Agricultural Mechanization and Gendered Structural Transformation in India

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Abstract

Lewis (1954) describes development as a process by which excess labor moves from a labor-intensive "subsistence" sector with lower wages to a modern "capitalist" sector. However, preexisting market imperfections can act as impediments to a smooth transition. In India, the gendered nature of rural labor markets caused female labor force participation to fall after to the the introduction of modern methods of mechanized tilling. We investigate if the existence of more female friendly job opportunities could have stemmed this fall in female labor force participation. Exploiting the staggered roll-out of the National Rural Employment Guarantee Scheme, a public workfare program across districts we show that contrary to expectations, fall in female labor days due to mechanization was not lower in the districts with the workfare program than in other districts. In order to address potential endogeneity concerns in estimating the causal effect of mechanization on labor outcomes, we instrument mechanized tilling by the exogenous variation in soil texture across districts.

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1   Introduction

The Lewis (1954) dual sector model describes development as a process by which excess labor moves from a labor-intensive "subsistence" sector with lower wages to a modern "capitalist" sector (Gollin, 2014). As new capital is infused into the modern sector it expands, drawing surplus labor from the traditional sector in the hopes of better wages. The diversion of economic resources to its most productive uses creates a surplus for society as a whole. However, the process of transformation is slow-moving and existing market imperfections can prevent its effects from reaching all sections of society.

Between 1999-2011, Indian agriculture saw a sharp rise in the level of mechanization in its production processes. This was primarily driven by rapid increase in the number of tractors from 2 million in 1999 to triple that value in 2011 (Bhattarai et al., 2016; Afridi et al., 2023). During the same period, labor force participation rate of women nearly halved from 47 per cent to 26 per cent (Periodic Labor Force Survey, 2017). Recent work suggests that the introduction of mechanized tilling in India was directly responsible for the fall in female labor force participation though men's labor force outcomes were left largely unaffected (Afridi et al., 2023). This is explained by the specialisation of roles along gender lines in Indian agriculture. Male and female labor are imperfect substitutes in this

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context and importantly their degrees of complementarity with machines differ (Boserup, 1970; Laufer, 1985; Afridi et al., 2023). Men are the primary labor type used in land preparation, thus though were substituted by the introduction of tractors, they were also more likely than women to be reabsorbed for operating and maintaining these machines in the newer more capital intensive production processes (Afridi et al., 2023). Women on the other hand are largely employed for down stream agricultural processes like weeding and transplanting (Bardhan, 1974; Mahajan and Ramaswami, 2017; Afridi et al., 2023). Mechanised tilling by tractors reduced the need for weeding and indirectly displaced the women who were involved in these processes. However, reabsorption into alternative employment opportunities was insufficient, as reflected in the observed fall in female labor force participation rates (Afridi et al., 2023).

It is a well-tested proposition that growth in the agricultural sector is more effective at reducing poverty than growth in non-agricultural sectors (Ligon and Sadoulet, 2018; Ivanic and Martin, 2018; Dorosh and Thurlow, 2018; Christiaensen and Martin, 2018). With the increase in agricultural productivity, rural households can gain as producers due to lower costs of production, as consumers due to lower prices and as agricultural labor with increased employment and higher wages (Emran and Shilpi, 2018; Christiaensen and Martin, 2018). The channel through labor opportunities is especially relevant for densely populated countries with a surplus of labor engaged in agriculture like India. However, whether the labor channel operates effectively depends on the type of technological change: labor or land saving and the presence of compensating non-agricultural employment opportunities (Emran and Shilpi, 2018; Christiaensen and Martin, 2018). The introduction of tractors in tilling led to a fall in the need for female labor in agricultural processes and the gendered nature of the Indian rural job market meant that the new jobs opening up on farms went to men.

The present paper investigates if the existence of alternative female friendly jobs in other sectors can help staunch the fall in female labor force participation due to the structural transformation in the rural economy. We use the roll-out National Rural Employment Guarantee Scheme between 2006 and 2008 as a case study to investigate the validity of

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this hypothesis.

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) was passed by the Indian Parliament and notified in 2005. The act led to the creation of state level public employment schemes which were collectively called the NREGS and which comprise the largest workfare program in the world (Sukhtankar et al., 2017). Under the schemes every adult member of a rural household is guaranteed 100 days of work every financial year. The act lays special emphasis on women's employment. One-third of all jobs created under the act are reserved for women and in contrast to the private sector where women are paid less than men, the jobs created under the act pay the same wages irrespective of gender. The schemes became operational in 200 of the poorest[1] districts during Phase 1 in February 2006. An additional 130 districts were included as part of Phase 2 in April and May 2007 and the remaining districts were added in April 2008.

We exploit the staggered roll-out of the NREGS to test if NREGS being operational in a district can help stem female job loss due to agricultural mechanization. Put another way, our objective is to examine if and to what extent the female labor displacing effects of agricultural mechanisation would have been worse in a district in the absence of NREGS. Though there is some evidence showing that NREGS was effective in increasing overall rural female employment (Azam, 2012), there is also evidence that NREGS by raising rural wages increased the adoption of labor-saving technologies in India (Bhargava, 2023).

A key challenge in estimating a causal relationship between agricultural mechanization and female employment outcomes is accounting for unobserved heterogeneity that affects both. To account for this, we exploit the exogenous variation in soil texture in a district to instrument for the level of mechanisation in tilling in a district. Mechanised tilling by tractors is used for primary or deep tilling which is possible in loamy but not clayey soil (Afridi et al., 2023; Carranza, 2014). Instrumenting the area of district land under

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[1]The Planning Commission ranked all 447 districts from poorest to richest (Bhargava, 2023) and based the order of assignment to phases based on this. However, there were at least two known exceptions: areas facing Naxalite pressures were prioritised and each state had to have at least two districts in Phase I (Sukhtankar et al., 2017)

mechanized tilling by the difference in the share of loamy and clayey soil in the district we investigate the heterogenous effect of tractor adoption across NREGS and non-NREGS districts in 2007. In 2007 NREGS was operational in phase I and phase II districts but not in phase III districts. Our results indicate that a 1% increase in the area of land in a district operated on by tractors leads to a 0.13% reduction in female labor hours spent on market work. Where we define market work as work for which a woman is paid wage either in private sector or in government sponsored projects such as those created under NREGS or is self-employed in family owned farm. However, our estimates suggest that NREGS being operational in a district did not necessarily reduce the fall in female labor hours spent on work outside the household. We believe that the reason for this may be two-fold. One, NREGS by increasing rural wage rates led to faster adoption of labor-saving technologies like tractors (Bhargava, 2023) and thereby could have hastened mechanization in a way. Second, earlier evidence about the employment effect of NREGS show that though it led to an increase in the days spent on public works it was offset by a decrease in the days spent on private work (Imbert and Papp, 2015). The next section describes the data used in our study.

2 Context and Data

Figure 2 describes the timeline of the NREGS roll-out. The NREGS was rolled out in the first 200 districts as part of Phase I in February 2006, to the next 130 districts as part of Phase II in May 2007 and to the remaining districts as part of Phase III in May 2008. The pre-intervention period is taken as July 1999 to June 2000 and the post-intervention period is taken as July 2007-June 2008. In the post-intervention period, the NREGS was operational in both Phase I and II districts but had not yet been adopted in the Phase III districts. In the pre-period NREGS was not operational in any of the districts in my sample. Thus phase I and II districts constitute the *treatment* group and phase III districts the *control* group. For ease of exposition, we refer to phase I and II as NREGS districts and phase III distrcits as non-NREGS districts. The pre-intervention period is used to compare the outcomes and treatment variable between the treatment and control groups but our regressions will utilise data from the post-intervention period.
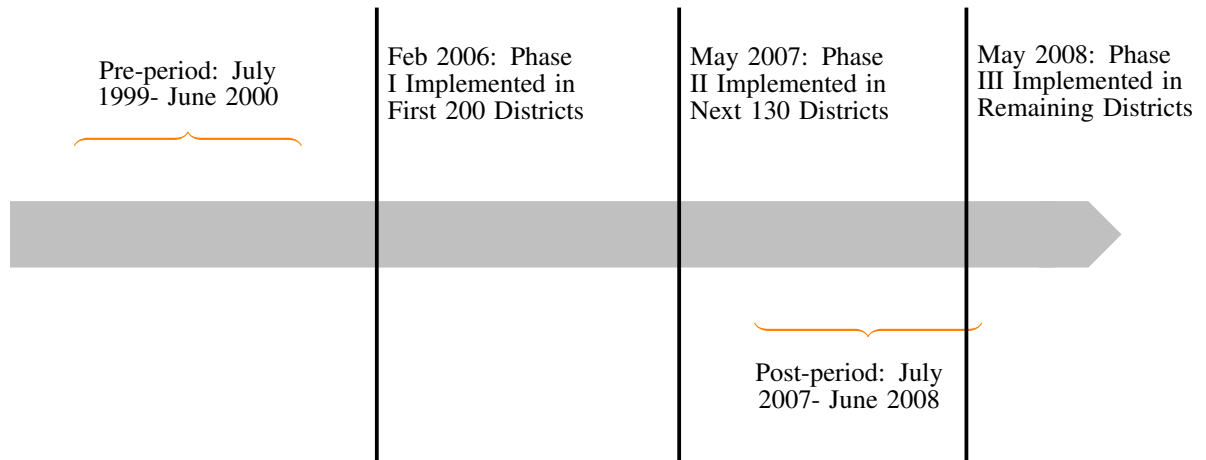
Figure 1: Timeline of the NREGS

Data on employment is available from the Employment and Unemployment surveys conducted by the National Sample Survey Organisation (NSSO). The National Sample Survey (NSS) provides several individual-level employment indicators. The NSS computes for each individual above the age of four, the percentage of days in the previous

seven days spent in private sector work, public works, self-employment and domestic work. From this we create variables reflecting the percentage of time in the reference week spent on domestic work, on private sector work/self-employment and on public sector work. For our regressions we take the sum of the percentage of days spent on wage work, the percentage spent on self employment like working on the family farm and the percentage spent on public works such as those created under NREGS as the outcome. We define this measure as the percentage days spent on market work for a woman.

District level data on agricultural mechanisation was obtained from the Input Census which is conducted every five years by the Indian Ministry of Agriculture [2]. There have been four rounds of the survey so far: 1996-97, 2001-02, 2006-07, 2011-12 and 2016-17. The Input Census rounds that align with my pre- and post-periods the closest are the 1996-97, the 2001-02 and the 2006-07 rounds. However, the 2001-02 round has several missing observations and inconsistencies. Due to delays, the 1996-97 round was actually conducted over 1997-99. This round is used as the pre-period before NREGS was rolled-out in any of the districts. The 2006-07 round is used to construct the post-treatment sample. We construct the treatment variable as the percentage area in a district which was operated on by tractors. The Input Census, lists the total number of agricultural holdings which use tractors in any phase of the production process. We use this number together with a measure of the average landholding size to calculate the share of district are operated on by tractors.

The instrument used to capture exogenous variations in mechanised tilling is constructed as the difference between the percentage of loamy and the percentage of clayey soil in a district. The data required to construct this measure was obtained from the Indian soil dataset collected under a project by the Indian Space Research Organisation-Geosphere Biosphere Programme (ISRO-GPO). The dataset reports the fraction of clayey or loamy in 0.5 km x 0.5 km grids. These are averaged at the district level to get the fraction of clayey

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[2]This data was downloaded from `https://inputsurvey.dacnet.nic.in/`. The website has migrated to a new address: `https://inputsurvey.da.gov.in/`, though the district tables are not visible yet.

or loamy soil in a district.

Individual-level controls like caste, religion, age, marital status and wealth level are available from the NSS dataset. Other district-level controls like average yearly rainfall, temperature, composition of crops grown, fraction of irrigated land, fertliser consumption and nightlights data are obtained from the Indian Crops Research Institute for Semi-Arid Tropics-Tata Cornell Institute (ICRISAT-TCI) dataset which compiles data for Indian districts from various publicly available sources.

2.1   Descriptive Statistics

Table 1 provides a snapshot of the employment and mechanization variables in our sample. We have data from 355 districts among which 99 are NREGS phase I districts, 71 are NREGS phase II districts and 185 are phase III districts. Only phase I and II districts had NREGS functioning in 2007-08 and are taken as the NREGS districts. The employment variables are calculated based on individual's reported daily activities in the reference week. We only keep women aged between 15 and 65 years in our dataset.

Between 1999 and 2007, the amount of time spent doing wage work or on self employment has reduced while the amount of time spent on domestic work has increased. Afridi et al. (2023) show that the adoption of mechanised tilling led to fall in women working in agriculture. This is reflected in the lower days of work outside the house for women in 2007 as compared to 1999 and the rise in the area of land under mechanized tilling between the two time periods. Figures 2 to 4 depict the trends in days worked for treatment and control group districts. To better allow comparison of the trands between groups, the value of days worked in 1999 for each category is indexed to 100 in the figures. Phase I and II districts are taken as the treatment group and phase III districts are the control group. Days of market work decreased to a larger extent in the phase I and II districts as compared to the phase III districts (see figure 2). Days of domestic work also increased to a greater degree in the districts where NREGS was active in 2007 as compared to the other districts (see figure 3). Days of public work clearly increased to a much greater ex-

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tent in the NREGS districts as compared to phase III districts as expected (see figure 5). Thus there was a substitution of work outside the house for women with domestic work and public work. Figure 4 shows that mechanization also increased faster in the NREGS districts as compared to the non-NREGS districts. Existing research shows that adoption of NREGS in districts and the resulting rise in wages led to faster adoption of labor-saving technologies (Bhargava, 2023).

Table 1: Summary Statistics of employment of women and mechanised tilling

|	All districts		NREGS districts		Non-NREGS districts	
	1999	2007	1999	2007	1999	2007
	(1)		(2)		(3)	
Individual level						
Days wage/self work in week (%)[a]	25.11 (39.51)	23.55 (38.91)	28.92 (41.76)	25.53 (40.03)	22.08 (37.36)	21.73 (37.76)
Days domestic work in week (%)	59.20 (46.57)	61.31 (46.32)	56.44 (47.04)	59.16 (46.78)	61.40 (46.08)	63.29 (45.81)
Days public work in week (%)[b]	0.07 (2.34)	0.36 (5.55)	0.09 (2.68)	0.62 (7.18)	0.05 (2.03)	0.13 (3.40)
Number of women	122531	116507	229		271	
District level						
Mechanization (%)[c]	13.02 (19.96)	32.55 (32.32)	7.89 (12.53)	29.04 (30.30)	17.81 (24.05)	35.77 (33.83)
Number of districts	355		170		185	

Notes: Standard deviation reported in parentheses.

[a] Percentage of days in a week women spent in work they were paid a wage or was self-employed such as on family farm.

[b] Percentage of days in a week women was self-employed such as work on family farm.

[c] Mechanization is measured as the percent area in a district which is operated on by tractors.

Figure 2: Trends in wage work/self-employed work days in treatment and control districts.
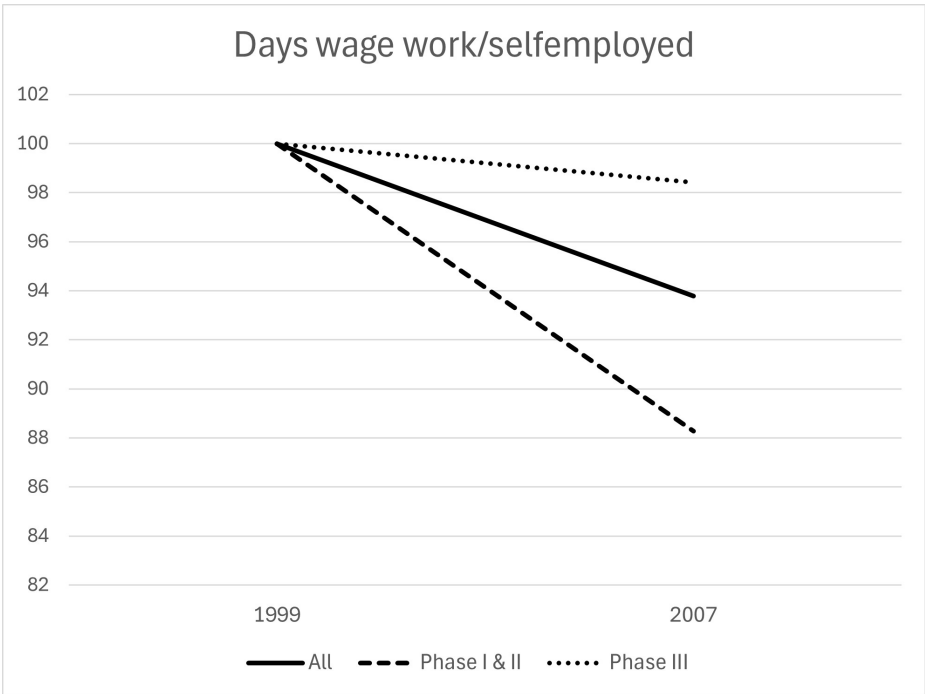
Days wage work/selfemployed

Notes: Value of days worked in 1999 is indexed to 100. Phase I and II districts make up the treatment and phase III districts make up the control.

Figure 3: Trends in domestic work days in treatment and control districts.
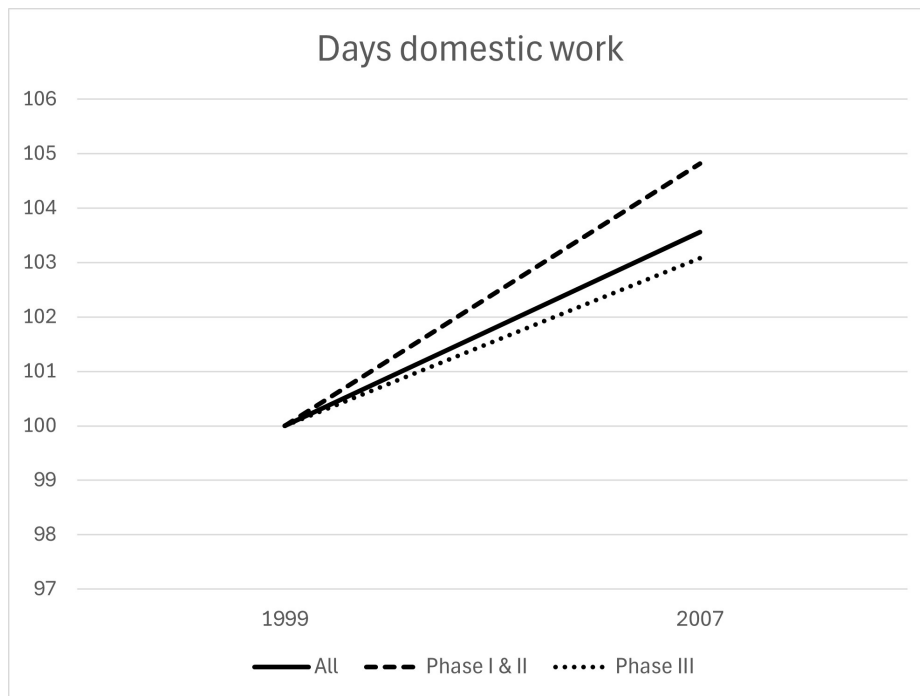
Notes: Value of days worked in 1999 is indexed to 100. Phase I and II districts make up the treatment and phase III districts make up the control.

Figure 4: Trends in public work days in treatment and control districts.

Notes: Value of days in 1999 worked is indexed to 100. Phase I and II districts make up the treatment and phase III districts make up the control.
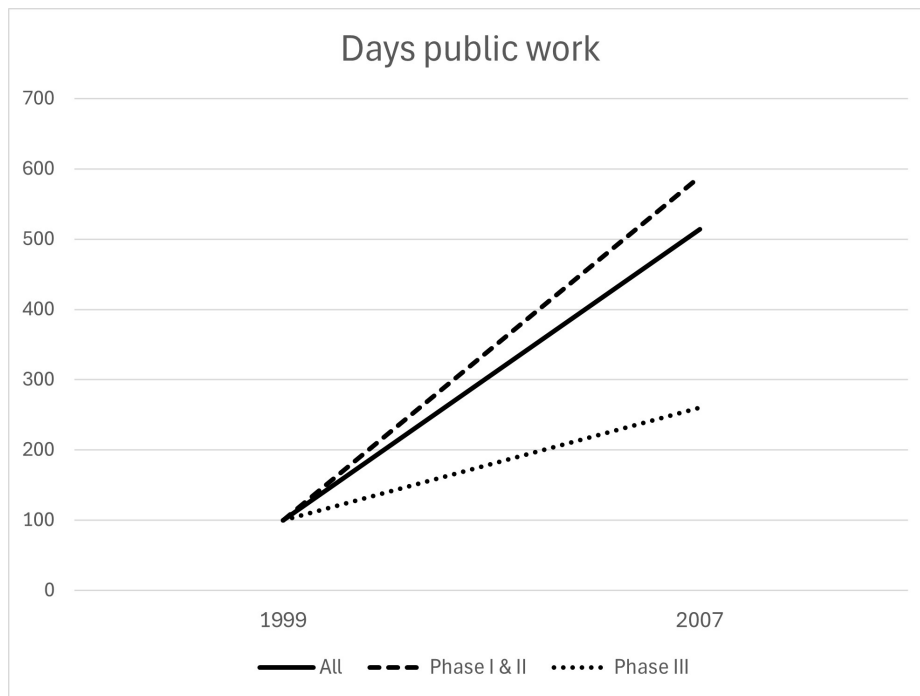
Figure 5: Trends in mechanization in treatment and control districts.

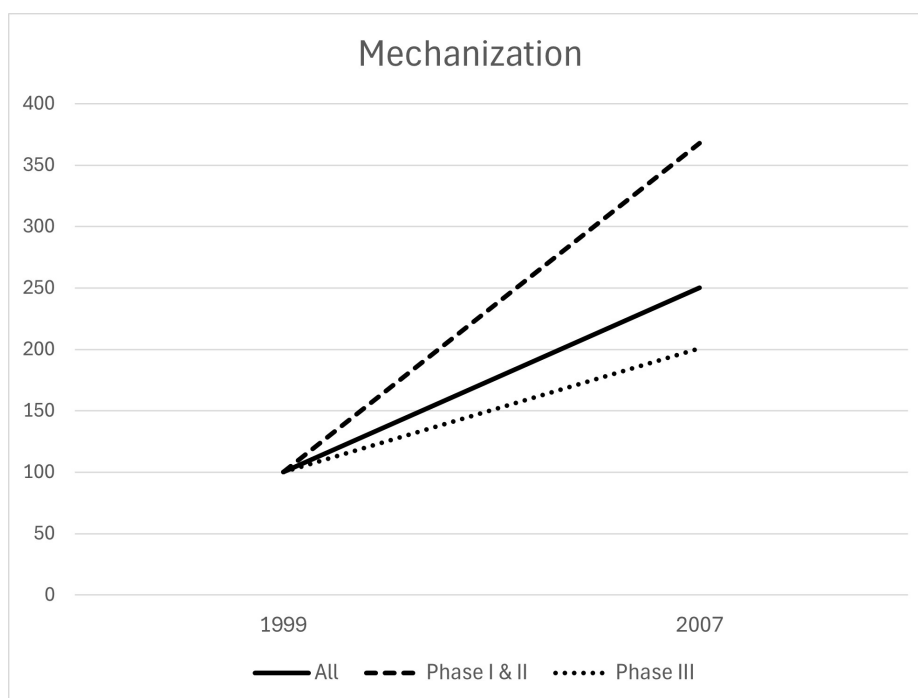Notes: Mechanization is measured as the paercentage of area in district operated on by tractors. The value in 1999 is indexed to 100. Phase I and II districts make up the treatment and phase III districts make up the control.

3   Methodology

Mechanisation in agriculture, specifically mechanisation in tilling is a continuous process that has been shown to reduce female labor force participation over time (Afridi et al., 2023). The NREGS rolled-out in stages across Indian districts increased female non-farm employment opportunities through its guarantee of 100 days of work at minimum wages for every adult in a rural household (Imbert and Papp, 2015; Azam, 2012; Sukhtankar et al., 2017).

One way of measuring the heterogeneous effects of mechanisation on women's labor outcomes based on NREGS status, is a cross-sectional regression of female labor hours on district level of mechanisation while controlling for NREGS status in 2007. Phase III districts can act as the counterfactual to phase I and II districts with similar levels of mechanisation. To account for unobserved heterogeneity that might influence both female labor hours and mechanisation level in a district, we instrument mechanised tilling rate in a district by soil texture. Mechanised tilling by tractors is used for primary or deep tilling which is possible in loamy but not clayey soil (Afridi et al., 2023; Carranza, 2014). The soil texture only determines the depth of tillage and does not affect the quality or crop suitability of a soil (Carranza, 2014). The soil texture is therefore arguably exogenous to female labor outcomes and independent of NREGS status as well. The constructed soil texture variable, which is equal to the difference between the share of district area with loamy soil and the area with clayey soil, represents the inherent potential of a district to adopt mechanized tilling.

There is also evidence that NREGS induced adoption of labor saving technology to substitute low skilled labor who might be more expensive in the wake of NREGS (Bhargava, 2023). A comparison of the trends in unconditional means of mechanized tilling between NREGS districts and non-NREGS districts in our dataset also shows that adoption of mechanized tilling was faster in the NREGS districts (see figure 5). Thus NREGS could have a direct effect on female labor hours as well as indirect effect by increasing the rate of mechanisation. In a reduced form regression of labor outcomes on NREGS sta-

tus and actual mechanisation level, the estimated coefficient on mechanisation could also capture an indirect effect of NREGS on female employment. Thus instrumenting level of mechanisation by the exogenous variation in soil texture across districts should also reduce concerns of multicollinearity between NREGS status and mechanization. Soil texture is arguably exogenous to female labor outcomes and NREGS status.

3.1 Empirical Strategy

We will estimate the following specification using cross-sectional data for the year 2007:

$$Y_{id} = \beta M_d + \gamma \mathbb{1}_{NREGS} + \delta M_d \times \mathbb{1}_{NREGS} + \theta X_d + \phi_s + \psi_q + \epsilon_{i,d} \quad (1)$$

where $\mathbf{Y}_{id}$ is the hours worked variable for woman i in district d, $\mathbf{M}_d$ captures the level of mechanization variable, $\mathbb{1}_{NREGS}$ is an indicator variable for the treatment group which are the early adopters of NREGS (Phase I and II districts), $\mathbf{X}_i$ are individual level controls like consumption expenditure, education level, age, religion, caste and marital status, ϕ_s are state fixed effects, ψ_q are quarter fixed effects and $\epsilon_{i,d}$ is the random error. The dependent variable is $\mathbf{Y}_{id}$ is taken to be the percentage of days spent on wage work/ self-employment, on domestic work and on the sum of the two categories of work in separate regression. To account for correlated errors within districts, standard errors are clustered at the district level.

We instrument mechanization, $\mathbf{M}_d$, and the interaction term between mechanization and NREGS status, $M_d \times \mathbb{1}_{NREGS}$, by the soil texture variable in order to account for unobserved heterogeneity affecting both employment choices and the level of mechanized tilling in a district. The first stage regressions are given by:

$$M_d = \beta S_d + \gamma \mathbb{1}_{NREGS} + \delta S_d \times \mathbb{1}_{NREGS} + \theta X_d + \phi_s + \psi_q + \epsilon_{i,d} \quad (2)$$

and:

$$M_d \times \mathbb{1}_{NREGS} = \beta S_d + \gamma \mathbb{1}_{NREGS} + \delta S_d \times \mathbb{1}_{NREGS} + \theta X_d + \phi_s + \psi_q + \epsilon_{i,d} \quad (3)$$

where the only new variable is S_d which indicates the soil texture variable for district d.

4 Results

Table 2 shows the second stage results from the IV regression of mechanization on the percentage of days spent on either wage work or self employment or public projects. The regressions were run using data for the post-intervention period in 2007 when NREGS was active in phase I and II districts but not phase III districts. The outcome variable is the percentage of days spent by a woman in either wage work or self-employment or public projects. Column 1 shows the results for all 355 districts. The estimated coefficient for mechanization is negative indicating that a unit increase in the percentage of district area operated on using tractors reduces percentage of days worked outside the house for women by -0.27%. Column 2 shows the results for the non-NREGS districts. The estimated coefficient for mechanization however is lower than that for the entire sample. Column 3 shows that results for the regression on the NREGS districts. The estimated coefficient for mechanization is much higher in this sub-sample than the non-NREGS sample though it is only statistically significant at the 10 % level. The first stage F-statistic for each of the regressions is reported in the table. The F-statistic for the regression on NREGS districts is lower than the generally accepted cutoff of 10, indicating that we may have a weak IV.

The result indicates that NREGS was not successful in mitigating some of the labor displacing effects of mechanization in agriculture. An explanation for this may be provided by looking at the effect of NREGS on the different categories of work for women. Imbert and Papp (2015) show that NREGS increased the days of public work available to people however the increase more than offset by a fall in the days of private work performed by people. Additionally, Bhargava (2023) shows that NREGS increased the adoption of labor saving technologies.

Table 3 reports the results from the IV regression represented in specification (1). We see that the coefficient for mechanisation is negative and indicates that for every unit increase in the percentage of district area operated on by tractors the percentage of days worked outside the house by women falls by 0.13 %. However, the coefficients for neither the NREGS districts nor the interaction term between NREGS status and mechanization is

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statistically significant. However the coefficient for NREGS status is positive while the interaction term has a negative sign. This seems to indicate that NREGS was at least not effective in mitigating the labor displacing effects of mechanization.

Table 2: Results of separate IV regression of percentage of days spent on wage work or self-employment or public projects on mechanization for women in NREGS districts and non-NREGS districts.

	(1) All districts		(2) Non-NREGS districts		(3) NREGS districts	
	b	se	b	se	b	se
Mechanization (%)	-0.270***	(0.063)	-0.123**	(0.047)	-0.899*	(0.478)
Age	-0.020	(0.026)	-0.019	(0.033)	-0.008	(0.051)
Urban	-7.230***	(0.760)	-6.667***	(0.866)	-9.231***	(1.782)
Primary education	-10.117***	(0.987)	-8.050***	(1.130)	-13.412***	(3.258)
Secondary education	-12.835***	(1.065)	-10.881***	(1.226)	-15.572***	(2.761)
Higher sec and above	-2.764**	(1.024)	-0.929	(1.229)	-4.475*	(2.229)
Currently married	4.893***	(0.770)	3.572***	(1.060)	6.498***	(1.251)
Widowed	11.257***	(0.946)	11.789***	(1.274)	10.299***	(1.490)
Separated	28.131***	(1.950)	26.626***	(2.822)	29.641***	(2.999)
Land: 0.02-0.20 h	-4.193***	(0.982)	-2.789***	(0.847)	-8.352	(4.481)
Land: 0.20-1.00 h	0.507	(0.998)	0.978	(1.213)	-0.520	(2.630)
Land: Above 1.00 h	6.033***	(1.044)	6.528***	(1.395)	3.985	(2.361)
ST	3.020	(2.658)	7.609*	(3.293)	-9.333	(10.090)
SC	5.932***	(0.955)	4.485***	(1.090)	11.152**	(3.408)
OBC	5.742***	(0.940)	4.462***	(1.027)	12.169**	(4.098)
Muslim	-8.745***	(1.075)	-8.333***	(1.233)	-5.687	(3.291)
Other religion	4.788**	(1.682)	1.698	(1.596)	5.796	(3.764)
MPCE	-0.000***	(0.000)	-0.000**	(0.000)	-0.000*	(0.000)
Quarter FEs	Yes		Yes		Yes	
N	116351		60536		55815	
First stage F-stat	23.45		19.18		9.13	

SEs clustered at district level. * for p<0.1, ** for p<0.05, and *** for p<0.01.

Table 3: Results of IV regression of percentage of days spent on wage work or self-employment or public projects for women on mechanization and NREGS status.

| | (1) | |
| | All districts | |
	b	se
Mechanization (%)	-0.134**	(0.049)
Mechanization*NREGS	-0.830	(0.577)
NREGS district	25.271	(16.878)
Age	-0.020	(0.034)
Urban	-7.681***	(1.001)
Primary education	-11.113***	(2.129)
Secondary education	-13.345***	(1.717)
Higher sec and above	-2.915*	(1.466)
Currently married	4.968***	(0.895)
Widowed	11.015***	(1.030)
Separated	28.445***	(2.261)
Land: 0.02-0.20 h	-5.560*	(2.550)
Land: 0.20-1.00 h	0.534	(1.459)
Land: Above 1.00 h	5.559***	(1.389)
ST	-4.630	(8.667)
SC	8.061***	(2.141)
OBC	8.328***	(2.396)
Muslim	-7.331***	(1.645)
Other religion	4.963*	(2.230)
MPCE	-0.000*	(0.000)
Quarter FEs	Yes	
N	116351	
Chi^2(1):Mech + Mech*NR	2.72	
p value:Mech + Mech*NR	0.099	
First stage F-stat	10.44	

SEs clustered at district level. * for p<0.1, ** for p<0.05, and *** for p<0.01.

5   Conclusion

Mechanization in Indian agriculture particularly the adoption of tractors for tilling led to a fall in female employment in rural India (Afridi et al., 2023). The introduction of labor saving technologies leads to the displacement of less productive labor. This is a part of the process of structural transformation of society from traditional modes of production to modern capitalist modes. The workers displaced from the traditional sector act as surplus labor to be absorbed into the expanding capitalist sector. However preexisting market imperfection can make prevent reabsorption. In the context of the Indian rural economy, jobs are organised along gendered lines. Thus the women displaced from farming jobs were unable to find new jobs in the farming sector even though the displaced men were reabsorbed to a large extent (Afridi et al., 2023). In this paper, we investigate whether the availability of alternative, women-friendly jobs in other sectors of the economy can help mitigate female job loss associated with mechanization in the traditional sector. The NREGS rolled out in phases across Indian districts provides a unique opportunity to validate this hypothesis. The scheme guaranteed 100 days of employment annually to every adult member in a household in public projects and had special quotas for jobs for women. Comparing trends in unconditional means in days spent in wage work or self-employment between NREGS and non-NREGS we find that though it fell across all districts between 1999 and 2007, the fall was larger in non-NREGS districts than in NREGS districts. We ran a cross-sectional regressions of the days spent on wage work or self-employment or public projects on district level mechanization and NREGS status of a district in 2007. However, the results of the regression were insufficient to rule if NREGS did in fact have any influence on the female labor displacing effect of mechanization. However existing studies show that the implementation of the NREGS fell far short of the programme's intention (Imbert and Papp, 2015). It is possible that studying heterogeneous effects among NREGS districts may offer up more clues as to how much NREGS jobs were effective in mitigating female job loss. Additionally we plan to use an alternative triple difference in difference specification to examine the effects of NREGS.

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