

Women Violence and Work: Threat of Sexual Violence and Women's Decision to Work

Tanika Chakraborty*
Nafisa Lohawala†

Abstract

The stagnancy of women's workforce participation in urban India is alarming and puzzling, considering the pace of economic development experienced in the previous decade. We investigate the extent to which the low workforce participation of women can be explained by growing instances of officially reported crimes against women. For causal identification, we employ a fixed effects strategy using district-level panel data between 2004-2012. To address additional concerns of endogeneity, we exploit state-level regulations in alcohol sale and consumption and provide estimates from two different strategies - an instrumental variable approach and a border-analysis. Our findings indicate that an additional case of sexual violence per thousand women in a district decreases a woman's probability of working by 6.6 percentage points. The deterrent effect is notably stronger for the sections of women who are either more vulnerable to attacks or likely to bear higher social costs due to the stigma associated with such crimes.

Keywords: Crime-against-women, Female Labor Supply, Instrumental Variable, Alcohol Regulation

*Indian Institute of Management, Calcutta. Email:tanika@iimcal.ac.in

†University of Michigan, Ann Arbor. Email:nafisalo@umich.edu

1 Introduction

Policymakers around the world have considered a broad range of policies to increase women's work force participation rates. These include policies related to maternity benefits(Baker and Milligan, 2008), child care support(Cascio et al., 2015), tax incentives(Eissa and Liebman, 1996) and protection against discrimination at work citation needed. While variants of most of these policies are followed across the world, their relevance varies widely across countries. For instance, the need for greater child care support might depend on the social context. Child care support might be less a responsive policy in societies where help from extended families is widely prevalent. We explore a new line of policy to improve female labor supply in countries with high incidence of crime against women - reducing the implicit cost of traveling to work. This follows from the findings of our research in this paper. We investigate the role played by the threat of sexual violence on women's work force participation, especially for work that involves traveling away from home.

Sexual violence against women is a significant deterrent to women's liberty to move freely, both in developed and developing nations. Past studies have provided survey based evidence on how women modify their lifestyle choices to reduce the risk of violence. For example, Riger and Gordon (1981), in a study of a few cities in the US, find that women are much more likely to avoid going out at night compared to men. The gravity of sexual violence against women has been increasingly recognized at international level, and United Nations now declares it as a major violation of women's rights. However, the incidence of such violence and stigma borne by the victims of sexual violence varies widely. In India, a survey conducted by UN Safe City Initiative in New Delhi finds that out of the 2001 women and adolescent girls surveyed, 92% reported having experienced some form of sexual violence in public spaces in their lifetime, and 88% reported having experienced some form of verbal sexual harassment. A noteworthy 63% reported being afraid of going out alone after dark (UN-Women and ICRW, 2013). Sudarshan and Bhattacharya (2009) revealed a similar finding in their survey of non-working women of Delhi, where safety concern was cited as the second most important reason reported for not working. The fear became particularly prominent after the Nirbhaya Delhi rape case of 2012, widely reported in both domestic and international media. Nearly 82% of the 2,500 women surveyed in several Indian cities after the attack reported leaving the office earlier (Thoppil, 2013). These surveys suggest that crimes of sexual nature may have a dissuasive impact on women considering whether or not to work.

Extant research also exists on women's choice to participate in the labor force. However, very few have studied whether the threat of sexual violence alters economic choices of women, particularly labor supply decisions. To our knowledge, Mukherjee et al. (2001), Chakraborty et al. (2014) and Siddique (2018) are the only papers to study the relationship between sexual violence and women's work force participation. However, both Mukherjee et al. (2001) and Chakraborty et al. (2014) only establish correlations. While the former finds a positive correlation in a survey based in Delhi, the latter uses cross sectional data from the India Human Development survey to find a negative relationship. The discrepancy in findings could be driven by the non-causal approaches. Siddique (2018) is the closest to our work.

She uses data from two rounds of the National Sample Survey between 2009 and 2012 and links it with political events data from the Global Database of Events, Language and Tone (GDEL) to study the effect of any physical violence against women on women's labor force participation in India. After eliminating district specific factors and accounting for state-time effects she finds a significant reduction in women's participation in areas with higher reported incidents of violence.

We analyse the impact of sexual crimes against women on women's labor force participation. We specifically focus on sexual violence since there is no a priori reason to believe that other forms of physical violence, like murder, would affect men and women's choices differently. Our analysis rests on a fixed effects model using district level panel data from India stretching over a period of almost 10 years. Employment information is obtained from four waves of the National Sample Survey conducted between 2004-05 and 2011-12. We combine this with official police records on district-level incidences of reported sexual crimes such as rape, molestation, and sexual harassment as opposed to media reports or self reported perception measures. The GDEL data used by Siddique (2018) aggregates information on violence related to political events from a few prominent English dailies. Given the vast linguistic diversity of India and the relatively limited reach of English print media across the wider population, police cases registered across India, which comprises both political and apolitical crimes, are more likely to be representative of crimes from all corners of India.

However, as is true of all measures of reported crimes, print or perceived, registered crime data is also likely to suffer from measurement error problems due to large scale under-reporting (Iyer et al., 2012). Hence, in addition to the fixed effects model, we also provide sensitivity analyses using alcohol regulation policies. First, we provide estimates from an instrumental variables approach that exploits state level variation in the minimum legal alcohol drinking age. We argue that restriction on alcohol sale and consumption is unlikely to directly affect women's labor supply but closely relate to crimes against women (Luca et al., 2015). Second, we use a complete alcohol ban in the state of Gujarat to conduct a border-analysis. This framework compares the interior districts of Gujarat with those sharing a common border with the neighboring states where there is no prohibition on alcohol sales.

We find a robust and statistically significant deterrent effect of sexual crimes on female workforce participation. In particular, an additional crime per thousand women in a district decreases the expected probability of working by 6.6 percentage points. The effect is more pronounced for young women, which is consistent with the fact that vulnerability and stigma cost reduce with age. Conversely, the marginal effect of crime is almost non-existent for women working in the agricultural sector, for women with little or no education, and for women with low household income. This is consistent with the fact that women from poor economic backgrounds are pushed into the market by necessities rather than economic opportunities (Klasen and Pieters, 2012).

India is an outlier when it comes to women's work force participation. Over the past decades, the country experienced high growth rates, significant improvement in women's educational attainment and remarkable decline in fertility rates. And yet, the female labor force par-

ticipation rates (FLFPR) continues to remain low. Between 2004-05 and 2009-10, FLFPR declined from 33.3% to 26.5% in the rural areas and 17.8% to 14.6% in the urban areas (Lahoti and Swaminathan, 2013). Women's workforce participation in India is one of the lowest among the emerging economies. The International Labor Organization's Global Employment Trends 2013 Report places India at 120th position among 131 countries for women's labor force participation. The gender employment gap (50 %) is one of the widest among the G-20 economies. Even compared to the South Asian neighbors, India's FLFPR remains abysmally low although its per capita income is the highest in the region (Alvi and Das, 2016).

Productive employment of female working age population has important economic and social implications. According to United Nations Economic and Social Commission for Asia and Pacific (UNESCAP), had India reached the same FLFPR as the US (86%), its GDP would have increased by an additional 4.2% (UNESCAP, 2007). Apart from the economic consequences, FLFP is an indicator of economy's development and women's well being (Mammen and Paxson, 2008), and empirical literature has consistently linked female autonomy borne out of financial independence with better child-care outcomes (Duflo, 2003; Qian, 2008). In India, a higher female bargaining power is further associated with more general-neutral education spending (Nordman and Sharma, 2016). Considering the sizeable implications, it becomes imperative to investigate the reasons behind the low participation rate.

Previous researchers have attributed the declining trend in FLFPR in India to various supply side and demand side factors. One explanation is that employment for poorly educated women coming from lower economic spectrum is typically driven by necessities rather than economic opportunities. In the absence of education, opportunities outside home are limited to socially stigmatized low-skilled work. Hence, a rising household income makes a convincing case for women to quit working - an income effect (Olsen and Mehta, 2006). Himanshu (2011) and World-Bank (2010) find a pattern of growth in female employment during financial distress which is consistent with the income effect hypothesis. In fact, a part of employment growth in India between 1999-00 and 2004-05 can be explained by the setback in the agricultural sector which forced women to enter the labor market to supplement household income (Abraham, 2009). The decline post-2004 is, therefore, interpreted as a reversal of the increase that was initially driven by distress. Higher income also leads to a greater involvement of working-age women in education, which explains some crowding out in FLFPR between 2004-05 to 2009-10 (Rangarajan et al., 2011).

As the female education rises and the opportunities for white collar jobs open up, the income effect weakens and the substitution effect strengthens since there is no social stigma against white collar jobs (Goldin, 1994; Olsen and Mehta, 2006; Mammen and Paxson, 2008). Within highly educated women, the low FLFPR is partly attributed to the selection into higher education (Klasen and Pieters, 2015) and partly to the lack of suitable employment opportunities. Even though the rising education levels have created a high-skilled female labor supply, the economy has not produced enough employment to take it in (Das and Desai, 2003). Even in rural India, the lack of sufficient non-farm jobs is held partially responsible (Sanghi et al., 2015), and an increased labor market flexibility, investment in infrastructure, and enhanced social spending is expected to enable more women to enter the workforce (Das et al., 2015).

Our paper contributes to this literature by estimating the extent to which incidence of sexual violence against women discourages women’s labor force participation in India. The rest of the paper is organized as follows: Section 2 describes the data sources and descriptive statistics, along with the spatial and chronological trends. Section 3 explains the estimation approach. Section 4 reports the estimation results and summarizes the main findings. Section 5 concludes.

2 Data and Summary Statistics

We leveraged data from multiple sources. The individual-level information on labor force participation and demographic particulars comes from four National Sample Surveys (NSS) on employment and unemployment conducted between 2004-2011: round 61 (survey-year 2004-05), round 64 (2007-08), round 66 (2009-10) and round 68 (2011-12). Each round surveys more than 100,000 households across India, providing rich data that is representative at the national and state levels. Our sample consists of urban women aged 21-64 years with each observation at individual/district/state/time level, a district being an administrative unit within a state. There were 593 districts in India in 2001. The number went up to 640 by 2011. As a result, the geographical boundaries of districts have changed over years. New districts are typically formed by splitting a single existing district into two or more parts. In some cases, segments from two or more existing districts are combined to form a third district. Our strategy for obtaining unambiguous geographical boundaries is to club new districts and respective parent districts. We obtain 566 units after aggregation.

We complement NSS records with district-level information on registered sexual crimes obtained from the annual ‘Crimes in India’ reports published by the National Crime Record Bureau (Table A1). A registered crime represents a police complaint filed as an initial step of the criminal investigation. NCRB compiles data for police districts, which are smaller segments within the administrative districts. We obtain the offenses registered in administrative districts by adding crimes in corresponding police districts. We ignore the crimes registered with railway police and special crime branches because their jurisdictions span over multiple districts. The Indian Penal Code (IPC) categorizes seven offenses as crimes against women: rape (Section 376 IPC), kidnapping and abduction (Section 363-373 IPC), dowry death (Section 302, 304B IPC), torture by husband and relatives (Section 498A IPC), molestation (Section 354 IPC), sexual harassment (Section 509 IPC), and importation of girls (Section 366-B IPC). We focus only on rapes, molestation, and sexual harassment since these crimes are encountered most frequently at workplace or during commute. Dowry death and torture by husband and relatives are domestic crimes and hence irrelevant to the analysis. Kidnapping occurs outside homes but is not a sexual offense. Importation of girls is excluded considering its large degree of under-reporting.

Our empirical framework focuses on identifying the effect of sexual-crime rate on women’s decision to work. An important empirical challenge is the potential reverse causality that

arises because a high workforce participation renders more women susceptible to crimes. We address this concern by using lagged sexual-crime rate in the analysis. Thus, the employment records for a district in the NSS year t are matched with the crimes recorded in the calendar year $t - 1$ (or $t - 2$). Table A1 documents the NSS rounds used in the study with the corresponding time-lag in NCRB data.

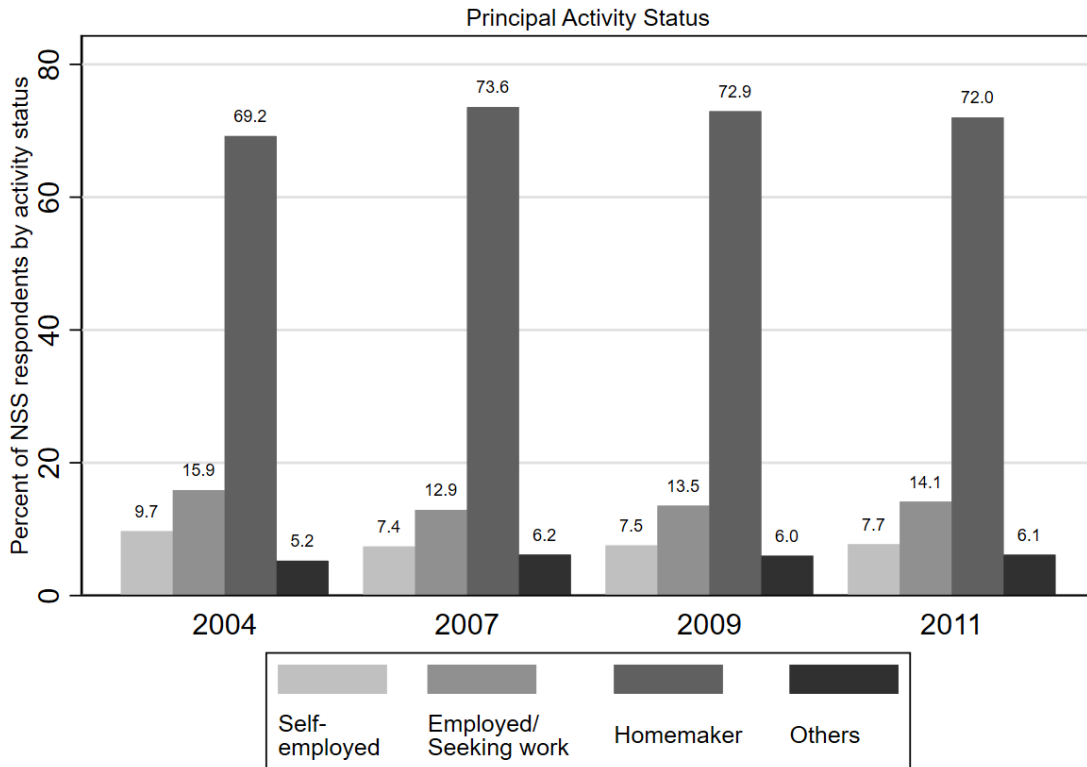
Apart from employment and crime records, we also obtain information on the state-level alcohol drinking-age regulations, which we use to induce exogenous source of variation in crimes against women. Since state governments have the upper hand in deciding the alcohol-related legislation, alcohol policies vary both across states and within states over time. The minimum legal drinking age varies from 18 to 25 for most states, and alcohol consumption is prohibited in some states altogether. We were able to document the minimum legal drinking age for 25 states and six union territories from the laws published by state excise departments. Table A2 highlights these policy across the states during our period of analysis. One state (Tamil Nadu) also changed the legal drinking age between 2003-2010.

Figure 1 summarizes the principal activity status of urban women aged 21-64 across the four survey years. The pattern is very similar over time. The ‘self-employed’ category, comprising of women engaged as paid or non-paid workers in the household enterprises, constitutes less than 10% of the sample in any given year. The ‘employed/ seeking work’ category (12.0-15.9%) includes (a) regular/casual wage employees working away from home, and (b) women not engaged in work, but making tangible efforts to seek work or being available for work. Around 70% of women across all years are homemakers, i.e. engage only in domestic duties. The others category ($< 6\%$) comprises of students, rentiers, pensioners, remittance recipients, physically disabled, etc. We use principal activity statuses to construct our dependent variable, i.e. workforce participation (see section 3 for details.) A woman is taken to participate if she either works as regular/casual wage employee away from home or is seeking (available for) work. The base category consists of homemakers. Our sample excludes self-employed women as are not vulnerable to crimes that occur outside homes. The others category is also excluded [WHY?].

Table 1 reports the mean and standard deviation (in parenthesis) of all variables used in the study. The summary is presented for each of the four years used in the analysis to examine the historical developments. The first panel presents the summary statistics of sexual crimes in the districts. The total rape cases registered in the country steadily increased by 40%, with average reports rising from 27.92 to 39.11. The total molestation reports increased by 23% with average instances rising from 57.96 to 71.44, while sexual harassment reports remained stagnant at around 19.35. The second panel summarizes the personal and household characteristics. There are 177,316 women in the overall sample, with an average age of 37.86. The average schooling is around seven years for the entire sample and has increased over time from 6.26 years in 2004-05 to 7.58 years in 2011-12. Between 2004-05 and 2009-10, the average household size reduced from 5.55 to 5.13, which is consistent with the increasing preference for nuclear families over the past decades.

Figure 2 presents the national trends in reported sexual crimes (Panel (a)), and women’s

Figure 1: National trends



Source: NSS data multiple rounds, own calculations

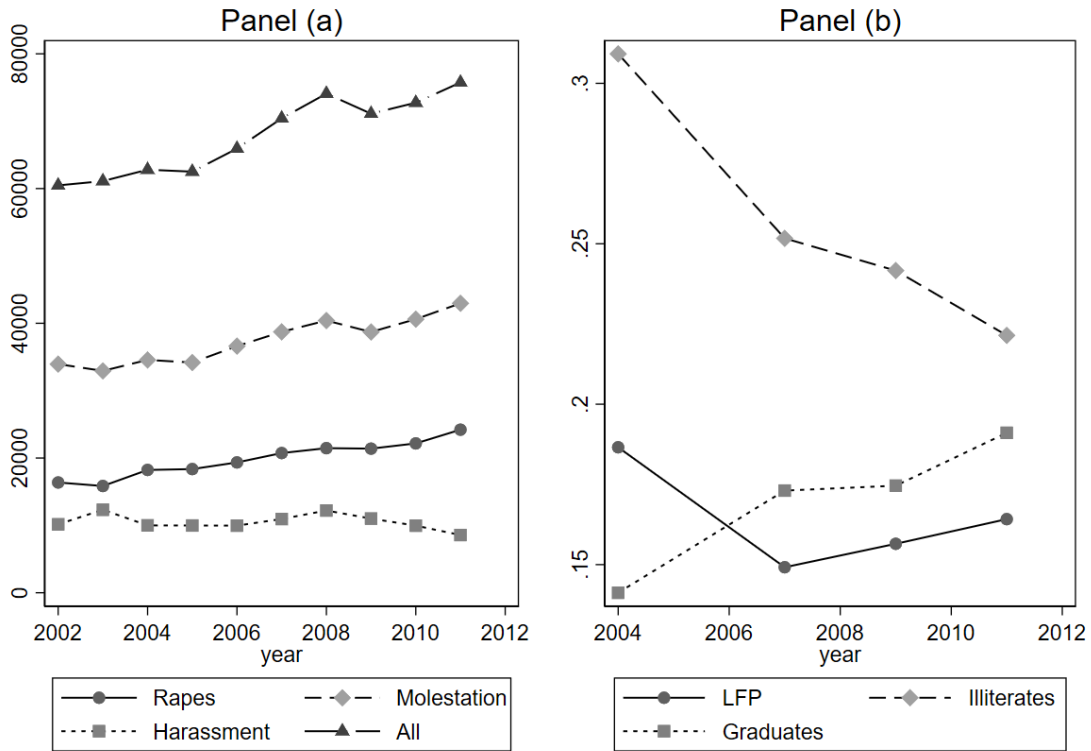
Notes: .

education attainment and workforce participation (Panel (b)). Between 2002-2011, overall complaints related to sexual-offenses rose by 20%. Most movement came from the steady increase in reported rape and molestation cases over the years. In the same time frame, the participation of women in jobs away from home remained stagnant in spite of the increasing education attainment levels. Although the percentage of women with a graduate degree increased from 14% to 19% and the percentage of illiterate women fell from 31% to 19%, workforce participation remained limited to 16.40%. Figure 3 shows that this stagnancy was common to all age groups, dismissing the possibility that the reduced workforce participation is merely an artifact of redirection of working age women to higher education. If anything, the labor-force participation has slightly increased in the education-seeking age group (20-30). Overall directions of these trends are consistent with the hypothesis that sexual crimes discourage women from working outside homes.

Figure 4 further explores the cross-section association between sexual crimes and female workforce participation. Panel (a) reports the incidence of sexual crimes per thousand women in different states during the calendar year 2003. Panel (b) reports the urban female workforce participation in NSS sample year 2004-05. A close examination indicates that the states with

high instances of crimes against women have low female workforce participation, suggesting that the crimes may explain some patterns in the female labor force participation. Even though the cross-sectional correlation is borne out, we need to account for time-varying characteristics. [CHANGE THE LAST SENTENCE]

Figure 2: National trends



Source: NSS and NCRB data multiple rounds, own calculations

Notes: Panel (a) describes the trends in total registered cases of rapes, molestation and sexual harassment in the country over the period 2002-2011. Panel (b) shows the trend in percent of women (age group 21-64) employed in workforce, percent of illiterate women, and percent of females with at least graduate level education between 2004-05 and 2011-12.

3 Empirical Framework

In this section, we examine the association between sexual-crime rate and female workforce participation. Under the cost-benefit framework of Chakraborty et al. (2014), a woman's participation can be seen as a rational choice wherein she works if the expected benefit from work exceeds the expected cost of work. Higher instances of crimes against women raise the likelihood of victimization, and hence increase psychological cost of work.

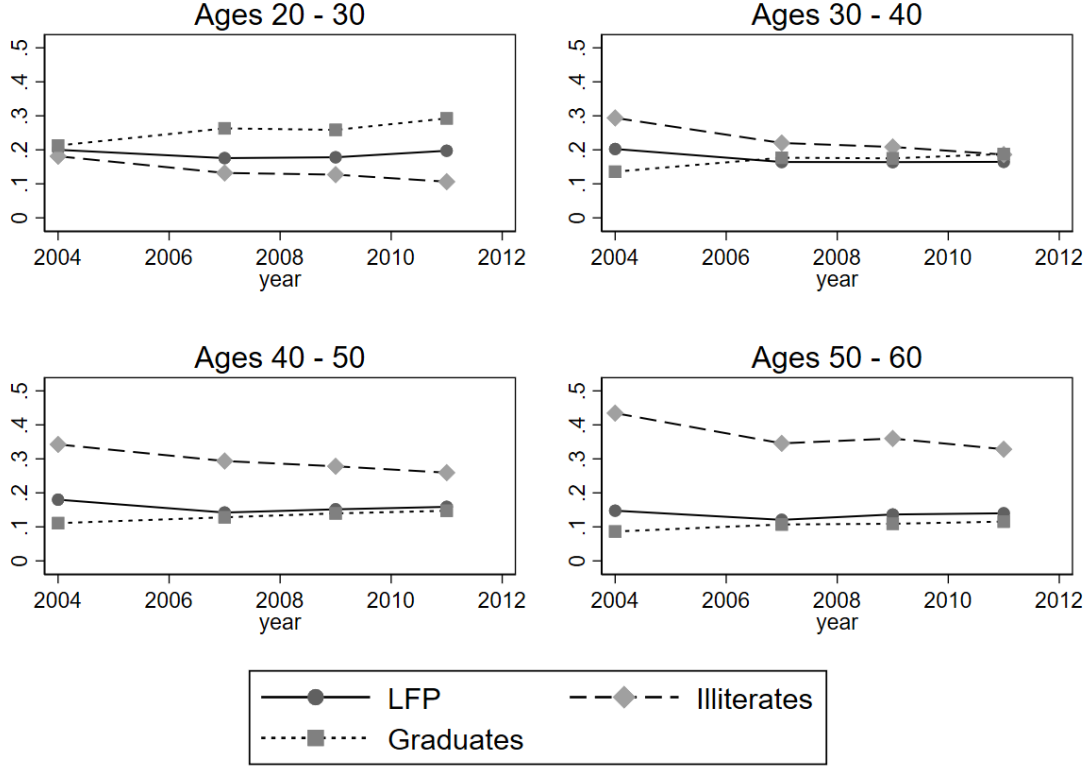
Table 1: Summary statistics across different time periods

Variable	Survey year				
	2004-05	2007-08	2009-10	2011-12	Overall
<u>Crimes</u>					
Rape(t-1)	27.92 (34.19)	34.10 (42.21)	37.85 (45.99)	39.11 (49.95)	34.74 (43.67)
Molestation(t-1)	57.96 (70.09)	64.41 (79.22)	71.13 (84.00)	71.44 (90.53)	66.23 (81.44)
Sexual Harassment(t-1)	21.59 (61.75)	17.31 (34.34)	21.20 (62.12)	17.30 (68.15)	19.35 (58.08)
Theft(t-1)	407.57 (999.85)	462.44 (1089.45)	535.68 (1260.02)	556.42 (1413.48)	490.53 (1201.94)
Murder(t-1)	57.30 (55.41)	56.86 (54.40)	57.44 (55.94)	58.48 (57.60)	57.52 (55.82)
Observations	566	566	566	566	2264
<u>Individual/ Household Characteristics</u>					
Workforce participation	0.19 (0.39)	0.15 (0.36)	0.16 (0.36)	0.16 (0.37)	0.16 (0.37)
Age	37.19 (11.01)	38.26 (11.47)	37.86 (10.97)	38.11 (11.06)	37.86 (11.15)
Schooling	6.26 (5.70)	7.07 (5.79)	7.27 (5.79)	7.58 (5.83)	7.03 (5.80)
Household size	5.55 (2.76)	5.26 (2.67)	5.22 (2.61)	5.13 (2.52)	5.29 (2.65)
Hindu	0.75 (0.43)	0.75 (0.43)	0.74 (0.44)	0.74 (0.44)	0.75 (0.44)
Scheduled tribe	0.07 (0.25)	0.08 (0.26)	0.07 (0.25)	0.08 (0.26)	0.07 (0.26)
Scheduled caste	0.14 (0.35)	0.12 (0.33)	0.13 (0.34)	0.13 (0.34)	0.13 (0.34)
OBC	0.35 (0.48)	0.33 (0.47)	0.36 (0.48)	0.38 (0.49)	0.36 (0.48)
Observations	45207	47719	42030	42360	177316

Source: NSS and NCRB multiple rounds, Own calculations

Notes: Upper panel reports the mean and standard deviation (in parenthesis) for different crimes in aggregated districts. For a survey round beginning in year t , crimes are summarized for calendar year $t - 1$ (see table A1 for details). Lower panel reports mean and standard deviation (in parenthesis) of individual and household characteristics of urban women aged 20-64.

Figure 3: National trends in female education and workforce participation for different age groups



Source: NSS and NCRB data multiple rounds, own calculations

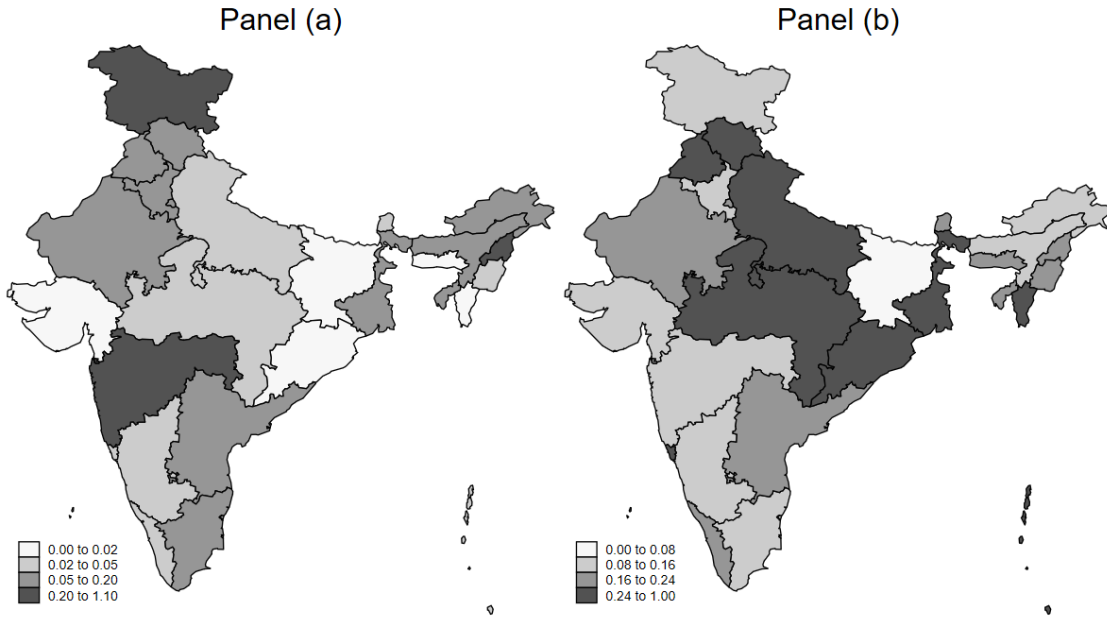
Notes: The figure shows the age-wise trend in percent of women employed in workforce, percent of illiterate women, and percent of females with at least graduate level education between 2004-05 and 2011-12. LFPR is stagnant in all age-groups, and not just in college or high school age group (20-30). Thus, the decline in LFPR cannot be entirely explained by education increase.

We begin by estimating the following baseline linear probability model, which incorporates lagged sexual-crime reports taking the following form:

$$W_{idt} = \beta_0 + C_{d,t-1}\beta_1 + \beta_2\mathbf{X}_{idt} + \delta_d + \delta_t + \epsilon_{idt} \quad (1)$$

where W_{idt} is a binary variable taking value one if individual i from district d participated in the workforce outside home as per survey year t , and zero otherwise. $C_{d,t-1}$ denotes the sexual-crime rate in district d in the calendar year $t - 1$. β_1 is the parameter of interest, and captures the effect of exposure to sexual crime on the decision to participate in workforce. The lag in sexual-crime rate allows us to address potential reverse causality arising because workforce participation increases women's vulnerability to crimes. \mathbf{X}_{idt} represents individual-level characteristics (i.e., age and education status) and household-level characteristics (i.e.,

Figure 4: State-wise disaggregation of sexual crimes female workforce participation in urban areas



Source: NSS data multiple rounds, own calculations

Notes: Panel (a) shows the reported sexual crimes (rapes, molestation, sexual harassment) per thousand women in 2003. Panel (b) reports the percent of urban women (age group 21-64) employed in the workforce in years 2004-05. Darker shades indicate higher values.

household size, and religious and caste affiliation) that affect an individual's employability or choice. We capture religion using an indicator variable that takes value one if the respondent follows Hinduism, and zero otherwise. Similarly, we record caste affiliation using indicators for socially disadvantaged SC, ST and OBC groups that qualify for affirmative action schemes in India, and treat General caste as the omitted category. We include district fixed effects (δ_d) to control for important sources of unobserved heterogeneity. For instance, large districts with a high population may exhibit high incidents of sexual crimes as well as better employment opportunities for women. Alternatively, districts with more conservative values may display low female workforce participation and more underreporting of sexual crimes. District fixed effects also help control for possible differences in law enforcement across states. Finally, time fixed effects (δ_t) are included to allow for possible structural differences in the economy and the degree of modernization in the society in terms of awareness and open-mindedness.

$C_{d,t-1}$ is measured by the total reported rape ($R_{d,t-1}$), molestation ($M_{d,t-1}$), and sexual harassment ($H_{d,t-1}$) cases per thousand women in the district. Let $F_{d,t-1}$ describe the female

population in district d in the calendar year $t - 1$. Then,

$$C_{d,t-1} = \frac{R_{d,t-1} + M_{d,t-1} + H_{d,t-1}}{F_{d,t-1}} \times 1000 \quad (2)$$

$F_{d,t-1}$ is approximated from the closest decennial census (2001 or 2011) instead of aggregated NSS data, since NSS is only representative at state level. As a robustness check, we also report state-level regressions where female population is approximated by aggregating NSS data.

The marginal effect of sexual crimes may be different for different sections of women depending on their economic and cultural backgrounds. Women from conservative societies, for instance, are likely to face higher psychological cost inflicted by the stigma attached to the crimes and, hence, may be more responsive to the crime rate. It is also possible for certain groups of women to face stronger employment incentives and be less deterred by crimes. We investigate such heterogeneity by estimating the following equation:

$$W_{idt} = \phi_0 + \phi_1 G_{idt} \times C_{d,t-1} + \phi_2 G_{id,t-1} + \phi_3 C_{d,t-1} + \phi_4 \mathbf{X}_{idt} + \delta_d + \delta_t + \epsilon_{idt} \quad (3)$$

where G_{idt} is an indicator taking value one if individual i from district d belongs to group G during period t , and zero otherwise. A positive and statistically significant coefficient on G indicates that in absence of sexual crimes women from group G are more likely to work outside homes as compared to other women. Moreover, a negative (positive) and significant coefficient on the interaction term indicates that relationship between violence and workforce participation is stronger (weaker) for women from group G as compared to others.

3.1 Identification

Ordinary least squares estimates may be biased due to measurement error in reported crimes arising due to two reasons: (1) underreporting, and (2) false reporting. Underreporting of sexual attacks is a well known problem in India. According to a report by [UN-Women and ICRW \(2013\)](#), a high proportion of women in the nation’s capital Delhi would rather choose to confront the perpetrator than inform the police. The problem is characteristic of conservative societies where women fear the stigma attached to the crime. Lack of faith in the judicial system and fear of reverse harassment by police are other reasons why victims do not take action. Under-reporting can also result from the systematic error in the statistical agency’s crime reporting procedure. The instances where sexual assaults result in the victim’s death are only recorded as murder (i.e., principal offense) to avoid double counting. Since murders are gender-neutral crimes and not recorded separately for women, the information about the accompanying sexual offenses is lost. The compilation procedure most likely affects the reporting of rapes since sexual harassment and molestation are usually non-fatal.

On the other hand, laws related to sexual offenses in India are inherently biased in favor of women and lend themselves to easy misuse. A study by Delhi Commission of Women claimed that 53.2% of rape cases filed between April 2013 and July 2014 in Delhi were subsequently found to be false. Another analysis published by popular newspaper The Hindu found that a large fraction of rape complaints were made by parents to evade potential stigma from daughter’s consensual relationship, or involved breach of promise to marry (Shrinivasan, 2014). Such instances pose a challenge to measuring criminal activity.

Since under-reporting and false reporting of crimes are linked with the societal differences across space and time, their effect is partially attenuated through region and year fixed effects. The endogeneity issues that nonetheless remain may bias the OLS estimates downwards. We address this concern by using state-level policies governing alcohol accessibility to provide exogenous variation in the instances of crimes against women. Alcohol use has been widely associated with sexual aggression (), and may affect the incidence of crimes through two channels. First, alcohol consumption heightens emotional responses and aggressive behavior, making men more likely to commit sexual offenses in an inebriated state. Second, alcohol consumption impairs cognitive function and decision making, which may render intoxicated women more vulnerable to crimes.

India is one of the few countries where alcohol-related laws are enforced at the state level. Some states ban the consumption of alcohol altogether, while others fix a minimum legal drinking age (MLDA) ranging between 18 to 25 years. In spite of the weak law enforcement and non-trivial evasion in India, policies limiting alcohol access have been shown to reduce the likelihood of consumption as well as instances of crimes against women (Luca et al., 2015). Studies have shown drinking age laws to affect sexual crimes in other countries as well (Cook and Moore, 1993). Since the state policies governing the minimum legal drinking age are unlikely to be correlated with the female labor force participation, the spacial and temporal variation in drinking age policies can be used as an exogenous source of variation in sexual crimes.

MLDA policies induce selective prohibition on certain age groups, generating a variation in the fraction of men who are legally qualified to drink. We use this variation in two ways. Our first strategy is to use the fraction of legal drinking male population as an instrument for the sexual-crime rate. Unlike baseline analysis which is conducted at the district-level, our instrumental variable approach uses state-level data. This allows us to better approximate the male and female populations using NSS data without worrying about the issue of representativeness. The estimation equations are as follows:

$$W_{ist} = \alpha_0 + C_{s,t-1}\alpha_1 + \mathbf{X}_{st}\alpha_2 + \delta_s + \delta_t + \varepsilon_{ist} \quad (4)$$

$$C_{s,t-1} = \gamma_0 + \gamma_1 z_{st} + \mathbf{X}_{st}\gamma_2 + \theta_s + \theta_t + \omega_{ist} \quad (5)$$

Let M_{st} represents the total male population and $MLDA_{st}$ represent the minimum legal

drinking age in state s during survey year t . The excluded instrumental z_{st} is constructed as follows:

$$z_{st} = \frac{\sum_{i=1}^{M_{st}} \mathbf{I}(\text{Age}_i > \text{MLDA}_{st})}{M_{st}} \times 1000$$

In the second approach, we use the policy discontinuity at the Gujarat border to proxy the variation in sexual crimes. The state of Gujarat has prohibited the manufacture, storage, sale and consumption of alcohol since the 1960s. However, cross-state differences in alcohol laws at the Gujarat border affect the alcohol accessibility of Gujarat residents. In particular, it is easy for people residing at the Gujarat border to evade Gujarat’s alcohol prohibition as they can buy and consume liquor in the neighboring states with liberal policies. Since individuals are likely to drive back under influence after consuming alcohol in low restriction areas, districts in proximity to other states are likely to be more susceptible to sexual crimes as compared to districts in the interior of Gujarat. We leverage this mechanism to examine the impact on female labor force participation, by making comparison among local economic areas that are adjacent and hence similar, except for the difference in alcohol accessibility.

Figure 5 presents the district map of Gujarat as in 2000. The term ‘exterior districts’ is used to describe the districts of Gujarat that share a border with a neighboring state with liberal MLDA policy. All remaining districts are referred to as interior districts. In contrast to the district fixed effect model described in equation 1, this analysis compares female labor force participation in contiguous-border district pairs, each comprising of one exterior and one interior district. Overall, the analysis uses data from twelve pairs of districts over four years. The estimation equation is:

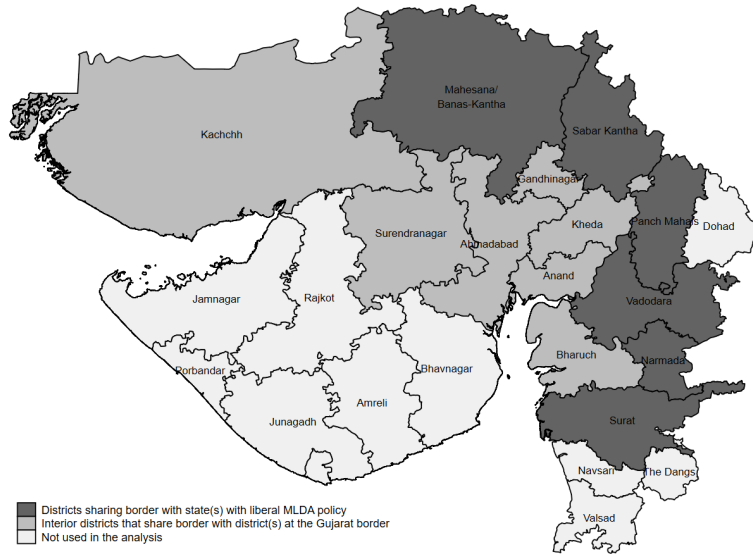
$$W_{idpt} = \lambda_0 + B_{dp}\lambda_1 + \mathbf{X}_{idt}\lambda_2 + \mathbf{X}_{dt}\lambda_3 + \eta_t + \eta_p + \nu_{idpt} \quad (6)$$

where p indexes adjacent district pairs. B_{dp} is an indicator variable taking value one if district d from contiguous pair p is a border district and zero otherwise. The coefficient λ_1 . We include contiguous district pair fixed effects to account for local economic and social conditions.

The next section presents the estimation results. We first present the estimates from the OLS model with cluster-robust errors. We then conduct several robustness and falsification tests to check the validity of our results and compare the deterrent effects on different sections of women. Finally, we use the variation in policies regarding the legal sale of alcohol to instrument for the rate of sexual crimes.

¹Parts of districts Mahesana and Banas Kantha were split to form a new district named Patan in the early 2000s. The analysis combines these districts to maintain geographical consistency across years.

Figure 5: Districts of Gujarat as in 2000 ¹



4 Results

4.1 Baseline Model

Table 2 reports the results from specification 1 on the NSS sample of urban women in the age-group 21 to 64 years. Column (1) reports the outcome obtained by regressing the decision to work W_{idt} on $C_{d,t-1}$ without controls. This column indicates a positive and statistically significant correlation between sexual crimes and female workforce participation. However, as mentioned earlier, this specification suffers from endogeneity problem because it fails to control for differences across geographic regions that may be correlated with workforce participation as well as the incidence of crimes. The issue is addressed in Column (2) which includes district fixed effects, thus ensuring that comparisons identifying the effect of sexual crimes are only made within (and not across) districts. The inclusion of district fixed effects change the estimate completely, indicating a significant inhibitory effect of sexual crimes on female workforce participation. The subsequent columns sequentially include year fixed effects (Column (3)), individual-specific controls (Column (4)) and household-specific controls (Column (5)). Individual controls include age, a quadratic in age and years of schooling, whereas household-level controls include religious and caste indicators. The coefficient for sexual crimes remains virtually unchanged by the addition of these controls.

The OLS estimates from our preferred model (Column (5)) show that an increase in rate of crimes against women by 1% reduces the probability of working away from home by 6.6 %. The coefficients for other variables are found to be consistent with the previous literature. For instance, the estimates for quadratic in age indicate that the involvement in work increases with age at a decreasing rate. In addition, women belonging to the SC-ST groups are 11-14 percent point more likely to work as compared to the general caste women. Besides,

workforce participation is positively associated with the years of schooling and negatively associated with the household size in all the specifications. Household size may reflect the influence of social norms governing gender roles and responsibilities. Women in large families may face higher burden of household chores, which dissuades them from finding employment. Alternatively, family size may be indicative of traditional families that exercise greater control over women.

4.2 Placebo

While district fixed effects and rich set of covariates reduce the possibility of correlated unobserved factors, the negative association between crime rate and women’s employment outside their homes may be driven by confounders like local economic conditions. For instance, poor labor market conditions may lead to high unemployment as well as influence the crime rate. To address these concerns, we conduct some falsification tests and report them in Table 3.

As a first step, we estimate equation 1 by replacing sexual crimes with gender-neutral crimes such as thefts and murders. The rationale is that poor economic conditions are likely to influence all types of crimes (Cantor and Land, 1985). Consequently, if the negative relationship in Table 2 is driven by the labor market conditions, we must observe a negative association between workforce participation and gender-neutral crimes as well. Conversely, if threat of sexual assault is responsible for the pattern in female workforce participation, we would not expect to find such a pattern with the gender-neutral crimes. Thefts and murders are chosen because both crimes are serious in nature and do not have a stigma associated with them. These properties ensure correct reporting behavior, guaranteeing that the results are not attenuated by measurement error. Columns (1) and (2) report the outcomes from regressing workforce participation on thefts and murders respectively. We find that neither of the gender-neutral crimes has a significant deterrent effect on female workforce participation.

As another falsification test, we examine the relationship between crimes against women and male labor force participation. The rationale is similar: if sexual crimes are driven by poor labor market conditions, it may also affect men’s labor-force participation. Column (3) reports the outcomes from estimating equation 1 on the sample of urban men aged 20-64. Again, we find no statistical relationship between crimes against women and men’s labor-force participation outside homes. The coefficients on age and schooling are qualitatively similar to the previous models. This result must be treated with caution since there is little variation in the male labor force participation anyway.

4.3 Heterogeneity Analyses

In this subsection, we investigate whether certain sections of women respond more strongly to crimes as compared to others. The analysis involves estimating equation 3 for different

Table 2: Crime against women and female workforce participation: Baseline

Dependent Variable: Workforce participation					
VARIABLES	None	+ District FE	+ Time FE	+ Individual	+ Household
Crimes	0.093*** (0.030)	-0.057** (0.023)	-0.063** (0.027)	-0.060** (0.026)	-0.063** (0.027)
Age				0.005*** (0.001)	0.004*** (0.001)
Age squared				-0.000*** (0.000)	-0.000*** (0.000)
Schooling				0.005*** (0.000)	0.006*** (0.000)
Hindu = 1					0.013*** (0.004)
Scheduled tribe = 1					0.146*** (0.012)
Scheduled caste = 1					0.110*** (0.006)
OBC = 1					0.014*** (0.004)
Household size					-0.013*** (0.001)
HH monthly exp					-0.000 (0.000)
Constant	0.145*** (0.005)	0.167*** (0.004)	0.168*** (0.004)	0.070*** (0.022)	0.101*** (0.023)
Observations	177,316	177,316	177,316	177,316	177,316
R-squared	0.001	0.045	0.046	0.057	0.076
District FE	No	Yes	Yes	Yes	Yes
Time FE	No	No	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. Sample consists of urban women between age group 20 to 64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 3: Crime against women and female workforce participation: Placebo

Dependent Variable: Workforce participation			
VARIABLES	Females		Males
	Theft (1)	Murder (2)	Baseline (3)
Crimes	0.009* (0.005)	-0.050 (0.116)	-0.015 (0.011)
Age	0.004*** (0.001)	0.004*** (0.001)	0.010*** (0.001)
Age-sq	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
schooling	0.006*** (0.000)	0.006*** (0.000)	0.001*** (0.000)
Hindu = 1	0.013*** (0.004)	0.013*** (0.004)	-0.002 (0.002)
Scheduled tribe = 1	0.146*** (0.012)	0.147*** (0.012)	0.001 (0.003)
Scheduled caste = 1	0.110*** (0.006)	0.110*** (0.006)	0.006*** (0.001)
OBC = 1	0.014*** (0.004)	0.014*** (0.004)	0.002 (0.001)
Household size	-0.013*** (0.001)	-0.013*** (0.001)	-0.002*** (0.000)
mpce	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Constant	0.081*** (0.023)	0.095*** (0.024)	0.830*** (0.012)
Observations	177,316	177,316	123,185
R-squared	0.076	0.076	0.064
Time FE	Yes	Yes	Yes
District FE	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. Sample consists of urban women between age group 20 to 64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

groups designated by indicator G . Understanding the heterogeneity in responses enables us to draw insights into the mechanisms affecting the deterrent effect of crimes. Figure 6 provides a graphical illustration of the labor-force participation status of different sections of women by plotting the predicted probability of working (or seeking work) outside homes against the crime rate in the district. The marginal effect of the sexual crimes on a group is given by the slope of the predicted-probability curve. The detailed regression outcomes are reported in Appendix Table A3.

Sector: We begin by examining whether urban women respond differently as compared to women from rural areas. The deterrent effect of crimes is expected to be weaker for rural women for multiple reasons. Firstly, rural women are more likely to be driven into the workforce by necessity as opposed to an opportunity. Consequently, they may face stronger employment incentives (Klasen and Pieters, 2012) and may be compelled to overcome their fear of crimes. Secondly, the nature of jobs in the two sectors is different. For example, 75% of the NSS sample of rural women is employed in the primary sector (mostly agricultural) jobs, as opposed to 15% urban women. Agricultural jobs require women to work near their homes, so the probability of victimization while commute is low. Lastly, rural women may be less informed about the sexual crimes considering the high illiteracy rate and lower media coverage in rural India.

For this analysis, we extend the estimation sample to include women from rural households, thus yielding a larger sample size of 435,546. The indicator G is defined as one if the respondent belongs to an urban household. Figure 6 shows that in contrast to urban women, rural women display a higher level of participation for each level of the crime rate. The estimates also yield a trivial and statistically insignificant effect of crimes on these women as consistent with our hypothesis.

Education attainment: As a next step, we investigate the heterogeneity in response to crimes based on women’s educational attainment. On one hand, a higher level of education indicates a higher opportunity cost of not working. On the other hand, high educational attainment reflects high socio-economic status and low marginal benefit of employment. Due to these opposing factors, the overall effect of crimes is theoretically ambiguous. Figure 6 shows that at each level of crime rate, women with more than ten years of schooling are significantly more likely to be engaged in the labor force. The marginal effect of crime, however, is statistically indistinguishable among these groups as indicated by the slopes of the two curves.

Religion: As mentioned earlier, the inhibitory effect of sexual crimes may vary for women with different cultural backgrounds depending on the value that their local society places on chastity. Since religion forms an important part of cultural identity, we next explore the differential effect for Hindu women ($G = 1$) as compared to non-Hindu women. Figure 6 indicates that at lower levels of crime, both sections of women are equally likely to participate in workforce. However, the slope is much lower for non-Hindus, indicating that the relationship between sexual crimes and labor supply is much stronger for these women.

Age: Young women are more vulnerable to sexual crimes as compared to middle-aged women. Historically, around 40% of rape victims in India are in the age group 18-30 while less than 15% have been older than 30 years. Moreover, the stigma cost of such crimes is likely to be higher for young women. It is, therefore, conceivable that younger women may be more deterred by crimes. We examine this possibility by dividing our sample into two age groups: 21-40 and 40 above. Figure 6 shows that both sections of women respond to negatively to higher crime rates. The interaction term reported in Table A3 is negative but statistically insignificant, indicating that there is no significant difference in the deterring effect among the two age groups.

Household income: Finally, we compare the inhibitory effect of crimes on women from households with different monthly per capita expenditure (MPCE). Women from low income households have a larger economic incentive to work and thus overcome their fear of assault, so it is possible that women from low MPCE households are less responsive to crimes. Figure 6, on the contrary, shows women from poorer households to be slightly more responsive to crimes, if not equally responsive. Table A3 Column 5 indicates that the interaction term is statistically insignificant, so the marginal effects are in fact quite similar for the two groups.

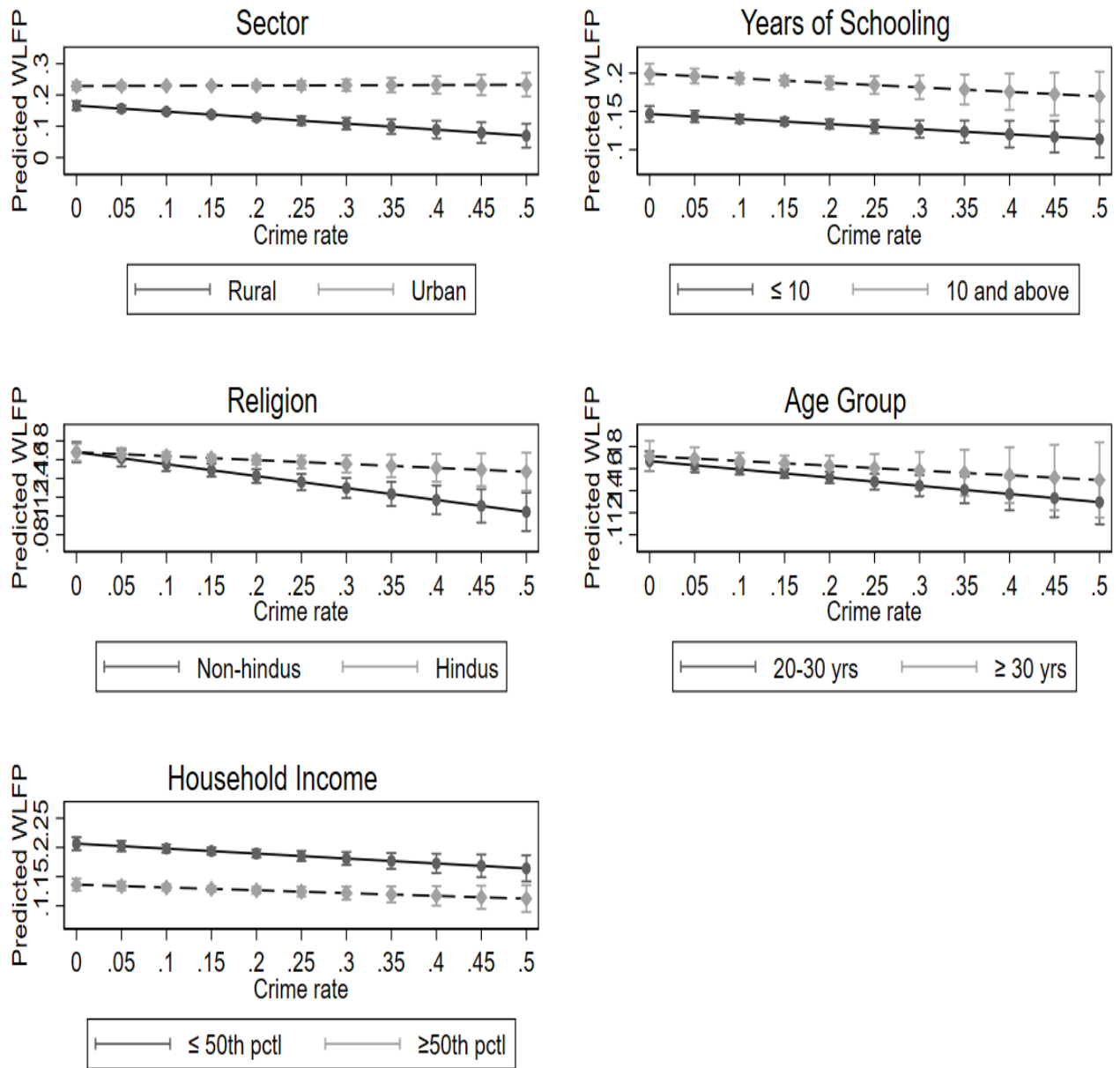
4.4 Robustness

The results so far document a robust negative and significant relationship between crimes and women’s participation in jobs away from home. One concern, however, is that the negative association between sexual crimes and female workforce participation may be an artifact of unknown social factors or other anomalies. In this section, we test these issues by examining if the negative relationship persists in alternative empirical specifications, estimation sample and variable definitions.

Table 4 reports regression outcomes from several modifications of specification 1. Column (1) reproduces our main result from Table 2. Column (2) controls for social factors that encourage male dominance by adding region-level controls accounting for local economic and social conditions and reflecting women’s position in society. These controls are obtained by aggregating NSS data, and include male literacy, child sex ratio, and girl-child marriage ratio. The estimated effect remains virtually unchanged by the inclusion of additional controls. Column (3) further adds district-level linear time trends to control for unobserved district-specific characteristics that vary over time and are related to female workforce participation. The negative relationship survives the additional controls, and is stronger than before. Since there is a concern regarding the representation of the NSS district samples, the subsequent columns present analogous analysis using state-level regressors and state fixed effects. The sexual-crime rate is measured from the state-level analog of Equation 2. Here, we approximate the female population in the denominator using NSS instead of decennial censuses as the surveys are representative at the state-level.² Similarly, all other state-level controls are also

²The results obtained by using census population are qualitatively similar, and not reported here for the sake of brevity.

Figure 6: Heterogenous treatment effects



The figure plots predicted probability of workforce participation at each level of sexual-crime rate for women of different sectors (Panel (a)), years of schooling (Panel (b)), religion (Panel (c)), age-group (Panel (d)), household income (Panel (e)). Predicted probabilities are constructed by estimating specification 3.

generated from NSS. Column (4) reports the outcomes from estimating the base specification at the state-level. The coefficient indicates that additional crime per thousand women is associated with a 33.5% reduction in the probability of a woman working outside home. This

effect is also robust to the sequential inclusion of state-level controls and state-level linear time trends in Columns (5) and (6).

Table 5 reports additional robustness checks by altering the estimation sample and variable definitions. In Column (1) we report the outcome obtained by restricting the estimation sample to urban women aged 20-50. We observe a higher magnitude of the crime coefficient in the younger sample, which is expected since young women are more vulnerable to sexual assaults. Column (2) presents the regression outcomes by modifying the definition of labor participation. Here we define W_{idt} as an indicator variable taking value one if a woman works as regular or casual wage employees away from home as a principal *or subsidiary* activity. Finally, in Column (3), we modify the construction of crime variable, by incorporating two-year lag. The effect of sexual crimes continues to remain negative and significant, with coefficient magnitude slightly higher than the main specification. This combination of evidence provides further validity to our results.

4.5 Instrumental Variable Approach

To account for measurement error in reported crimes and to address the endogeneity concerns that remain after controlling for district fixed effects, we instrument for crimes using state-level alcohol policies. The identification strategy is based on the idea that while alcohol availability affects crimes against women, it is unlikely to affect women’s workforce participation decisions directly.

Table 6 reports the IV estimates from equation 4. For comparison, we present the OLS and IV estimates of each specification. Each column controls for state and year fixed effects. Column 1 shows the estimate of the effect of crimes is -0.322. Column 2 shows that when the same model is estimated by TSLS using the fraction of drinking age men as an instrument for the crime rate, the estimated effect of crime is -0.449. The remaining columns repeat the first two columns, but also add state-level controls mentioned in Table 4. The results reported in these columns are similar, with the IV estimates being slightly larger than the OLS estimates.

4.6 Contiguous Border Analysis

Next, we take a reduced-form approach by using the discontinuity in alcohol availability at the Gujarat border. The identification is achieved by using the variation in the ease of availability of alcohol in various districts of Gujarat. In particular, the residents of districts that share a border with another state find it easier to evade alcohol prohibition as they can easily buy and consume alcohol in the neighboring states. Since the availability of alcohol is closely associated with crimes against women, comparing the female labor force participation of border districts in Gujarat to the surrounding districts in the interior of Gujarat can help

Table 4: Crime against women and female workforce participation: Robustness

Dependent Variable: Workforce participation			
VARIABLES	Ages 20-50	Alternative WLF	Crimes(t-2)
	(1)	(2)	(3)
Crimes	-0.071** (0.031)	-0.066** (0.026)	-0.086*** (0.033)
Age	-0.002 (0.002)	0.005*** (0.001)	0.004*** (0.001)
Age squared	0.000 (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Schooling	0.007*** (0.001)	0.006*** (0.000)	0.006*** (0.000)
Hindu = 1	0.016*** (0.005)	0.013*** (0.004)	0.013*** (0.004)
Scheduled tribe = 1	0.144*** (0.013)	0.150*** (0.012)	0.146*** (0.012)
Scheduled caste = 1	0.105*** (0.006)	0.115*** (0.006)	0.110*** (0.006)
OBC = 1	0.013*** (0.004)	0.015*** (0.004)	0.014*** (0.004)
Household size	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)
HH monthly exp	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Constant	0.198*** (0.036)	0.104*** (0.023)	0.104*** (0.023)
Observations	150,617	177,316	177,316
R-squared	0.079	0.075	0.077
Time FE	Yes	Yes	Yes
State/District FE	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. Sample consists of urban women between age group 20 to 64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 5: Crime against women and female workforce participation: Robustness

Dependent Variable: Workforce participation						
VARIABLES	District-level			State-level		
	Baseline (1)	+ Dist Controls (2)	+ Dist Trend (3)	Baseline (4)	+ State Controls (5)	+ State Trend (6)
Crimes	-0.063** (0.027)	-0.065** (0.027)	-0.150*** (0.036)	-0.335*** (0.112)	-0.246** (0.103)	-0.499*** (0.110)
Age	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)	0.004*** (0.001)
Age squared	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)
Schooling	0.006*** (0.000)	0.006*** (0.000)	0.006*** (0.000)	0.006*** (0.001)	0.006*** (0.001)	0.006*** (0.001)
Hindu = 1	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.013*** (0.004)	0.014*** (0.004)	0.014*** (0.004)
Scheduled tribe = 1	0.146*** (0.012)	0.146*** (0.012)	0.146*** (0.012)	0.139*** (0.013)	0.139*** (0.013)	0.139*** (0.013)
Scheduled caste = 1	0.110*** (0.006)	0.110*** (0.006)	0.111*** (0.006)	0.107*** (0.009)	0.107*** (0.009)	0.107*** (0.009)
OBC = 1	0.014*** (0.004)	0.014*** (0.004)	0.014*** (0.004)	0.012** (0.005)	0.012** (0.005)	0.012** (0.005)
Household size	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)
HH monthly exp	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)
Constant	0.101*** (0.023)	0.093*** (0.023)	0.104*** (0.023)	0.143*** (0.026)	0.192*** (0.036)	0.217*** (0.033)
Observations	177,316	177,316	177,316	177,316	177,316	177,316
R-squared	0.076	0.077	0.084	0.062	0.063	0.064
State/District FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
State/District Controls	No	Yes	Yes	No	Yes	Yes
State/District Linear Trend	No	No	Yes	No	No	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. Sample consists of urban women between age group 20 to 64. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 6: Crime against women and female workforce participation: IV

Dependent Variable: Workforce participation				
VARIABLES	OLS	IV	OLS	IV
	(1)	(2)	(3)	(4)
Crimes	-0.322** (0.124)	-0.449** (0.198)	-0.211* (0.110)	-0.323** (0.160)
Child sex ratio			-0.000*** (0.000)	-0.000*** (0.000)
Male unemployment			0.963*** (0.281)	0.852*** (0.298)
Girl-child marriage ratio			0.275 (0.361)	0.264 (0.387)
Constant	0.200*** (0.018)	0.160*** (0.027)	0.267*** (0.030)	0.291*** (0.048)
Observations	158,468	158,468	158,468	158,468
R-squared	0.032	0.032	0.033	0.033
State FE	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models. Sample consists of urban women between age group 20 to 64 states (UTs) excluding Jammu & Kashmir, Manipur, Karnataka, and Dadra & Nagar Haveli. Robust standard errors presented in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

Table 7: Contiguous-pair Analysis in Gujarat

VARIABLES	No controls	+ Indi/ HH Controls	+ Dist Controls
	(1)	(2)	(3)
(sum) border	-0.041** (0.019)	-0.052*** (0.019)	-0.051*** (0.019)
Constant	0.162*** (0.025)	0.029 (0.116)	0.018 (0.139)
Observations	5,746	5,746	5,746
R-squared	0.024	0.087	0.088
Contiguous Pair FE	Yes	Yes	Yes
Time FE	Yes	Yes	Yes
Individual Controls	No	Yes	Yes
HH Controls	No	Yes	Yes
District Controls	No	No	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Sample consists of urban women between age group 20 to 64. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

assess the effect of sexual crimes. Contiguous border districts in the interior of Gujarat present proper controls for local economic and social conditions.

Table 7 presents results from the reduced form contiguous pair analysis. Column (1) compares the female workforce participation in the contiguous border districts without any controls. We find that women in the border districts are 4.1 percent point less likely to work outside homes. Columns (2) and (3) sequentially include individual/ household controls and district-level controls.

5 Conclusion

We find a robust negative and significant impact of sexual crimes on the probability of workforce participation. Our preferred specification shows that an additional crime per thousand women in a district decreases the expected probability of working by 6.6 percentage points. We believe that the deterrent effect arises because rising instances of sexual attacks in a region increase the expected cost of working away from home (both psychologically and monetarily) by increasing the probability of victimization. If the expected costs exceed the expected benefits from work, it deters women from engaging in the workforce. The deterrent effect is larger for women who face higher stigma or are more vulnerable to crimes. In particular, it is higher for women who are young or work in non-agricultural sectors. It is also higher for women belonging to richer economic backgrounds since their marginal utility from work is

low, and hence, safety is the primary concern. To the extent that the reporting of crimes is infected by measurement error, we expect our study to underestimate the inhibitive effect of crimes on female workforce participation.

Women's workforce participation is necessary to harness the benefits of the demographic dividend in the country. Sexual violence, being a severe hindrance to women's freedom, indirectly hinders the development of the economy. The multifaceted repercussions of sexual violence and corresponding low female workforce participation make it essential to take measures to reduce the victimization as well as the stigma cost associated with these crimes. Safety in public transport systems is crucial for propelling the free movement of women, and hence, easing their commute to workplaces. The 2012 Nirbhaya Delhi gang-rape case exposed the inefficacy of the existing system to provide a secure transport medium for women. Delhi Metro Rail Corp. and Mumbai Suburban Railways reserve coaches exclusively for women to address the threat of victimization. While a similar policy can be extended to other means of transport like buses and shared cabs, isolating women from some potentially harmful spheres cannot be the one-stop solution to ensure safety as it is unfeasible and socially unhealthy to impose large-scale restrictions on access to public spaces.

Reverse sexual harassment of victims by the police, as well as trivialization and normalization of sexual crimes by the society, dissuades women from reporting instances of sexual harassment and assault (UN-Women and ICRW, 2013). The slow response of the judiciary towards cases of sexual crimes further exacerbates the plight of the victims and increases the confidence of the assaulters. In the broader light, this makes it difficult for the public to place their faith in the executive bodies enacted to uphold the law, which hinders liberalization of the society. Successful implementation of remedial policies requires an accessible, efficient and trustworthy law and order mechanism. It is paramount that the police and the judiciary provide complaint redressal in a respectful, supportive and efficient manner. Crimes will have a low deterring effect on labor force participation if society as a whole believes that perpetrators will be firmly dealt with. Future research in this direction may aim at analyzing the policies that can achieve this.

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Appendix

Table A1: NCRB and NSS Data

NSS		NCRB	
ROUND	SURVEY YEAR (t)	CRIMES YEAR ($t-1$)	CRIMES YEAR ($t-2$)
61	2004-2005	2003	2002
64	2007-2008	2006	2005
66	2009-2010	2008	2007
68	2011-2012	2010	2009

Table A2: Minimum legal drinking age across states in India

S.No.	STATE	2003	2006	2008	2010
1	A&N ISLANDS	18	18	18	18
2	ANDHRA PRADESH	21	21	21	21
3	ARUNACHAL PRADESH	21	21	21	21
4	ASSAM	21	21	21	21
5	BIHAR	21	21	21	21
6	CHANDIGARH	25	25	25	25
7	CHHATTISGARH	21	21	21	21
8	DAMAN & DIU	21	21	21	21
9	DELHI	25	25	25	25
10	GOA	21	21	21	21
11	GUJARAT	99	99	99	99
12	HARYANA	25	25	25	25
13	HIMACHAL PRADESH	18	18	18	18
14	JHARKHAND	21	21	21	21
15	KERALA	18	18	18	18
16	LAKSHADWEEP	99	99	99	99
17	MADHYA PRADESH	21	21	21	21
18	MAHARASHTRA	21	21	21	21
19	MEGHALAYA	25	25	25	25
20	MIZORAM	99	99	99	99
21	NAGALAND	99	99	99	99
22	ORISSA	21	21	21	21
23	PUDUCHERRY	18	18	18	18
24	PUNJAB	25	25	25	25
25	RAJASTHAN	18	18	18	18
26	SIKKIM	18	18	18	18
27	TAMIL NADU	18	21	21	21
28	TRIPURA	21	21	21	21
29	UTTAR PRADESH	21	21	21	21
30	UTTARAKHAND	21	21	21	21
31	WEST BENGAL	21	21	21	21

Source: Luca et al. (2015)

Notes: Table highlights the minimum legal drinking age in selected states of India.
'P' refers to a blanket prohibition.

Table A3: Crimes against women and female workforce participation: Heterogeneity Analyses

VARIABLES	Sector	Schooling	Religion	Age	HH Income
Group × Crimes	-0.201*** (0.051)	0.007 (0.056)	0.086*** (0.022)	0.014 (0.053)	0.037 (0.035)
Group	-0.063*** (0.008)	0.053*** (0.008)	-0.000 (0.005)	0.026*** (0.008)	-0.070*** (0.007)
Crimes	0.008 (0.051)	-0.066** (0.033)	-0.127*** (0.028)	-0.072** (0.036)	-0.085*** (0.032)
Age	0.017*** (0.001)	0.004*** (0.001)	0.004*** (0.001)		0.006*** (0.001)
Age squared	-0.000*** (0.000)	-0.000*** (0.000)	-0.000*** (0.000)		-0.000*** (0.000)
Schooling	0.001*** (0.000)		0.006*** (0.000)	0.007*** (0.000)	0.008*** (0.000)
Hindu = 1	0.030*** (0.004)	0.018*** (0.004)		0.012*** (0.004)	0.014*** (0.004)
Scheduled tribe = 1	0.171*** (0.008)	0.136*** (0.012)	0.146*** (0.012)	0.148*** (0.012)	0.141*** (0.012)
Scheduled caste = 1	0.128*** (0.005)	0.098*** (0.006)	0.110*** (0.006)	0.112*** (0.006)	0.102*** (0.006)
OBC = 1	0.031*** (0.004)	0.006 (0.004)	0.013*** (0.004)	0.015*** (0.004)	0.010** (0.004)
Household size	-0.014*** (0.000)	-0.013*** (0.001)	-0.013*** (0.001)	-0.013*** (0.001)	-0.009*** (0.001)
HH monthly exp	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	-0.000 (0.000)	
Constant	-0.079*** (0.017)	0.143*** (0.024)	0.103*** (0.024)	0.136*** (0.008)	0.070*** (0.023)
Observations	435,546	177,316	177,316	177,316	177,316
R-squared	0.189	0.073	0.077	0.075	0.082
Time FE	Yes	Yes	Yes	Yes	Yes
District FE	Yes	Yes	Yes	Yes	Yes

Source: NSS and NCRB multiple rounds, own calculations

Notes: Linear probability models.

Sample consists of urban women between age group 21 to 64. Robust standard errors presented

in parentheses are clustered by district and year. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$