Suicide and Property Rights in India.

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Abstract

This paper studies the impact of female property rights on male and female suicide rates in India. Using state level variation in legal changes to women's property rights, we show that better property rights for women are associated with a *decrease* in the difference between female and male suicide rates, but an *increase* in both male and female suicides. We conjecture that increasing female property rights increased conflict within household and this increased conflict resulted in more suicides among both men and women in India. Using individual level data on domestic violence we find evidence that increased property rights for women did increase the incidence of wife beating in India. We develop a model of intra-household bargaining with asymmetric information and costly conflict to explain these findings.

Key Words: Suicide, Inheritance, Property Rights, Conflict.

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1 Introduction

Suicide rates in India have increased steadily over the last few decades.[1] The WHO estimates that there were 190 000 adult suicide deaths in India in 2010 alone. Suicide has become the second leading cause of death among young Indians - it is the cause of twice as many deaths as HIV/AIDS and almost the same number as maternal deaths in young women (Patel et. al. 2012).[2] This paper studies the impact of female property rights on male and female suicide rates in India.[3] Using state level variation in legal changes to women's property rights, we show that better property rights for women are associated with a *decrease* in the difference between female and male suicide rates, but an *increase* in both male and female suicides.[4] The large majority of suicide victims in India are married and the broad class of 'family problems' is the main reported cause of suicide for both men and women. We thus conjecture *marital discord* could be the main channel through which improving female property rights raise suicides.

Following Durkheim's (1897) ground breaking work, the relationship between marriage and suicides has been much studied empirically in sociology but mostly ignored in economics.[5] This sociological literature has long recognized the tendency for higher suicide rates, for both men and women, to be associated with increased equality across the sexes. It emphasizes how increased opportunities for women can accentuate tensions and marital discord within households, by challenging traditional roles, increasing the importance of negotiation and raising the potential for conflict. There are numerous empirical accounts investigating the possible consequences of female empowerment on suicides. For example, in the United States, Stack (1987) found a positive relationship between the labor force participation of wives and both the male and female suicide rates over the period 1948-1963, when antipathy towards female labor participation prevailed; and a smaller, but still positive relationship, with male suicide rates over the 1964-1980 period when female labor participation was more widely accepted.[6] Similarly, cross-country studies find a concave

[1] The estimated rate of increase is more than 40 percent. More detailed verbal autopsy studies suggest that annual suicide rates could be six to nine times these official rates (refer to Vijayakumar 2010).

[2] India is second only to China in terms of total number of suicides. Relative female to male mortality rates from this cause are high in both these countries compared to other regions. Refer to Anderson and Ray (2010) for an analsyis of excess female mortality at different ages by cause of death in China and India.

[3] Refer to Doepke et. a. (2012) for an overview on the economics of female property rights.

[4] These results are obtained while controlling for state and year fixed effects, socio-economic controls and robust to using political variables as instruments for pro-women legislative changes.

[5] Ligon et al. (2004) being an exception.

[6] Similar relationships are found for Canada (Trovato and Vos 1992).

effect of female labor participation on the female to male suicide ratio and a positive correlation between the UNDP's Gender Empowerment Measure (a measure of women's access to social, political, and economic power) and suicide rates for both women and men (Pampel 1998).[7] In China, the marriage law in 1950 that granted women the right to choose their own partners, demand a divorce, inherit property, and control of their children, might have resulted in an estimated 70,000 to 80,000 suicides and murders of women between 1950 and 1953 (Das Gupta et al 2000).

Suicides of married women and men as a response to family conflict are a common occurrence particularly in developing countries. Canetto (2008) discusses the cultural ramifications of suicide - that relative to developed countries, where suicidal behaviour tends to be interpreted as a symptom of individual mental health, in poorer countries, suicide is often considered a normal, albeit last resort response, to a serious family conflict.

Economists and sociologists have studied and found conflicting information on the association between violence and women's empowerment, particularly in terms of economic opportunity, control of assets and social group participation. In India for instance, some studies find that women with greater economic resources, such as ownership of land or employment were less likely to report violence (for example, Panda and Agarwal 2005), while in others, employed women have been found to report violence more frequently than unemployed women, and this is despite the higher income resulting from female employment (see for instance, Eswaran and Malhorta 2011). Likewise, Luke and Munshi (2011) find that when women in the tea plantations in South India earn a higher share of the household income, the probability of marital violence increase. In the context of Progresa in Mexico, Bobonis et al. (2012) find that although women in recipient households were significantly less likely to be victims of physical abuse than women in comparable non-beneficiary households, they were more likely to be victims of emotional violence and more likely to separate.

Using alternative individual level data, which contains measures of domestic violence, we find evidence that increased property rights for women did increase the incidence of wife beating in India. We thus conjecture that increasing female property rights increased conflict within household and it is this increased conflict which resulted in more suicides among both men and women in India.

This paper then develops a simple model of intra-household bargaining with asymmetry of information. In line with the recent literature on the economics of the family, our model assumes that there are gains from cooperation that spouses can generate in a marriage, and that husbands and

[7] Mayer (2003) finds similar correlations in India using state-wide variation in gender-related development indexes.

wives bargain over the allocation of consumptions in the household under the threat of separation (divorce or 'separate spheres model' a la Lundberg and Pollak (1993)). To this basic framework, we add two crucial elements: asymmetry of information and costly conflict. In typical models of intra-household bargaining, the outside options are never actually resorted to. As it is well-known in the bargaining and conflict literature, adding private information can generate delays and bargaining failure. Hence, we assume that husbands and wives derive some private value of their union that is not known to their spouse. Moreover, we aim to capture the idea that *conflict is an integral part of the bargaining process*. When an offer (regarding the division of resources) is rejected, conflict ensues. Threatening separation does create an atmosphere of discord within the household that comes at a cost, and separation cannot be achieved instantaneously. At any point though, individuals may instead choose the ultimate *exit* and commit suicide. Hence, separations and suicides are predicted by the model.[8]

With this simple model of intra-household bargaining and conflict, we show that a pro-women redistribution of resources can easily increase the likelihood of conflict between husband and wives, in which case, the ratio of female to male suicide rates decreases.

To be sure, we are not saying that improving female property rights is not desirable. Until recently, women have been excluded from land rights in many societies and their ability to inherit property has largely been restricted. A growing body of empirical evidence shows that improving women's asset ownership, relative income, or ability to control land impacts the intra-household allocation of resources towards children (among others Lundberg et al. 1997, Duflo and Udry 2004, Bobonis 2009). That improvements in women's relative position in the household can be desirable, not only on equity, but also on efficiency grounds is a frequent justification for policies targeting women, such as microcredit and conditional cash transfers. Moreover, there is evidence that making inheritance law more egalitarian between sons and daughters has had desirable consequences in India. For example, Roy (2010) and Deininger, Goyal, and Nagarajan (2010) show that the legal changes to women's property rights that we consider here increased daughters' likelihood to inherit land, women's age at marriage and the educational attainment of daughters.

[8]In Ligon et al (2004)'s dynamic model of bargaining, where divorce and suicide can occur, a key assumption is that there is a strong advantage to being the one leaving the other that can create a prisoner dilemma type of situation. When the marriage surplus is small (due to a shock), this preemptive advantage can make it impossible for the couple to stay together. If now one of the party prefers committing suicide than staying alone, suicide would result. However, it is not clear that such a preemptive advantage exists in the case of India.

In most economic models where ownership of assets matter (for a given level of resources), it does so by affecting the outside options of men and women, thereby affecting intra-household bargaining. When wives contribute a greater proportion of the total family wealth, they expect, and are more likely to get, a more equitable sharing of consumption decision power. In our model too, women's expected welfare rises due to increased female property rights. Rather our paper points out that greater female autonomy could also lead to increased conflict within the household and, in extreme cases, to higher suicide rates for both men and women.

The paper is organized as follows. The next section discusses the changes in female property rights that we study and then we describe our data. Section 4 contains our empirical analysis. Section 5 presents a theoretical model that is consistent with our results. Section 6 concludes.

2 Female Property Rights in India

Under traditional Hindu law, women had almost no rights to property ownership.Since 1956, the property rights for all Hindus have been governed by the Hindu Succession Act. *Hindus* in the Act include Sikhs, Jains, and Buddhists, and the Act applies to all states except Jammu and Kashmir - covering 86% of the Indian population.[9] The Hindu Succession Act of 1956 was aimed at unifying the existing legal doctrines guiding succession and establishing a law of succession whereby sons and daughters would enjoy similar property rights. While the Act significantly enhanced women's inheritance rights (Agarwal 1994), two major sources of inequalities remained: the Act exempted *joint family property* and *tenancy rights*.

Traditional Hindu Law (dating from the 12th century) distinguished between two types of property: *joint* family property versus *separate* property. The former is inherited ancestral property, the latter is purchased or inherited from persons other than father (grandfather, great grandfather, ...). If a man has no sons, his share of ancestral property became his separate property. Under the Hindu Succession Act of 1956, only the separate property of males devolves equally upon sons and daughters.[10] Since 1956, some states amended the Act so that both sons and daughters also have right to joint family property (Kerala in 1976; Andhra Pradesh in 1986; Tamil Nadu in 1989; Maharashtra and Karnataka in 1994). In other states, men remained the sole coparceners in joint

[9] Tribal communities of the north-eastern states are governed by customary law instead (mainly uncodified).
[10] Also widows and mothers.

family property until 2005. Under the Hindu Succession (Amendment) Act of 2005, all daughters, including married daughters, are coparceners in joint family property. In the empirical estimations that follow, we will be exploiting, these differences across states prior to 2005. We will interpret Amendments to the 1956 Act, which occurred prior to 2005, as a measure of increased inheritance rights for women in those states, for the years that the Amendment was in place (prior to 2005).

Another shortfall of the Hindu Succession Act of 1956 is that it does not cover land ownership stemming from tenancy rights.[11] The Hindu Succession (Amendment) Act of 2005 brought all agricultural land on par with other property. But prior to 2005, state tenurial laws governed tenancy rights and several states specified an order of devolution that strongly favors men. Additional laws which governed land ownership in India pertain to landholding restrictions. These landholding limits were defined per family unit, and the states vary in their definition of the family, where in some states daughters receive no recognition at all. Agarwal (1995) discusses the gender inequalities implicit in these state-level land and tenancy reform acts prior to 2005. Using this state level variation in the legal treatment of women with regards to land and tenancy reforms, we will construct alternative measures of pro-female property reforms to use in our empirical analysis.

3 Data

The data for the annual suicides for men and women in each state come from the National Crime Records Bureau of India. The data are available starting in the year 1967 through to the present. Police are expected to investigate all suspected suicides and the final verdict to determine cause of death is then passed to and reviewed by local government officials.[12] The most common means of suicide adopted in India – the ingestion of poison (35%), usually agricultural pesticides, and hanging (32%) account for nearly 70% of suicides (Mayer and Ziaian 2002) – ensure that a substantial amount of cases will come to the attention of the police. Nevertheless, suicides are likely under-reported - for one, suicide is illegal in India. Substantial under-reporting is confirmed by detailed epidemiological studies that find, in some areas, suicide rates are as much as four to six times higher than the official rates (Gajalakshmi and Peto 2007, Joseph et al 2003, Soman et. al. 2009). However, the general patterns of suicide rates in the official data that we will be focusing on in our analysis match those found in these more detailed micro-level analyses. Of particular relevance

[11] In some states, the definition of tenant was so broad as to encompass most agricultural land.
[12] Official suicide rates are then estimated off a sample of the population.

to our work, roughly the same female to male suicide ratio is found. Moreover, our empirical strategy will be to examine variation in suicide rates across time and state. In particular, we will be exploiting the impact of a legal change in female property rights which varies by state and year in India on annual suicide rates of men and women. In our estimations, we will be controlling for year and state fixed effects, therefore the under-reporting of suicide rates could only be biasing our results if this under-reporting is systematically correlated with one particular legal change across the states.

As discussed, the legal changes we focus on are Amendments to the Hindu Succession Act of 1956, which vary by year and state until 2005, when the Hindu Succession (Amendment) Act of 2005 was implemented throughout the country. Our period of analysis is therefore, 1967 (the first year that the suicide data are available) to 2004. Suicide rates over this period are shown in Table A1 in the Appendix. Average suicide rates are 11 and 7.3 (per 100,000) for men and women respectively. The male to female suicide rate ratio for the entire period is 1.5. This ratio is much lower than for most Western countries (where it is usually three time as large), and it is close to 1 for the age group 15-29. Figure 2 in the Appendix shows the male and female suicides rate over time in each of the fifteen Indian states studied here.

For all of our control variables, we use panel data for fifteen major Indian states over the period 1967-2004. Table A1 in the Appendix provides means and standard deviations for the main variables used in the paper. These variables are averaged over the entire period. The data sources are described in more detail in the Appendix.

4 Empirical Analysis

4.1 Basic Results

Our first set of estimations examine the effect of Amendments to the Hindu Succession Act of 1956, which vary by state and year, on male and female suicide rates. As discussed in Section 2, since 1956 some states amended the Act so that both sons and daughters have right to joint family property (Kerala in 1976; Andhra Pradesh in 1986; Tamil Nadu in 1989; Maharashtra and Karnataka in 1994). In other states, men remained the sole coparceners in joint family property until 2005. We use this variation in the Amendments, by state and year, to determine the effect

on male and female suicide rates over the period 1967-2004.

In particular, the first set of estimating equations is represented by the following:

$$S_{st}^{i} = \beta_0 + \beta_1 X_{st} + \beta_2 A_{st} + \lambda_s + \gamma_t + \varepsilon_{st} \quad (1)$$

Where S_{st}^{i} refers to either the suicide rate of females ($i = F$) or males ($i = M$), per 1000 individuals (of group i), in state s and year t. X_{st} includes a set of state and time varying controls. A_{st} is our key variable of interest. It is equal to 1 if state s, in year t, has already passed an Amendment Act which increased inheritance rights to women and 0 otherwise (refer to the Appendix for details on the construction of this variable). λ_s and γ_t are state and year fixed effects respectively, and ε_{st} is a regression disturbance term.

Fixed effects at the state level control for the usual array of cross state differences in history, family and economic structure that have been constant over our sample period, while the year effects cover macro-shocks, trends in female empowerment and policies enacted by the central government that affect suicide rates.

Table 1 present the OLS estimates of (1). Columns 1 and 4 show that, controlling for state and year fixed effects, the Amendments are associated with an increase of 3 suicides (per 100,000) for female and 6 (per 100,000) for males (recall the average suicide rate is 7.3 and 11 (per 100,000) for women and men respectively). To be sure, economic and cultural factors are likely to matter for suicides. Adding cultural controls (population shares of Muslims, Hindus, Scheduled Tribes and Scheduled Castes) only reduces these estimates by 1 suicide (per 100,000). Economic factors (state income per capita, rural food production, yields, the incidence of floods or droughts, average rainfall, banks per capita, urbanization, and share of state expenditure on heath, development and education) explain much more of the variation in suicide rates, but columns 3 and 6 show that the Amendments still resulted in a substantial increase in suicides: 1 more female suicide (per 100,000) and 3 more male suicides (per 100,000).

*****Insert Table 1*****

We also estimate (1) for relative female to male suicide rates. We use two measures: the simple difference ($S_{st}^{F} - S_{st}^{M}$) and also the ratio (S_{st}^{F} / S_{st}^{M}). Table 2 reports the results from these

estimations. We see, that the Amendments significantly reduce both of these relative measures. That is, although both male and female suicide rates increase with the Amendments (as seen in Table 1), male suicide rates increase by more. Controlling for state and year fixed effects as well as economic and cultural variables, we see (from Column 6 of Table 2) that the Amendment decreases the female to male suicide ratio by 0.08 (where the average of this ratio is 0.74).

*****Insert Table 2*****

4.2 Robustness Checks

Tables 3 and 4 below report results from a series of robustness checks on the effect of the Amendments on suicide rates of females and males respectively. The first column in the tables reports the results from an estimation which includes an alternative set of controls that represent different economic and cultural measures as well as some additional geographic measures (see the table notes for details). The second estimation excludes the state of Kerala. This state is distinct for many reasons, not only because it was the first to pass the Amendment Act but also it has the highest overall suicide rates in the country. Moreover it is an anomaly in India with regards to the status of women, along many positive dimensions. The third estimation excludes the three states (Bihar, Punjab, and Uttar Pradesh), where, as seen in Figure 1, the average suicide rates for both men and women have been decreasing through time. In addition, these three states have the lowest overall suicide rates in the country. The estimation reported in the fourth column includes state specific linear time trends. In the fifth estimation we attempt a placebo test which includes an additional dummy variable, denoted A_{st-10}, which is equal to 1 for all years greater or equal to $t-10$, if state s passed the Amendment Act in year t and zero otherwise. If it is indeed the effects of the Amendment that we are picking up in our estimation of (1), then we should expect that the estimated coefficient on in this additional dummy variable, A_{st-10}, to be insignificant in the estimations. We see from the results that this is the case: the effects of the Amendment are only significant for the years when the Amendment was actually passed, and not significant if we *pretend* the Amendment was passed instead 10 years prior. The final column reports estimation results of (1) where standard errors are clustered at the state level. We see from all of these estimations, that our main finding, that the passing of the Amendment Acts (which increased inheritance rights to women) significantly increased female and male suicides, persists.

Insert Tables 3 and 4

Table 5 below reports analogous estimation results for the relative ratio of female to male suicide rates (S^F_{st}/S^M_{st}). Again, our results of the earlier section are robust, where the Amendment Acts significantly increased male relative to female suicide rates.

Insert Table 5

A final set of estimations, reported in Table A4 in the Appendix, demonstrates that these results are also robust to using the years since the Amendment was in place instead of a dummy variable equal to 1 in each year that the Amendment has been passed, as A_{st} is defined in (1).

4.3 Instrumental Variables Estimations

In the OLS estimates presented so far, there is still a concern that unobservables possibly determine both suicides and property legislation. To address this issue we attempt to instrument for these legislations. We follow the strategy of Besley and Burgess (2000) who conjecture that different groupings in the state legislature enact different Amendments and Acts. Specifically, we use the seat shares of different political groups, lagged by one period, as instruments. To correspond to the set of estimations represented by (1), this implies a first-stage estimation:

$$A_{st} = \gamma_0 + \gamma_1 X_{st} + \gamma_2 Z_{st-1} + \varphi_s + \psi_t + \eta_{st} \tag{2}$$

where Z_{st-1} are the political variables reflecting the seat shares of different political groups, each lagged by one period. These are constructed from data from the Election Commission of India who record the number of seats won by different parties in each state election (see the Appendix for details).

The first stage estimation results are presented in the first column of Table 6 below. It shows that state parties and the Congress party were more likely than Hindu parties to pass Amendments to the Inheritance Law while the soft left parties were less likely to pass them (the F-test on the instruments is about 10). Columns 2 to 5 show that, controlling for cultural and economic factors, the results of Tables 1 and 2 remain robust to this instrumenting strategy. That is, the

Amendments increased both female and male suicide rates, but increased that of males by more, where the magnitude of the coefficients in these IV estimations are larger than those in the OLS estimations.

*****Insert Table 6*****

4.4 Alternative Property Rights Measures

In this section we consider an alternative measure of property rights for women. The previous estimations pertain to variation across states and time with regards to legislating Amendments to the Hindu Succession Act which granted sons and daughters similar rights to joint family property. However, there are additional laws which govern land ownership in India which pertain to tenancy rights and landholding restrictions.[13] Agarwal (1995) discusses the gender inequalities implicit in these state-level land and tenancy reform acts. The succession rules relating to land held under tenancy are different than the personal laws. In a subset of states, devolution of tenancy land is only to male heirs. In other states, daughters and sisters are recognized but come very low in the order of heirs. In the remaining states, personal law applies to tenancy land and women have some rights over the land. Landholding laws are defined by the maximum landholding per family unit and the states vary in their definition of family. In some states, the family constitutes the cultivator and his/her spouse, sons, and unmarried daughters. In other states, the family unit includes all children (married or not). In many states, adult sons receive special consideration and the parental household can hold additional land on account of each adult son. In other states, adult sons, count as a separate unit and are entitled to hold land in their own right. In many of these enactments, unmarried adult daughters receive no recognition at all, they do not count either as part of the family unit or as a separate unit and in other states, married daughters do not receive recognition.

Using this state level variation in the legal treatment of women, we construct alternative measures of pro-women property reforms. In particular, we use the cumulative indexes of state-level landholding and tenancy reforms used by Besley and Burgess (2000). We then interact these measures with an index which captures the degree to which these reforms favoured women in accord with Agarwal (1995). Specifically, we estimate:

[13]The Hindu Succession Act covers only owned agricultural land and does not cover land stemming from tenancy rights.

$$S^i_{st} = \alpha_0 + \alpha_1 X_{st} + \alpha_2 L_{st} + \alpha_3 FL_s * L_{st} + \alpha_4 T_{st} + \alpha_5 FT_s * T_{st} + \delta_s + \theta_t + \epsilon_{st}. \quad (3)$$

In this case, our key variables of interest are represented by L_{st}, T_{st}, $FL_s * L_{st}$ and $FT_s * T_{st}$. L_{st} is a cumulative index of state-level landholding reforms, and T_{st} is a cumulative index of tenancy reforms. Both of these are constructed from the data used by Besley and Burgess (2000), see the Appendix for details. FL_s is an index of the degree to which these landholding reforms favored women in accord with Agarwal (1995). $FL_s = 1$ if married and unmarried daughters receive no recognition; $FL_s = 2$ if married but not unmarried daughters receive recognition; and $FL_s = 3$ if unmarried and married daughters receive recognition. FT_s is an index of the degree to which these tenancy reforms favored women in accord with Agarwal (1995). $FT_s = 1$ if the devolution of tenancy land is only to male heirs; $FT_s = 2$ if daughters and sisters are recognized but come very low in the order of heirs; $FT_s = 3$ if personal law applies to tenancy land and women have some rights over the land. δ_s and θ_t are state and year fixed effects respectively, and ϵ_{st} is a regression disturbance term.

The estimation results of (3) are reported in Table 7. We see that a similar picture emerges when considering these alternative measures of pro-women reforms. While the overall cumulative landholding and tenancy reforms reduce both male and female suicide rates, the effect varies widely depending on whether these reforms favor men or women. Landholding reforms that favor men (rate 0 on the pro-women scale) reduce female suicides by 6 (per 100,000) and male suicides by 15 (per 100,000), whereas landholding reforms that rate 1 on our pro-women scale only reduces female suicide by 3 (per 100,000) and male suicide by 8 (per 100,000). Similarly pro-male tenancy reforms prevent 2 female and 3 male suicides (per 100,000), while pro-female tenancy reforms (which rate 1 on our pro-women scale) only prevent only 1 female and 2 male suicides (per 100,000). In both cases, the effects of the interaction terms (α_3 and α_5) are positive and significant in all estimations and larger for male suicide rates.

*****Insert Table 7*******

Table 8 presents the OLS estimates of the effects that these pro-female land reform measures have on the relative suicide rate of women to men, measured as the difference ($S^F_{st} - S^M_{st}$) and also the ratio (S^F_{st} / S^M_{st}). Consistent with our earlier estimations, we see that landholding and tenancy reforms which favour men (women) increase (decrease) relative female to male suicide rates.

Insert Table 8**

4.4.1 Instrumental Variables Estimations

Finally, we also estimate an IV specification of (3). In a two-stage estimation, where the second-stage estimates are represented by (3), we need to instrument for both, the cumulative indexes of reforms, L_{st}, and T_{st}, as done in Besley and Burgess (2000), and also their interaction with the female oriented policy indices, $FL_s * L_{st}$ and $FT_s * T_{st}$. To this end, as recommended by Angrist and Pischke (2009, p. 191), we first estimate the following:

$$L_{st} = \delta_0 + \delta_1 X_{st} + \delta_2 Z_{st-1} + \pi_s + \sigma_t + \mu_{st} \tag{4}$$

$$T_{st} = \theta_0 + \theta_1 X_{st} + \theta_2 Z_{st-1} + \phi_s + \alpha_t + \upsilon_{st} \tag{5}$$

Where X_{st} and Z_{st-1} are the same variables defined in (2). We then use the predicted values, $\widehat{L}_{st}$ and $\widehat{T}_{st}$, from (4) and (5) respectively, and their interactions with the female policy index, $FL_s * \widehat{L}_{st}$ and $FT_s * \widehat{T}_{st}$, as instruments in the four first-stage estimations of L_{st}, T_{st}, $FL_s * L_{st}$ and $FT_s * T_{st}$ in a conventional 2SLS procedure:

$$L_{st} = \lambda_0 + \lambda_1 X_{st} + \lambda_2 \widehat{L}_{st} + \lambda_3 FL_s * \widehat{L}_{st} + \tau_s + \chi_t + \iota_{st} \tag{6}$$

$$FL_s * L_{st} = \rho_0 + \rho_1 X_{st} + \rho_2 \widehat{L}_{st} + \rho_3 FL_s * \widehat{L}_{st} + \omega_s + \delta_t + \zeta_{st} \tag{7}$$

$$T_{st} = \pi_0 + \pi_1 X_{st} + \pi_2 \widehat{T}_{st} + \pi_3 FT_s * \widehat{T}_{st} + \gamma_s + \phi_t + \xi_{st} \tag{8}$$

$$FT_s * T_{st} = \sigma_0 + \sigma_1 X_{st} + \sigma_2 \widehat{T}_{st} + \sigma_3 FT_s * \widehat{T}_{st} + \kappa_s + \pi_t + \varrho_{st} \tag{9}$$

The first columns in Table 9 and 10 show that political variables are strongly significant deter-

minants of landholding and tenancy reforms (F-tests of about 30 and 20 respectively). In particular, hard left parties increase the likelihood of these reforms.

Columns 4 and 5 in Table 9 show that landholding reforms have large effects on suicides. Pro-male landholding reforms significantly decreased male and female suicide rates, while pro-female landholding reforms (by one unit) have on average *half* the reducing effects. The remaining two columns show similar results for the relative female to male suicide rates, where again, pro-female landholding reforms increase this relative measure by roughly half.

*****Insert Table 9******

Table 10 reports the analogous results for the tenancy reforms. We see very similar relationships between pro-female tenancy reforms and suicide rates. Taken together these results demonstrate a very consistent picture. Improving female property rights *raise both* female and male suicides, but more the latter so that the relative female to male suicide rates decrease.

*****Insert Table 10******

4.5 Family Conflict as a Channel

According the National Crime Records Bureau Reports on suicides, based on police investigations of the deaths, roughly 70 percent of the individuals who commit suicide are married and fall into the age group of 15-44. Suicide victims are more likely to be educated (only about 20 percent have no education). For women, about 55 percent are housewives. These similar patters are bourne out in the more careful micro-level studies (Gouda and Rao 2008, Mohanty et. al. 2006, Patel et. al. 2012).[14]

The broad class of "family problems" accounts for the single largest cause of suicides irrespective of gender in the national level data. More specifically, this category refers to quarrels with spouse, parents, or in-laws and accounts for the majority of suicides among the 15 to 44 age group for

[14]These studies are typically conducted by health care workes and rely on verbal autopsy data. Soman et. al. (2009), for example, performed a cohort study where villages were visited repeatedly for five years. Each reported death was investigated by local health care workers as well as a physician who conducted a validation study of each death and a detailed inquiry of household and village members.

both males and females. Illness is the second most important cause associated with suicides (this does not typically refer to mental illness but more commonly to a serious (likely terminal) illness) and accounts for the majority of suicides for individuals aged 60 and over. Other causes like poverty, bankruptcy, and dowry disputes are cited as the causes of only 2 to 3 percent of suicides respectively. Again, these relationships are also found in the micro-level studies which point to marital disharmony as a main cause of suicide (Mohanty et al. 2006, Gouda and Rao 2008).

Given that the majority of suicides seem to be due to family conflict, we now test to see if the effects of the Amendments on suicide rates, found in the earlier section, are determining this particular cause of suicides. To this end, Table 11 reports results from analogous estimations to (1), where the dependent variable is instead the suicide rate from family problems for males and females. We see that, as before, the Amendment Acts (which increased inheritance rights for women) significantly increase both these male and female suicide rates, where the estimated coefficient is larger for males.

****Insert Table 11 ******

Table 12 reports results from analogous estimations to (1), where the dependent variable is instead the proportion of total suicides which are due to family problems, for both males and females. Columns 1 to 4, report this proportion, relative to all suicides, by gender. We see that, consistent with the earlier findings, the Amendment Acts significantly increase the proportion of suicides due to family problems for both males and females. Columns 5 and 6 report this proportion relative to total suicides only where the cause is known. We see that the main results persist and that the estimated effects are large, where the increase in the proportion of suicides attributed to family problems is more than 25 percent for both males and females.

****Insert Table 12 ******

The fact that it is male and female suicides caused by family problems and martial disharmony that have increased with the Amendment Acts, we conjecture that increasing female property rights increased conflict within household and that this increased conflict resulted in more suicides among both men and women. We now turn to an alternative data set to test this conjecture more directly.

We use individual level data from the National Family Health Surveys of India (NFHS-2 and NFHS-3), which comprise detailed information on violence against women collected from married women aged 15-49.

In particular, we estimate the following:

$$Y_{is} = \psi_0 + \psi_1 X_{is} + \psi_2 A_{is} + \alpha_s + \varepsilon_{is}. \tag{10}$$

Where Y_{is} is an outcome variable for an individual female i residing in state s. We focus on two measures of violence against women as our outcome variables of interest. The first takes on a value of 1 if a given female i (residing in state s) thinks that wife beating (by her husband) is justified under any of a number of circumstances (refer to the Appendix for details), and zero otherwise. The second takes on a value of 1 if a given female i (residing in state s) has been beaten by her husband, and zero otherwise. Roughly 50 percent of women in our sample think that wife beating is justified, and roughly 25 percent have been beaten by their husbands. X_{is} is a vector of individual and household control variables which include: education, age, and occupation of wives and their husbands; caste and religion of wives; household location (rural or urban); and household durable good ownership. Table A2 in the Appendix presents summary statistics on these variables. Our key independent variable of interest is A_{is}, which is computed as the number of years a woman i, residing in state s, has been married with the Amendment in place. α_s are state fixed effects.

We use two waves of the surveys to estimate (10). Table 13 reports the estimation results using the 1998 survey (NFHS-2). We see that, consistent with our conjecture, the Amendments (measured by A_{is}) have a positive and significant effect on both outcome variables; that is, both the justification and the occurrence of wife beating (as reported by wives). These results suggest that, increasing property rights in favour of women, can lead to more violence against women.

****Insert Table 13 ******

Table 14 below repeats the estimations using the 2005 survey (NFHS-3) instead. We see that the main results persist.

****Insert Table 14 ******

5 The Model

The empirical evidence of the earlier sections suggests that increasing female property rights increased conflict within household and that this increased conflict resulted in more suicides among both men and women. This section presents a model of intra-household bargaining with asymmetry of information that captures the idea that, within a household, arguing is akin to starting a conflict. While bargaining and conflict are most often studied separately or as alternatives, there is a burgeoning literature that recognize that conflict is often an intrinsic part of bargaining (see Sanchez-Pages 2009).

In our model, husbands and wives can use their resources to generate a surplus, and they bargain over its allocation. As is common in the literature on intra-household bargaining, who owns the resources in the household matters by affecting the outside options of the spouses.[15] In order for bargaining to fail some of the time, we assume that each spouse derives some private satisfaction with the marriage, whose magnitude is unknown to their partner. Asymmetry of information constitutes a first departure from most of the literature on intra-household bargaining.[16]

But what is truly distinct in this model is that we assume that when an offer is rejected, marital discord or conflict ensues. This comes at a cost to each spouse, and a cost whose magnitude is realized only at the time of the conflict. Separation cannot be achieved without going through a period of marital conflict. In contrast, suicide, the ultimate exit, can be achieved instantaneously.

In our choice of modeling, we wanted to capture, or at least accommodate, the main views on suicide. Leenars (1996) provides a useful overview of the psychological perspective on suicide and of Schneidman's work (the father of suicidology who pioneered the use of hotlines as a means of suicide prevention). Both authors point to a lack of coping responses among people who attempt or commit suicide. A recent traumatic event can be identified in many suicides. In particular, suicide is linked to events involving loss or conflict in existing interpersonal relationships. However, it is not simply the stress or even the pain, but the person's inability to cope with the event or pain. The common stimulus in suicide is unendurable psychological pain. The person may feel any number of emotions but it is the feeling of being hopeless-helpless that is particularly painful for many suicidal people.

[15] In the 'unitary' model of the household, who owns the resources does not affect any of the household choices. This model has been empirically rejected in most contexts.

[16] We are aware of only a couple of papers with intra-household bargaining and asymmetry of information: Bloch and Rao (2002) and Friedberg and Stern (2010).

The situation is unbearable and the person desperately wants a way out of it, an exit. The suicide is functional because it abolishes painful tension for the individual. It provides relief from suffering. Schneidman identified cognitive constriction (i.e., rigidity in thinking, narrowing of focus, tunnel vision, etc.) as a common cognitive state among those who die by suicide, preventing individuals in pain from perceiving ways to end the pain other than death.

Hence, we think of the cost of conflict in our model as the psychological and or physical pain that the spouses do endure during an episode of marital discord. It's magnitude is uncertain ex-ante since it depends on many factors, including their ability to cope and put weight on the future. When the pain is too acute, individuals may choose to commit suicide to end it.

5.1 Preferences

The preferences of husbands and wives depend on the status of their marriage.

If the marriage is intact, both spouses enjoy the household resources, and some surplus is generated. Moreover we assume that each has a personal level of satisfaction with the marriage that is private information (as in Bloch and Rao 2002). Specifically, we assume that preferences can be represented by the utility functions

$$V^h(I_h + I_w, x, \theta_h) \;\&\; V^w(I_h + I_w, x, \theta_w), \tag{11}$$

where I_j for $j \in \{h, w\}$ represent the resources of the husband and wife, x indicates how pro-wife the division of non public goods are within the household, and θ_j for $j \in \{h, w\}$ are the husband and wife's private level of satisfaction with the marriage. These satisfaction levels are independent and each follows a distribution $G_j(\theta)$.[17] V^w and V^h are strictly increasing in income and personal satisfaction, and weakly concave in income. Moreover, V_w is strictly increasing and concave in x while V_h is strictly decreasing and convex in x, $\partial^2 V^w(I, x, \theta_w)/\partial I \partial x < 0$ and $\partial^2 V^h(I, x, \theta_h)/\partial I \partial x > 0$, where $I = I_h + I_w$.

If the husband and wife separate or revert to "separate spheres" (Lundberg and Pollak (2003)),

[17] Adding a joint component to the satisfaction in the marriage that is known to both parties would not affect the analysis.

their preferences change and are given by the following utilities

$$U^h(I_h) \;\&\; U^w(I_w), \tag{12}$$

where U^h and U^w are strictly increasing and concave.

5.2 Timing

Once a husband and wife are married, the personal levels of satisfaction with the marriage are revealed. The husband then makes an offer x to his wife. If the wife accepts, all is well and they enjoy the utilities V^h and V^w in (11). If she refuses, it triggers marital discord or conflict within the household. This means that both husband and wife incur costs (of conflict) κ_h and κ_w drawn from a distribution F (where F_j indicates the marginal distribution for $j \in \{h, w\}$) before separating or reverting to their separate spheres and enjoying utilities U^h and U^w in (12). At any point in this process, individuals may instead choose to *exit*: end the pain and commit suicide.

To be sure, this is an extremely simplified model of conflict and bargaining. It allows us to illustrate our point while avoiding the multiplicity of equilibria that would arise with multiple rounds of bargaining (due to signaling).

5.3 Decisions

Working backwards, consider a situation where a wife has rejected her husband's offer. This refusal initiates conflict within the household, and husband and wives observe their costs of conflict κ_h and κ_w. Her utility will be $U^w(I_w) - \kappa_w$ unless she kills herself, in which case she gets 0. Hence, she stays alive if $\kappa_w \leq U^w(I_w)$. Similarly, the husband ends his days if $\kappa_h > U^h(I_h)$, and otherwise gets utility $U^h(I_h) - \kappa_h$. Note that these expressions assume that κ captures the cost of conflict with a spouse or the cost of dealing with the spouse's suicide. This assumption simplifies the analysis by removing any strategic element to the decision of suicide.

It follows that, if the wife rejects an offer, her expected utility is given by

$$E^w(I_w) \equiv F_w[U^w(I_w)]U^w(I_w) - \int_0^{U^w(I_w)} \kappa dF_w(\kappa) \tag{13}$$

while her husband's expected utility is

$$E^h(I_h) \equiv F_h[U^h(I_h)]U^h(I_h) - \int_0^{U^h(I_h)} \kappa dF_h(\kappa). \tag{14}$$

Hence, a wife accepts an offer x if:

$$V^w(I, x, \theta_w) \geq E^w(I_w), \tag{15}$$

where $I = I_w + I_h$.

Let $\widetilde{\theta}(x)$ be the value of θ_w so that inequality (15) holds with equality. $G_w[\widetilde{\theta}(x)]$ is the probability that an offer x is rejected.

The husband chooses an offer x that maximizes his expected utility

$$\left(1 - G_w[\widetilde{\theta}(x)]\right) V^h(I, x, \theta_h) + G_w[\widetilde{\theta}(x)]E^h(I_h). \tag{16}$$

Let $x^*(\theta_h)$ denote the solution to this problem. If the solution is interior,

$$\left(1 - G_w[\widetilde{\theta}(x)]\right) \frac{\partial V^h(I, x, \theta^h)}{\partial x} - \frac{\partial G_w[\widetilde{\theta}(x)]}{\partial x} \left(V^h(I, x, \theta_h) - E^h(I_h)\right) = 0. \tag{17}$$

5.4 Pro-Women Redistribution

We are interested in the effect of changes in property rights that increase women's resources and decrease men's resources. To be sure, such changes would affect not only bargaining within households but the marriage market as well. However, in a society where there are many households of different wealth levels, each having a boy and a girl, if assortative matching between the families results, men would marry women of the same wealth as their sister. Hence, a change in property rights that is pro-women would result in a one-to-one transfer of wealth between partners.

Consider the effect of a pro-women redistribution of wealth, an increase in I_w by τ that is exactly compensated by a decrease in I_h.

Proposition 1 *When suicide rates are positive, a pro-women redistribution of resources decreases*

the ratio of female to male suicide rates.

Suicides rates consist of the probability of conflict times the probability of committing suicide in the case of conflict. Hence, the female suicide rate S_f is given by

$$S_f = \int G_w[\widetilde{\theta}(x^*(\theta_h))]\,(1 - F_w[U^w(I_w)])\,dG_h(\theta_h), \tag{18}$$

and the male suicide rate is given by

$$S_m = \int G_w[\widetilde{\theta}(x^*(\theta_h))]\left(1 - F_h[U^h(I_h)]\right)dG_h(\theta_h). \tag{19}$$

The female to male ratio, S_f/S_m, decreases if $\ln S_f - \ln S_m$ decreases, that is $\frac{dS_f/d\tau}{S_f} < \frac{dS_m/d\tau}{S_m}$. This is clearly the case as

$$\begin{aligned}
\frac{dS_f/d\tau}{S_f} &= \frac{d\left(\int G_w[\widetilde{\theta}(x^*(\theta_h))]dG_h(\theta_h)\right)/d\tau}{\int G_w[\widetilde{\theta}(x^*(\theta_h))]dG_h(\theta_h)} - \frac{f_w[U_w(I_w)]}{1 - F_w[U_w(I_w)]}U^{w'}(I_w) \\
\frac{dS_m/d\tau}{S_m} &= \frac{d\left(\int G_w[\widetilde{\theta}(x^*(\theta_h))]dG_h(\theta_h)\right)/d\tau}{\int G_w[\widetilde{\theta}(x^*(\theta_h))]dG_h(\theta_h)} + \frac{f_h[U_h(I_h)]}{1 - F_h[U_h(I_h)]}U^{h'}(I_h).
\end{aligned}$$

To be sure, the effect of a pro-women redistribution of wealth on the suicide rates for both genders is *ambiguous*. Of crucial importance is the effect of a pro-women redistribution on the likelihood of conflict. If it increases, the suicide rate of men increases while the suicide rates of women can move in either direction.

Why is a pro-women redistribution likely to increase conflict? Assume that V^w is separable in θ_w and that $\frac{1-G_w(\theta)}{g_w(\theta)}$ is decreasing in θ. And let's call *surplus* the difference between the utility in a peaceful marriage and the utility once separated, that is

$$\Delta_i \equiv V^i(I, x, \theta_i) - E^i(I_i),\ for\ i \in \{h, w\}.$$

A decrease in conflict requires that the increase in x^* following a pro-women distribution is sufficiently high to increase the wife's surplus (it more than compensates the increase in her outside option); but for such an increase to satisfy the first order condition, the husband's surplus needs

also to increase. Whether it is even possible for both surpluses to increase and conflict to decrease depends on the utility function and the distributions.

5.5 An Example

In the example that follows, we suppose that utilities are linear:

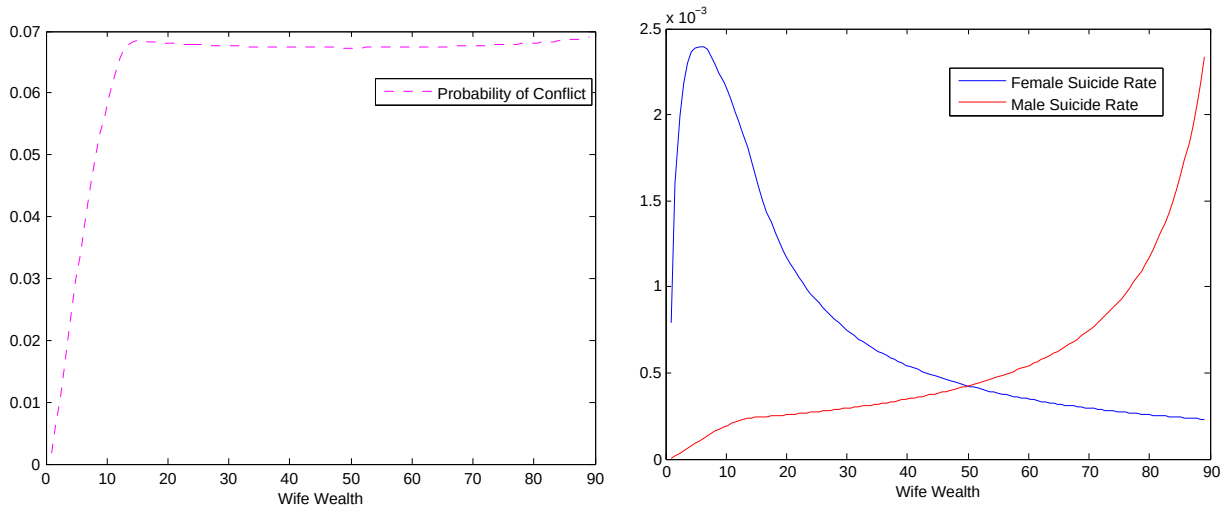
$$V^w(I, x, \theta_w) = xbI + \theta_w \ \& \ V^h(I, x, \theta_h) = (1 - x)bI + \theta_h$$

and θ^h are assumed to be uniformly distributed between 0 and $\overline{\theta}$.

When wives own nothing they'll accept anything and therefore husbands offer $x = 0$ and there is no conflict. If the surplus from marriage is small compared with the range of private satisfaction form the marriage $(b-1)I < \overline{\theta}$, husbands with low valuations offer to keep all the joint gain from the marriage as long as women's share of wealth is low enough. Conflict necessarily rises over this interval. Then, as we keep on raising women's share of wealth, x will increase and conflict will first decrease as women and men are becoming more equal and then increase as women become richer. Naturally, men with a very high satisfaction from the marriage will make offers that their wives will accept for certain.

This is illustrated in the example that follows. We set $b = 1.2$, $\overline{\theta} = 50$ and $U^j(I) = I$ for $j \in \{h, w\}$. The private satisfaction from the marriage θ^w and the costs of conflict are assumed to be independent and follow a Pareto distribution ($\underline{\kappa} = 0.5$ and $\alpha = 1.1$).

We set the total resources at $I = 100$ and progressively raise the level of resources owned by the wife I^w from 1 to 99. Figure 1 shows the consequence of a pro-women redistribution on the likelihood of conflict and on the suicide rates of men and women. These are averaged over the different realizations of the levels of private satisfaction. We see that the likelihood of conflict rises over a large range of the division of assets. This increase in conflict is always associated with an increase in male suicides, and sometimes with an increase in female suicides. When conflict decreases, female suicides decline. The female to male suicide ratio declines throughout.



(a) likelihood of conflict

(b) suicide rates

Figure 1: Effect of Pro-Women Redistribution

5.6 Other Possible Explanations

Our data do not allow us to directly test whether the above explanation is the actual channel through which improvements in property rights increased suicide rates in India. Other explanations are possible.

For instance, it might be that conflict between brothers and sisters, not husbands and wives, increased as a result of the reforms. This would not change the way we think about this theoretically, as we can use the above framework to model bargaining between a sister and a brother over assets I.[18] However, we think that it is less likely to be a main explanation as in micro-studies of suicides mentioned in Section 3 marital disharmony was cited as a main trigger while dispute among siblings was not.

Another possibility is that, following the reform, some men pushed women to suicide to obtain their resources. Note though that this would only explain the increased female suicide and therefore

[18] I_j would be the assets that j is entitled by law, x the division of assets, and θ_j the value that j attaches to the relationship with his or her sibling.

needs to be combined with another explanation.[19]

6 Conclusion

Our paper has demonstrated a positive relationship between better property rights for women and female and male suicide rates in India. We conjecture that increased marital conflict could be the main channel through which improving female property rights raise suicides. Our findings are consistent with the sociological literature, which emphasizes how increased gender equality can accentuate tensions and distress within households - leading to a greater incidence of male and female suicides. The empirical accounts from industrialized countries suggest that this dire consequence of increased opportunities for women may be mitigated once societal institutions adjust and there is a greater acceptance of the new gender roles.

Of course, from a policy perspective, one would never want to advocate reducing gender equality on a account of its link to suicide rates. Rather, the evidence provided here contributes more to the sociological literature which focuses on the profound sociological significance of the unprecedented rise in women's empowerment and its effect, both negative and positive, on a variety of social dimensions. By contrast, the economic literature on behaviour in the household, has mainly focused on the positive effects of increasing women's outside options. By explicitly considering costly conflict in the household, we demonstrate some more subtle features of increased bargaining power of women.

[19]Moreover, following concerns over dowry violence, when a woman commits suicide within 7 years of her married life, her husband quickly comes under suspicion. That is, if there is evidence that her husband or his relatives had treated her with cruelty, it would be presumed by the Court that her husband or relatives had aided (abetted) her suicide (Section 113 A of the Indian Evidence Act).

7 Appendix

7.1 Data Sources

Dependent Variables: Suicide numbers by gender and cause come from National Crime Records Bureau of India.

Instrumental Variables: Political variables come from Election Commission of India.

Cultural Controls: Population, religion, and caste data come from decennial census published in the Annual Statistical Abstract of India. Variables are interpolated between censuses.

Economic Controls:

State expenditure data, rainfall, drought and flood information comes from the EOPP Indian States Data Base at STICERD, London School of Economics.

Bank availability come from the Burgess and Pande (2005) data set.

7.2 Variable Definitions

State Dummies: States included: Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamil Nadu, Uttar Pradesh, and West Bengal.

Year Dummies: Years covered 1967-2004

Female Inheritance Amendments: $A_{st} = 1$ for $t \geq 1976$ for Kerela; $A_{st} = 1$ for $t \geq 1986$ for Andhra Pradesh; $A_{st} = 1$ for $t \geq 1989$ for Tamil Nadu; $A_{st} = 1$ for $t \geq 1994$ for Maharashtra and Karnataka; and $A_{st} = 0$ otherwise.

Land Reform Indexes: L_{st} is the cumulative number state-level legislations regarding landholdings. These include legislations which implemented ceilings on landholdings (Type 3 in the Besley-Burgess data); and acts that consolidated disparate landholdings (Type 4 in the Besley-Burgess data). T_{st} is the cumulative number of state-level legislations regarding tenancy rights. These include acts which regulate tenancy contracts, abolish tenancy, and transfer ownership to tenants (Type 1 in the Besley-Burgess data); and acts which attempt to abolish intermediaries (Type 2 in the Besley-Burgess data). In accord with the Besley-Burgess data, amendments to the acts count as new legislations.

FT_s is an index which increases in the rights women have regarding tenancy acts. Using the information in from Table 2 in Agarwal (1995) , we code this: $FT_s = 1$ if the devolution of tenancy

land is only to male heirs {Punjab, Uttar Pradesh, Jammu and Kashmir, Haryana, Himachel Pradesh}; $FT_s = 2$ if daughters and sisters are recognized but come very low in the order of heirs {Bihar, Gujarat, Maharashtra, Orissa, West Bengal, Andhra Pradesh, Karnataka, Kerela, Tamil Nadu}; $FT_s = 3$ if personal law applies to tenancy land and women have some rights over the land {Rajasthan, Madhya Pradesh}.

FL_s is an index which increases in the rights women have regarding landholding acts. Using the information in from Table 3 in Agarwal (1995) , we code this: $FL_s = 1$ if married and unmarried daughters receive no recognition {Punjab, Rajasthan, Uttar Pradesh, Andhra Pradesh, Haryana}; $FL_s = 2$ if married but not unmarried daughters receive recognition {Bihar, Assam, Gujarat, Madhya Pradesh, Maharashtra, Orissa}; $FL_s = 3$ if unmarried and married daughters receive recognition {Jammu and Kashmir, Karnataka, Kerela, Tamil Nadu, West Bengal}.

Political Variables: Z_{st-1} includes the proportion of seats in the state legislatures (Vidhan Sabha) held by Hard Left (Communist Party of India; Communist Party of India Marxist Parties); Soft Left (Indian National Congress Socialist Parties); Congress (Indian National Congress; Indian National Congress Urs); and State Parties (Teluga Desam; Assam Gana Parishad; Shiv Sena; Uktal Congress; Shiromani Alkali Dal; Dravida Munnetra Kazhagam)

Domestic Violence Variables: Y_{is} reflects two dependent variables: that wife beating is justified and that a wife has been beaten. The first takes on a value of 1 if a woman believes it is justified to be beaten by her husband for at least one of the following reasons: (i) goes out without telling him; (ii) neglects the house or children; (iii) argues with or disrespects her husband; (iv) refuses to have sex with him; (v) is unfaithful; or (vi) does not cook properly. Women were most likely to answer that wife beating was justified if a wife neglects the children or house. The next most likely justification for wife beating was if she shows disrespect to her husband or if she goes out without telling him. The second dependent variable takes on a value of 1 if a woman has ever been physically abused by her husband.

Female Inheritance Amendment (Individual level regressions): Let T (equal to 1998 or 2005) denote the year the data were collected for the National Family Health Surveys. Let A_s denote the year that the Amendment was passed in state s (i.e., A_s=1976 for Kerala; A_s=1986 for Andhra Pradesh; A_s=1989 for Tamil Nadu; A_s=1994 for Maharashtra and Karnataka). Then we define A_{is} as follows. $A_{is} = T - \textit{year married}$ if $\textit{year married} > A_s$; or $A_{is} = T - A_s$ if $\textit{year married} \leq A_s$. $A_{is} = 0$ for all of the states where no Amendment was passed prior to the year 2005. .

7.3 Summary Statistics

Table A1 - Summary Statistics (across all years and states)

Variable	Mean
Female Suicide Rate	0.073 (0.048)
Male Suicide Rate	0.11 (0.085)
Female Suicide Rate - Male Suicide Rate	-0.35 (0.05)
Female Suicide Rate/Male Suicide Rate	0.74 (0.23)
Hindus (share of population)	0.827 (0.154)
Muslims (share of population)	0.152 (0.173)
Schedule Tribes (share of population)	0.074 (0.074)
Schedule Castes (share of population)	0.151 (0.058)
Real State Domestic Product per capita (log)	7.144 (0.456)
Rural food product per capita	0.307 (0.273)
Yields	30.283 (17.982)
Food Shock	0.261 (0.439)
Flood	0.118 (0.323)
Drought	0.113 (0.317)
Average monthly rainfall	335.826 (256.696)
Share of Health Expenditure in State income	0.012 (0.005)
Share of Development Expenditure in State income	0.109 (0.041)
Share of Education Expenditure in State income	0.035 (0.012)
Banks per capita	0.057 (0.027)
Urban Population Share	0.234 (0.083)
Prop of Seats won by State Parties	0.114 (0.232)
Prop of Seats won by Congress	0.418 (0.259)
Prop of Seats won by Hard Left	0.085 (0.15)
Prop of Seats won by Soft Left	0.02 (0.049)
Observations	603

Notes: Standard deviations are in parentheses. Suicide rates are defined per 1000 individuals in a given state and year. Yields are total agricultural output per area sown. Food shock is equal to one if a food shortage occurred in a given state and year, and zero otherwise. Similar dummy variables are defined for the occurrence of a flood or drought.

Table A2 - Summary Statistics - Individual Level Data (NFHS)

Variable	1998 Survey	2005 Survey
Wife beating is justified	0.54 (0.50)	0.47 (0.50)
Beaten by husband	0.19 (0.39)	0.28 (0.45)
Wife - Age	31.05 (8.50)	29.16 (9.49)
Wife - No education	0.49 (0.50)	0.32 (0.47)
Wife - Housewife	0.63 (0.48)	0.60 (0.49)
Wife - Year of marriage	1985 (8.70)	1990 (8.66)
Wife - Years with Amendment	2.16 (4.26)	3.86 (6.03)
Husband - No education	0.26 (0.44)	0.22 (0.42)
Husband - Cultivator	0.35 (0.48)	0.25 (0.44)
Hindu	0.78 (0.42)	0.72 (0.45)
SC	0.17 (0.37)	0.17 (0.38)
ST	0.12 (0.33)	0.14 (0.34)
OBC	0.29 (0.45)	0.33 (0.47)
Rural	0.69 (0.46)	0.54 (0.50)
Number of Durables Owned	2.30 (1.73)	2.71 (1.76)
Observations	88506	61938

Notes: Standard deviations are in parentheses. SC, ST, and OBC refere to the caste groupings (Scheduled Caste, Scheduled Tribe, and Other Backward Castes). The excluded category are the higher ranked castes in the Indian social hierarchy.

7.4 Other Estimations

Other Determinants of Suicides:

Table A3 - Male and Female Suicide Rates with Controls- OLS Estimations

Variable	Female	Female	Male	Male
Hindu Population	-0.04 (0.04)		-0.18 (0.08)**	
Muslim Population	-0.12 (0.04)***		-0.27 (0.08)***	
SC Population	0.18 (0.04)***		0.36 (0.09)***	
ST Population	0.45 (0.08)***		0.39 (0.17)**	
Domestic Product		0.03 (0.01)***		0.06 (0.02)***
Food Production		-0.04 (0.01)***		-0.08 (0.02)***
Yields		-0.0003 (0.00009)***		-0.0003 (0.0002)
Food Shock		0.002 (0.002)		0.009 (0.003)***
Flood		-0.001 (0.002)		-0.007 (0.004)
Drought		-0.003 (0.002)		-0.007 (0.004)
Rainfall		1.8e-5 (3.9e-6)***		3.2e-5 (8.6e-6)***
Health Expenditure		-0.89 (0.31)***		-0.59 (0.71)
Development Expenditure		-0.03 (0.04)		-0.11 (0.10)
Education Expenditure		-0.14 (0.15)		-0.47 (0.34)
Banks		0.29 (0.12)**		0.86 (0.30)***
Proportion Urban		0.24 (0.05)***		0.41 (0.11)***
Observations	595	527	595	527
$\overline{R}^2$	0.91	0.94	0.87	0.91

Alternative Measure of Amendments:

Table A4 - Suicide Rates with Years of Amendment- OLS Estimations

Variable	Female	Male	Female-Male	Female/Male
Years of Amendment	0.002 (0.0002)***	0.006 (0.0005)***	-0.005 (0.0003)***	-0.006 (0.002)***
Cultural Controls	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES
Observations	531	531	531	531
$\overline{R}^2$	0.94	0.93	0.91	0.62

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Notes: All regressions have state and year controls. Robust standard errors are in parentheses. A single asterix denotes significance at the 10% level, double for 5%, and triple for 1%.

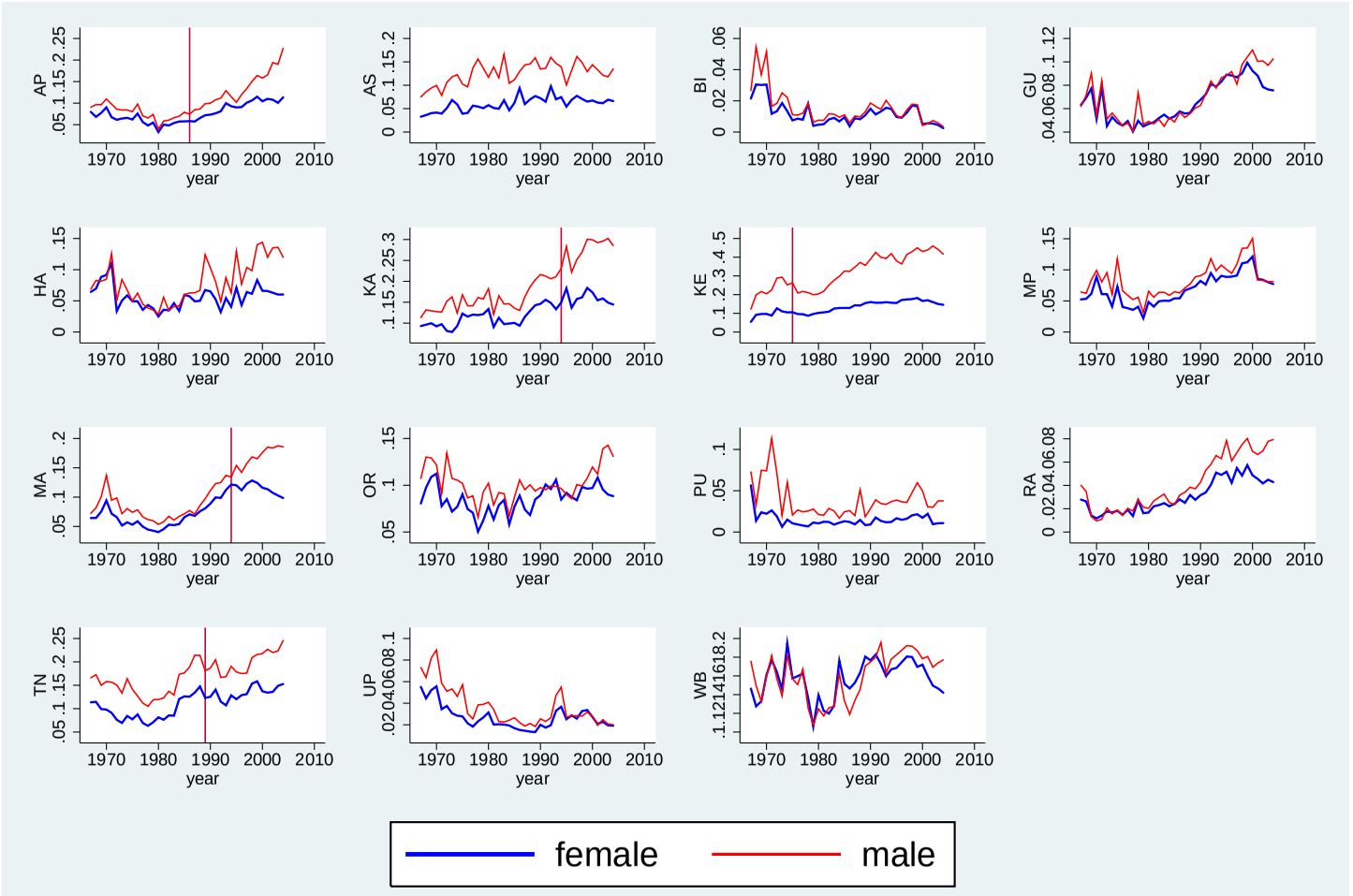

Figure 2: Annual Suicide Rates by State

Notes: Female (male) suicide rate is defined as the total number of female (male) suicides divided by the total female (male) population in a given state and year. The vertical lines indicate the timing of the Amendments.

Table 1 - Suicide Rates and Female Inheritance- OLS Estimations

Variable	Female	Female	Female	Male	Male	Male
Amendment	0.03 (0.003)***	0.02 (0.003)***	0.008 (0.003)***	0.06 (0.007)***	0.05 (0.007)***	0.03 (0.008)***
Cultural Controls	NO	YES	NO	NO	YES	NO
Economic Controls	NO	NO	YES	NO	NO	YES
Observations	603	595	527	603	595	527
$\overline{R}^2$	0.91	0.92	0.94	0.89	0.89	0.92

Table 2 - Relative Suicide Rate and Female Inheritance- OLS Estimations

Variable	Female-Male	Female-Male	Female-Male	Female/Male	Female/Male	Female/Male
Amendment	-0.03 (0.004)***	-0.03 (0.005)***	-0.02 (0.005)***	-0.09 (0.02)***	-0.08 (0.02)***	-0.09 (0.02)***
Cultural Controls	NO	YES	NO	NO	YES	NO
Economic Controls	NO	NO	YES	NO	NO	YES
Observations	603	595	527	603	595	527
$\overline{R}^2$	0.85	0.85	0.88	0.54	0.56	0.64

Notes: All regressions have state and year controls. Robust standard errors are in parentheses. A single asterix denotes significance at the 10% level, double for 5%, and triple for 1%.

Table 3 - Female Suicide Rate and Female Inheritance- Robustness Tests

Variable	Additional controls	Excluding Kerela	Excluding Bihar, Punjab, U.P.	State specific linear time trends	Placebo Test	Standard errors clustered by state
Amendment	0.02 (0.003)***	0.01 (0.003)***	0.01 (0.003)***	0.01 (0.004)***	0.01 (0.003)**	0.02 (0.005)***
Amendment -10 years					0.004 (0.003)	
Cultural Controls	YES	YES	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES	YES	YES
Observations	516	516	426	531	520	531
$\overline{R}^2$	0.94	0.94	0.91	0.94	0.94	0.93

Table 4 - Male Suicide Rate and Female Inheritance- Robustness Tests

Variable	Additional controls	Excluding Kerela	Excluding Bihar, Punjab, U.P.	State specific linear time trends	Placebo Test	Standard errors clustered by state
Amendment	0.03 (0.006)***	0.04 (0.006)***	0.04 (0.008)***	0.02 (0.007)***	0.03 (0.008)***	0.04 (0.01)***
Amendment -10 years					-0.006 (0.006)	
Cultural Controls	YES	YES	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES	YES	YES
Observations	516	496	426	531	520	531
$\overline{R}^2$	0.93	0.89	0.90	0.95	0.92	0.91

Notes: All regressions have state and year controls. Robust standard errors are in parentheses. The additional controls in the first estimation include: total population, total land area, population growth, total state revenu, expenditure on social and community services, non-developmental expenditures, food subsidies, total grants from central government, administrative services expenditure, proportion christian, proportion sikh, proportion jain, and proportion buddhist.

Table 5 - Relative Suicide Rate and Female Inheritance- Robustness Tests

Variable	Additional controls	Excluding Kerela	Excluding Bihar, Punjab, U.P.	State specific linear time trends	Placebo Test	Standard errors clustered by state
Amendment	-0.10 (0.02)***	-0.07 (0.03)***	-0.11 (0.03)***	-0.07 (0.02)***	-0.07 (0.02)***	-0.081 (0.047)*
Amendment -10 years					-0.02 (0.03)	
Cultural Controls	YES	YES	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES	YES	YES
Observations	516	485	418	520	520	522
$\overline{R}^2$	0.72	0.59	0.64	0.74	0.64	0.64

Table 6 - Suicides and Female Inheritance- IV-2SLS Estimations

Variable	*First-Stage* Amendment	Female Suicides	Male Suicides	Female-Male Suicides	Female Suicides / Male Suicides
Amendment		0.04 (0.01)***	0.10 (0.03)***	-0.06 (0.02)***	-0.45 (0.13)***
Hard Left	-0.13 (0.17)				
Soft Left	-0.67 (0.16)***				
State Parties	0.34 (0.12)***				
Congress	0.15 (0.07)**				
Cultural Controls	YES	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES	YES
F-stat on Instruments	10.30				
Observations	486	485	485	485	485
$\overline{R}^2$	0.68	0.91	0.89	0.87	0.62

Table 7 - Suicides and Female Land Reforms- OLS Estimations

Variable	Female	Female	Female	Male	Male	Male
Landholding Acts	-0.09 (0.008)***	-0.08 (0.009)***	-0.06 (0.009)***	-0.20 (0.02)***	-0.20 (0.02)***	-0.15 (0.02)***
Tenancy Acts	-0.02 (0.004)***	-0.01 (0.005)***	-0.02 (0.004)***	-0.04 (0.007)***	-0.04 (0.009)***	-0.03 (0.008)***
Female*Landholding Acts	0.04 (0.004)***	0.04 (0.004)***	0.03 (0.004)***	0.09 (0.009)***	0.09 (0.009)***	0.07 (0.009)***
Female*Tenancy Acts	0.01 (0.002)***	0.007 (0.003)***	0.008 (0.002)***	0.02 (0.004)***	0.02 (0.005)***	0.01 (0.005)***
Cultural Controls	NO	YES	NO	NO	YES	NO
Economic Controls	NO	NO	YES	NO	NO	YES
Observations	472	466	403	472	466	403
$\overline{R}^2$	0.91	0.91	0.95	0.92	0.92	0.95

Table 8 - Relative Suicide Rate and Female Land Reforms- OLS Estimations

Variable	Female-Male	Female-Male	Female-Male	Female/Male	Female/Male	Female/Male
Landholding Acts	0.11 (0.01)***	0.12 (0.01)***	0.09 (0.01)***	0.19 (0.05)***	0.36 (0.08)***	0.14 (0.09)
Tenancy Acts	0.02 (0.005)***	0.02 (0.006)***	0.01 (0.005)***	0.20 (0.07)***	0.22 (0.07)***	0.13 (0.06)**
Female*Landholding Acts	-0.05 (0.007)***	-0.05 (0.007)***	-0.04 (0.007)***	-0.08 (0.02)***	-0.13 (0.03)***	-0.07 (0.04)*
Female*Tenancy Acts	-0.01 (0.003)***	-0.01 (0.003)***	-0.007 (0.003)***	-0.09 (0.04)***	-0.09 (0.04)***	-0.06 (0.03)*
Cultural Controls	NO	YES	NO	NO	YES	NO
Economic Controls	NO	NO	YES	NO	NO	YES
Observations	472	466	403	472	466	403
$\overline{R}^2$	0.89	0.89	0.92	0.51	0.53	0.59

Notes: All regressions have state and year controls. Robust standard errors are in parentheses. In all of the estimations the years covered are 1967-2000.

Table 9 - Suicides and Female Landholding Acts- IV-2SLS Estimations

Variable	*First-Stage* Landholding	*First-Stage* Landholding	*First-Stage* Female*Landhold.	Female Suicides	Male Suicides	Female-Male Suicides	Female Suicides / Male Suicides
Landholding Acts				-0.07 (0.04)*	-0.19 (0.07)***	0.12 (0.04)***	0.72 (0.45)†
Female*Landhold. Acts				0.04 (0.01)***	0.10 (0.03)***	-0.06 (0.02)***	-0.27 (0.18)†
Hard Left	3.20 (0.65)***						
Soft Left	-3.03 (0.50)***						
State Parties	-0.87 (0.18)***						
Congress	-0.17 (0.11)						
$\widehat{Landholding}$		-0.58 (0.18)***	-0.86 (0.45)**				
Female*$\widehat{Landhold}$		0.53 (0.07)***	0.95 (0.17)***				
Cultural Controls	YES	YES	YES	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES	YES	YES	YES
F-stat on Instruments	30.5	45.7	23.4				
Observations	441	411	380	380	380	380	290
$\overline{R}^2$	0.92	0.94	0.92	0.92	0.93	0.92	0.72

Notes: All regressions have state and year controls. Robust standard errors are in parentheses. A single asterix denotes significance at the 10% level, double for 5%, and triple for 1%. † refers to significance at the 13% level. In this final estimation the sample is restricted to the years 1967-1992 (the orginal Besley-Burgess data set), for all of the other estimations the sample is the years 1967-2000.

Table 10 - Suicides and Female Tenancy Acts- IV-2SLS Estimations

Variable	*First-Stage* Tenancy	*First-Stage* Tenancy	*First-Stage* Female*Tenancy	Female Suicides	Male Suicides	Female-Male Suicides	Female Suicides / Male Suicides
Tenancy Acts				-0.03 (0.006)***	-0.05 (0.01)***	0.02 (0.008)***	0.20 (0.08)**
Female*Tenancy Acts				0.02 (0.004)***	0.03 (0.007)***	-0.01 (0.005)**	-0.09 (0.04)**
Hard Left	5.65 (0.92)***						
Soft Left	0.67 (0.89)						
State Parties	-0.86 (0.20)						
$\widehat{Tenancy}$		1.74 (0.28)***	2.62 (0.62)***				
Female*$\widehat{Tenancy}$		-0.42 (0.13)***	-0.36 (0.29)				
Cultural Controls	YES	YES	YES	YES	YES	YES	YES
Economic Controls	YES	YES	YES	YES	YES	YES	YES
F-stat on Instruments	19.6	26.1	20.3				
Observations	437	407	407	406	406	406	406
$\overline{R}^2$	0.92	0.93	0.93	0.94	0.93	0.91	0.78

Notes: All regressions have state and year controls. Robust standard errors are in parentheses. A single asterix denotes significance at the 10% level, double for 5%, and triple for 1%. In all of the estimations the years covered are 1967-2000.

Table 11 - Suicide Rates from Family Conflict and Female Inheritance- OLS Estimations

Variable	Female	Female	Male	Male
Amendment	0.01 (0.001)***	0.005 (0.001)***	0.02 (0.002)***	0.008 (0.002)***
Cultural Controls	NO	YES	NO	YES
Economic Controls	NO	YES	NO	YES
Observations	510	439	527	439
$\overline{R}^2$	0.77	0.86	0.75	0.85

Table 12 - Proportion of Total Suicides from Family Conflict and Female Inheritance- OLS Estimations

Variable	Female (All Suicides)	Female (All Suicides)	Male (All Suicides)	Male (All Suicides)	Female (Cause Known)	Male (Cause Known)
Amendment	0.08 (0.01)***	0.06 (0.01)***	0.05 (0.008)***	0.04 (0.01)***	0.19 (0.03)***	0.06 (0.02)**
Cultural Controls	NO	YES	NO	YES	YES	YES
Economic Controls	NO	YES	NO	YES	YES	YES
Observations	509	438	509	438	401	430
$\overline{R}^2$	0.51	0.58	0.52	0.61	0.45	0.56

Table 13 - Domestic Violence and Female Inheritance (1998 NFHS-2) - Probit Estimations

Variable	Wife Beating Justified	Wife Beating Justified	Wife Beating Justified	Wife Beaten	Wife Beaten	Wife Beaten
Years Amendment	0.01 (0.003)***	0.01 (0.003)***	0.01 (0.003)***	0.03 (0.003)***	0.03 (0.003)***	0.03 (0.005)**
Individual Controls	YES	YES	YES	YES	YES	YES
Household Controls	YES	YES	YES	YES	YES	YES
Clustering at Sampling Unit	NO	YES	NO	NO	YES	NO
Clustering at State Level	NO	NO	YES	NO	NO	YES
Observations	70673	70673	70673	70673	70673	70673
$\overline{R}^2$	0.12	0.12	0.12	0.07	0.07	0.07

Table 14 - Domestic Violence and Female Inheritance (2005 NFHS-3) - Probit Estimations

Variable	Wife Beating Justified	Wife Beating Justified	Wife Beating Justified	Wife Beaten	Wife Beaten	Wife Beaten
Years Amendment	0.008 (0.003)***	0.008 (0.003)***	0.008 (0.005)*	0.008 (0.003)***	0.03 (0.003)***	0.03 (0.004)**
Individual Controls	YES	YES	YES	YES	YES	YES
Household Controls	YES	YES	YES	YES	YES	YES
Clustering at Sampling Unit	NO	YES	NO	NO	YES	NO
Clustering at State Level	NO	NO	YES	NO	NO	YES
Observations	47095	47095	47095	47095	47095	47095
$\overline{R}^2$	0.09	0.09	0.09	0.07	0.07	0.07

Notes: All regressions have state fixed effects. Individual and household controls include: education, age, and occupation of both wives and their husbands; caste and religion of wives; household location (rural or urban); and household durable good ownership. Year Amendment is computed as the number of years a woman has been married with the Amendment in place. Robust standard errors are in parentheses. A Sampling Unit includes roughly 40 households for the 1998 survey and 500 for the 2005 survey.