



INTERNATIONAL POLICY CENTER
Gerald R. Ford School of Public Policy
University of Michigan

IPC Working Paper Series Number 40

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April 2006

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Preliminary and Incomplete

Abstract

Empirical findings as well as theoretical predictions in the marriage bargaining literature suggest that women's financial independence has a positive effect on their empowerment. Findings in the domestic violence literature, however, challenge the generalization of the results. The theory of male backlash in the domestic violence literature predicts that in a patriarchal economy, an increase in women's economic independence will lead to an increase in cases of domestic violence targeted at women. Violence is a means of restoring the husband's authority over his wife particularly when the women's independence challenges the dominance of men. Patterns of physical spousal violence in India are in line with the theory of male backlash in a sense that working women are more subject to physical spousal violence than non-working women. However, the interpretation is made difficult by issues of reverse causality and omitted variable bias. In this study, I address these issues by exploiting changes in rural women's labor market outcomes exogenously driven by the rainfall shocks and the rice-wheat dichotomy in women's employment. The IV regressions results indicate that women's labor force participation decreases the probability of physical spousal violence by 0.07. The findings suggest that the positive relationship between women's working status and the physical spousal violence is likely to be driven by reverse causality and omitted variable bias rather than the male backlash.

*Department of Economics, Michigan State University, chinym@msu.edu I am grateful to Andrew Foster, Mark Pitt, and Nancy Qian for their insight and guidance. I also thank Richard Blundell and Robert Pollak for their comments and encouragement. Special thanks to Doug Park, Delia Furtado, Isaac Mbiti, and Muna Miky. All remaining errors are mine.

1 Introduction

The theory of marital bargaining predicts that women's greater financial independence should empower them with better outside options, lower their threshold for tolerating abuse inside marriage, and lead to a reduction in violence against them. According to the male backlash theory, on the other hand, in a patriarchal society, violence can be a means of restoring the husband's authority over his wife particularly when the women's independence challenges the dominance of men. Therefore, an increase in women's financial independence will increase the incidence of violence against them.

Patterns of physical spousal violence in India are in line with the male backlash theory: women who participate in the labor market tend to be more subject to physical violence by their husbands. Given that women in India virtually do not have options outside marriage, which is an important underlying assumption for the male backlash theory to be valid, the male backlash theory might be a more appropriate model that captures the marital relationship in India.

However, the interpretation of such empirical findings is made difficult by issues of endogeneity, such as the reverse causality of women's labor force participation as well as omitted variable bias. For instance, the positive correlation between physical violence and women's employment status may reflect the causal effect of domestic violence on the decision to work rather than the effect of working status on domestic violence. There might be a difference between working women and non-working women in terms of openness to public, which will lead to a systematic difference in reporting of violence between these two groups. In this paper, I address these issues by exploiting the plausibly exogenous variation in rural women's labor market outcomes driven by rainfall shocks and the rice-wheat dichotomy in women's employment and estimate the causal effect of women's financial independence on the incidence of domestic violence. The IV regression results using the interaction between the rainfall shocks and the rice-wheat dichotomy in women's employment as an instrumental variable indicates that women's labor force participation decreases the probability

of physical spousal violence by 0.07. The results suggest that the positive relationship between women’s working status and physical spousal violence is likely to be driven by endogeneity of women’s working choice and omitted variable bias rather than the male backlash.

The paper proceeds as follows. In Section 2, the existing theories of domestic violence and empirical findings are presented. Section 3 describes the conceptual framework. Section 4 describes the data sets. Section 5 provides features of physical spousal violence and women’s attitudes towards violence in India. The empirical specifications and estimation results are presented in Section 6, and Section 7 concludes.

2 Background

2.1 Theoretical Background

2.1.1 Bargaining Theory of Domestic Violence

Noncooperative bargaining models of domestic violence predict that an increase in women’s economic independence will decrease the level of violence within the households. Women’s financial independence will increase their probability of leaving the relationship by providing favorable outside options, and lead to either the end of the relationship or a decrease in abusive treatment within the intact households. Tauchen, Witte and Long (1991) developed a noncooperative model of domestic violence where both a man’s and a woman’s utilities depend on domestic violence, the behavior of woman, and his and her consumption of other goods. Both spouses can choose to make an income transfer to each other and have threat point utilities, which are identical to utilities outside the marriage. The effect of changes in income depends on whether the threat point utility is binding and whether there is a positive income transfer. When the woman’s threat point utility is binding and there is a positive income transfer, an increase in the man’s income and an increase in the woman’s income have opposite effects on violence. As his income rises, the man can buy more violence by increasing his financial transfer to her. As his payment for violence increases, the woman’s tolerance of violence will also increase. As the woman’s income rises, the man is forced to reduce the violence in order to maintain her reservation utility. When both individuals gain from

marriage and there are positive transfers, both persons' incomes have the same effects on violence and the effects are in general negative.¹ In a similar setting, Farmer and Tiefenthaler (1997)'s noncooperative model of domestic violence also predicts that increase in a woman's income will decrease the level of violence because a woman's financial independence increases her threat point.

2.1.2 Theory of Male Backlash

There are other models that generate opposite predictions to the theory of marital bargaining. Those models characterized as theory of male backlash predict that women's economic independence could increase the physical spousal violence against them (Aizer 2005). Marital relationships are governed by socially and culturally prescribed gender roles. To the extent that women's economic independence challenges socially sanctioned gender roles, women can be subject to more spousal violence because the challenged man might try to reinstate his authority over his wife by inflicting violence on her (Macmillan and Gartner 1999). In this approach, women's employment, for example, does not merely provide an access to financial resources but also serves as a symbol that represents the status of men and women within the households.

Similarly, according to the exchange theory (Molm 1990), a husband uses his ability to transfer money and violence as the two sources of power. A husband can influence his wife's behavior by transferring money to her or exercising violence as a punishment. As his wife's income increases relative to his, his ability to influence his wife through monetary transfer will decrease, and he will resort more to violence to influence her behavior. Therefore, an increase in women's financial independence will lead to more spousal violence.

The models that focus on the symbolic nature of women's economic independence are criticized because they ignore women's rationality constraint in abusive relationships (Aizer 2005). They do not take into account the possibility that abused women can choose to end relationships. There are certain cultures, however, in which women practically do not have outside options. In countries where divorce or separation are accompanied by significant stigma, the threat of ending the match

¹The direction of the effect depends on how each person's consumption of other goods affect the man's marginal utility of violence. The assumption that his marginal utility of violence decreases with his consumption of other goods does not necessarily rule out the positive effect of income on violence. However, the violence can increase with income only under very peculiar conditions.

may not be credible, in which case the bargaining model may not be appropriate (Luke and Munshi 2005).

2.2 Previous Empirical Findings

Empirical evidence on the effect of economic independence of women on spousal violence is inconclusive. Using U.S. California county level data, Aizer (2005) examined the effect of the relative wage between female dominated sector (service) and male dominated sector (construction) on the domestic violence. In her study, domestic violence rate was measured by arrests for domestic violence, female intimate partner homicides and hospitalizations for assault at a county level. She found that increases in county level relative female wage over time decrease domestic violence at a county level. Using 125 Californian women who were victims of domestic violence, Tauchen, Witte and Long (1991) found that in low and middle income families, an increase in women's income reduces violence whereas an increase in men's income increases violence. In high income families where most of the income is earned by men, an increase in either party's income will lower violence. On the other hand, in high income families where most of the income is earned by women, an increase in her income will increase violence. Farmer and Tiefenthaler (1997) used victims of violence data in the U.S. and found that higher female income leads to fewer incidence of violence. On the other hand, increases in male earned income decreases violence, whereas increases in male unearned income increases violence. Macmillan and Gartner (1999) analyze the relationship between women's employment and spousal violence against them among Canadian women. Their empirical results show that women's employment increases risk of violence when husbands are unemployed, whereas it decreases the risk when husbands are also employed.

The evidence in developing countries is more supportive of the male backlash theory. Luke and Munsh (2005), for example, found out that controlling the total household income, an increase in female income increases domestic violence against women among low caste families in Tamil Nadu in India, which is likely to result from increase in disagreement over household resource allocations as women's financial independence increases. Bloch and Rao (2002) found that the risk of spousal violence is higher for a woman from a rich household, using a survey data in three villages in

Karnataka in India. Their results suggest that a dissatisfied husband whose cost of violence is low enough will inflict violence on his wife in order to extract more monetary transfer from her family.

3 Conceptual Framework

Based on the previous literature, there can be two alternative hypotheses regarding the effect of women's employment, representative of the female economic independence on the incidence of spousal violence.

First, an increase in women's labor force participation will decrease the incidence of spousal violence. As the theory of marital bargaining suggests, an increase in female financial independence will increase their probability of leaving the relationship by providing favorable outside options, and lead to either the end of the relationship or a decrease in abusive treatment within the intact households. Related to this argument, it has been suggested that increasing their job opportunities in the labor market would be an effective way to provide an outside option for women in developing countries like India, where the lack of opportunities outside marriage for women is the major source of unjust treatment of women before and within marriage. Bloch and Rao (2002), for example, suggested that in India, "providing opportunities for women outside marriage and the marriage market would significantly improve their well-being by allowing them to leave an abusive husband, by finding a way of "bribing" him to stop the abuse, or by presenting a credible threat that achieves the same objective. In more specific terms, the main opportunities for women outside the marriage market would be in the labor market."

There is another theory in domestic violence literature that predicts a negative effect of women's labor force participation on the incidence of violence. According to the exposure reduction theory, when either husband or wife is working, spousal violence will decrease because they will have fewer opportunities for conflicts.

On the other hand, the alternative view suggests that an increase in women's labor force participation will increase the incidence of spousal violence. This prediction might be confined to a patriarchal society where social stigma against divorced or separate women is enormous and the

women's threat of ending the relationships is incredible. In such a cultural surrounding, whenever the women's independence challenges the dominance of men, they might try to restore their authority by exercising more violence on their spouses. Similarly, as Bloch and Rao described in their bargaining model, spousal violence can be a means to extract more transfer of resources. Therefore, when divorce is tremendously costly and virtually not an option for women, a dissatisfied husband can exercise more violence on a woman from a richer family in order to extract more transfer from her family. The same mechanism can be applied to working women who have more resources to be extracted than non-working women.

On the other hand, a positive effect of women's labor force participation on the incidence of violence might result from a totally different mechanism. For example, an increase in violence reporting can be a labor market outcome. Therefore, it can be that we observe the positive relationship not because working women experience more violence, but because working women report more than non-working women do.

The purpose of this paper is to test these two opposite hypothesis. As will be shown in the next section, patterns of physical spousal violence in India seem to be more supportive of the male backlash theory in a sense that working women are subject to more physical spousal violence than non-working women. However, the interpretation of such empirical findings is made difficult by issues of endogeneity. More specifically, the positive relationship can be a result of an omitted variable bias. For example, labor force participation is positively correlated with poverty. At the same time, poor women tend to be more subject to spousal violence because the lack of resources serves as a stressor within the household. Therefore, it can be that violence is driven by the lack of financial resources rather than the women's working status. Similarly, there can be a systematic difference between working women and non-working women in reporting spousal violence. If working women tend to be more open to the public than non-working women, it is the difference between these two groups of women in terms of openness to public, not their working status.² Moreover, the results might be driven by the reverse causality. For instance, the positive correlation between

²This argument is different from the argument that more reporting of violence is a labor market outcome. In this argument, some unobservable characteristics of women are correlated with both labor market participation and the reporting of violence, thereby biasing the effect of working status. Therefore, an instrument will be a solution. If more reporting is a labor market outcome, no instruments can fix the problem.

physical violence and women’s employment status may reflect the causal effect of domestic violence on the decision to work rather than the effect of working status on domestic violence. Therefore, I will address this endogeneity issues by exploiting the plausibly exogenous variation in women’s labor market outcomes caused by rainfall shocks and the rice-wheat dichotomy in India and identify the causal relationship between women’s working status and the experience of physical spousal violence.

4 Data

There are four sets of data employed in this study: the second National Family Health Survey (NFHS-2) of India (1998-99), Indian District Database 1961-91, High Resolution Gridded Daily Rainfall Data by the India Meteorological Department (IMD), Rural Economic and Demographic Survey (1998-99).

The second National Family Health Survey (NFHS-2) of India was conducted between 1998 and 99. The NFHS-2 survey covers a representative sample of more than 90,000 eligible women age 15–49 from 26 states that comprise more than 99 percent of India’s population. The survey covers a variety of demographic and health issues including domestic violence, the main interest of this paper. The data set contains information on women’s attitudes to domestic violence³, ever-experience of women’s domestic violence since age 15, persons who inflicted violence, the incidence of violence in the past 12 months, and frequency of the violence in the past 12 months. The survey takes a single question approach. The respondent is asked a single question to determine whether she has ever experienced violence. If she gives an affirmative answer, then follow up questions are asked. Given the sensitive nature of the issue, surveys dealing with domestic violence is particularly subject to underreporting. In that sense, it is a shortcoming that women are given only one chance to disclose their experience of violence. Moreover, violence is defined as “being mistreated physically or beaten,” and more concrete description of acts are not given. Because perceptions about “physical mistreatment or beating” might vary by persons and household culture, it has

³It is asked whether a husband is justified in beating his wife in the following situations: if he suspects her of being unfaithful, if her natal family does not give expected money, jewelry, or other items, if she shows disrespect for in-laws, if she goes out without telling him, if she neglects the house or children, if she does not cook properly.

to be kept in mind that apart from the chronic underreporting issue, the unrefined definition of violence in NFHS-2 data might cause measurement problems.

Indian District Database provided state level crop area information. Since NFHS-2 provides only state level identifier, district level crop information in 1981 is aggregated at the state level. Based on data availability, 18 states are chosen out of 26 states. These states divided into the rice area and the wheat area depending on which crop is dominant in each state. The rice area includes Andhra Pradesh, Assam, Bihar, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Manipur, Meghalaya, Orissa, Tamil Nadu, and West Bengal. The wheat area includes Gujarat, Haryana, Himachal Pradesh, Punjab, Rajasthan, and Uttar Pradesh. In each state, per capita total crop area including 33 different crops⁴ is calculated.

High Resolution Gridded Daily Rainfall Data by the IMD was used to calculate the state level rainfall shocks for the survey period. Rainfall shocks are measured as a deviation of the actual rainfall in the past 12 months of the survey⁵ from the yearly normal (30 year average).

This study also used the Rural Economic and Demographic Survey 1998-99 in order to estimate the total labor income of the agricultural landless households. The total wage incomes of the households are regressed on the basic demographic variables of the households and the crop information of the state in which the households reside in. The parameter estimates are then used to predict the total labor incomes of each household in the NFHS-2.

5 Violence in India

5.1 More Spousal Violence against Working Women

According to the National Family Health Survey 1998-9, working women are more likely to experience physical spousal violence than non-working women in India. Figure (1) presents the percentage of married women⁶ who are beaten or physically since age 15 by the violence perpetrators. Out

⁴Crops included are rice, jowar, bajra, maize, ragi, wheat, barley, gram, tur, groundnut, castor seed, sesamum, rapeseed/mustardseed, linseed, cotton, jute, msta, sugar, and tobacco

⁵Among households within a same state, the actual rainfall in the past 12 months might be different depending on in which months the survey was conducted.

⁶Married women are defined as those women who are married and live with their husbands. Women who are married but live separately from their husbands are excluded because separated women are different from women

of 80487 women who are married and live with their husbands, 35% women worked in the past 12 months and 65% women did not. Twenty seven percent of working women reported that they experienced an act of physical violence perpetrated by somebody since age 15, whereas the corresponding figure is 17% for non-working women. Twenty five percent of working women reported that husbands were one of the perpetrators, and 15% of non-working women reported that their husbands were one of the perpetrators. For 13% of non-working women, husbands were the only people who ever beat or physically mistreated them, whereas 22% of working women reported that their husbands were the only perpetrators of the violence. Compared to the ever experience of violence, the current violence rate is much lower. Figure (2) presents women's experience of violence in the past 12 months. In total, 12% of women reported that they experienced physical violence by anybody in the last 12 months. Among working women, 14% experienced violence by anybody, whereas 10% of non-working women experienced violence. Husbands are again main perpetrators of the physical violence against women. Nine percent of all women reported that husbands were only perpetrators of violence in the past year. Among working women, 12% said that husbands were the only perpetrators whereas the corresponding figure for non-working women was 7 percent.

Therefore, domestic violence against women is predominantly committed by their intimate partners, and more physical violence is inflicted on working women than non-working women. If the latter reflects the causal relationship - effect of women's labor force participation on the incidence of violence -, the patterns of physical spousal violence in India seem to be in line with the theory of male backlash.

5.2 Women's Attitudes towards Spousal Violence

Table (2) presents women's attitudes towards spousal violence. As mentioned earlier, NFHS-2 asked women whether wife beating is justified in the following situations: if a husband suspects that his wife is being unfaithful, if her natal family does not give expected money, jewelry, or other items, if she shows disrespect for in-laws, if she goes out without telling him, if she neglects the house or children, and if she does not cook properly. Overall, 32 percent of women agree with beating

who live with their husbands in terms of exposure to the risk of violence.

as a punishment for being unfaithful. Relatively few women agree with violence as a punishment for insufficient dowry. Seven percent of women believe that a wife deserves beating if there was not enough dowry or monetary transfer from the wife's family to the husband's. More than thirty percent of women agree with physical punishment if a wife shows disrespect for in-laws, or if she goes out without telling her husband. In general, taking care of house and children are considered as the most important responsibility of women. About 40 percent of women believe that they deserve beating if they neglect these duties. Further, around 24% of women agree with beating if they do not cook properly. Columns (2) and (3) present women's attitudes towards spousal violence by their working status. Notably, working women are more likely to accept violence as a punishment than non-working women, in all the occasions.

6 Empirical Analysis

6.1 Identification and Sample Selection

The main interest of this paper lies in understanding the causal relationship between a woman's working status and the incidence of physical spousal violence. Since I only have information on women's working status in the past 12 months, I will focus on the effect of a woman's working status in the past 12 months on her experience of violence in the past 12 months. Therefore, caution is required in interpreting the results because short term variations in women's working status might have rather restricted implications for the experience of spousal violence.

The major concern in examining the relationship between women's working status and their experience of violence is that women's working status is endogenous. A variable that simultaneously affects both her working choice and incidence of violence might bias the results of standard linear probability estimation. For example, poverty can cause higher incidence of violence as well as higher labor force participation of women. If an extroverted woman not only tends to choose to participate more in the labor market but also is more likely to report experience of spousal violence, the coefficient of a women's working status will be biased upward. Moreover, a woman who suffers more from spousal violence can choose to work more outside home if marginal disutility of working

decreases with level of violence. Therefore, in order to address this endogeneity of women's working status, I need some exogenous factors that change women's working status but are uncorrelated with unobservable violence factors within households or women's openness to public.

When the sample is restricted so that it only includes agricultural landless households, a rainfall shock might be a valid instrument. It is because a rainfall shock will exogenously change women's working status, but it is unlikely to be correlated with unobservable violence factors within households or women's openness to public. However, a major concern in using rainfall shocks as an instrument is that rainfall shocks might violate the exclusion restriction through other channels such as the husband's labor incomes.

Another source of exogenous variations in women's working status might be the rice-wheat dichotomy in India. In India, female labor force participation rates are consistently lower in the traditional wheat-growing belt of the northwest than in the rice-growing eastern and southern states. This geographically distinct employment variation is related to differences in farming intensities and cropping patterns across regions: in the wheat-growing region where plough cultivation is predominant, demand for female labor is low, whereas in the rice-growing region where weeding and transplanting is prevalent, demand for female labor is high (Boserup 1970). A number of studies analyzed these variations in female labor employment generated by differential demand for female labor due to ecological variations in cropping patterns and how these economic values of women affect household decision making (Bardhan, 1984; Rosenzweig and Schultz, 1982; Miller, 1981). For example, Bardhan relates North-South difference in survival chances of female child to the rice-wheat dichotomy and the resulting differential patterns of female employment in India. On the other hand, we do not observe this distinct pattern for men, because men engage in both types of work, whereas women are largely excluded from ploughing. Therefore, whether the households reside in a state where more rice is grown than wheat might be an exogenous factor that affects women's working status. However, if a more patriarchal and violence-oriented family tends to choose either area for any reason, being in a rice or wheat state might be correlated with unobservables in the violence equation Table (3), for example, presents women's attitudes towards violence by crop states. Other than for being unfaithful, for all the other occasions, women in the rice state

are more likely to accept violence as a punishment mechanism. If this reflects different household culture by crop state, it is likely that those violent oriented households choose more to reside in the rice state or households in the rice state become more patriarchal due to some social surroundings specific to that region.⁷

Rainfall shocks are likely to violate the exclusion restriction because they will affect the physical spousal violence through other channels such as husbands' labor income. Being in a rice or wheat state might be correlated with unobservables in the main equation if a more patriarchal and violence-oriented family tends to choose either state. However, the interaction between the rainfall shocks and the rice state dummy will not be correlated with the husband's income because we do not observe rice-wheat dichotomy for men's employment. The main idea is that labor demand shocks created by rainfall shocks will be differential for women's labor force participation depending on whether she is in a rice area or in a wheat area, whereas for men who engage in both rice and wheat production no differential effects are expected. Further, the shocks are not likely to be correlated with the household's intrinsic orientation for violence, because it is hard to imagine that unexpected weather shocks can change personality or household culture other than through income changes and vice versa. Therefore, the interaction between the dummy for the rice area and the rainfall shocks will be a valid instrument in identifying the effect of women's labor force participation on the physical spousal violence.

There are several concerns in using the interaction term as the instrument. First, rainfall might differentially affect the demand for male labor in both areas as well, if one of the crops is more sensitive to rain. Since rice production in general is more dependent on water availability, it is likely that the effect of rainfall on men's labor income will be also differential in the two areas. This might compound the result of the IV regression. I address this issue by directly controlling predicted total agricultural household income.⁸ Second, rainfall shock might have a direct effect

⁷This is contrary to the general belief that North is more conservative and oppressive in terms of treatment of women than the South. As far as the spousal violence is concerned, it seems that the rice area which largely corresponds to the South is more patriarchal.

⁸Using the Rural Economic and Demographic Survey 1998-99, I estimated landless household total labor income equation. The estimation is based on a set of household level demographic variables and a set of state level agricultural variables. Specifically, the household level demographic variables include the number of men, the number of women, the mean age of men, the squared mean age of men, the squared mean age of women, the mean education of men, the mean education of women, the squared mean education of men, the squared education of women. The state level

on violence. It is unlikely that the household culture or its violence orientation is a function of a rainfall shock. However, rainfall shocks might change the household time allocation patterns. If, for example, more rainfall shocks cause the couple to spend more time within the household than outside, the risk of violence might increase. If households in one area have a more violent and patricarchal culture than the other, the risk of violence caused by rainfall shocks will be higher in one area than in the other. Then, there will be a correlation between the interaction term and the unobservables in the main equation. However, Table (3) suggests that the households in the rice area are likely to have a more violent culture than the households in the wheat area, if at all. If a rainfall shock in the rice area increases both women’s labor force participation and the risk of violence more than those of women in the wheat area, the IV regression results will be upwardly biased. Therefore, if the sign of coefficient of the women’s working status is negative even with the bias, the bias cannot qualitatively change the conclusion.

6.2 Estimation Equations

The second stage equation is defined by

$$V_i = \alpha_0 + \alpha_1 W_i + \beta X_i + \gamma r_s + \delta S_{ts} + \varepsilon_i \quad (1)$$

where V is the woman’s violence experience in the past 12 months⁹, W is the woman’s working status in the past 12 months, X include household demographic variables, wealth (assets), household labor income, r is the dummy for being in a rice state, S_{ts} is the rainfall shock that varies by state and the survey month.

agricultural variables include per capita total crop area, a dummy indicating whether it is (majorly) a rice growing state, rainfall shock, rainfall shocks interacted with other two crop variables. The estimated coefficients were used to predict the total household labor income of the sample households in the original data set (Demographic and Health Survey).

⁹The experience of violence is measured in two different ways. First it is a dummy variable that takes 1 if physical spousal violence towards woman took place in the past 12 months and takes 0 otherwise. Violence is also measured in terms of frequency. The variable is measured as a discrete variable that takes 0 if no violence was inflicted, 1 if it took place once, 2 if it happened a few times, and 4 if violence was perpetrated many times.

The first stage equation is defined by

$$W_i = \gamma_0 + \gamma_1 [S_{ts} \times r_s] + \beta X_i + \gamma r_s + \delta S_{ts} + \varepsilon_i \quad (2)$$

where $S_{ts} \times r_s$ is the interaction between the rainfall shock and the rice state dummy.

For estimation, two different specifications are employed. First, I used the interaction term as the only instrument. Therefore, the main effects of the rainfall shock and the rice state dummy were included in the second stage equation. As additional controls in the second stage, I included state level per capita total crop area, village level arable land area, village level distance from the nearest town. These variables are included because they might affect violence through women's working status as well as the household labor income. Since I do not have the household income, I directly control these variables instead.

In the second specification, I directly control the predicted household labor income. As explained earlier, I predicted the household labor income based on their demographic variables, the crop variables both at the state and at the village level, distance from the nearest town, rice state dummy, rainfall shocks, and the interactions between the rainfall shock and the crop variables. Therefore, any effects of these crop variables and the rainfall shocks through the household labor income are controlled. Since it is unlikely that these crop variables will directly affect the spousal violence other than through the household income, once their effects through the total household income are controlled, I used these variables as additional instruments. In doing so, the main effects of the rainfall shocks and the rice state dummy are also treated as excluded instruments. The overidentification test results support the validity of the second specification.

6.3 Results

6.3.1 Estimation with Entire Sample

Table (8) presents the estimation results of equation (1) using the entire sample of women. The summary statistics of the entire sample is reported in Table (4). All the columns are results of linear probability model estimations. Column (1) presents that women's labor force participation has a

significant positive effect on the probability of physical spousal violence. When a woman works, the probability of physical spousal violence increases by 0.04. The coefficient decreases approximately by half when wealth¹⁰ is also controlled, suggesting that positive correlation between poverty and women's working status tends to bias the coefficient upward. Inclusion of other demographic variables decreases the coefficient slightly more but it is still positive and significant.

Women's age decreases the probability of spousal violence. A one year increase in women's age will decrease the probability of violence by 0.0017. On the other hand, men's age has a positive but insignificant effect on the physical spousal violence. This result suggests that the age difference reflects their relative status in the marital relationship and older women benefit from the better status. The more children they have, the more violence they experience. This may be driven by the fact that the available resource per capita decreases with family size and this lack of resources generates more stress within the household. Both women's and men's education have a significant negative effect on the probability of spousal violence. A one year increase in women's education leads to decrease in the probability of physical spousal violence by 0.0018, whereas a one year increase in husbands' education decreases the probability by 0.002. Women residing in urban areas are significantly more likely to suffer from spousal violence. When the couple lives in urban areas, the probability of spousal violence increases by 0.025. In general, urban households tend to have less contacts with neighbors and communities than rural households. Violence can be more easily committed when issues within the household are less exposed to public attention (Kishor and Johnson 2004). Further, being a low caste increases the probability of spousal violence by 0.02.

In Table (8) columns (4)-(6), the effect of women's labor force participation on the frequency of violence in the past 12 months exhibit similar patterns. The frequency of violence is measured as a discrete variable which takes 0 if no violence was inflicted, 1 if it took place once, 2 if it took place a few times, and 4 if violence was perpetrated many times. Women's labor force participation has a positive and significant effect on the frequency of violence after controlling demographic variables as well as wealth. Women's age as well as both men's and women's education decrease the frequency

¹⁰The wealth index was constructed using household asset data and principal components analysis. Assets include a number of consumer items such as a telephone, bicycle or car as well as availability of drinking water and sanitation facilities and etc. Each asset is assigned a score generated through principal components analysis and the scores are summed up by household. (Kishor and Johnson 2004)

of violence, whereas urban living and low caste increase it. However, the number of children does not have a significant effect on the frequency of violence.

6.3.2 IV Estimation with Restricted Sample

Reduced form and First-Stage Results Table (9) presents the reduced form effect of rainfall shock on the incidence of spousal violence in the rice state and in the wheat state respectively. This is the results using only the agricultural landless household data. The summary statistics of the restricted sample is reported in Table (5). Columns (1) and (3) present the effects of rainfall shocks on the incidence of violence when the shock is the only control variable. In the rice area, one more mm of rainfall shock decreases the incidence of violence by 0.013 percentage points, when the rainfall shock is the only control. The precision declines as the other controls are included and rainfall effects become significant at 10% level, if all the included instruments other than the total household labor income are controlled (Column (2)). One more mm of the rainfall shock will decrease the probability of the incidence of violence by 0.00011. The effects of rainfall shocks are largely insignificant in the wheat area when only the rainfall shock is controlled (Columns (3)). When all the exogenous variables are controlled, the rainfall shocks have positive effects of the incidence of violence and the effect is significant at 10% level (Column (4)). One more mm of rainfall shock increases the incidence of violence in the wheat area by 0.024 percentage points. Table (10) presents the reduced form effects of rainfall shock on the frequency of violence in the rice area and in the wheat area respectively. The result is not qualitatively different from Table (5).

Table (12) presents the first stage regression results. Column (1) presents the effect of the interaction between the rice state dummy and the rainfall shock on the probability of the women's working, when the household labor income is not controlled. When there is one more mm of rainfall and the woman is in the rice state, her probability of working will increase by 0.002. The results suggest that compared to women in the wheat area, the rainfall shocks affect women in the rice area more favorably, which is in line with the rice-wheat dichotomy. Column (2) presents the first stage regression results when the imputed household labor income is directly controlled. In

column (2), all the crop variables, the rainfall shocks, and their interactions are being treated as excluded instruments. The effect of the interaction between the rainfall shock and the rice state dummy is still significantly positive when the household income is controlled. Notably, the main effect of the rainfall shock on women's working status is significantly negative. One more mm of rainfall shock will decrease women's labor force participation by 0.2 percentage points. The effects of rainfall shock interacted with the per capita crop area are significantly positive. One more mm of rainfall interacted with one more hectare per capita crop area will increase women's working by 0.2 percentage points. Both the state level per capita crop area and the village level arable land have positive and significant effects on women's working status. Being in the rice state has a positive but largely insignificant effect on the working status. All the instruments are jointly significant.

Women's Working Status and the Physical Spousal Violence Table (13) presents the effect of women's labor force participation on the incidence of physical spousal violence. The OLS results in column (1) show that when women work, the probability of physical spousal violence will increase by 0.06. Again, wealth has a significant negative effect on the incidence of violence and the inclusion of wealth decreases the effect of the working status, suggesting the positive correlation between poverty and women's labor force participation. The coefficient becomes a little bit smaller when other demographic controls are included (column (3)). Among the demographic variables, only the women's education and the number of children have significant effects. A one year increase in women's education will decrease the probability of violence by 0.003. One more child will increase the probability of violence by 0.006. However, as is the results with the entire sample, even after controlling the effect of wealth, women's labor force participation still increases the probability of spousal violence by 0.04.

Column (4) presents the IV regression results using the interaction between the rice state dummy and the rainfall shock as the only instrument. Once instrumented, the women's working status has a negative effect on the incidence of violence. However, the effect is not significant at the conventional level and only significant at 15% level. Column (5) presents the IV regression results when the imputed household labor income is directly controlled and all the crop variables

and rainfall shocks are treated as excluded instruments.¹¹ As is apparent in the chi square p-value for the overidentification test, the full set of instruments passes the overidentification test. The results in column (6) show that the exogenous changes in women’s working status decreases the probability of physical spousal violence by 0.07, and the effect is significant at the conventional level. The results suggest that the positive effect of women’s labor force participation on the incidence of violence in the OLS regression is likely to be driven by reverse causality or omitted variable bias rather than the male backlash. Among the demographic variables women’s education has a significant negative effect on the probability of violence. Although men’s education also has a negative effect on the incidence of violence, the effect is not statistically significant. Being a low caste increases the probability of violence by 0.04, whereas wealth decreases the probability of violence. The effect of the total household income on the incidence of violence is negative but statistically not significant.

Table (14) presents the effect of women’s working status on the frequency of violence. The results are qualitatively similar with Table (13). The simple OLS results suggest that women’s labor force participation increases the frequency of violence even after controlling demographic and wealth variables. However, when the working status is instrumented, it has a significant negative effect on the frequency of violence (column (5)). Among the demographic variables, both women’s and men’s education significantly decrease the frequency of violence. Again, wealth decreases the frequency whereas being a low caste increases the frequency. An increase in the total household labor income significantly decreases the frequency of violence.

Women’s Income Contribution and the Physical of Violence Table (15) presents the relationship between the degree of women’s contribution to household income and the incidence of physical spousal violence. Women’s contribution to the household income is a discrete variable that takes 0 if women do not work, 1 if the contribution is almost none, 2 if it is less than half, 3 if it is about half, 4 if it is more than half, 5 if it is all. The OLS results show similar patterns as

¹¹The instruments are the rainfall shocks, rice state dummy, the interaction between the rice state dummy and the rainfall shock, state level per capita crop area, interaction between the per capita crop area and the rainfall shocks, village level per capita arable land, village level distance from the nearest town.

the working status results. More contribution leads to more violence and the relationship is robust to the inclusion of other demographic variables and the wealth (columns (1)-(3)).

The first stage regression result for women's income contribution using the same set of instruments for women's working status is reported in Table (12). As for the working status, the interaction between the rice state dummy and the rainfall shock has a significant and positive effect on the woman's contribution to the total household income (columns (3) and (4)). In column (4), the additional instruments are added and the total household labor income is controlled. The main effect of the rainfall shock is negative. Its effects through the per capita total crop area is positive but significant at 10% level. Having more crop areas at a state level and more arable land at a village level increase women's contribution to the household income. Being in a rice state increases women's contribution to the household income, but the effect is not statistically significant. The instruments are jointly significant

Column (4) and (5) in Table (15) presents IV regression results. Exogenous increases in women's contribution to the household income decrease the incidence of spousal violence. However, the effect is not significant at the conventional level. Column (5) presents the results controlling the predicted household income and including additional instruments. The increase in women's contribution to the household income decreases the probability of violence, but the effects are not statistically significant even at 10% level. Among the demographic variables, women's education and wealth have significant negative effects, whereas being in a low caste significantly increases the incidence of violence. All the other demographic variables are not statistically significant at the conventional level. Table (16) presents the effect of women's income contribution on the frequency of violence. The results are similar to the results in Table (15). The simple OLS results suggest that women who contribute more to the total household income will suffer more from physical spousal violence. The IV results suggest the opposite, although the effect is significant only at 10 % (column (5)).

7 Conclusion

The purpose of this study is to identify the causal relationship between women's working status and the risk of spousal violence against them. In India, working women tend to be more subject to physical spousal violence than non-working women. Given that there is virtually no option outside marriage for women in India, the theory of male backlash seems to appropriately explain reasons for more spousal violence against working women in India. However, there are concerns that the positive relationship between women's labor force participation and physical spousal violence might be driven by reverse causality or omitted variable bias. In this paper, I address these issues by exploiting plausibly exogenous variations in rural women's working status driven by rainfall shocks and the rice wheat dichotomy. The IV regression results indicate that women's working status has a significant negative effect on the incidence and the frequency of physical spousal violence. Women's labor force participation will decrease the probability of physical spousal violence by 0.07. The frequency of violence will decrease by 0.21 if a woman works. Therefore, the positive relationship between women's working status and the experience of violence in the simple linear probability model seems to be driven by endogeneity of women's labor force participation rather than the male backlash. These results suggest that increasing women's human capital and expanding their job opportunities in the labor market will improve their well-being by increasing their status within the household, as well as by decreasing the risk of physical spousal violence against them.

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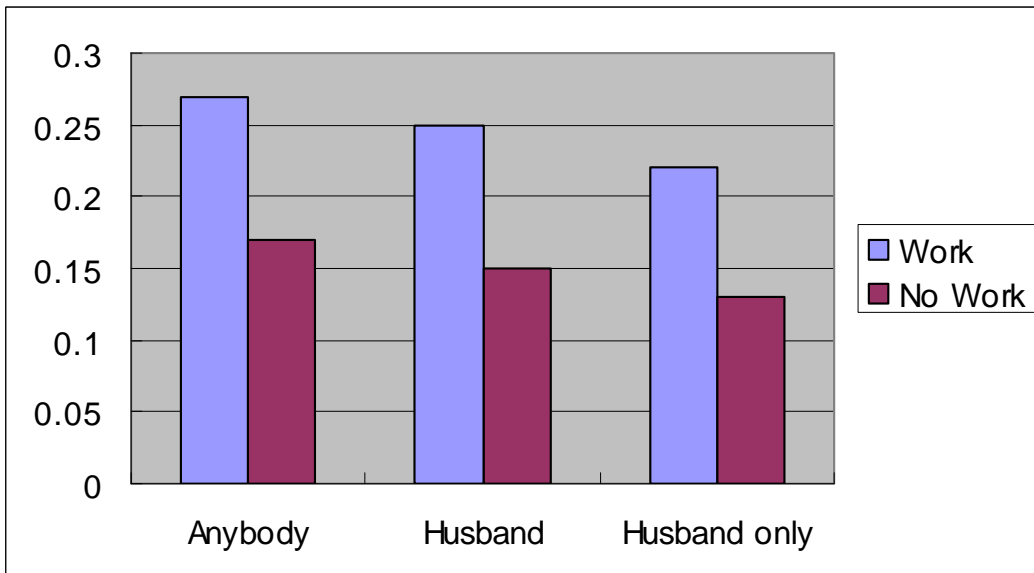


Figure 1: Violence Experience (ever) by Working Status and Perpetrator

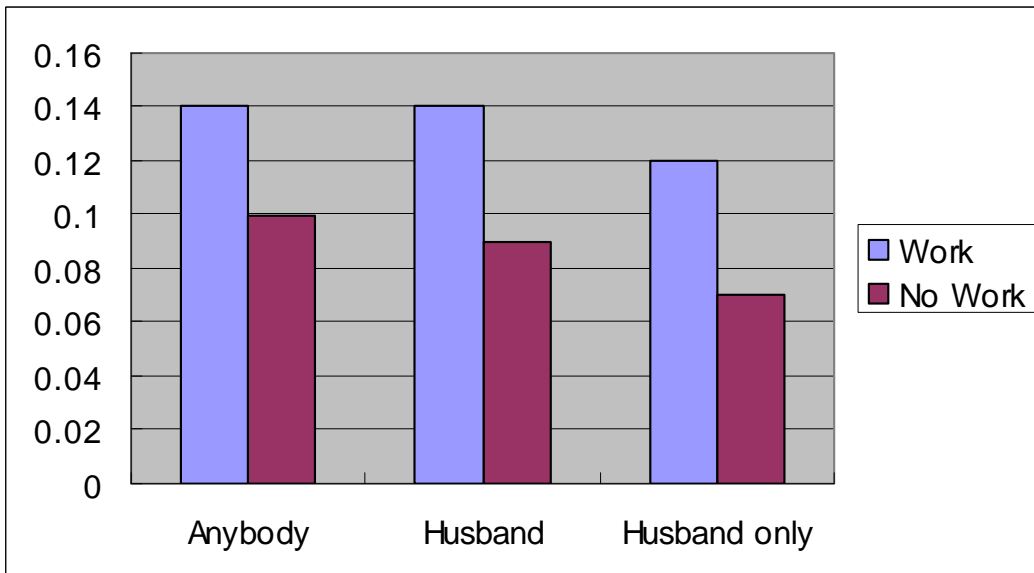


Figure 2: Violence Experience (past year) by Working Status and Perpetrator

	Total	Work	No Work
Violence ever			
Anybody	0.21	0.27	0.17
Husband	0.19	0.25	0.15
Husband only	0.16	0.22	0.13
Violence past 12 months			
Anybody	0.12	0.14	0.1
Husband	0.11	0.14	0.09
Husband only	0.09	0.12	0.07
Observation	80487	28860	51627

Table 1: Violence Experience by Working Status and Perpetrator

		Total	Work	No Work
Husband may hit wife				
1) if she is unfaithful	Yes	0.32	0.37	0.3
	No	0.67	0.62	0.69
2) if her family does not give money	Yes	0.07	0.1	0.05
	No	0.93	0.89	0.95
3) if she shows disrespect	Yes	0.34	0.41	0.3
	No	0.66	0.59	0.7
4) if she goes out without telling him	Yes	0.36	0.44	0.31
	No	0.63	0.55	0.68
5) if she neglects house or children	Yes	0.4	0.49	0.34
	No	0.6	0.51	0.66
6) if she does not cook properly	Yes	0.24	0.31	0.2
	No	0.75	0.68	0.8
Observation		75884	26871	49013

Table 2: Attitudes towards Violence by Working Status

		Total	Rice	Wheat
Husband may hit wife				
1) if she is unfaithful	Yes	0.33	0.32	0.38
	No	0.66	0.67	0.61
2) if her family does not give money	Yes	0.07	0.08	0.04
	No	0.92	0.91	0.96
3) if she shows disrespect	Yes	0.35	0.39	0.23
	No	0.64	0.6	0.76
4) if she goes out without telling him	Yes	0.4	0.42	0.29
	No	0.6	0.57	0.71
5) if she neglects house or children	Yes	0.42	0.47	0.26
	No	0.57	0.52	0.73
6) if she does not cook properly	Yes	0.25	0.26	0.19
	No	0.75	0.73	0.81
Observation		19074	13742	5323

Table 3: Attitudes toward Violence by Crop State

	Observation	Mean	Mean (weighted)	Standard deviation
Violence in the past year	75884	0.08	0.1	0.28
Work in the past year	75884	0.35	0.38	0.48
Woman age	75884	31.17	30.8	8.64
Man age	75884	37.12	36.95	9.83
Number of children	75884	2.65	2.63	1.78
Woman education	75884	3.96	3.62	4.79
Man education	75884	6.56	6.23	5.1
Urban	75884	0.32	0.27	0.47
Low caste	75884	0.58	0.6	0.49
Wealth	75884	0.03	-0.12	1

Table 4: Summary Statistics- Entire Sample

	Observation	Mean	Mean (weighted)	Standard deviation
Violence in the past year	19074	0.12	0.13	0.33
Work in the past year	19074	0.39	0.42	0.49
Woman age	19074	30	29.84	8.91
Man age	19074	36.34	36.34	10.2
Number of children	19074	2.62	2.58	1.84
Woman education	19074	2.36	2.29	3.68
Man education	19074	4.34	4.22	4.44
Low caste	19074	0.72	0.71	0.45
Wealth	19074	-0.46	-0.52	0.72
Household labor income	19704	11764	12021	12745
Rainfall shock	19074	104.65	142.54	188.2
Total crop area (per capita)	19074	0.3	0.28	0.13
Arable land (per capita)	19074	19.68	19.43	582.45
Distance	19074	32.84	43	433.6

Table 5: Summary Statistics-Agricultural Landless Households

	Observation	Mean	Mean (weighted)	Standard deviation
Violence in the past year	13751	0.14	0.14	0.34
Work in the past year	13751	0.44	0.46	0.5
Woman age	13751	29.98	29.89	8.95
Man age	13751	36.87	36.82	10.26
Number of children	13751	2.54	2.48	1.8
Woman education	13751	2.5	2.45	3.74
Man education	13751	4.14	4.08	4.36
Low caste	13751	0.72	0.71	0.45
Wealth	13751	-0.57	-0.56	0.66
Household labor income	13751	10073	10973.54	13230.61
Rainfall shock	13751	83.2	143.62	205.6
Total crop area (per capita)	13751	0.26	0.26	0.12
Arable land (per capita)	13751	3.73	4.72	74.85
Distance	13751	39.76	50.22	496.07

Table 6: Summary Statistics - Households in Rice Area

	Observation	Mean	Mean (weighted)	Standard deviation
Violence in the past year	5323	0.09	0.1	0.28
Work in the past year	5323	0.25	0.27	0.43
Woman age	5323	30.03	29.69	8.8
Man age	5323	34.96	34.61	9.9
Number of children	5323	2.84	2.89	1.9
Woman education	5323	1.99	1.71	3.5
Man education	5323	4.86	4.73	4.61
Low caste	5323	0.73	0.71	0.45
Wealth	5323	-0.18	-0.33	0.77
Household labor income	5323	16132.05	15730.73	10172.38
Rainfall shock	5323	160.08	138.7	116.03
Total crop area (per capita)	5323	0.4	0.37	0.98
Arable land (per capita)	5323	60.88	71.44	1094.96
Distance	5323	14.95	17.49	193.81

Table 7: Summary Statistics - Households in Wheat Area

	Violence incidence			Violence frequency		
	(1)	(2)	(3)	(4)	(5)	(6)
Working status	0.044538 (5.19)**	0.021215 (2.96)**	0.019399 (3.43)**	0.094466 (5.12)**	0.045443 (2.88)**	0.040229 (3.12)**
Woman age			-0.001693 (3.88)**			-0.002831 (2.87)**
Man age			0.000285 -0.56			0.000618 -0.55
Number of children			0.004393 (2.29)*			0.006904 -1.76
Woman education			-0.001819 (2.41)*			-0.003283 (2.14)*
Man education			-0.002075 (4.42)**			-0.00499 (6.53)**
Urban			0.025133 (5.56)**			0.056719 (6.15)**
Low caste			0.019284 (2.28)*			0.037729 (2.38)*
Wealth		-0.044911 (8.37)**	-0.033968 (7.38)**		-0.0944 (8.39)**	-0.074227 (7.33)**
Constant	0.080997 (7.93)**	0.084215 (11.92)**	0.117483 (8.49)**	0.157033 (7.79)**	0.163798 (12.36)**	0.219515 (8.47)**
Observations	75884	75884	75884	75884	75884	75884

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 8: OLS Estimation Results - Entire Sample

	Rice major state		Wheat major state	
	Violence incidence (1)	Violence incidence (2)	Violence incidence (3)	Violence incidence (4)
Rainfall shock	-0.00013 (2.45)*	-0.00011442 -1.98	-0.00028049 -0.98	0.00024245 -2
Total crop area (per capita)		-0.15623488 -2.04		-0.7070833 (6.22)**
Arable land (per capita)		0.00002117 -0.7		-1.176E-05 (8.99)**
Distance		-0.00000115 -0.19		0.00001798 (5.03)**
Constant	0.155691 (7.56)**	0.19306874 (5.73)**	0.24203507 (2.81)*	0.48342151 (9.39)**
Observations	13751	13751	5323	5323

Columns (1)-(4): Linear Probability Model

Columns (1) and (3) : Controls - rainfall shock

Columns (2) and (4): Controls - all excluded as well as included instruments other than the total household income

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 9: Reduced Form Estimation by Crop State - Violence Incidence

Reduced-form			
	Rice major state		Wheat major state
	Violence frequency	Violence frequency	Violence frequency
	(1)	(2)	(4)
Rainfall shock	-0.00026 (2.46)*	-0.00023379 -2	-0.00028049 -0.98
Total crop area (per capita)		-0.35696863 -2.15	-0.70708331 (6.22)**
Arable land (per capita)		0.00006316 -0.82	-0.00001176 (8.99)**
Distance		-0.00000576 -0.37	0.00001798 (19.37)**
Constant	0.3108 (7.16)**	0.38118616 (4.83)**	0.24203507 (2.81)*
Observations	13751	13751	5323

Columns (1) and (3) : Controls - rainfall shock
Columns (2) and (4): Controls - all excluded as well as included instruments other than the total household income

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 10: Reduced Form Estimation by Crop State - Violence Frequency

Reduced-form				
	Violence incidence		Violence frequency	
	(1)	(2)	(3)	(4)
Rice major statexshock	-0.000137	-0.000143	-0.00029	-0.000306
Rainfall shock	-1.8	-1.85	-1.85	-1.9
Total crop area (per capita)		-8.37E-05		-0.000109
		-0.51		-0.32
Total crop area (per capita)		-0.229583		-0.481074
		(2.16)*		(2.16)*
Total crop area (per capita)xshock		0.000461		0.000741
		-1.18		-0.89
Rice major state		0.031952		0.055131
		-1.71		-1.43
Arable land (per capita)		-6.07E-06		-1.22E-05
		(8.36)**		(6.47)**
Distance		9.8E-07		-4.14E-06
		-0.16		-0.28
Constant	0.188137	0.193119	0.375648	0.388742
	(4.26)**	(4.04)**	(4.02)**	(3.81)**
Observations	19074	19074	19074	19074

Columns (1) and (3) : Controls - rainfall shock

Columns (2) and (4) : Controls - all excluded as well as included instruments

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 11: Reduced Form Estimation -Violence Incidence and Frequency - Pulled

First stage				
	Working status		Income contribution	
	(1)	(2)	(3)	
	(4)	(5)	(6)	
Rice major state	0.00195794 (4.04)**	0.00194796 (4.00)**	0.00455519 (3.59)**	0.00450643 (3.51)**
Rainfall shock		-0.00213503 (3.86)**		-0.004998 (2.79)*
Total crop area (per capita)		0.87813451 (2.58)*		1.65592424 (2.35)*
Total crop area (per capita)xshock		0.00211202 (2.30)*		0.00610613 -1.78
Rice major state		0.03707016 -0.35		0.20833838 -0.98
Arable land (per capita)		0.00001747 (4.37)**		0.0000357 (5.30)**
Distance		-0.00000552 -1.32		0.00002578 -0.94
Constant	-0.14078789 -1.15	-0.13268264 -1.07	-0.432348 -1.6	-0.3927611 -1.42
F-test		31.75		13.7
Observations	19074	19074	19068	19068

Column (1) and (3) does not include household labor income

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 12: First Stage - Working Status and Income Contribution

Violence incidence		IV				
OLS		(1)	(2)	(3)	(4)	(5)
Working status		0.06018221 (5.70)**	0.04610125 (4.42)**	0.04467477 (4.61)**	-0.06973191 -1.62	-0.07467334 (1.96)*
Woman age				-0.00137301 -1.32	-0.00035761 -0.32	-0.00075896 -0.69
Man age				-0.00048979 -0.63	-0.00060421 -0.76	0.00001157 -0.02
Number of children				0.0059713 (2.35)*	0.00422669 -1.56	0.0032852 -1.07
Woman education				-0.00322918 (2.64)*	-0.00390892 (3.33)**	-0.00342731 (2.69)**
Man education				-0.00069247 -0.68	-0.00193528 -1.75	-0.00201326 -1.63
Low caste				0.0199553 -2	0.03602574 (2.51)*	0.0409737 (2.42)*
Wealth			-0.0574957 (5.70)**	-0.04020909 (4.72)**	-0.05353467 (6.07)**	-0.06076637 (4.89)**
Household labor income						-0.00075896 -0.69
Constant		0.10432387 (6.65)**	0.17718824 (3.74)**	0.223101 (4.90)**	0.17831943 (3.91)**	0.13917049 (6.36)**
Overidentification (Chi sq p-value)						0.31
Observations		19074	19074	19074	19074	19074

Column (4): rice major state x rainfall shock is the only instrument
Column (5): rice major state x rainfall shock, rainfall shock, total crop area per capita, total crop area x shock
rice state dummy, per capita arable land, distance from the nearest town are instruments.
Robust t statistics in parentheses
* significant at 5%; ** significant at 1%

Table 13: Women's Working Status and Incidence of Spousal Violence

Violence frequency					
	OLS			IV	
	(1)	(2)	(3)	(4)	(5)
Working status	0.12530626 (5.15)**	0.0945618 (3.91)**	0.08977954 (3.78)**	-0.31814208	-0.21203088 (2.45)*
Woman age			-0.00309786	0.00039661	-0.00132974 -0.56
Man age			-1.38	-0.00049797	0.00082313
Number of children			-0.00015142	-0.28	-0.53
Woman education			0.0093499	0.00324039	0.00299866
Man education			-1.64	-0.44	-0.47
Low caste			-0.00608519 (2.39)*	-0.00901641 (2.91)**	-0.00673927 (2.47)*
Wealth			-0.0027859	-0.00738072	-0.00611696 (2.57)*
Household labor income			-1.47	(2.93)**	0.09117923
Constant			0.03964979	0.09849119	(2.57)*
			-0.05749572 (5.70)**	-0.13583885 (4.87)**	-0.14120235 (5.42)**
Overidentification (Chi-sq p-value)			0.10432387 (6.65)**	0.26252133 (3.12)**	-0.00179615 (2.00)*
			0.223101 (4.90)**	0.27467359 (5.51)**	0.33
Observations	19074	19074	19074	19074	19074

Column (4): rice major state x rainfall shock is the only instrument

Column (5): rice major state x rainfall shock, rainfall shock, total crop area per capita, total crop area x shock, rice state dummy, per capita arable land, distance from the nearest town are instruments.

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 14: Women's Working Status and Frequency of Violence

Violence incidence		IV				
	OLS					
	(1)	(2)	(3)	(4)	(5)	
Income contribution	0.01854661 (7.36)**	0.01367613 (4.42)**	0.01309933 (4.47)**	-0.02985857	-0.02496323 -1.55	
Woman age		-0.00126946	-1.22	-0.00035413	-0.05985892 (5.18)**	
Man age		-0.00051771	-0.65	-0.00052948	-0.00089894 -0.85	
Number of children		0.0058194	(2.31)*	0.00411542	0.00011331 -0.17	
Woman education		-0.00333443	(2.72)*	-0.00386254	0.00339135 (3.30)**	
Man education		-0.00072206	-0.74	-0.00221614	-0.00317429 (2.37)*	
Low caste		0.02082403	-1.94	0.03844753	-0.00209937 (2.50)*	
Wealth		-0.05931248 (5.60)**	-0.04164783 (4.73)**	-0.05410003	0.04014476 (2.41)*	
Household labor income				-0.00035413	-0.0007452 -1.87	
Constant	0.11093947 (6.81)**	0.17493061 (3.71)**	0.21905421 (4.89)**	0.17544249 (3.92)**	0.13457674 (6.18)**	
Overidentification (Chi-sq p-value)					0.3	

Observations 19068 19068 19068 19068 19068

Column (4): rice major state x rainfall shock is the only instrument

Column (5): rice major state x rainfall shock, rainfall shock, total crop area per capita, total crop area x shock rice state dummy, per capita arable land, distance from the nearest town are instruments.

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 15: Women's Income Contribution and Incidence of Spousal Violence

Violence frequency				
	OLS			IV
	(1)	(2)	(3)	(4)
	(6.12)**	0.03015058 (3.96)**	0.02848227 (3.96)**	-0.06345346 (2.22)*
Income contribution	0.04057954	0.03015058	0.02848227	-0.06345346
Woman age			-0.00293735 (-1.33)	-0.00097842 (-0.41)
Man age			-0.00020573 (-0.12)	-0.00023093 (-0.14)
Number of children			0.00913164 (1.66)	0.0054849 (0.96)
Woman education			-0.00626973 (-2.46)*	-0.00739996 (-3.09)**
Man education			-0.00277106 (-1.55)	-0.00596859 (-2.29)*
Low caste			0.04051786 (1.97)	0.07823453 (2.63)**
Wealth		-0.13192466 (-5.91)**	-0.09452102 (-5.01)**	-0.1211704 (-6.53)**
Household labor income				-0.00188798 (-2.13)*
Constant	0.21726551 (6.56)**	0.35699338 (3.73)**	0.44200342 (4.59)**	0.34866843 (3.73)**
Overidentification (Chi-sq p-value)				0.34
Observations	19068	19068	19068	19068

Column (4): rice major state x rainfall shock is the only instrument

Column (5): rice major state x rainfall shock, rainfall shock, total crop area per capita, total crop area x shock
rice state dummy, per capita arable land, distance from the nearest town are instruments.

Robust t statistics in parentheses

* significant at 5%; ** significant at 1%

Table 16: Women's Income Contribution and Frequency of Spousal Violence