Women Police Stations and Female Labour Force Participation*

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Abstract

Exploiting a policy experiment that led to the reorganisation of the police force in urban India, we examine if improved local safety around factories can explain gender gap in employment in the context of emerging market economies. We find that an access to women-led police cells and all-women police stations reduce the social stigma around the reporting of gendered crime, thereby deterring such offences and increasing the share of female in total employment by 24%. We also find a positive effect on the growth rate of female employment by 2%, which could imply a potential long term effect. The results do not point towards a mere substitution among genders, but an overall increase in employment and expansion of firm size. The results suggest that this is more of a supply side effect than a demand side phenomenon. Our results point towards a possible shift from the informal to the formal sector. Moreover, both total factor productivity and labour productivity increase, implying that the marginal female worker employed is not of a significantly lower quality.

Keywords: Female Employment, Safety, Gender Gap, Economic Growth.

JEL Codes: J16, J28, J21, J24

*All errors are my own.

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1 Introduction

Even though the recent years have observed a considerable reduction in gender gap in employment both in developed and developing countries, the occurrence of gender inequality is still significantly high, specifically in South Asia, the Middle East and North Africa (OECD, 2018; WorldBank, 2011).[1] These gaps persist in the labour market, where women typically receive lower wages, are underrepresented in certain occupations, and work fewer hours than men, as well as in several other dimensions including education, access to productive inputs, political representation, or bargaining power inside the household (Borker, 2017). [2]

Figure 1 shows that countries which have high gender gap in employment are also countries that have low physical security of women. Given that many of developing countries have started to incorporate more women in the police force to increase female safety, it is imperative to understand whether and how such changes can contribute toward enhancing gender convergence in employment, an aspect which is still relatively under-researched due to paucity of data.[3]

We contribute to this literature by exploiting a policy change in India that led to the staggered establishment of all women police stations across the states of India. Using this as a quasi-natural experiment we investigate its effect on the gender employment gap for Indian manufacturing firms. Three features drive our choice: (a) following the National Conference of 2005 for Women in Police, all states were mandated to increase gender diversity in the police force to 30%. (b) After this conference, the Model Police Act was implemented in 2006 following which all states adopted women police stations (referred as WPS henceforth) across the years. (c)These WPS are stations that typically employ only female officers and, only handle cases related to violence committed against women. For

[1]Achieving gender equality and empowering all women and girls by 2030 is one of the seventeen sustainable development goals laid out by UN (United Nations) in the UN Millennium Development Goals. See: https://www.un.org/sustainabledevelopment/gender-equality/

[2]At the global level, the numbers are 75% of men compared to 48.5% of women. For OECD countries, the employment gap varies between 15–25% with the pay gap between 4–40% (OECD, 2018).

[3]Current research have shown that gender gaps (both employment and wages) have started to decline slowly since 1990s, a period from which countries across the world have started to become increasingly focused on the gender composition of the police force.

this reason, officers placed at WPS receive specialized training in dealing with victims and in processing these types of crimes. Hence this is a perfect set-up to study the impact of increase in women's safety on their labour force participation. Furthermore, India is a good case study because of its diverse manufacturing sector and a developing nation with severe gender employment gap. In 2020, the gap was at 23.2%, while the same for wage was 20.4% (Sai and Kameswari, 2022).[4]

The theoretical literature has focussed on explaining the effects of economic growth on gender employment gap, for example, Becker (1957); Becker and Lewis (1973); Doepke and Tertilt (2009); Fernandes and Paunov (2012); Galor and Weil (1999); Greenwood et al. (2005); Ngai and Olivetti (2015) . Other papers have focused on the reverse effect, i.e. the impact of gender inequality on growth. These theories are, more often than not, based on the income and human capital channels, as in Galor and Weil (1999), and Lagerlof (2003). Galor and Weil (1999), for instance, postulates that an increase in women's relative income increases the opportunity cost of raising children, which then has multiple positive economic effects like dampening of population growth, increase in per capital income, higher labour productivity etc. A few papers like Cuberes and Teignier (2016); Hsieh et al. (2019b), have modelled how greater gender equality in labour market access can improve economic growth. These models of human capital formation develop from the assumption that there is a random distribution of labour-market oriented skill among men and women. Under this framework, it is obvious that any barrier to women's entry into the labour market, or into some specific occupations, will be distortive to economic outcomes. However, all these papers treat labour force participation of women based on individual level characteristics. In this paper we add to this literature by showing how community or society level variables, such as safety, can affect female employment.

We investigate whether local safety concerns contribute to the gender gap in employment. Safety concerns are a critical cost borne by and incorporated in the utility functions of women when choosing to set out of their house and participate in the labour force. Re-

[4]96.6% of the women declare care-taking and household chores as the main reasons for not entering the labour force. In 2018, 40.1% of women in the economically active population did not report any personal income, while only 15.0% of men reported the same situation (Sai and Kameswari, 2022)

cent research specifies that safety concerns of women outside the home are likely to play an important role in their decision-making process. For instance, Borker (2017) studies safety as a determinant of college choices of girls. Her study suggests that women are willing to choose a worse college by quality if the travel route is perceived to be one standard deviation safer which translates into a 20% decline in the present discounted value of their lifetime income. Peprah and Koomson (2017) show that in Ghana women prefer to work in open fields which are perceived to be safer than mines even though agriculture pays lower wages. Muralidharan and Prakash (2017) and Seki and Yamada (2018) show that policy decisions that improve the transport infrastructure encourages women to take part in productive activities more. These, however, are at best indirect evidence since the improvement in transport not only makes it safe but also reduces cost which may then affect female schooling (Muralidharan and Prakash, 2017) or labour force participation (Seki and Yamada, 2018). We look at the direct effects of improvement of safety on female labour force participation thereby adding to the literature on importance of policies that strengthen social institutions.

A growing literature has established that all-women police stations indeed increase safety for women and ease their access to justice in the context of both developed and developing economies (Amaral et al., 2021; Carrington et al., 2020; Córdova and Kras, 2020; Kavanaugh et al., 2019; Miller and Segal, 2019; Perova and Reynolds, 2017). These stations exclusively cater to female victims and are often considered to have a more friendly reporting atmosphere for women. This leads to an improvement in justice and bolsters the sense of safety amongst women. Standard economic theory predicts that female employment should respond to improved safety. Nevertheless, socially discriminatory norms which are unfavourable for women such as disapproval of women working outside the home, may weaken or even sever this link for women (Field et al., 2010; Jensen, 2012). In this setting, the social costs of employment might outweigh the potential gains, making such improvements in safety ineffective. Such a tradeoff informs this paper's key question. Is setting up of WPS to ease access to justice sufficient in catalyzing employment, even in the presence of discriminatory social norms? This is an empirical question worth examining.

We also contribute to the growing literature of impacts of female representation on various gender-based outcomes. An increase in female representation in local government in India has been found to induce a large improvement in service provision for women (Chattopadhyay and Duflo, 2004; Iyer et al., 2012). Miller and Segal (2019) study the impact of the integration of women in US policing on violent crime reporting and domestic violence escalation and show that counties with higher female representation in the police force have a significantly lower incidence of female homicides. Amaral et al. (2021); Kavanaugh and Pliskin (2020); Perova and Reynolds (2015) demonstrate that establishing an all women police station(WPS) in a metropolitan municipality is associated with reduction in the female homicide rate in metropolitan areas in India, Brazil and Peru respectively. Our results bolster the claim of positive effects of an increased female representation by showing an improvement in economic participation of women.

We also examine corporate decisions at large, following the establishment of all women police stations to see how firms react to changes in social institutions. Financial and legal institutions have been known to have significant impact on firm's input choices and well as other decisions. Differences in institutions determine different level of efficiencies of resource allocation which in turn determine different levels of operating leverages (Beck et al., 2006; Demirgüç-Kunt and Maksimovic, 1998; Rajan and Zingales, 1998). Market institutions like labour rights and trade union strengths have also affected corporate decisions Blanton et al. (2015). In this paper, we provide evidence that even social institutions like improvement in local safety can go a long way in affecting firms' input decisions and therefore overall productivity. Even though it is difficult to disentangle the demand and the supply effect and quantify them, we can conclude that overall increase in employment and productivity implies an overall welfare gain.

Our identification strategy potentially alleviates concerns regarding endogeneity through reverse causality since gender employment decisions of firms cannot possibly be regarded to be influencing the Government's decision of establishing all women police stations. Additionally, we check for pre-trends in the differences between states with and without female police stations in terms of the demand for female workers; we do not find any conceivable

differences in the employment share of female workers between these two sets of firms before the establishment of the WPS.

To ensure that our benchmark results are robust to omitted variables, we control for a battery of fixed effects along like firm-fixed effects and industry-time fixed effects (such as various trade shocks, technological innovations specific to certain industries etc.). This allows us to absorb potential confounding factors that may simultaneously affect social infrastructure and employment trajectories of firms. However, as the establishment of WPS are staggered across time, our results may run into the problems that arise in event-study estimates when the magnitude of the treatment effect is correlated with the timing of treatment (Callaway and Sant'Anna, 2021; Goodman-Bacon, 2021).We resolve this issue using the approach proposed by Callaway and Sant'Anna (2021),where we estimate and then average separate treatment effects by cohort where each cohort represent the group of cities/states that get treated in a year. We also run placebo tests following De Chaisemartin and d'Haultfoeuille (2020) using three years prior the treatment to eliminate the probabilities differential trends in the years prior to the policy adoption. Lastly, we plot our coefficients controlling for region-linear trends (Goodman-Bacon, 2021), firm and year fixed effects and find no differential pre-trends.[5]

We have two main sets of results. First, our results indicate that after the establishment of all women police stations, the share of female workers increase by about 24%. This increase is analogous in firms of all size and ages, and mainly driven by domestically owned establishments. We also find evidence towards an increase in growth rate of female employees by about 2%.

Second, this reorganisation in the labour force due to an improved local safety had a significant impact on the firm performance and productivity (both labour and overall). Firm performance improved in terms of sales and value-addition. In terms of productivity, our

[5]Even though Wooldridge (2021) shows that the unit-specific time averages and time-period specific cross-sectional averages (two way Mundlak regressions) and pooled OLS TWFE regressions are essentially identical estimations with a common or staggered treatment time, with or without covariates, this equivalence holds only when the treatment intensities are constant across time. In our paper the treatment intensities change across time as treated states/districts can set up more WPS across time as shown in **Figure 3**. Hence along with the TWFE estimations, we use De Chaisemartin and d'Haultfoeuille (2020) method to mitigate concerns regarding lack of parallel trends across treated and control regions and we also show the Callaway and Sant'Anna (2021) estimation results for separate treatment cohorts across time.

results show that about 4% and 5% of the increase in labour and total factor productivity, respectively due to the reduced gender-gap in the workforce.

Third, our results point towards a stronger supply channel through which this increase in female employment takes place. We find that the results are stronger where there are more females to begin with. Even though there is no evidence of rural-urban migration, there is evidence of informal to formal shifts in female employment within urban areas.

The rest of the paper is organised as follows. Section 2 describes the police force of India and lays down the institutional background. We describe our dataset in detail in Section 3 with a few stylized facts. Section 4 explains our empirical strategy. Section 5 presents our baseline results, while Section 6 concludes.

2 Institutional background

Since 1939, women have worked in law enforcement in India, albeit the exact date of their entry varies greatly by state. Women were first admitted to the police force in the states of Kerala and Maharashtra in 1939, and then in Delhi and Gujarat in 1948. Women were included in Tamil Nadu and Uttar Pradesh starting in 1967 and 1973, respectively. In 2009, the Ministry of Home Affairs of the Government of India said that states should work to ensure more thorough reporting and prompt registration of first information reports (FIR). On the same day, the Ministry released a recommendation for governments to strengthen efforts to combat crimes against women.

Kerala was the first state in India to open a women's police station in 1973. Since the National Police Commission of 1977, the deployment of specialised police to handle crimes of a sensitive nature, such as those committed against women, has been advised (Natarajan, 2016). The introduction of WPS in Tamil Nadu in 1992 led to an extraordinary concentration of WPS, accounting for 40% of all police stations. In 2005, National Conference for Women in Police, held in Bhubaneshwar Orissa mandated the setting up of All women police stations to attend specifically to female victims. By 2007, 97 stations had been launched in the other states, and by 2012, 281 more stations had been added.

WPS is led by a female inspector, solely has female officers on staff, and is primarily responsible with handling complaints of violence against women. WPS staff members are specially trained, and most WPSs have a counsellor. A victim of a crime must determine whether to call the police after the incident. A First Information Report (FIR) is filed if they do. The attending examiner, who is usually the Inspector, then chooses whether to launch a formal investigation or not. Finally, officers may or may not make an arrest following an investigation. The police commence their investigation when a FIR is filed at a police station. Following the conclusion of the police investigation and the gathering of witness testimonies and affidavits, a chargesheet is brought. The individuals named in the chargesheet are those who are being accused. Arrest is a possible middle result.

Therefore the first test that we perform to check the impact of women police stations on safety is on the reporting of crime and arrest rates. As the first stage, we test how reporting of different categories of crime have changed over the period of 2005-2015. And then we check for the effectiveness of the presence of all women police stations through the changes in arrest rates.

3 Data set and some stylized facts

We use multiple datasets to test the predictions, including (i) Annual reports from the Bureau of Police Research and Development which gives the detailed information on police organization, policy reforms and locations of WPS along with their years of adoption, (ii) the Annual Survey of Industry (ASI), an annual survey of registered factories conducted by Ministry of Statistics and Program Implementation (MoSPI) since 1960 and (iii) data on violence and crime from National Crime Records Bureau (NCRB) annual crime reports and (iv) Employment and Unemployment Survey part of the National Sample Survey (NSS) which is a repeated cross-sectional survey representative at the state-level.

3.1 Data on Police Stations

The first dataset is the one collected from annual reports on Policing Organization from the Bureau of Police Research and Development (BPRD). These reports typically elaborate policy reforms on a national level pertaining to the Police Bureau. For the purpose of this study, we also use the dates of the establishment of WPS from these reports. We use the annual reports from 2000-2015 for the state level study, and from 2005-2015 for the city level analysis because the BPRD provides city-level information only after 2005. These reports give us the location and the year of establishment of the women police stations, along with the number of officers and constables posted in each of the stations in each year.

3.2 Factory level datasets of Annual Survey of Industry (ASI)

The data used in this study are compiled from three main sources. Our first and primary data source is the Annual Survey of Industry (ASI), an annual survey of registered factories conducted by Ministry of Statistics and Program Implementation (MoSPI) since 1960. ASI performs census survey on all the registered factories, registered with 100 or more workers and, conducts a sample survey for the units having less than 100 workers. This data coverage extends to 19 out of 28 states and 5 out of 7 Union territories of India spanning 495 districts. The primary unit of enumeration is a factory in case of manufacturing industries, a workshop in case of repair services, an undertaking or a licensee in the case of electricity, gas and water supply undertakings and an establishment in the case of bidi and cigar industries. Going forward, we refer to all these establishments as factories . The data spans the period, fiscal years 2000 to 2015 which makes it a balance panel. The factory identifiers are provided against each observation, which lends itself nicely to a panel structure. For the purpose of this analysis, we restrict our sample to all those census factories which are wholly privately owned and exclude any establishment with a government stake. Among other things, ASI provides detailed information regarding the number of workers segregated by the gender, number of man-hours worked by each worker type, total wages, output and benefits per worker type. **Table 1** shows the summary

statistics of the important variables of the firms in our sample. An average firm has 30 employees, with about 12 permanent employees, an average of about 11 female employees and about 19 male employees.

3.3 Data on Violence and Crime

This source of data comes from the "Crime in India" publications of the National Crime Records Bureau (NCRB) at the Ministry of Home Affair. It includes data on crime reported and eventual arrests and charge-sheeting, which helps us confirm both 'recording effect' as well as the 'efficiency effect' of having separate cells for the investigation of crimes against women. This data source is the key source of administrative data on law and order in India. This data documents First Information Report (FIR) that has to be registered once an incidence of crime has occurred and been reported– (Iyer et al. 2012). The NCRB provides data for multiple categories of crime which include violence against women, non-gender based violence, and crime related to property. The analysis uses this data to verify and study how setting

3.4 Household Level Data

To study the mechanisms driving our results, we make use of the National Sample Survey's most recent comparable rounds (NSS). This repeated cross-sectional data is representative at the state level. It includes details about each person's employment situation at the time of the interview. These two-stage stratified random sampling procedures were created to collect information from households across the entire nation. Usually, the head of the family is asked for information on the household members' sexes, levels of education, and employment. Furthermore, details on the type of business (proprietary partnership, government, public/private firms, cooperative societies trust, and other businesses where one is working. Moreover, data on employment terms are gathered. Also, based on geography, the households are categorised as self-employed, wage workers, non-workers, attending educational institutions, etc. We make use of rounds 61, 62, 64, 66, and 68, which respectively

survey people over the years 2004–2005, 2005–2006, 2007–2008, 2009–2010, and 2011–2012. We utilise the first year of the survey to align NSS survey rounds with WPS opening dates. Women between the working ages of 15 and 55 make up our sample.

4 Empirical strategy

4.1 First Stage

We use a staggered difference-in-differences approach exploiting the variation in the timing of WPS establishments across the states in India. The idea here is to test the effectiveness of the all women police station on crime so that we could ensure the validity of the instrument. We estimate the city-level events from 2005-2015 for this section as city is the most granular regional division and 2005 is the earliest year for which the data is available. The equation estimated using the city-level panel is

$$log(Crime_{st}) = \beta\,(WPS_t) \;+\; citycontrols_{it} + \theta_t + \delta_s + \epsilon_{ijt} \tag{1}$$

where $Crime_{st}$ is defined in two differenct ways. The first way is just the incidence of crime rate per 100,000 population in logarithms in city s and WPS is a binary variable that takes the value 1 when a city gets its first WPS. We include controls like literacy, population sex ratio, state income per capita and police per capita. We add city and time fixed effects to this regression to absorb any time and city invariant changes. We cluster the standard errors at the city level as the treatment is at the city level.

The second way is where we define crime as the deterrence measure. Either as arrest rates or as rates of chargesheeting, i.e. the ratio of arrests/chargesheets made to reported crimes. After a crime has been committed a first information reports (FIR) is filed at a police station. Then the police starts the investigation. Following the conclusion of the police investigation and the gathering of witness statements, a chargesheet is submitted. The individuals named in the chargesheet are those who are being accused. Arrest is a possible middle result. Therefore, both arrests and chargesheets are indicators of how well

these police stations are doing.

Recently, various concerns have been raised about the multi-period DD estimators when treatment timing is staggered and there is heterogeneity in treatment effects within-unit over time; or between groups of units treated at different times (De Chaisemartin and d'Haultfoeuille, 2020; Goodman-Bacon, 2021). In investigations where all treated observations are pooled together across groups, the leads and the lags of the events may be contaminated (Sun and Abraham, 2021). We try to alleviate this concern by estimating independent event studies for each treatment cohort, as per Callaway and Sant'Anna (2021) (defined by the year a city/state/distrcit gets its first WPS). Then, we average leads and lags across the treatment cohort. This process guarantees non-negative weights and highlights the impacts of dynamic treatment more efficiently.

4.2 Baseline

We now describe our empirical strategy of the effect of the establishment of all women police stations using a simple reduced form equation. Our study design utilizes the staggered difference-in-differences framework over the period 2005-2015, where we use the firms in the districts that get all women police stations early as the treatment group and others as the control group. [6] Here we use data disaggregated at the district level as the factory level data is available at the district level only. We use two different methodologies for the baseline tests, just to tackle the concerns of a dynamic difference-in-differences setup. We begin by setting out the standard TWFE model, that allows us to track outcome trends before and after establishment of the women police stations.

We use the following specification:

$$y_{ist} = \beta \left(WPS_s \times Post_t \right) \; + \; firmcontrols_{it} + \phi_i + \theta_j^t + \epsilon_{ijt} \tag{2}$$

[6] It is to be noted here that the employment estimations of our benchmark results are all done at the district level, instead of the city level as the firm level data is at the district level. Districts are an administrative division of an Indian state or territory which include one or two cities (or large towns), a few smaller towns and dozens of villages. Hence districts are less granular than cities and more granular than states in India.

y_{ijt} represents our outcome variable of interest for firm i in district s at time t. For our analysis, y is the share of female workers in total (male + female) workers. WPS_s is a binary variable that takes the value of 1 if the district gets the first WPS. The variable $Post_t$ is a binary variable that takes a value of 1 in years after establishment of all women police stations.

However, the setting up of all women police stations is certainly not the only external shock that could possibly influence the demand for more female workers (for example) for the manufacturing firms in India: trade with other major partners, technological innovation or infrastructural changes in education provision of women etc. may also impact the firm level decision-making process. It is quite likely that many of such events would impact our estimates, especially the events happening around the years of 2006-2012. In order to potentially avoid this problem of identification, we include firm fixed effects (ϕ_i), industry-year fixed effects (θ_j^t) to control for such events.

Controlling for all such factors, our coefficient of interest in Eqn.(2) β would then only measure the effect of the all women police stations on the share of female employment. The argument goes as follows: any event that is not firm-specific (e.g., a domestic macroeconomic policy change), would impact a firm in a district with all women police stations and one without such police stations in an identical fashion. Thus the net effects shown by the treated firms in the post-WPS period over and above the firms in the control group (i.e., the firms in districts without WPS), would represent an effect attributable to a factor specific only to the districts in WPS, i.e., in our case the improvement of local safety.

The underlying assumption here is that control group of firms potentially have the same characteristics as the treated firms, but they are not affected by the treatment. And, we show such is the case in our next section. In summary, we expect higher employment for female workers and hence, a rise in their share due to a probable change in the local safety of the firms' location.

$firmcontrols_{it}$ includes a vector of firm level characteristics, such as value-added (size of a firm), age and ownership which can potentially affect the demand for female workers. We cluster our standard errors at the district level as the effect of the treatment differs

across the district. [7]

Recent literature examines the inference issue when treatment is spaced out over time across units (countries), leading to many experiments. Estimates made using the traditional difference in difference estimator may be inaccurate if treatment effects vary across nations or over time. Since their treatment status does not alter, already treated units can serve as controls for later treated units. Hence, the single coefficient estimator may be biased away from the genuine treatment effect if there are changes in treatment effects over time since they are deducted from the TWFE estimate. The standard fixed effect estimator gives a weighted average of all conceivable pairs of the underlying TWFE estimator, as demonstrated by Goodman-Bacon (2021). De Chaisemartin and d'Haultfoeuille (2020) and Callaway and Sant'Anna (2021), expanding on previous work, show that some of these weights may be negative when treatment effects are heterogeneous. To make sure that our results are not associated with negative weights, we report the results across time-periods for different cohorts using the Callaway and Sant'Anna (2021). Our main estimates present pre-treatment "placebo" estimates considering shifts by one period at a time, e.g. from pre-period $t-j$ to pre-period $t-j+1$. The most important reason behind doing this is that our treatment intensities change across time as the treated regions may keep increasing the number of WPS after the establishment of the first one. Hence looking at the cohort-time results become crucial. We also report the placebo results following De Chaisemartin and d'Haultfoeuille (2020) using previous three years before the treatment and 100 bootstraps for the estimation to ensure no differential trends across treated and control regions.

5 Results

5.1 First order effects

The effects of establishing all women police stations on incidence of crimes, arrest rates and chargesheeting (indictment) for offences are examined in the first stage. Results estimating

[7] We also check our results using a two way clustering method at firm and year level – the results remain similar.

equation (1) are reported in **Table 2**. In Panel A we report incidence of different categories of crime. We see that the incidence of domestic violence (Column 1) increases along with incidence of sexual harassment (Column 3) which are both essentially self-reported crimes. Reporting domestic violence increases by 23.36% and sexual harassment reporting increases by 34.47%. One may argue that an increase in these numbers do not necessarily indicate an improved reporting ambience but may actually imply an overall increase in incidence of gender-based crimes. To counter this agreement we show that the crimes that are usually not self-reported like kidnapping (Column 2) and homicides (Column 4) do not change significantly. This points towards an increase only in the reporting of certain sensitive categories of crime and not in the overall incidence of crime.

To elaborate this point further, we plot the three broad categories of crime in **Figure 2**. We see that the numbers of reported gender based violence increase after the establishment of all women police stations while the numbers of non-gender crimes and property based crimes increase at a much lower rate. This indicates that the overall crime in the economy doesn't increase. The increase in gender-based crime comes from an increase in the reporting of these kind of crimes.

In Panel B of **Table 2**, we report the results of arrests (Columns 6-8) and chargesheeting (Column 5). We find that arrests have only increased for gender based crimes (Column 8) by 15.25% including in domestic violence(Column 6) by 11.62%. Arrests have not changed significantly for non-gendered crimes which is consistent with the fact that these police stations do not deal with non-gender based crimes. In terms of chargesheeting, Column 1 reports a 2.8% increase. This is consistent with the training given to female officers at the WPS to which increases not only arrests following an FIR but also chargesheeting rates.

Table 3 report the results for the Callaway and Sant'Anna (2021) method where cities that got WPS for the first time in a given year is treated as one cohort, and then we average leads and lags across the treatment cohorts. We find that in the pre-treatment period, on average, there are no significant changes in reporting of domestic violence or sexual harassment (Columns 1 and 2) thereby bolstering the assumption of parallel trends. From the event-time (year when the a city gets its first WPS) we see similar results as in

case of two-way fixed effects in **Table 2**. We run the same estimation for the preventive measures as well, for arrest rates (column 3) and chargesheet rates (column 4). The results are consistently positive post the establishment of WPS and qualitatively similar to the two-way fixed effects results.

Overall we conclude that the first stage of our tests hold and establishment of WPS can be used as an instrument for improved safety for women.[8]

5.2 Benchmark results

Now we estimate Eq. (2) for the benchmark results. **Table 4** reports the results. **Panel A** reports the results for standard two-way fixed effects difference-in-difference results, while Panel B reports the time decomposed results following Callaway and Sant'Anna (2021). From **Panel A** Column 1, we find that there is 24% increase in the ratio of female to total employment. Given the average female to total ratio is 36%, a 24% increase raises it to 45%. [9]. From **Panel B**, we find that the results are qualitatively similar and statistically significant only after the policy implementation. In **Panel A**, Column 2, there is evidence of the an increase of the female to male ratio by 4%, from 57% to 79%. This implies, that in an average firm before the policy there were approximately 6 females for every 10 males which increased to approximately 8 females for every 10 males. The results hold after the cohort-time decomposition and is not only statistically but also economically significant. In Columns 3, we estimate our main specification with the absolute number of females using natural logarithm in both **Panels A** and **Panel B**. And we find that there is an 8% increase in total female employees. However this result could be biased upwards since logarithmic transformation will drop all the firms that have 0 female employees. Hence we estimate the same using an inverse sine hyperbolic transformation in column 4 and find a 6% increase in the absolute number of female employees.[10]. And finally, in column 5 we estimate the

[8]These results are further illustrated in Amaral et al. (2021) where they look at several other categories of violence, use more detailed data from police stations and find qualitatively same results.

[9]These results are qualititatively similar to Choi and Greaney (2022) who look at the impact of introduction of multinational firms on female employment

[10]In **Table B2** we run the same estimation for absolute male employees and total number of employees to find that the number of male employees do not decrease significantly, leading to a 5% increase in the total employee strength of an average firm

growth rate of female employment to check for long term effects. **Panel** A shows us a 2% increase in growth rate of female employment on average. However, in **Panel B** we see that before the policy the growth rate, though statistically insignificant, was negative. This potentially implies that before the establishment of WPS female employment growth was atleast constant, if not decreasing. Post the adoption of WPS policy, this changes into an albeit small, but positive growth rate.

To represent the existence of parallel trends, we plot the coefficients standardizing the event time at 0. We regress the share of female workers in total workers on the interactions of our treated dummy, WPS_s, with year dummies (λ_t) and plot the coefficients. We use the following regression equation:

$$y_{ijt} = (\lambda_t \times WPS_s) + firmcontrols_{it} + \phi_i + \theta_j t + \epsilon_{ijt} \tag{3}$$

Figure 4 plots the evolution of the share of female employment among treated districts(districts with WPS) relative to the non-treated districts(districts with no WPS) following Eq. (3). Our yearly coefficients portray that the share of female workers before the establishment of WPS are economically small and not statistically significant thereby indicating no differential pre-reform trends in female employment between firms in treated and non-treated districts.[11]

We finish this section by checking which type of firms are driving our benchmark results by dividing our firms according to size, ownership, age and type of industry. This helps us understand if certain types of firms are contributing disproportionately towards the change, or are able to capitalise on the policy change better than others etc. We report the results in **Table 5** . Our results show that for female workers: the effect is visible across all sizes and age quartiles implying that it is not only the big firms or the new firms

[11]We also test the parallel trends assumption in **Table B1** using the two-way fixed effects estimator of (De Chaisemartin and d'Haultfoeuille, 2020), which allows for heterogeneity in treatment effects over time or across units. As a placebo, three years before the adoption of WPS is used with 100 bootstraps and we find statistically insignificant results implying that there was no evidence of differential trends across the treated and the control districts ex-ante. We also make an event-study coefficient plot of the female employment standardising the establishment year of WPS in **Figure 4** and see clearly that the treated and control districts show a somewhat parallel trend before the establishment of WPS.

that are driving the change. Infact, from columns 1 and 2, we see that firms of all size expand their female labour force, however the coefficients are bigger in magnitude for bigger firms. From columns 5 and 6 we see that firms across all age quartiles reflect an increase in their female employment, with stronger results for older firms. In columns 3 and 4 it is evident that the results are driven mainly by domestic firms. Finally, we classify the firms as female dominated if they belong to the top quartile of average female employment across industries in the years 2000-2005. The rationale behind this test was to check if only female-dominated firms (e.g.- firms in the textile or glass industries) are leading the change. As expected we see stronger results for firms which had more female employees ex-ante but they do not solely drive the results, non-female dominated industry firms also show an economically significant expansion in their female labour force.

5.3 Robustness Checks

We check for the robustness of our benchmark results using a series of alternative specifications in **Table B3**. Here in Columns 1 and 2 we run the baseline estimation excluding the states (and all districts in it) of Tamil Nadu, which adopted WPS policy in 1992 and has the most WPS of any Indian state—196, or 41% of all WPS in the nation. We run this test to make sure that this state is not driving all the results and check if the results are still valid with the smaller sample. We see that the results are consistent.

In columns 3 and 4, we run our baseline at the state level treatment which gives us less number of cohorts and more treated observations per cohort. Qualitatively our results remain the same. This test also takes the argument of migration into concern. It is a possibility that the female labourers are migrating from less safe locations to more safe locations in which case the results may not be driven by the treatment but by the control districts. However, in India most of the migration is within state Imbert and Papp (2020). Therefore, carrying out our benchmark exercise at the state level makes sure that within state, accounting for migration across districts, the result of an increase in female employment at the firm level is still consistent.

In columns 5 and 6 , we explore the case of Bihar and Jharkhand. This serves as an

interesting robustness check as the state of Bihar got divided into Bihar and Jharkhand in the year of 2000 following which Jharkhand adopted WPS in 2006 in all its districts. Bihar however adopted the policy much later in 2012. It is an ideal set up to study the impact of WPS as the two regions are adjacent and were part of the same state and are hence expected to be not significantly different from each other in terms of macroeconomic attributes. We see that the statistical strength of the results decrease, however the magnitudes are still economically significant.

Finally, in the last two columns, 8 and 9, we run the baseline model with an unbalanced panel to ascertain that attrition from the universe of firms is not directly related to the adoption of WPS. This is to make sure that the composition of the industries are not changing wherein certain firms are shutting down due to macroeconomic factors which could also be driving the adoption of WPS in the districts. The results are consistent and infact stronger in magnitude for the unbalanced panel. Later in the paper we also show that adoption of WPS do not lead to creation of new firms in the short run.

5.4 Real effects and Firm Performance

Overall, our baseline results point towards an increase in female employment, both in ratio and in absolute numbers. Now it is imperative to study the real firm level impact of such a labour force reorganisation which may reduce misallocation of talent within the Indian firms that have tended to favour men relative to women in the pre- women police station period. If so, then higher or better gender ratio can improve firm level performance. Hsieh et al. (2019a) argue that gender and racial discrimination can result in misallocation of a nation's talent. Choi and Greaney (2022) show that such have been the case with Korean firms with increased foreign ownership.

We test this hypothesis by looking at few important firm level performance indicators and productivity in **Table 6**. **Panel A** shows that the WPS led to about 7% increase in total sales (column (1)), 17% increase in manufacturing sales (column (2)), 10.5% increase in value-added (column (3)), 11% increase in raw material expenditure (column (4)), and 7% increase in total compensation (column (5)) of a firm.

Srivastava (2019), Fransen et al. (2012), and Mandel and Semyonov (2005) argue that the average pay for women is considerably less than men, i.e., female workers with the same productivity (as the male workers) on the margin are cheaper to hire. Hence, one reason behind the increased operations and female employment could be related to an overall reduction in operational costs. If that is the case, then we are wrongly assigning our observation on the increase in female employment on improvement in safety conditions. To rule out this explanation, we look at the average compensation of workers. The caveat here is we do not have data on male and female compensation separately because our dataset does not provide a gender-wise breakup but only total wages. Though we have data limitations in terms of the availability of separate information for female and male wages, looking at the overall wages would certainly give us an idea of whether lower wages for female workers is one channel which may have induced increase in female employment. We find that the average wages increase implying that the marginal female worker is not cheaper to hire.

Next, we look at firm level productivity in **Panel B** following Choi and Greaney (2022). Our purpose here is twofold: (a) to check whether the safety policy change had any effect on both labour and overall productivity of a firm, and (b) whether reorganizing the workforce led to increase in the labour and total factor productivity (TFP) of a firm.

Column (6) reports results for establishment of new firms. The dependent variable is binary and takes the value 1 if the firm is established in the concerned year. However we do not find any improvement in entrepreneurship or establishment of new firms. This further strengthens the argument that the improvement in female employment is not driven by unobserved macroeconomic prosperity. Column (7) uses labour productivity of a firm as the dependent variable. We define the labour productivity by real gross value-added per worker. Our point estimate from column (7) shows that the WPS led to an 11% increase in the labour productivity of a firm.

Column (8) repeats column (7) but by controlling for the share of female workers. The establishment of WPS increases labour productivity by 10.7% (the direct effect) conditional on the female share, while the female share of workers increase labour productivity of an

firm by 11.1% (the substitution effect). Therefore, the indirect effect (i.e., the impact of WPS on labour productivity via workforce reorganization) is 0.31 percent (= 11.1% × 4.4 percentage points). This implies that 4.5% (= 0.48/10.7) of the labour productivity increase due to the establishment of WPS may have been caused by reduced gender-employment-gap.

Columns (9) and (10) repeat the same exercises using TFP following the production function estimation technique in Ackerberg et al. (2015).[12] We use log values of real value-added, employment, real capital employed, and real intermediate input use (energy expenses) to estimate TFP. We deflate nominal values of value-added, capital employed, and energy expenses by the industry level WPI deflator. Our estimates show that the establishment of WPS led to a 14.2% increase in the total productivity of a firm and 5% of the total productivity increase can be attributed to the changes in composition of the workers. Our estimates is comparable to 1–7% found for Korean firms (Choi and Greaney, 2022), 8% for the USA (Hsieh et al., 2019a), and 5% for Chinese firms (Tang and Zhang, 2021).

5.5 Mechanisms

Now that we ruled out the argument that women are hired at a lower cost (Mandel and Semyonov, 2005), we delve into some other mechanisms that may be driving our results. Improvement in safety could affect gender employment gap through various channels:(a) firms could be hiring more females if there are police stations near by knowing that this would deter workplace gendered crimes - demand side effects, (b) more females could be getting out of the house to participate in the labour force with WPS around - supply side (Borker, 2017; Kondylis et al., 2020), (c) women could be moving from informal jobs near their place of residence to formal jobs further away with an increase in the perceived safety on the road - sectoral redistribution Muralidharan and Prakash (2017); Seki and Yamada (2018).

A. Demand-side: First, we look at the demand side. We run a battery of tests and report the results in **Table 7**. In columns (1) and (2), we check if the increase in the

[12]For details, please refer to Ackerberg et al. (2015).

share of female workers is only observed in high-tech industries. The idea here is that these industries have sticky demand for labour. Now if the share of female workers increases for these industries (along with others), then it potentially points toward an overall increase in the demand for female workers. We classify industries as high-tech as the ones which are in the top quartile of the technology adoption of the Indian manufacturing sector. We find that employment of female workers increased only in non-high industries, indicating that a demand-side mechanism may not be at work. Then we follow Black and Brainerd (2004) and divide our industries into export competitive and non-export competitive or concentrated industries in columns (3) and (4) of **Panel A**. The idea here is that exporting firm would use niche technology and hence can only hire specially trained employees. Therefore, if labour demand is the channel behind our observed increase in the share of female workers, then we should find an increase in the share only or higher for non-export competitive industries which do not require niche skills. We term those industries as competitive for which the export earnings in the pre-policy period are greater than the average of the manufacturing sector. We find that the increase in the share of female workers is visible across both types of industries, with similar coefficients for export competitive industries suggesting a weak or negligible demand side channel.

B. Supply side: Another potential mechanism which can explain the improvement in the gender gap in the Indian firms is the supply side channel, which is to say that with an increase in the perceived local safety, women are more encouraged to take part in economic activities. The increase in employment comes more from the employees and less from the employers side. To verify that the results are driven by the supply side, we test for spatial heterogeneity in **Table B** columns (1) through (4). The idea here is that if supply-side channels are present, then results will be stronger in places which have more females in the working age group ex-ante. The gender employment gap may improve only in regions where a higher amount of females participate in the workforce, such as the *Metropolitan region of Delhi*. In order to check for this, we use the gender ratio (female-to-male) in the total population across the districts of India from the census year 1992. Interestingly, we find evidence of spatial heterogeneity of female labour supply playing a role. Results are

present in regions with female to male ratio greater than median and stronger in regions where the female to male ratio is in the top quartile. Therefore, higher the availability of females in a district, higher is the impact of the policy in reduction of gender gap in the firms of that district, suggesting the presence of a strong supply side channel.

C. Sectoral Reorganisation: to stusy possible sectoral shidt of the female labour force, we use NSSO data from Employment Unemployment Survey from the rounds 61, 62, 64, 66, and 68, which respectively survey people over the years 2004–2005, 2005–2006, 2007–2008, 2009–2010, and 2011–2012. We utilise the first year of the survey to align NSS survey rounds with WPS opening dates. We only consider the age group of 15-55. The idea here is to explore where the supply of this female labour force is coming from. We want to see if the probability of participation in the labour force increases for a female post the adoption of a WPS in a district. Therefore, the dependent variable is a dummy variable which takes the value 1 if a woman is employed and 0 otherwise. We use age, education and caste as individual controls. Peprah and Koomson (2017) show that women opt to work in safer environments even at a lower wage rate and hence following their work, I check if women move from informal sector to formal sector factories which may have more men or may be located farther away. From **Table 8**. From **Panel A**, we find that the probability of a woman to participate in the labour force increases overall by 1.3% points (Column 4). Also, this increase is less in the informal sector compared to the formal sector, indicating a possible shift from the informal to the formal sector.

Next we look at the permanent versus casual job holders. A recent study by Aggarwal (2023) shows that more than 23% of Indian labour force is in the casual/ non-permanent sector hence it is of utmost importance to understand if and how local safety affect various types of workers. We find that there is a 1.1% increase in overall probability of a female joining the labour force and an additional 2.7% increase in the probability of joining the permanent workforce. Hence the increase in female employees that we find at the firm level could potentially be coming from various other casual employment categories.

5.6 Redistribution across socio-economic characteristics

: In this section we study redistribution of the labour force across some critical socio-economic characteristics of the household. Using the same NSSO dataset, in **Table 9** we look at various socio-economic characteristics of the household. In the first two columns we look at the probabiltiy of a woman to join the workforce with respect to her family income. We see that the probability is higher if the household is in the lower(poorer) quartile of income rather than the upper quartiles.

Next we look at the number of working members relative to the size of the famile/household. We find that the probability of a woman to join the workforce is higher is the family has less than half of its members who are employed. We also study the religion of the woman. NSS defines seven main religions for India - Hinduism, Islam, Sikkhism, Christianity, Buddhism and Jainism and Judaism. From columns 5 and 6 we see that the probability of a woman to take part in the labour force post WPS is higher if the religion of the woman is hindu as opposed to all the other religions which is consistent with the literature. Overall, these analyses help us understand what socio-economic household characteristics are driving our baseline results. [13].

6 Conclusion

Safety in public places is known to influence decision functions of women thereby having a general impact on the economy (Borker, 2017; Seki and Yamada, 2018). However, the impact of safety on labour force participation and the underlying mechanisms behind this effect is still not well understood. We attempt to fill this gap by exploiting the staggered adoption of all women police stations in India.

Our findings show that the proportion of female employees increased by around 24% as a result of the creation of WPS. With 11 female employees on average, 24% is an economically significant percentage.

[13] Sanghi and Srija (2014) use the same data source of NSSO and show that non-hindus, especially muslims and women are the most disadvantaged group and usually are worse- off in taking advantages of various administrative policy changes due to lack of education and other restrictive social norms

The productivity and performance of the firms are significantly impacted by this reorganisation of the labour force brought on by an improvement in local safety (both labour and overall). Sales and value-adding performance of the firms both improved. Our findings indicate that the decreased gender gap in the workforce is responsible for around 4% and 5%, respectively, of the rise in labour and total factor productivity.

Our findings have multiple relevant policy implications. First, we emphasize the role of safety in improving labour force participation of women in developing countries. Since the results are localised, increasing local safety for women and deterring sexual crimes could be a potential way to reduce gender gap in employment. Second, it shows that the marginal woman is not less productive thereby highlighting the loss of productivity that the emerging market economies face due to this underutilised labour force. Such improvements in employment gap can have long-run consequences in terms of educational and career choices of women, economic growth, standard of living, and inter-generational redistribution (Agénor et al., 2021). Third, we also point at some socio-economic characteristics of household with women who have higher probabilities of joining the labour force with an increase in local safety.

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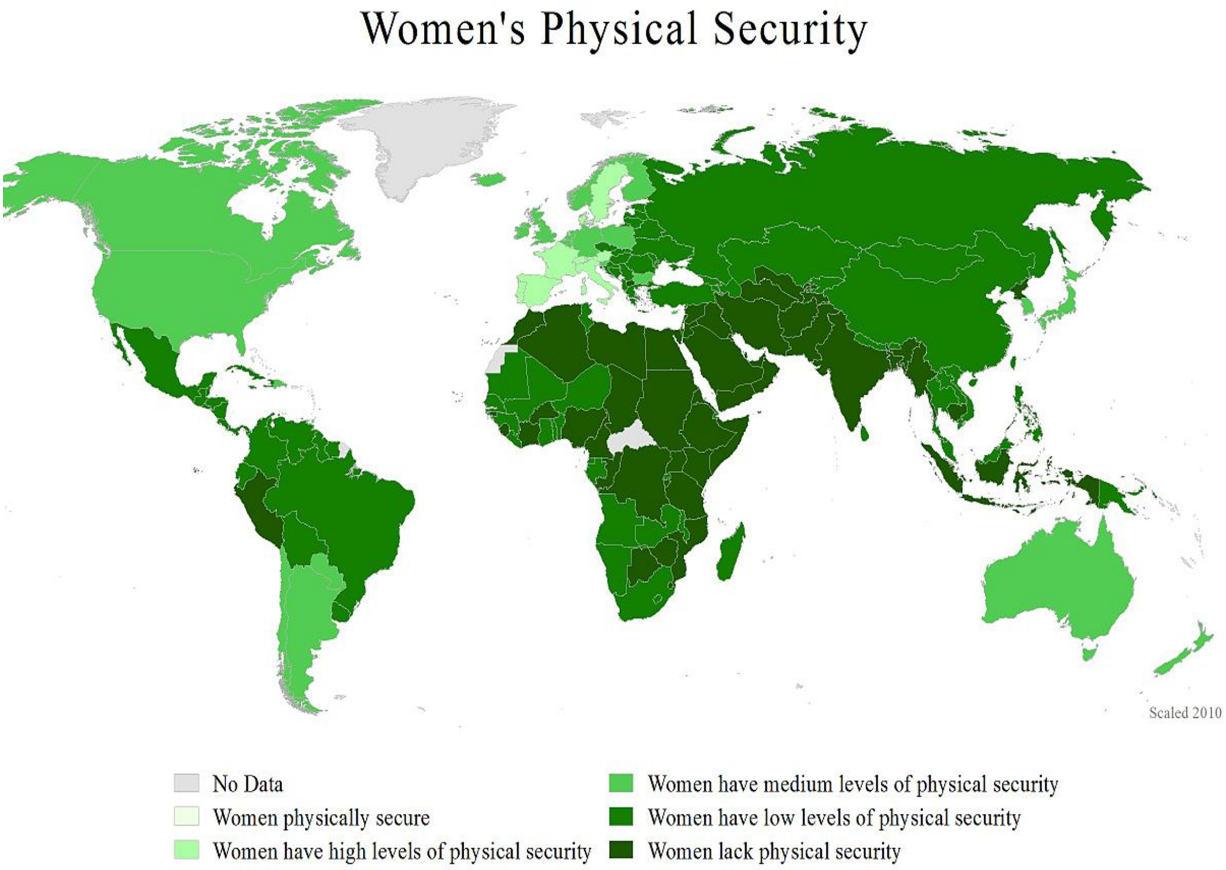
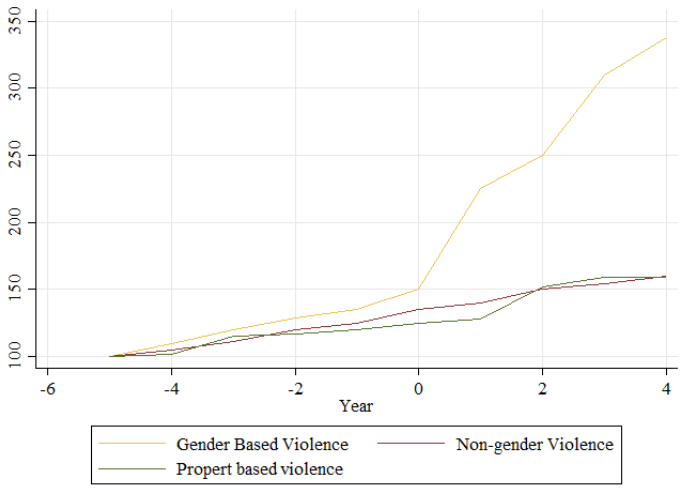
Figure 1: Physical safety of women around the World



Source: World Bank Report, 2012

Figure 2: Trends in Violent Crimes in India



Notes: In this graph we plot the average female employed in firms that are located in district with WPS(treated), and those in firms located in district with no women police stations(control). We see that the overall number of all women employed are increasing, however the districts with female police station clearly show a sharper increase after 2006. Before 2006 the trend was somewhat parallel.

Table 1: Descriptive Statistics on Firm Performance and Employment:

	Mean	Std. Dev
	(1)	(2)
All Manufacturing Units		
Sales	1,199.71	8,030.21
Value-added	591.68	4,019.40
Total Compensation	133,777.5	480,551.2
Use of Foreign Technology	103.97	3,393.91
Patents Expenses	2,478.02	74,252.88
Labour Productivity	2.09	0.87
Total Employment	30.97	54.85
Female Permanent Workers	10.95	7.05
Male Permanent Workers	19.12	26.63
Share of Female Permanent Workers	0.36	0.27
Total Contractual Workers	17.02	34.17

Notes: Sales, Value-added, Total Compensation, Use of Machinery, Use of Foreign Technology, Patents Expenses, Value of Final Products is expressed in '000 INR. Labour Productivity is calculated as real gross value-added of firm divided by total employment. The employment variables are in numbers except for the shares.

Table 2: Effects of All Women Police Stations on Crime

Panel A: Incidence of Crime				
	Domestic Violence(DV)	Kidnapping	Sexual Harrassment	Homicidal Crime
	(1)	(2)	(3)	(4)
$PostWPS$	0.210***	0.317	0.296***	0.898
	(0.018)	(0.299)	(0.061)	(0.643)
R-Square	0.24	0.20	0.25	0.20
N	582	582	582	582
Panel B: Prevention Measures				
	Chargesheet Rate(DV)	Arrest in DV	Arrest in Non-gendered Crime	Arrest in Gendered Crime
	(5)	(6)	(7)	(8)
$PostWPS$	0.028***	0.110***	0.107	0.142***
	(0.005)	(0.017)	(0.117)	(0.035)
R-Square	0.69	0.82	0.82	0.78
N	520	557	529	557
Controls	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

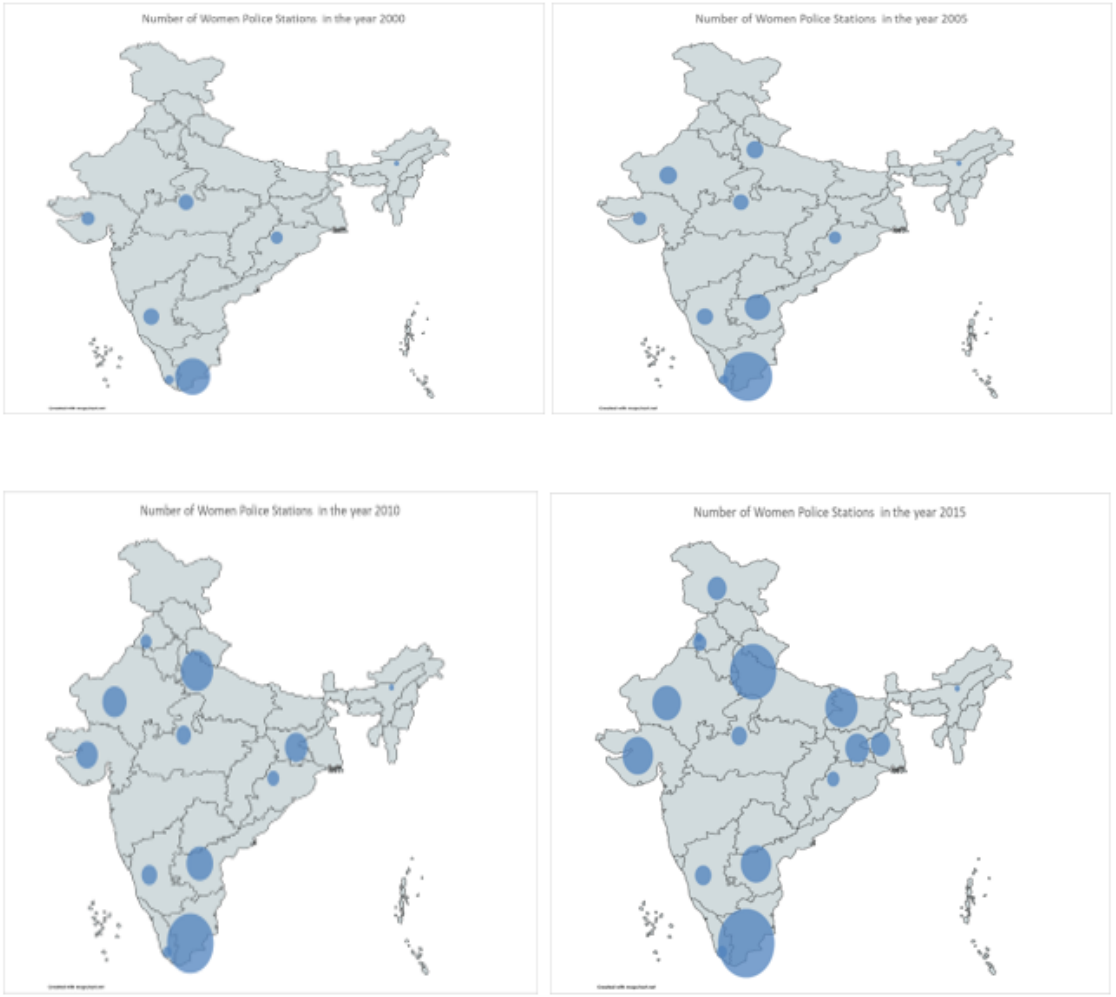
Notes: The dependent variables in columns 1 to 4 are city-level report rates by crime category, column 5 is the chargesheet rate (i.e. ratio between chargesheet crimes to reported crimes) and columns 6 to 8 - and city-level arrest rates, (i.e. the ratio of arrests made to reported crimes). The main independent variable is a dummy that takes the value one for the years after the roll-out of the women police station policy in a city. Baseline controls include ratio of males to females, literacy rate, rate of urban population, and the growth of state-level GDP per capita. All regressions are weighted by population size. Data sources: National Crime Records Bureau, Census of India, Bureau of Police Research and Development, and Election Commission of India. The period of analysis is 2005-2015. Standard-errors are clustered at the city-level. *** 1%, ** 5%, * 10%.

Table 3: Effects of All Women Police Stations on Crime- Staggered Treatment

Callaway Sant'Anna Results				
	Crime Rate		Prevention Measures	
	DV	SH	Arrest Rate	Chargesheet Rate
	(1)	(2)	(3)	(4)
$PostWPS_{t-2}$	-0.078	-0.063	0.002	0.049
	(0.119)	(0.131)	(0.873)	(0.690)
$PostWPS_{t-1}$	-0.091	-0.087	0.012	0.057
	(0.113)	(0.127)	(0.714)	(0.532)
$PostWPS_t$	0.118***	0.162***	0.018***	0.009***
	(0.017)	(0.014)	(0.008)	(0.039)
$PostWPS_{t+1}$	0.147**	0.185**	0.025***	0.013***
	(0.012)	(0.011)	(0.005)	(0.033)
$PostWPS_{t+2}$	0.235***	0.251***	0.031***	0.019***
	(0.021)	(0.017)	(0.005)	(0.028)
R-Square	0.76	0.77	0.62	0.81
N	582	582	557	520
Controls	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
City FE	Yes	Yes	Yes	Yes

Notes: All the regressions are for the years 2005-2015. We use the Callaway Sant'Anna method of staggered difference-in-differences estimation where every cohort is a group of cities that get their first WPS in a given year. Controls include ratio of males to females, literacy rate, rate of urban population, and the growth of state-level GDP per capita. Standard errors in parentheses are clustered at the city level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Figure 3: Spatial Intensity of AWPS



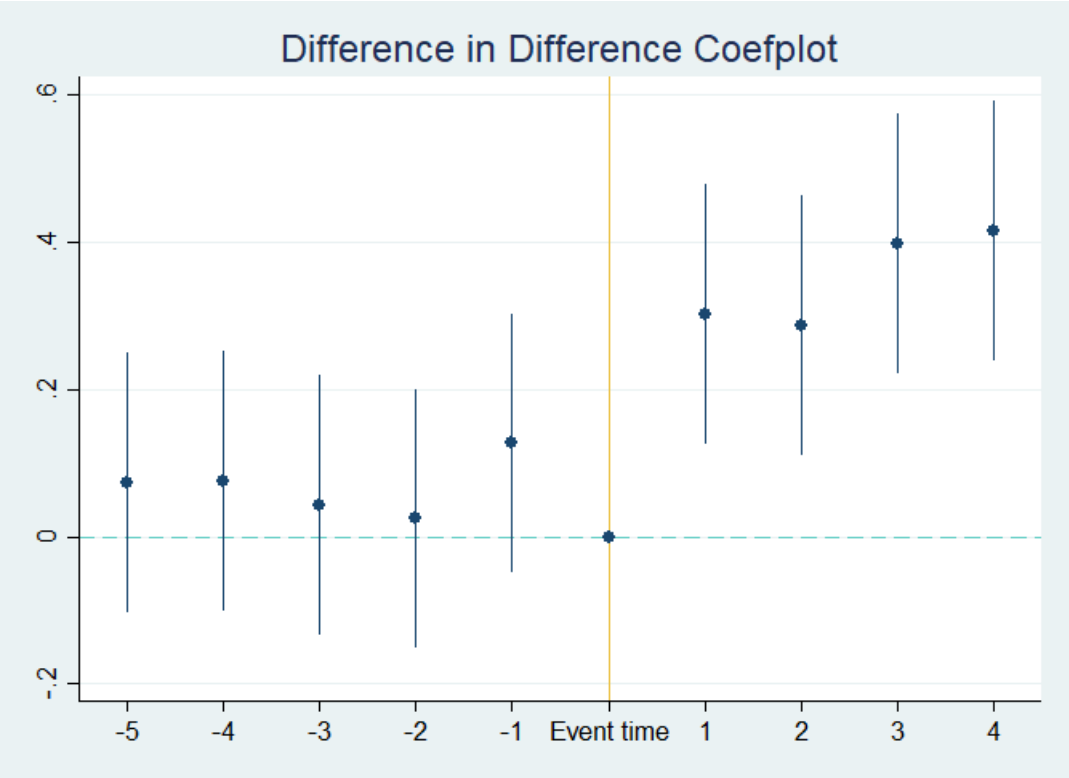
Notes: In this diagram we plot the number of all women police stations across time in different states. We take 4 snapshots in time, 2000, 2005, 2010 and 2015. This clarifies why not only does the treatment vary over time but also the intensity of treatment (in the already treated regions) varies over time.

Table 4: All Women Police Stations and Employment

Panel A: TWFE Results					
	Female/ Total	Female/ Male	log (Absolute Female)	IHS(Absolute Female	Growth Rate
	(1)	(2)	(3)	(4)	(5)
$PostWPS$	0.241***	0.044***	0.081***	0.067***	0.024**
	(0.028)	(0.018)	(0.017)	(0.016)	(0.017)
R-Square	0.64	0.60	0.65	0.60	0.63
N	62,443	62,443	48,990	62,443	49,310
Panel B: Callaway Sant'Anna Results					
	Female/ Total	Female/ Male	log (Absolute Female)	IHS(Absolute Female	Growth Rate
	(6)	(7)	(8)	(9)	(10)
$PostWPS_{t-2}$	0.210	0.003	0.062	0.044	-0.009
	(0.110)	(0.126)	(0.013)	(0.010)	(0.002)
$PostWPS_{t-1}$	0.218	0.011	0.071	0.051	-0.007
	(0.105)	(0.117)	(0.015)	(0.013)	(0.002)
$PostWPS_{t}$	0.128***	0.016***	0.077***	0.059***	0.003
	(0.005)	(0.017)	(0.018)	(0.014)	(0.001)
$PostWPS_{t+1}$	0.201***	0.031***	0.081***	0.062***	0.012**
	(0.015)	(0.011)	(0.018)	(0.014)	(0.003)
$PostWPS_{t+2}$	0.228***	0.046***	0.088***	0.065***	0.036**
	(0.018)	(0.012)	(0.018)	(0.015)	(0.008)
R-Square	0.69	0.62	0.66	0.68	0.47
N	62,443	62,443	48,990	62,443	49,310
Firm Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry FE*Year FE	Yes	Yes	Yes	Yes	Yes

Notes: All the regressions are for the years 2005-2015. The dependent variables in Columns 1 and 2 are ratio of female to total employees and female to male employees. Column 3 has the natural log and column 4 has the inverse hyperbolic sine transformation of the number of female employees as the dependent variables. In column 5 we report the growth rate of female employees. Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Figure 4: Coefficient plot of Female Employment



Notes: In this graph we plot the differences in the trends in share of female employees in firms that are located in districts with women police stations(treated), and those in firms located in districts with no women police stations(control). Standardizing the establishment year as 0, it is clear that the share of female employees in total employees significantly increases after the establishment of WPS.

Table 5: WPS and Employment Dynamics: Firm Characteristics

	Size		Ownership		Age		Female Dominated	
	Female/ Male	Female/ Total	Female/ Male	Female/ Total	Female/ Male	Female/ Total	Female/ Male	Female/ Total
	(1)	(2)	(3)	(4)	(5)	(6)		
$PostWPS$	0.024***	0.148***	0.031***	0.121***	0.018*	0.119*	0.009*	0.108*
	(0.005)	(0.029)	(0.005)	(0.027)	(0.009)	(0.063)	(0.004)	(0.059)
$PostWPSXQ2$	0.017***	0.137***			0.018*	0.108*		
	(0.004)	(0.024)			(0.009)	(0.057)		
$PostWPSXQ3$	0.017***	0.118***			0.012*	0.102*		
	(0.004)	(0.023)			(0.006)	(0.053)		
$PostWPSXQ4$	0.018***	0.114***			0.008*	0.097*		
	(0.003)	(0.027)			(0.004)	(0.050)		
$PostWPSXForeign$			0.015	0.091				
			(0.190)	(0.101)				
$PostWPSXTopQuartile$							0.012***	0.309***
							(0.003)	(0.068)
R-Square	0.743	0.761	0.521	0.507	0.635	0.630	0.421	0.499
N	62,443	62,443	62,443	62,443	62,443	62,443	62,443	62,443
Firm FE	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE*Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Notes: All the regressions are for the years 2005-2015. We use the ratio of female to total, and the ratio of female to male workers as our dependent variables as the outcome of interest. Size is defined as the logarithmic transformation of total assets and age is defined from the date of set-up. Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Table 6: All Women Police Stations, Firm Performance, and Productivity

Panel A: Firm Performance					
	Total Sales	Manufacturing Sales	Value-Added	Raw Material Expenditure	Total Compensation
	(1)	(2)	(3)	(4)	(5)
PostWPS	0.070***	0.168***	0.105***	0.113***	0.073***
	(0.018)	(0.028)	(0.018)	(0.043)	(0.017)
R-Square	0.94	0.90	0.95	0.80	0.93
N	62,443	62,443	62,443	62,443	62,443
Panel B: Productivity					
	New Firms	Labour Productivity		Total Factor Productivity	
	(6)	(7)	(8)	(9)	(10)
PostWPS	0.086	0.110***	0.107***	0.142***	0.108***
	(0.075)	(0.017)	(0.017)	(0.035)	(0.031)
Share of Women it			0.111***		0.144***
			(0.022)		(0.045)
Adj R-Square	0.31				
R-Square		0.82	0.82	0.78	0.76
N	13,128	49,697	49,697	60,932	48,482
Firm Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Industry FE *Year FE	Yes	Yes	Yes	Yes	Yes

Notes: All the regressions are for the years 2005-2015. In the top panel, we use natural logarithm of our dependent variables as the outcome of interest. In column (6), we use logit to examine the entry of ew firms in the market; in columns (7) – (8) we use real value added per worker; and in columns (9) – (10) we use total factor productivity following Ackerberg et al. (2015) as the dependent variable respectively. *PostWPS* is an indicator variable that takes the value 1 if that year is greater than (or equal to) the state specific WPS implementation year. Firm controls include log values of sales and age. Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Table 7: Mechanism: Demand and Supply

Panel A: Industry Heterogeneity				
	Female /Total Workers			
	High Tech Industries	Non High Tech Industries	Export Oriented Industries	Non Export Oriented Industries
	(1)	(2)	(3)	(4)
$PostWPS$	0.036	0.036***	0.028*	0.020*
	(0.031)	(0.019)	(0.015)	(0.010)
R-Square	0.670	0.647	0.692	0.728
N	13,859	48,584	26,900	35,543
Panel B: Spatial Heterogeneity				
	Female /Total Workers			
	Female to Male Ratio> $Median$	Female to Male Ratio< $Median$	Female to Male Ratio> $TopQuartile$	Female to Male Ratio< $BottomQuartile$
	(5)	(6)	(7)	(8)
$PostWPS$	0.344***	0.126***	0.532***	0.118**
	(0.0856)	(0.046)	(0.117)	(0.429)
R-Square	0.211	0.267	0.188	0.194
N	17,089	45,354	5,719	17,982
Firm FE	Yes	Yes	Yes	Yes
Year FE*Industry FE	Yes	Yes	Yes	Yes

Notes: All the regressions are for the years 2005-2015. In the top panel, we use the ratio of female to total workers as our dependent variables as the outcome of interest. A firm is defined to be high-tech if it is in the top quartile of the Indian manufacturing sector. A firm is defined to be export oriented is 25% of it's products are exported. Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Table 8: All Women Police Stations and Household Characteristics

Panel A: Sector of Employment				
	Female Employment Dummy	Female Employment Dummy	Female Employment Dummy	Female Employment Dummy
	(1)	(2)	(3)	(4)
$PostWPS$	0.022*	0.014*	0.026*	0.013*
	(0.010)	(0.007)	(0.013)	(0.006)
$PostWPSXInformal$	-0.012*	-0.013*	-0.010*	-0.009 *
	(0.006)	(0.006)	(0.005)	(0.004)
Adj-R-Square	0.163	0.132	0.179	0.14
N	511,146	511,146	511,146	511,146
Panel B: Type of Worker				
	(5)	(6)	(7)	(8)
$PostWPS$	0.01*	0.014*	0.019*	0.011*
	(0.005)	(0.006)	(0.009)	(0.005)
$PostWPSXPermanent$	0.035*	0.039*	0.048*	0.027*
	(0.017)	(0.017)	(0.023)	(0.012)
Adj-R-Square	0.129	0.121	0.146	0.128
N	511,146	511,146	511,146	511,146
District FE	No	Yes	Yes	Yes
Round FE	Yes	No	Yes	Yes
Controls	Yes	Yes	No	Yes

Notes: All regressions are for the years 2004–2005, 2005–2006, 2007–2008, 2009–2010, and 2011–2012. We utilise the first year of the survey to align NSS survey rounds with WPS opening dates. Women between the working ages of 15 and 55 make up our sample. The dependent variable is a dummy variable which takes the value 1 if a woman is in the labour force. In the top panel, we look at the sector of employment (formal/informal). Enterprises that are owned and operated by employees on their own accounts or unorganised businesses that employ workers make up the informal or unorganised sector in India. These are essentially partnerships and proprietary organizations. It should be noted that India treats unincorporated businesses with accounts as if they were corporations and classifies them as being a part of the formal economy (Ramana Murthy, 2019). In the bottom panel, we look at regular wage/ salaried employee whom we define as permanent employees as opposed to casual workers. $PostWPS$ is an indicator variable that takes the value 1 if that year is greater than (or equal to) the district specific WPS implementation year. Controls include total number of members in the household, income of the household, age and education and caste . Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Table 9: All Women Police Stations, Household Characteristics and Female Workers

	HH Income		Employed Members		Religion	
Household Characteristics						
	Female Employment (1)	Female Employment (2)	Female Employment (3)	Female Employment (4)	Female Employment (5)	Female Employment (6)
$PostWPS$	0.022*	0.019*	0.019*	0.013*	0.014*	0.023*
	(0.010)	(0.008)	(0.009)	(0.006)	(0.007)	(0.010)
$PostWPS\ X < half$			0.018*	0.119*		
			(0.009)	(0.063)		
$PostWPSXQ2$	0.012*	0.081*				
	(0.006)	(0.042)				
$PostWPSXQ3$	0.014	0.091				
	(0.010)	(0.070)				
$PostWPSXQ4$	0.011	0.11				
	(0.007)	(0.078)				
$PostWPSXHindu$					0.017*	0.009*
					(0.008)	(0.007)
Adj-R-Square	0.243	0.291	0.132	0.206	0.189	0.187
N	511,146	511,146	511,146	511,146	511,146	511,146
District FE	Yes	Yes	Yes	Yes	Yes	Yes
Round FE	Yes	Yes	Yes	Yes	Yes	Yes
Controls	No	Yes	No	Yes	No	Yes

Notes: All regressions are for the years 2004–2005, 2005–2006, 2007–2008, 2009–2010, and 2011–2012. We utilise the first year of the survey to align NSS survey rounds with WPS opening dates. Women between the working ages of 15 and 55 make up our sample. The dependent variable is a dummy variable which takes the value 1 if a woman is in the labour force. $PostWPS$ is an indicator variable that takes the value 1 if that year is greater than (or equal to) the state specific WPS implementation year. Controls include age, education and caste. Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Appendix

(FOR ONLINE PUBLICATION)

A Data

Our factory level dataset consists of an annual panel of around 6,000+ Indian factories across 4-digit manufacturing industries over the time period of 2005-2015. We use data from ASI. The dataset measures all monetary-based variables in '000 of INR. To account for inflation, all variables are deflated by 2000 industry-specific Wholesale Price Index (WPI).

The 7th Schedule of the Indian Constitution places "Police" under the State list, which means that individual states normally enact laws and exercise responsibility over this matter. This is known as the "Police Commissionerate System" in India. A "dual system" of control is in place at the district level, where the District Magistrate (DM) and Superintendent of Police (SP) must collaborate to oversee police administration. Many governments have adopted the commissionerate system at the metropolitan level in place of the dual system because it is believed to enable quicker decision-making to address complicated urban-centric problems. The Commissioner of Police (CP), usually leads the police command structure under the commissionerate system, and is in charge of the force in the city.

Variable Definitions

- **Sales**: Total sales of a plant/firm ('000 INR).
- **Value-added**: Total sales – Raw material expenditure ('000 INR).
- **Total Compensation**: Total compensation/wages of a plant/firm ('000 INR).
- **Total Employment**: Sum of total female, male permanent workers.
- **Exports/Sales**: Ratio of export sales over total sales of a firm.

- **Labour Productivity**: Total value-added divided by number of employees of a plant/firm.
- **Total Factor Productivity**: This is calculated following Ackerberg et al. (2015).
- **Gendered Crimes**: These are all the cases reported under the headings of rape, kidnapping and abduction of women, molestation, sexual harassment, and abuse by spouses and family members.
- **Non-Gendered Crimes**: Includes occurrences reported as riots, murder, dacoity, male abductions, arson, and injury.

B Tables

Table B1: WPS and Employment Dynamics: Parallel Trends Test following De Chaisemartin and d'Haultfoeuille (2020)

	Female/ Total	Female/ Male	log (Absolute Female)	IHS(Absolute Female
	(1)	(2)	(3)	(4)
$PostWPS$	0.236	0.040	0.073	0.064
	(0.200)	(0.051)	(0.101)	(0.074)

Notes: All the regressions are for the years 2005-2015. The dependent variables are same as our benchmark model following following De Chaisemartin and d'Haultfoeuille (2020) with three years prior to the policy as placebo effects and 100 bootstrap replications. Standard errors in parentheses are clustered at the district year level. *,**,*** denotes 10%, 5%, and 1% level of significance.

Table B2: WPS and Employment Dynamics: Male and Total

	Log (Male)	IHS(Male)	Log(Total)
	(1)	(2)	(3)
$PostWPS$	0.037	0.032	0.055***
	(0.080)	(0.069)	(0.011)
R-Square	0.683	0.361	0.725
N	59,970	62,443	62,443
Firm FE	Yes	Yes	Yes
Year FE*Industry FE	Yes	Yes	Yes

Notes:Notes: All the regressions are for the years 2005-2015. The dependent variables are logarithmic transformation of male employees (column 1), Inverse sine hyperbolic transformation of male employees(column 2) and logarithmic transformation of total number of employees(column 3). Standard errors in parentheses are clustered at the district year level. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively.

Table B3: All Women Police Stations and Employment- Alternate Specifications

	Female/ Total (1)	Female/ Male (2)	Female/ Total (3)	Female/ Male (4)	Female/ Total (5)	Female/ Male (6)	Female/ Total (7)	Female/ Male (8)
PostWPS	0.461***	0.058***	0.211***	0.039***	0.501***	0.059***	0.272***	0.049***
	(0.112)	(0.012)	(0.044)	(0.008)	(0.119)	(0.014)	(0.041)	(0.011)
R-Square	0.541	0.519	0.680	0.615	0.341	0.310	0.692	0.620
N	58,661	58,661	62,443	62,443	5,934	5,934	75,158	75,158
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year FE*Industry FE	Yes	Yes	No	No	Yes	Yes	Yes	Yes

Notes: All the regressions are for the years 2005-2015. The dependent variables are ratio of female to total employees and female to male employees. Columns 1 and 2 report the results when the State of Tamil Nadu (all districts in it) are excluded because it has an exorbitantly high number of WPS. Column 3 and 4 use state level variation in treatment, state-year level clustering, and state level fixed effects. Columns 5 and 6 report our baseline estimation at the district level only for the states of Bihar and Jharkhand. Columns 7 and 8 report our baseline regression with an unbalanced panel. Standard errors in parentheses are clustered at the district year level for columns 1-2 & 5-6. Intercepts are not reported. *,**,*** denotes 10%, 5%, and 1% level of significance, respectively. Columns 7-8 run our benchmark specification with the unbalanced panel.