y	N	N	N
State linear-trends	N	N	N	Y	N	N	N	N
Adj. R^2	0.86	0.87	0.88	0.93	0.88	0.86	0.88	0.88
N	480	464	464	480	464	480	464	464

Dependent variables are defined as the natural logarithm of the ratio of the incidence of crime per state and 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 *, ** and ***. Control variables include sex ratio, literacy rate, proportion of rural population, growth rate of per capita net state domestic product and strength of police force per hundred thousand of population. Political controls include the proportion of seats held by women in the state legislature and gender Chief Minister dummy.

In Table 4 results are presented for specification (4.1) for dependent variables total family related crimes rate against women and total non-family crimes rate against women. Due to the lack of data availability for years before 1987 for the crimes considered to be family-related crimes against women - see Table 1 for definitions- the sample is restricted to 313 observations. This slightly changes the identification strategy due to the lack of data availability since there aren't pre-amendment observations but this still a valid estimation strategy that should retrieve the impact of the legal amendments.

The estimated effect on family related crimes is negative and significant across all specifications. Column (1) the estimated effect if of -1.086 which amounts to a decrease of about 66.24%. When accounting for socio-economic and law and order controls the coefficient changes slightly - column (2)- and the same when accounting for political controls-column (3) but the direction of the effect remains negative.

The effects on non-family related crimes also shows that crimes against women decreased and in a smaller magnitude when compared to family-related crimes against women. The estimated coefficient is of about -0.933 which amounts to a decrease of about 61%. This result is as expected, i.e. it affects the levels of non-family related crimes but with a smaller impact in terms of magnitude. However, the implication of these results is that not only improving inheritance rights reduce violence against women which is family related but also, reduces crimes that are not necessarily to violence which is directly family related. This implies that empowering females improves the well-being not only within the marriage but also it produces some externalities reducing the level of violence faced outside the household.

Estimations of specification (4.2) are presented in Table 5. The effect of the amendment in the year of the reform is not significant in family related crimes. Coefficients of 3-4 years and 5-and more years are negative, with an increasing impact throughout time and significant. 1-2 years, 3-4 years and 5-and more years are negative and significant when accounting for other confounding factors - column (2). This indicates that the effect on family-related crimes was not immediate.

Table 4: Difference-in difference estimations on family and non-family related crimes

	Family					Non-Family				
	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
Post-law	-1.086**	-1.220***	-1.167***	-0.185	-1.160**	-0.933***	-0.940***	-0.965***	0.115	-0.933***
	(0.386)	(0.293)	(0.281)	(0.138)	(0.410)	(0.183)	(0.218)	(0.194)	(0.170)	(0.183)
Controls	N	Y	Y	Y	N	N	Y	Y	Y	N
Political controls	N	N	Y	N	N	N	N	Y	N	N
Controls*trend	N	N	N	N	Y	N	N	N	N	Y
Political controls*trend	N	N	N	N	Y	N	N	Y	N	Y
State linear-trends	N	N	N	Y	N	N	N	Y	N	
Adj. R^2	0.76	0.78	0.79	0.85	0.76	0.79	0.80	0.80	0.87	0.80
N	265	265	265	265	265	480	480	480	480	480

Dependent variables are defined as the natural logarithm of the ratio of the incidence of crime per state and 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 $*,**,***$. Control variables include sex ratio, literacy rate, proportion of rural population,growth rate of per capita net state domestic product and strength of police force per hundred thousand of population. Political controls include the proportion of seats held by women in the state legislature and gender Chief Minister dummy.

Column (4) controls for state-specific linear trends and the estimated effect is of about -0.185. The decrease in magnitude in the coefficient is expectable and reflects the upward trend in crime rates against women.

When considering non-family related crimes the coefficient of the effect of the amendment is -0.692 without controlling for any confounding factors and -0.747 when controlling for socio-economic and law and order controls. The effects are not statistically significant from zero in the post-law interaction effects with 1-2 years, 3-4 years and 5-and more years though the effect remains negative.

Improved inheritance rights reduced reported violence committed against women, family related crimes and non-family related crimes. In Proposition 1 it is shown that a possible mechanism under which a reduction in violence operates is that the control of additional source of income of the wife is shared with husband. Hence, if the amendments to the Hindu Succession Act produced any improvements in women's economic opportunities one the mechanism via which these could represent a decrease in violence committed against them is if this economic autonomy of women was shared.

Finally, because the data used is reported crime data which includes various type of crimes that do not necessarily occur within the family the explanation must not rely solely on intrahousehold bargaining framework. Improved inheritance rights decreased violence committed against women which does not occur within the household. The explanation for this is twofold. First, using Proposition 1 an increase in the share of inheritance controlled by the husband reduces the leisure time of the wife, thus reducing social interaction. This can explain the reduction in non-family related crimes. Second, improved inheritance rights improved women's autonomy even if the control of the legally owned inheritance is shared. As a result, one possible explanation of the reduction in non-family related crimes can be driven by this possibly marginal increase in autonomy of women. Raising economic opportunities of women distorts incentives to commit crimes against them.

Table 5: Difference-in difference estimations on family and non-family related crimes

	Family			Non-Family		
	(1)	(2)	(3)	(1)	(2)	(3)
Post-law	0.202	-0.033	-0.164	-0.692**	-0.747*	-0.711*
	(0.423)	(0.317)	(0.653)	(0.286)	(0.365)	(0.371)
1-2 years	-1.165	-1.140*	-0.954	-0.015	-0.011	-0.069
	(0.688)	(0.623)	(0.626)	(0.222)	(0.224)	(0.231)
3-4 years	-1.400**	-1.397**	-1.108**	-0.356	-0.349	-0.453*
	(0.612)	(0.523)	(0.477)	(0.215)	(0.204)	(0.219)
5-more years	-1.587**	-1.514**	-1.345**	-0.310	-0.264	-0.331
	(0.724)	(0.574)	(0.478)	(0.336)	(0.279)	(0.300)
Controls	N	Y	N	N	Y	Y
Political Controls	N	N	Y	N	N	Y
Adj. R^2	0.78	0.80	0.80	0.79	0.80	0.81
N	265	265	265	480	480	480

Dependent variables are defined as the natural logarithm of the ratio of the incidence of crime per state and 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 $*,**,***$. Control variables include sex ratio, literacy rate, proportion of rural population,growth rate of per capita net state domestic product and strength of police force per hundred thousand of population.

7 Conclusion

This paper provided evidence that female inheritance legislation has important implications for women's well-being. In this paper the relation between inheritance rights of women and violence against them is established. Using the exogenous legal amendment in the major inheritance law in India, the Hindu Succession Act, (1956), I exploit the effect of improved legislation that increases inheritance rights of women and show that this reduces violence committed against them. The amendments of the law allowed female daughters to have the same inheritance rights as sons. The reduction in violence committed against women is found to be both significant in

family related types of crimes and in non-family related type of crimes.

The mechanisms pointed out to explain this reduction are twofold. First, I established that the reduction in violence need not be necessarily be due to improvements in autonomy per se. Using a simple theoretical model I showed that if there is an increase in the share of inheritance controlled by the husband violence decreases.The mechanism outlined is that a reduction in the additional source of income of the wife increases the time the wife devoted to the production of the household public good. Since the husband uses violence to ensure that the contribution of the wife to the household is maintained the relation between time distortions allocation, changes in inheritance control and violence is establish to be negative. I conclude that improvements in inheritance rights decrease violence committed against women because the control of the property is not contributing to enhance the women's autonomy as much as it would if violence was not an option available to the husband. Thus, the difference between ownership and control over property can be significant and this drives our results. I posit that violence decreases if the control over owned resources is unequally shared with the husband. Hence, allowing inheritance rights for women while inducing greater empowerment by improving her threat points in the case of divorce in the absence of this *social possibility* improving inheritance rights will improve both spouses well-being and ultimately reduce violence against women. The empirical results also show that improved inheritance rights decreases both family and non-family-related crimes. This is also explain as a result from the theoretical framework. A reduced control over inheritance decreases social interaction thus reducing the probability of being a crime victim. Finally, because the level of economic autonomy is not necessarily entirely handed it to the husband the this marginal improvement in economic opportunities reduce crimes committed against women. In terms of policy analysis these results call upon the importance of legal conditions in economic development and on the effects of well-defined property rights from a welfare perspective.

I intend to pursue further analysis at the individual level in order to analyse how the same law altered spousal violence. One possible way to do this is to use the individual-level data provided by the National Family Health Surveys.

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8 Appendix

Figure 1: Total crimes committed against women between 1975-2007
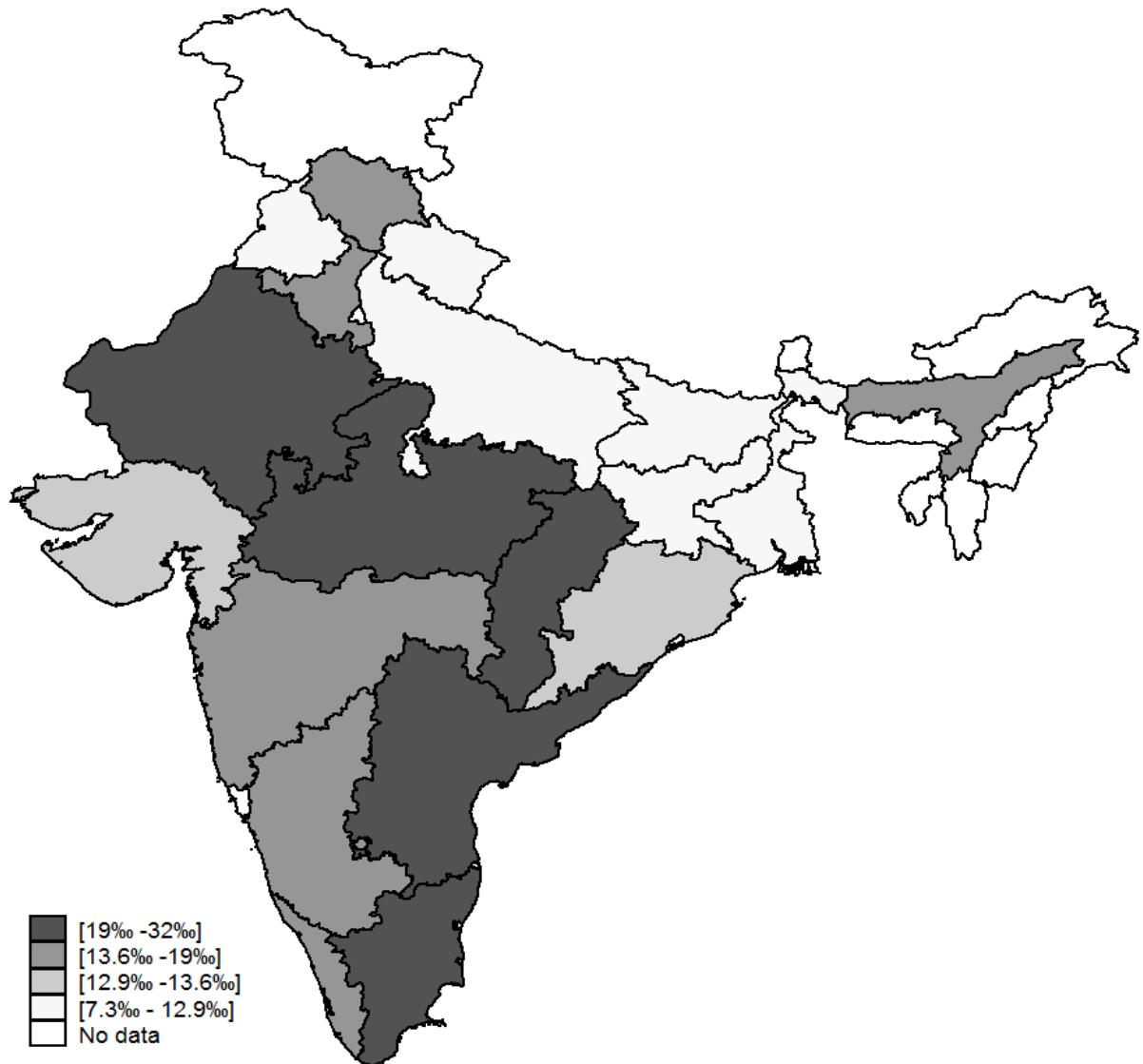(per 1000 female population)

Figure 2: Total crimes committed against women between 1975-2004
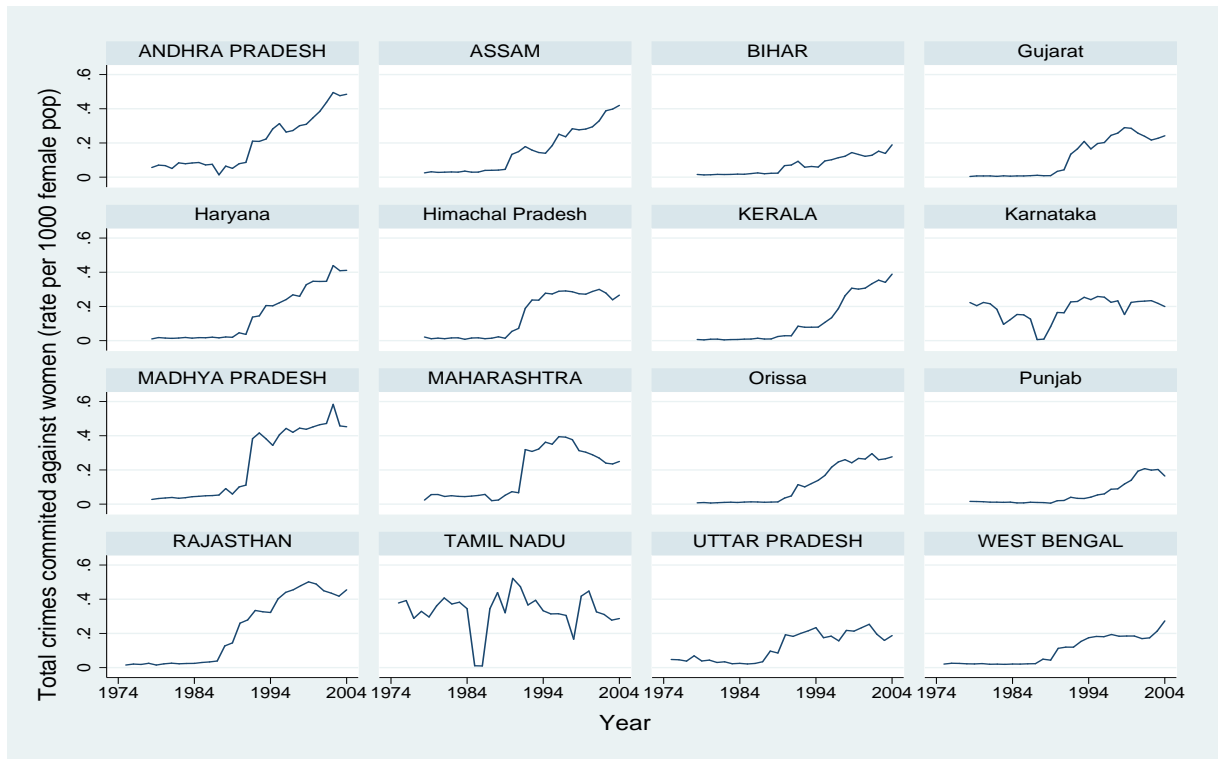(per 1000 female population)

Table 1: Indian Penal Code and Special and Local Laws Crime Categories - Definitions

Category	Definition	Availability	Classification
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).	1990-2004	Family
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.	1990-2004	Family
Dowry Deaths	In the following of the Dowry Prohibition Act 1961, Sec. 304-B IPC(pp.428).	1988-2004	Family
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)	1994-2004	Non-Family

Table 1 - continued from previous page

Category	Definition	Availability	Classification
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.	1975-2004	Non-Family

Table 1 - continued from previous page

Category	Definition	Availability	Classification
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).	1990-2004	Non-Family

Table 1 - continued from previous page

Category	Definition	Availability	Classification
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.	1990-2004	Family
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)	1990-2004	Non-Family
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)	1990-2004	Non-Family
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)	1988-2004	Non-Family

Table 1 - continued from previous page

Category	Definition	Availability	Classification
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)	1975-2004	Non-Family

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.

Table 2: Descriptive Statistics

	All			Reform			Non-reform		
Variable	Obs.	Mean	SD	Obs.	Mean	SD	Obs.	Mean	SD
Total crime rate (per 1000 female)	480	0.158	0.142	86	0.236	0.142	394	0.141	0.136
Non-family related crimes (per 1000 female)	480	0.078	0.078	86	0.105	0.100	394	0.072	0.071
Family related crimes (per 1000 female)	265	0.086	0.058	70	0.096	0.066	195	0.083	0.055
Proportion of rural population	480	0.763	0.091	86	0.692	0.078	394	0.779	0.086
Proportion of female seats in Lok Sabha	480	0.046	0.026	86	0.054	0.033	394	0.044	0.023
Gender Chief Minister	480	0.075	0.264	86	0.093	0.292	394	0.071	0.257
Female population	480	23770	15760	86	27046	10566	394	23055	16605
Female-male ratio	480	0.934	0.045	86	0.988	0.038	394	0.922	0.038
Police Force (per 1000 population)	480	0.353	0.347	86	0.157	0.184	394	0.395	0.360
Literacy Rate	480	0.538	0.151	86	0.707	0.142	394	0.501	0.125
per capita net state GDP ('000)	480	0.789	0.774	86	1.345	0.849	394	0.668	0.701