

Public Works Program, Labor Supply, and Monopsony

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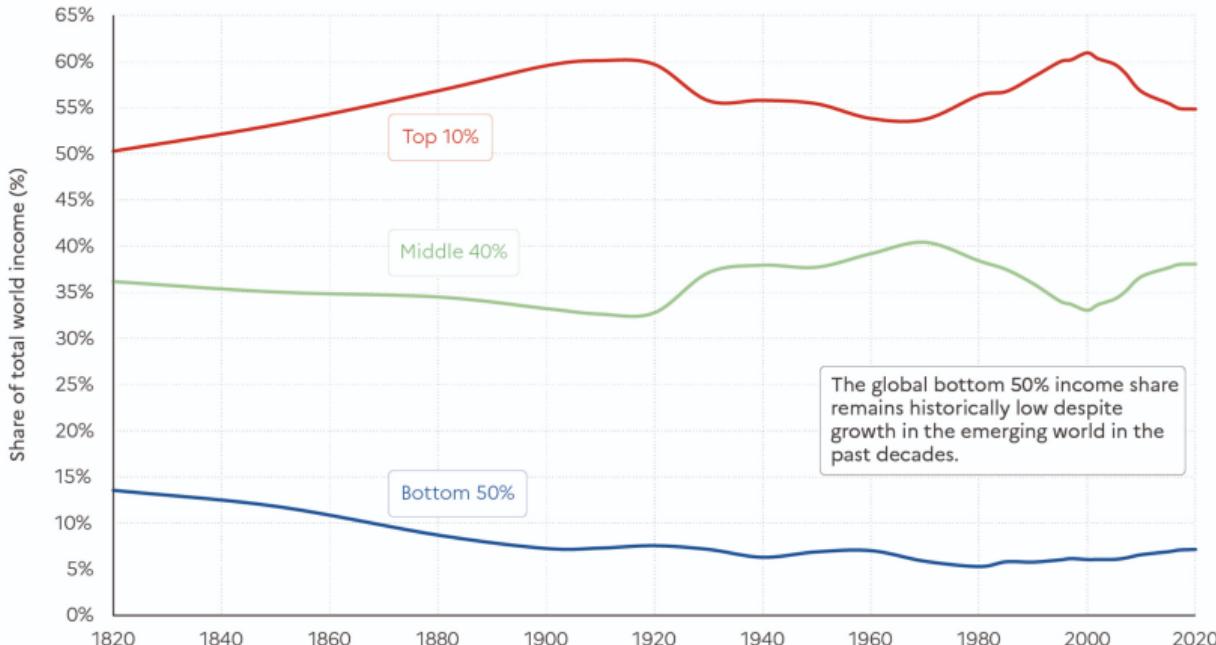
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Motivation

Figure 2.1 Global income inequality: bottom 50%, middle 40% and top 10%, 1820-2020



Interpretation: The share of global income going to top 10% highest incomes at the world level has fluctuated around 50-60% between 1820 and 2020 (50% in 1820, 60% in 1910, 56% in 1980, 61% in 2000, 55% in 2020), while the share going to the bottom 50% lowest incomes has generally been around or below 10% (14% in 1820, 7% in 1910, 5% in 1980, 6% in 2000, 7% in 2020). Global inequality has always been very large. It rose between 1820 and 1910 and shows little change over the long term between 1910 and 2020. Income is measured per capita after pension and unemployment insurance transfers and before income and wealth taxes. **Sources and series:** wir2022.wid.world/methodology and Chancel and Piketty (2021).

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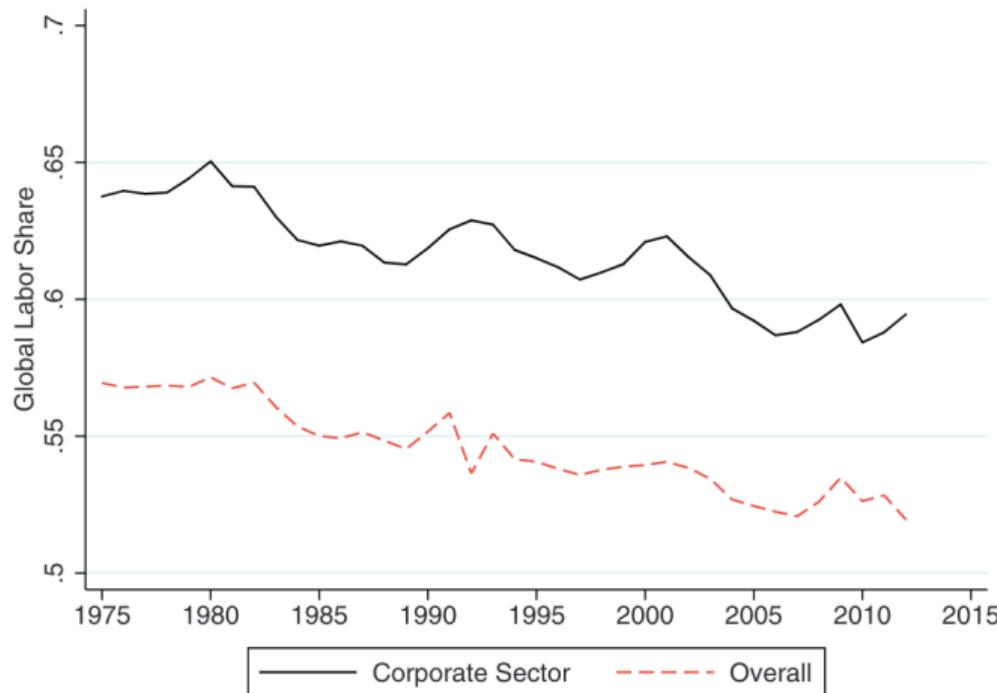


FIGURE I
Declining Global Labor Share

Source: Karabarbounis and Neiman (2014, QJE)

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- ▶ Significant market power in the labor markets
 - Elasticity of labor supply to an individual firm is finite (Manning, 2003; Bachmann et al., 2021; Amodio and De Roux, 2021; Bassier et al., 2022; Caldwell and Oehlsen, 2022; Datta, 2023)
 - Wage markdowns: $\text{Wage} < \text{MRPL}$ (Berger et al., 2022; Yeh et al., 2022; Hoang et al., 2024)
 - Labor markets are highly concentrated (Azar et al., 2019; Felix, 2022)

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- ▶ Labor reallocation, mobility, wage collusion, automation threat → Labor market power
 - Trade (Felix, 2022; Kondo et al., 2022), infrastructure investments (Brooks et al., 2021; Perez et al., 2022), employer collusion (Delabastita and Rubens, 2023), robot exposure (Byambasuren, 2025), and foreign capital liberalization (Byambasuren et al., 2025)

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- ▶ Policy implications
 - Market power may justify the use of minimum wages and other redistributive policies

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- ▶ Implications about public work providing a wage floor – enhancing the ability of workers to bargain for higher wages (Basu et al., 2009)
- ▶ Direct effects of India's public employment program (**public, rural, ag. & construction**)
 - **Public** employment and wages ↑ (Imbert and Papp, 2020a), **driven by female workers** (Azam, 2012)
 - **Rural** households' earnings ↑ by 14% and poverty ↓ by 26% (Muralidharan et al., 2023)
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 - **Private** employment ↓ and wages ↑ (Imbert and Papp, 2015), **rural out-migration ↓ and urban wage ↑** (Imbert and Papp, 2020a; Imbert and Papp, 2020b), **family employment ↑** (Zimmermann, 2024), **child labor ↑** (Li and Sekhri, 2020)

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- ▶ Indirect effects in the manufacturing sector is understudied (Agarwal et al., 2021)

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 - Flattening the labor supply curve, and thus improve workers' bargaining power
 - Quantify plant-level markdowns ([MRPL/Wage](#))
 - Estimate the causal impact of NREGA on wage markdowns
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- ▶ RQ2. What are the associated mechanisms?
 - Guided by a theoretical model
 - Implement various heterogeneity tests

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- ▶ **Theoretical model: Composition story**
 - Public works attract mobile rural workers from urban areas
 - Leaves only immobile workers with lower labor supply elasticity
- ▶ Empirically, the effects are most salient
 - Among urban firms
 - In districts with more in-migration (Imbert and Papp, 2020a; Imbert and Papp, 2020b)

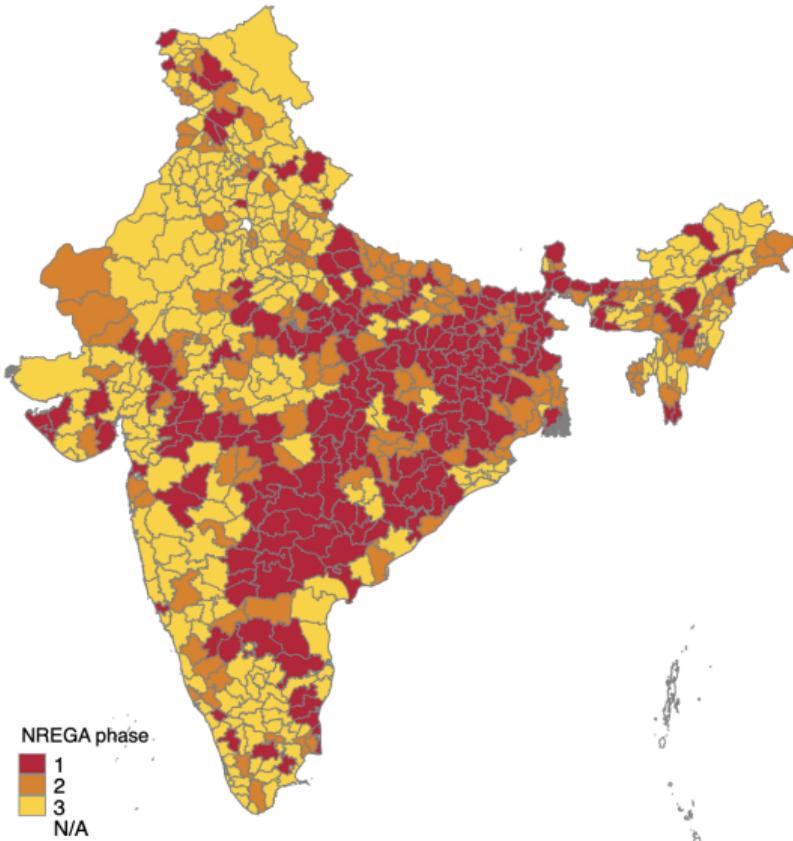
Roadmap

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2. Markdown Estimation
3. Conceptual Model
4. Data
5. Empirical Analysis
6. Conclusion

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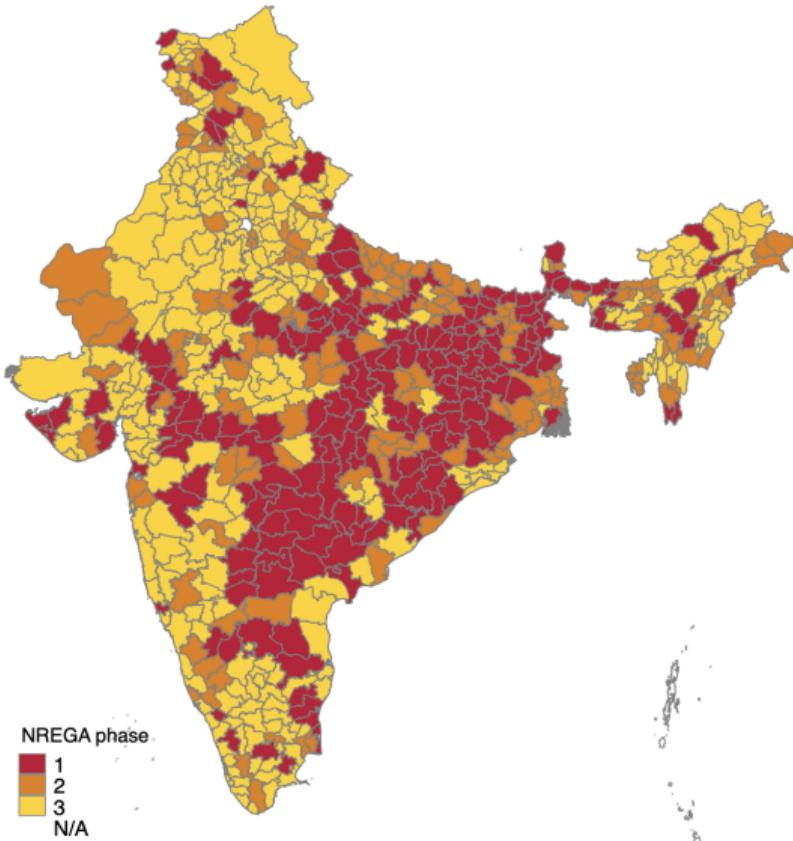
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India's National Rural Employment Guarantee Act



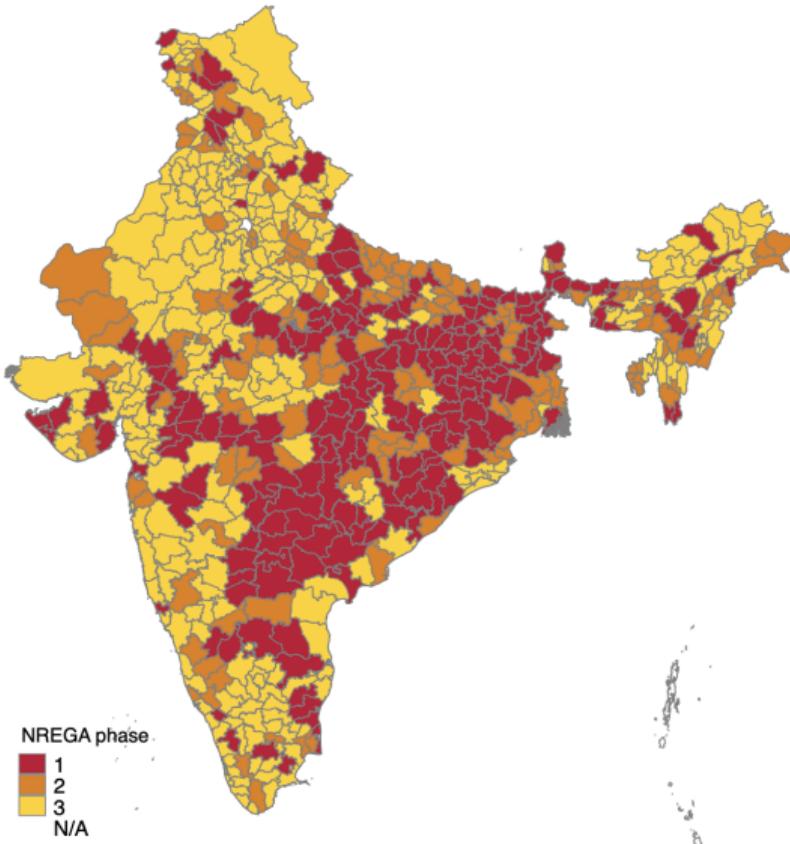
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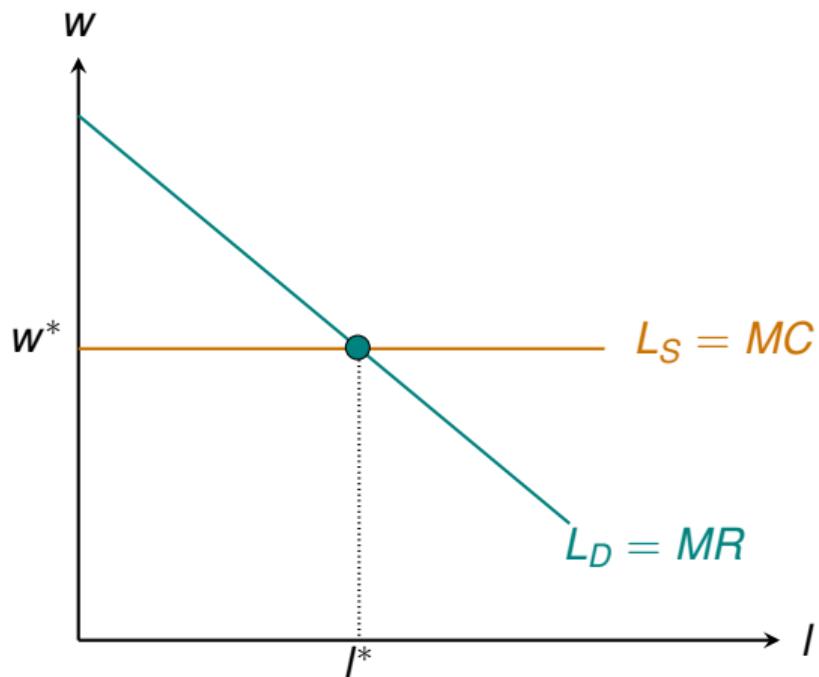
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- ▶ Anyone over 18 years of age residing in a rural area is eligible
- ▶ Staggered rollout over three phases
 1. 200 poorest districts in Feb 2006
 2. 130 districts in Apr 2007
 3. All remaining districts in Apr 2008

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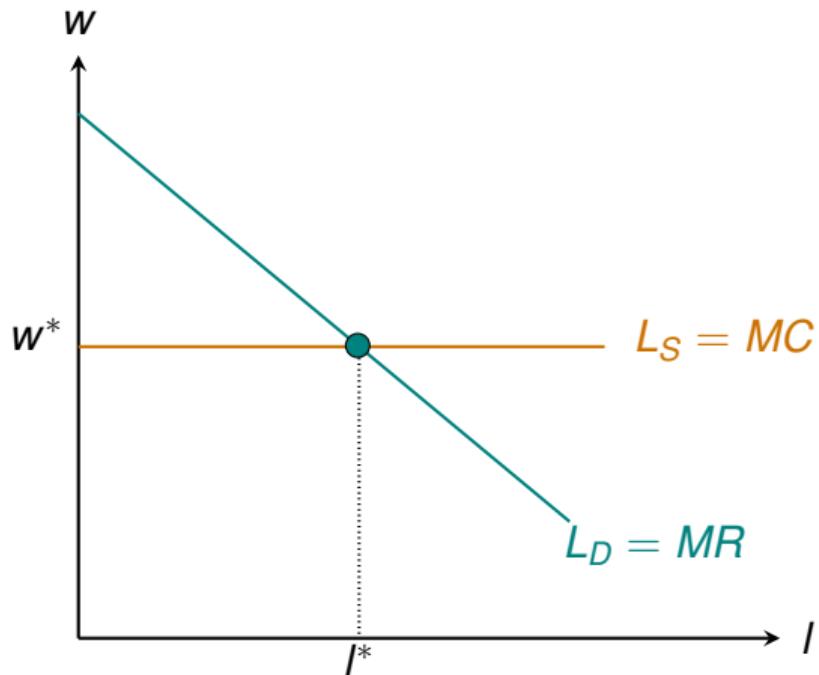
Individual Firm's Labor Market Equilibrium

(a) Perfect competition

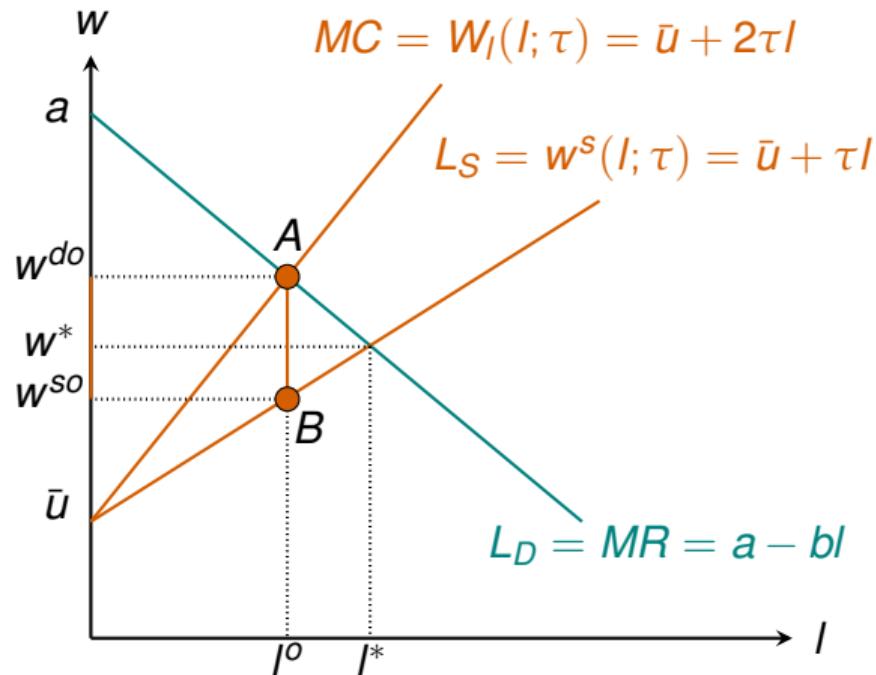


Individual Firm's Labor Market Equilibrium

(a) Perfect competition



(b) Monopsony



Measuring Labor Market Power: Definition

- ▶ The wage markdown, ν , is defined as the ratio of MRPL to wage:

$$\nu = \frac{R_l(l)}{w(l)} = \varepsilon_s^{-1} + 1,$$

where $R_l(l) = \frac{\partial R(l)}{\partial l}$ is the MRPL, $w(l)$ is the wage, and $\varepsilon_s = \frac{\partial l}{\partial w(l)} \frac{w(l)}{l}$ is the elasticity of labor supply.

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- ▶ In perfectly competitive labor markets: $\nu = 1$
- ▶ Employer has market power: $\nu > 1$

Measuring Labor Market Power: Markdown Estimation

- ▶ Markdown is defined by (Yeh et al., 2022)

$$\nu_{it} = \frac{\theta_{it}^L}{\alpha_{it}^L} \mu_{it}^{-1}$$

- θ_{it}^L : output elasticity of labor
- α_{it}^L : share of labor expenditure in revenue
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$$\mu_{it} = \frac{\theta_{it}^M}{\alpha_{it}^M}$$

- θ_{it}^M : output elasticity of any flexible input M_{it} (e.g., materials, energy, etc.)
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- ▶ Estimate μ_{it} and θ_{it}^L using a production function approach (De Loecker and Warzynski, 2012)

▶ Estimation approach

▶ Production function estimation

Estimated Wage Markdowns

	Median	Mean	IQR ₇₅₋₂₅	SD	N
Panel A. Homogeneous workers					
All workers	1.024	1.387	1.135	1.211	92969
Panel B. Skilled and unskilled workers					
Unskilled (production) workers	1.109	1.529	1.392	1.375	77378
Skilled (non-production) workers	2.954	5.005	4.569	5.780	77378
Panel C. Workers at urban and rural firms					
Urban firms in high-mobility districts	1.018	1.354	1.108	1.158	27528
Urban firms in low-mobility districts	1.075	1.441	1.225	1.256	22063
Rural firms in high-mobility districts	1.069	1.465	1.225	1.280	17622
Rural firms in low-mobility districts	0.960	1.328	1.044	1.188	23988

Notes: The distributional statistics are calculated using sampling weights provided in the data.

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Conceptual Model

- ▶ Firm-specific labor supply setup (Card et al., 2018; Manning, 2021)

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- ▶ Heterogeneous workers with origins $o = \{u, r\}$ and skills $s = \{H, L\}$
- ▶ NREGA in the model

		<u>Skills</u>			
		Skilled	Unskilled	<u>Skills</u>	
				Urban	Urban
Firms	Urban	No direct impact	No direct impact	Skilled	Unskilled
	Rural	No direct impact	NREGA direct benefits	Ineligible	Ineligible

		<u>Skills</u>			
		Skilled	Unskilled	<u>Skills</u>	
				Urban	Urban
Firms	Urban	Ineligible	Ineligible	Skilled	Unskilled
	Rural	Ineligible	Ineligible	Ineligible	Ineligible

Conceptual Model

- Let the utility of a worker of type os in firm i be given by

$$u_i^{os} = \beta^s \left(\underbrace{w_i^{os}}_{\text{Wage}} + \underbrace{a_i^{os}}_{\text{Non-wage amenities}} + \underbrace{\tau_i^{os}}_{\text{Wage adj. term}} \right) + \underbrace{\eta_i^{os}}_{\text{Type I EV preference shifter}}$$

- $\tau_i^{us} = 0$, for $s = H, L$ (NREGA targets rural residents)
- $\tau_i^{rH} = 0$ (skilled workers are not willing to take NREGA work involving unskilled labor)
- $\tau_i^{rL} \geq 0$ (firm-specific NREGA benefits)

- For large I , the approximate firm-specific labor supply schedule of firm i is

$$\ell_i^{os}(w_i^{os}) \approx \beta^s [(w_i^{os} - \bar{w}^{os}) + (a_i^{os} - \bar{a}^{os}) + (\tau_i^{os} - \bar{\tau}^{os})] + \ell^{os} \quad (1)$$

Conceptual Model

- ▶ Average markdown over low-skilled workers from urban and rural settlements is

$$\bar{\mu}_i^{os} = (1 - \theta_i^{rL})\mu_i^{uL} + \theta_i^{rL}\mu_i^{rL}, \quad (2)$$

where $\theta_i^{rL} = L_i^{rL}/(L_i^{uL} + L_i^{rL})$ is the share of rural workers in the workforce

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- ▶ Mixture of urban and rural workers in (1) and (2) \implies **Composition effect** is important
- ▶ With public works,
 - $\theta_i^{rL} \downarrow$ at urban firms via out-migration
 - $\mu_i^{rL} \downarrow$ because rural workers have outside option
 - Perhaps, $\mu_i^{rL} < \mu_i^{uL}$ because rural workers are mobile & can migrate
 - If above true, with NREGA, we expect markdown \uparrow

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Data

- ▶ Firm-level data
 - ASI establishment panel (1999-2008)
 - Annual nationally representative survey of all factories
 - Information necessary to estimate markdown using production approach
- ▶ NREGA data (Imbert and Papp, 2015)
 - Rollout of the program across districts in three phases
- ▶ Additional data
 - Rainfall (CHIRPS)
 - In-migration rate (Census, 2001)

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Estimation Strategy

$$Y_{it} = \alpha + \beta \times \text{Post NREGA}_{dt} + \mathbf{X}'_{it}\gamma + \phi_i + \delta_{jst} + \varepsilon_{it}$$

- ▶ Y_{it} : Labor market outcomes for firm i at year $t \in [1999, 2008]$
- ▶ Post NREGA $_{dt}$: Treatment indicator for the post-NREGA period
- ▶ Strategy: DID design (Imbert and Paap, 2015; Agarwal et al., 2021; Behrer, 2023) » Baseline design
 - Treated group: Phases 1 & 2
 - Control group: Phase 3 (never treated during our study period)
- ▶ Controls: Firm age, age-squared, district-level rainfall shocks
- ▶ Fixed effects: Firm, industry-state-year
- ▶ SE cluster: District-level

Estimation Results: Heterogeneous Effects by Labor Productivity

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA × Below median	-0.101*** (0.019)	0.086*** (0.022)	-0.018 (0.015)	0.074*** (0.025)
Below median	0.023 (0.014)	0.018 (0.016)	-0.018* (0.010)	-0.002 (0.017)
Post-NREGA	0.025 (0.022)	-0.039* (0.022)	0.008 (0.018)	-0.033 (0.024)
Controls	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
State-Industry-Year FE	✓	✓	✓	✓
N	71921	71921	68151	68151
R ²	0.97	0.88	0.91	0.89

► Average effects

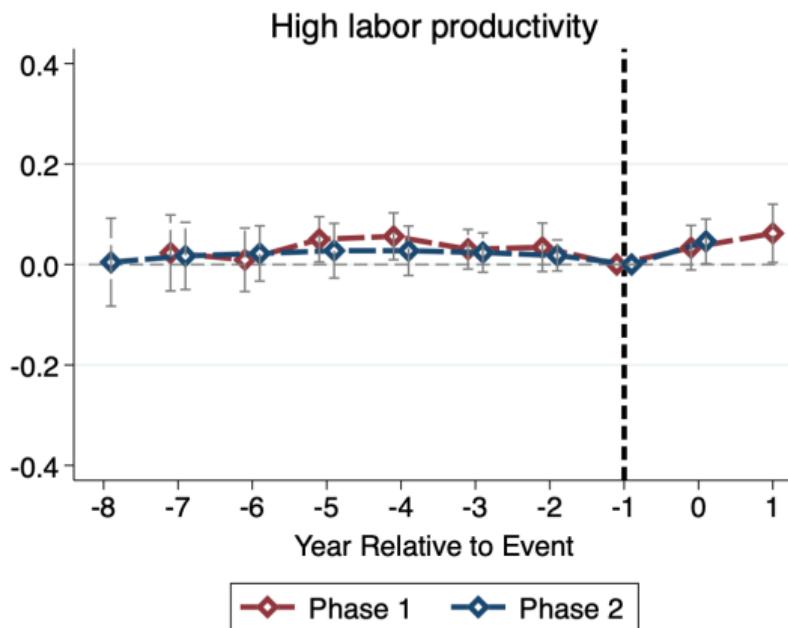
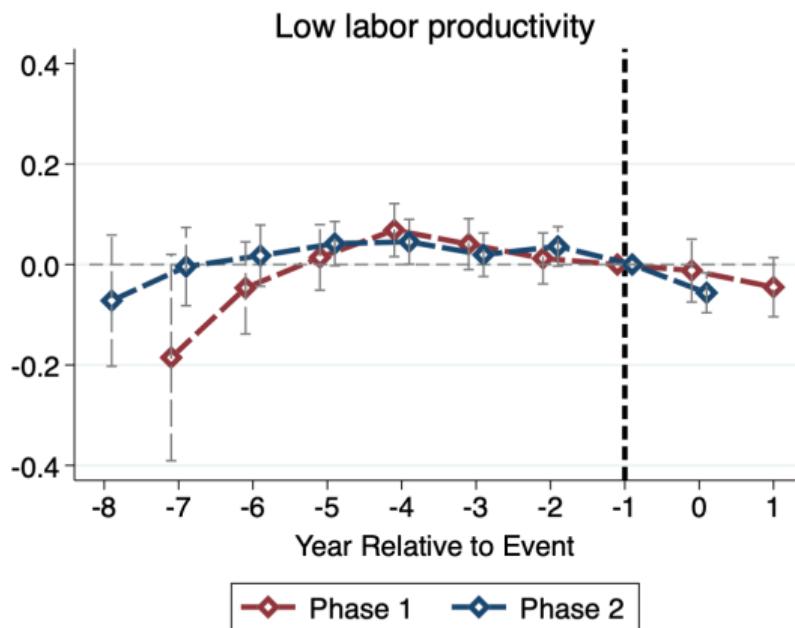
► Unskilled workers

► Skilled workers

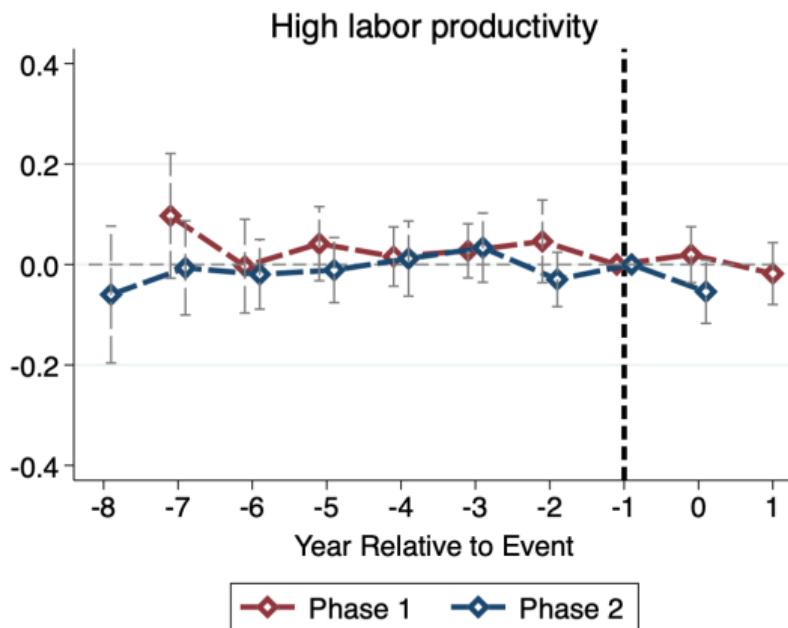
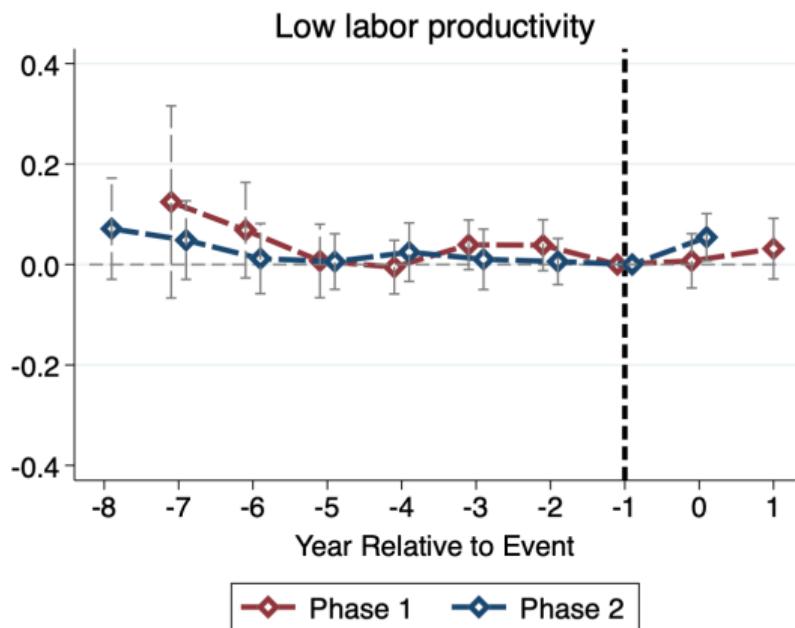
► Regular workers

► Contract workers

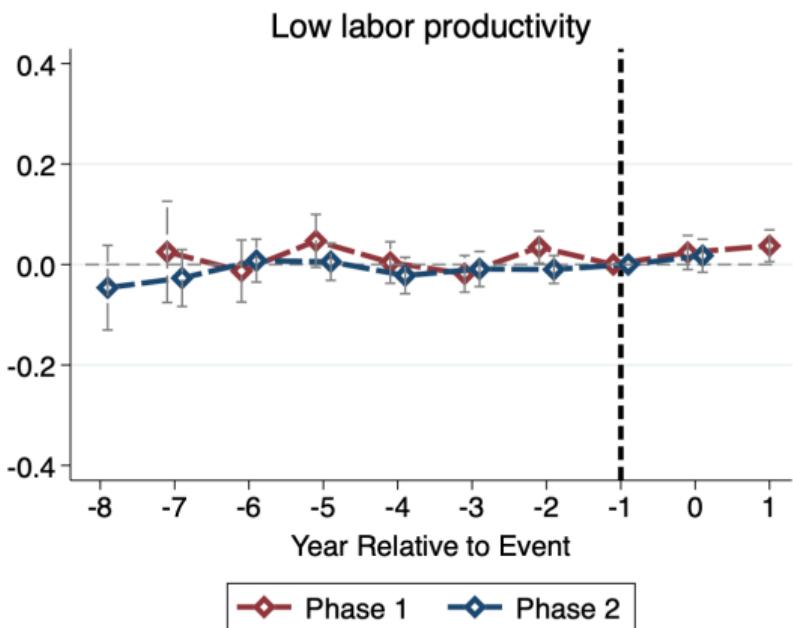
Event Study Plots: Employment



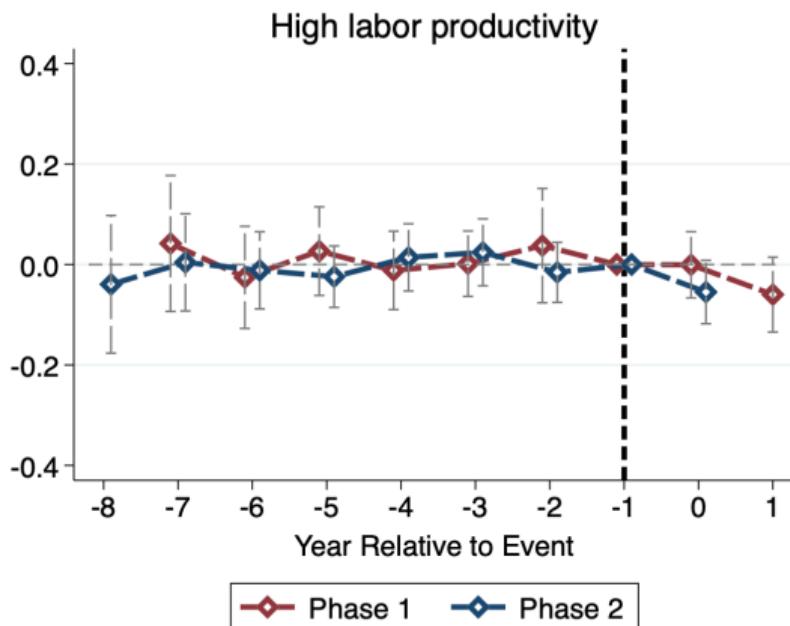
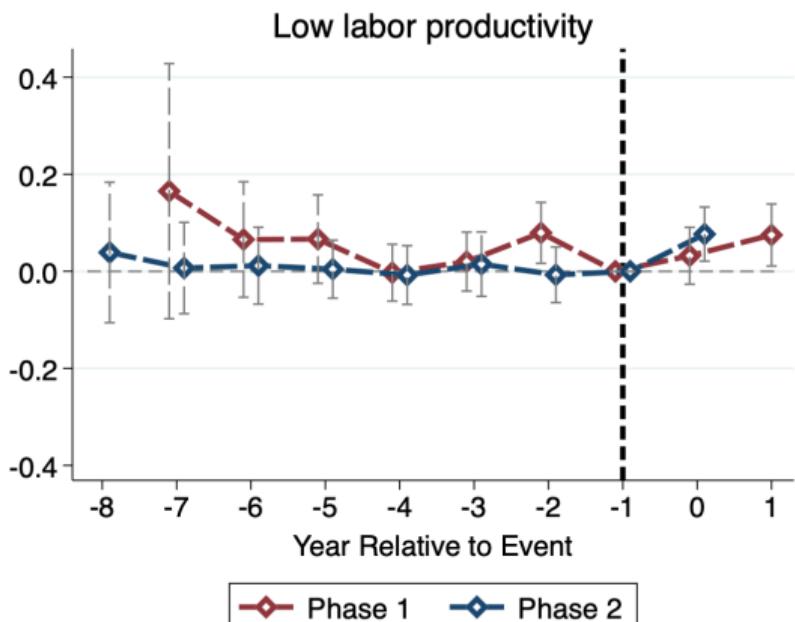
Event Study Plots: Markdowns



Event Study Plots: Wage

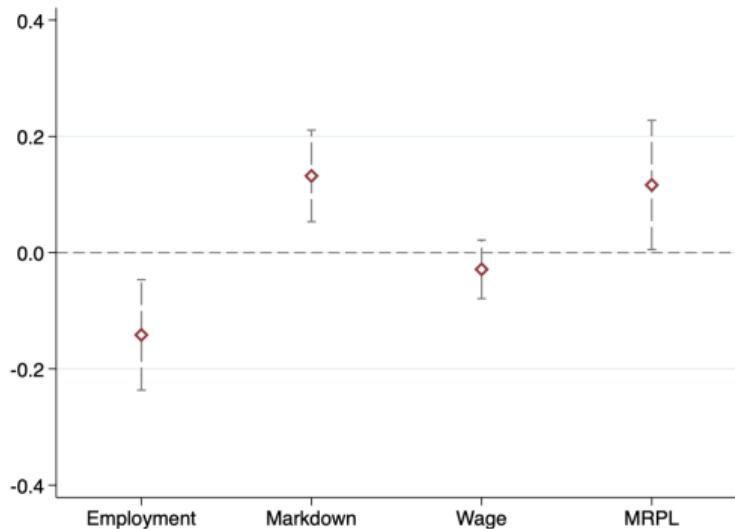


Event Study Plots: MRPL

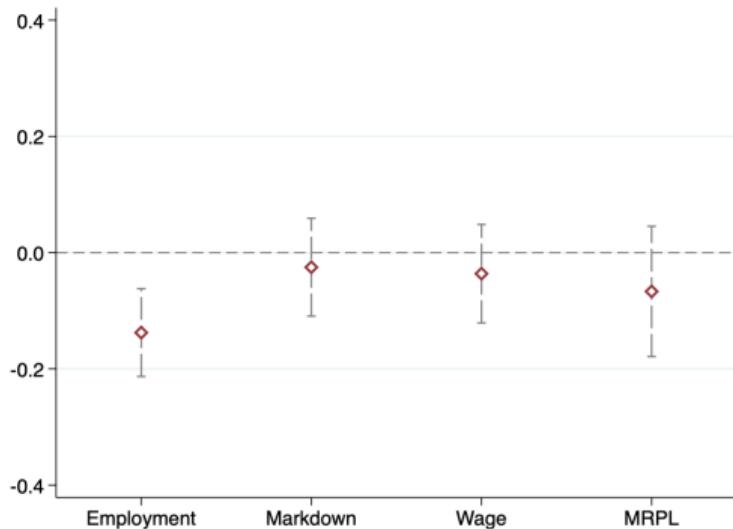


Heterogeneous Effects by Labor Productivity: High Mobility Districts

(a) Urban

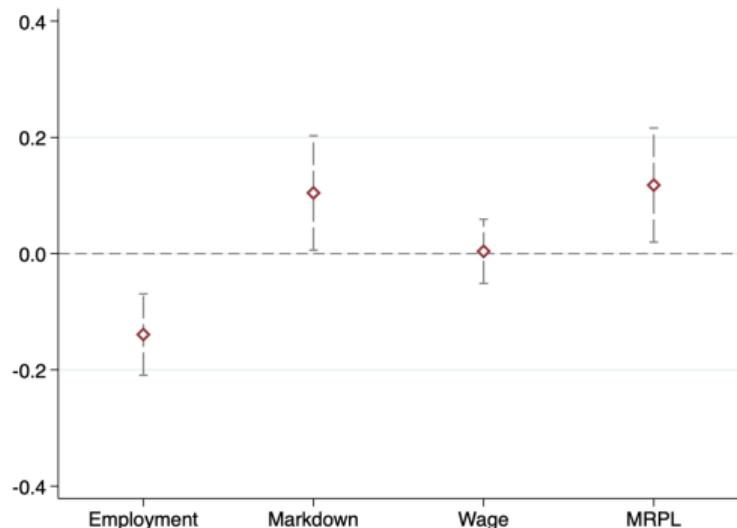


(b) Rural

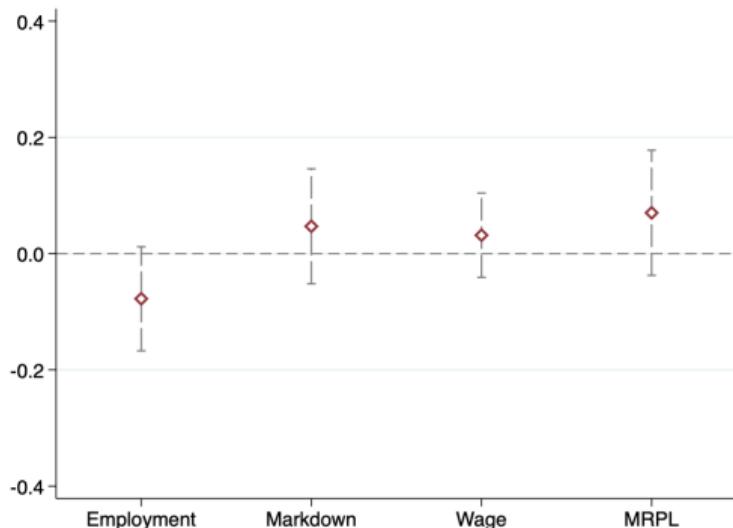


Heterogeneous Effects by Labor Productivity: Low Mobility Districts

(a) Urban



(b) Rural



► Labor intensity ► Wage distribution ► Minimum wage ► Industries ► Urban

Identification Assumptions & Robustness Checks

- ▶ Baseline event-study (Cook and Shah, 2022) [» Employment](#) [» Markdown](#) [» Wage](#) [» MRPL](#)

$$Y_{it} = \alpha + \sum_{\tau=-1; \tau=-7}^{\tau=1} \gamma_{1\tau} \times I_\tau \times P1_d + \sum_{\tau=-1; \tau=-8}^{\tau=0} \gamma_{2\tau} \times I_\tau \times P2_d + \mathbf{X}'_{it}\boldsymbol{\gamma} + \phi_i + \delta_{jst} + \varepsilon_{it}$$

- ▶ Placebo test by shifting the treatment period (Abbring and Van den Berg, 2003) [» Employment](#)

[» Markdown](#) [» Wage](#) [» MRPL](#)

- ▶ Heterogeneity by sample splitting [» Results](#)

- ▶ Full sample with alternative fixed effects [» Employment](#) [» Wage](#)

- ▶ Using mandays as a labor input [» All workers](#) [» Skilled & Unskilled workers](#) [» Regular & Contract workers](#)

- ▶ Dropping control districts surrounded by treated districts [» Maps](#) [» All workers](#) [» Unskilled](#)
[» Skilled](#) [» Regular](#) [» Contract](#)

Roadmap

1. Policy Context
2. Markdown Estimation
3. Conceptual Model
4. Data
5. Empirical Analysis
6. Conclusion

Conclusion

- ▶ First evidence on the indirect effect of NREGA on labor market power in manufacturing

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- ▶ Effect of NREGA on markdown is positive and particularly strong for firms with low labor productivity
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Conclusion

- ▶ First evidence on the indirect effect of NREGA on labor market power in manufacturing
- ▶ Effect of NREGA on markdown is positive and particularly strong for firms with low labor productivity
 - Markdown effect is concentrated in districts with greater labor mobility in urban areas
- ▶ Public works program crowds out employment in manufacturing firms → Labor composition changes
 - Composition effect → Employer power at crowded out firms ↑ due to high employer power over immobile workers with lower labor supply elasticity

Conclusion

- ▶ First evidence on the indirect effect of NREGA on labor market power in manufacturing
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- ▶ Public works program crowds out employment in manufacturing firms → Labor composition changes
 - Composition effect → Employer power at crowded out firms ↑ due to high employer power over immobile workers with lower labor supply elasticity
- ▶ Highlights the importance of the migrant workforce in manufacturing jobs and migration effects of NREGA (Imbert and Papp, 2020a; Imbert and Papp, 2020b)

Public Works Program, Labor Supply, and Monopsony

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Appendix

Measuring Labor Market Power: Markdown Estimation

- ▶ Estimate plant-level markdowns ν_{jt} using “production” approach
 - Estimate production function using “proxy variable” method (Olley and Pakes, 1996; Levinsohn and Petrin, 2003; Ackerberg et al., 2015)
 - Compute output elasticities, under translog production function, as

$$\begin{aligned}\theta_{jt}^L &= \hat{\beta}_I + \hat{\beta}_{KL}k_{jt} + \hat{\beta}_{LM}m_{jt} + 2\hat{\beta}_{IL}l_{jt} \\ \theta_{jt}^M &= \hat{\beta}_m + \hat{\beta}_{km}k_{jt} + \hat{\beta}_{lm}l_{jt} + 2\hat{\beta}_{mm}m_{jt}\end{aligned}$$

- ▶ Production function estimation
 - General form of production function (in log terms):

$$\begin{aligned}y_{jt} &= f(\mathbf{x}_{jt}; \beta) + \omega_{jt} + \varepsilon_{jt} \\ &= f(\mathbf{v}_{jt}, \mathbf{k}_{jt}; \beta) + \omega_{jt} + \varepsilon_{jt}\end{aligned}$$

- where fully flexible inputs $\mathbf{v}_{jt} = m_{jt}$ and non-fully flexible inputs $\mathbf{k}_{jt} = (k_{jt}, l_{jt})'$.
- Proxy unobserved productivity ω_{jt} with $\omega_{jt} = g_t(m_{jt}; \mathbf{k}_{jt}, \mathbf{c}_{jt})$ » Back

Production Function Estimation

- ▶ Three-step process to estimate β vector:
 - **Step 1:** Non-parametric estimation of y_{jt} on \mathbf{x}_{jt}

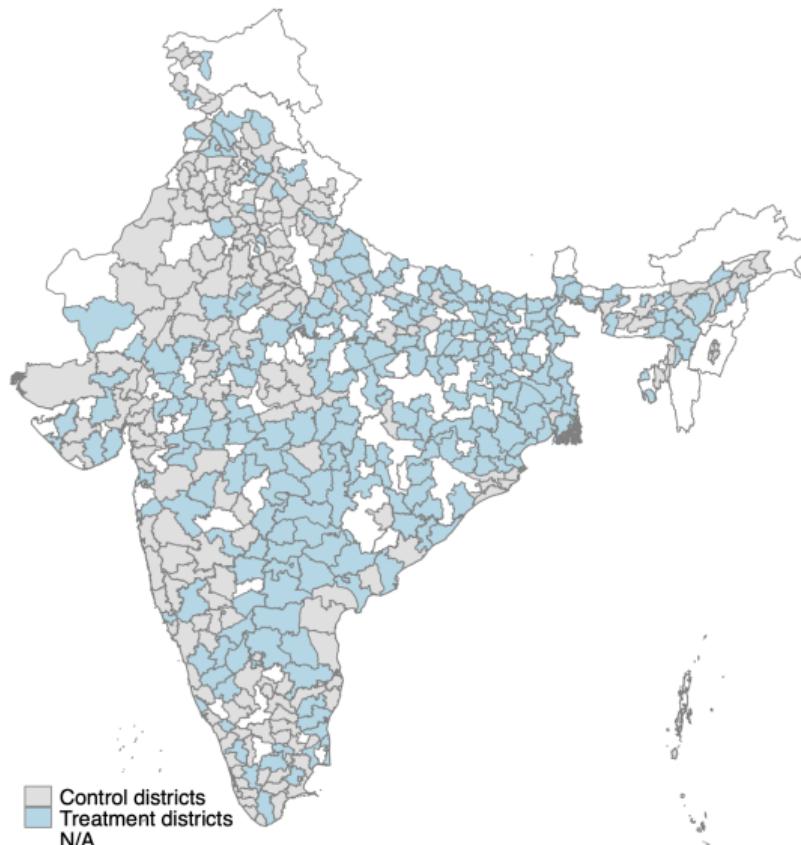
$$\mathbf{x}_{jt} = (k_{jt}, l_{jt}, m_{jt}, k_{jt}l_{jt}, k_{jt}m_{jt}, l_{jt}m_{jt}, k_{jt}^2, l_{jt}^2, m_{jt}^2)'$$

- **Step 2:** Obtain innovations ξ_{jt} to productivity ω_{jt} using $\omega_{jt} = s_t(\omega_{jt-1}) + \xi_{jt}$
- **Step 3:** Identify parameters β using GMM-IV with instruments \mathbf{z}_{jt} : one-period lagged values of every polynomial term in $f(\mathbf{x}_{jt}; \beta)$ including l_{jt} and m_{jt} but capital at the current period k_{jt}

» Back

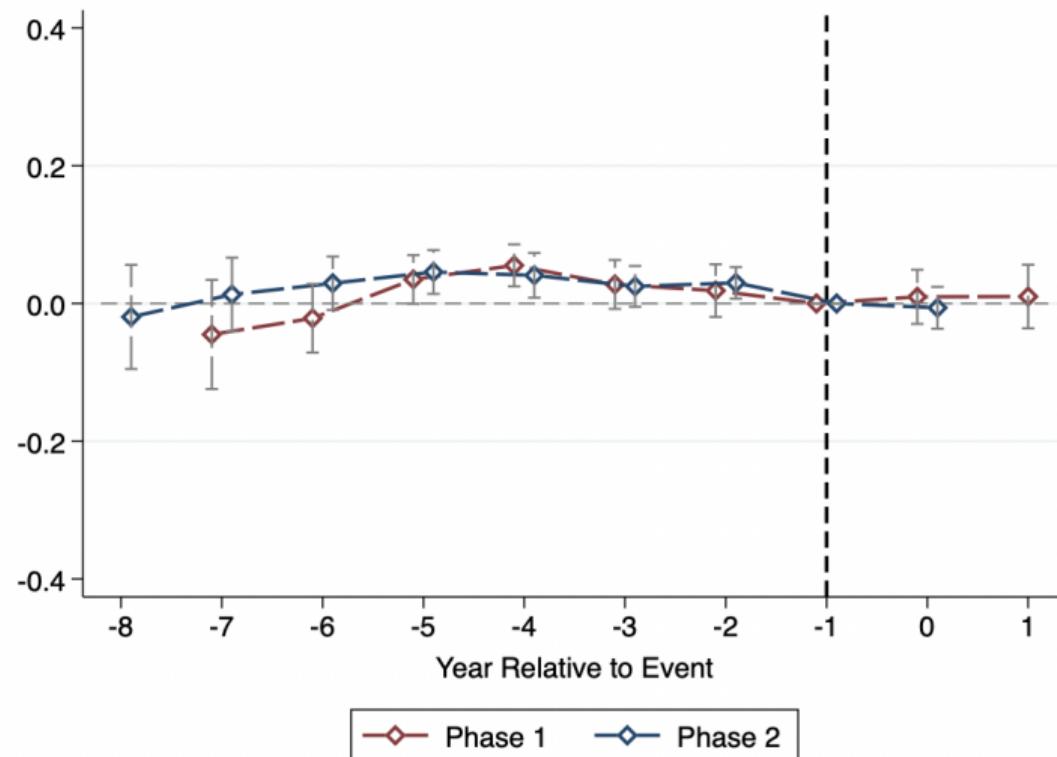
Baseline Treatment and Control Groups

Back



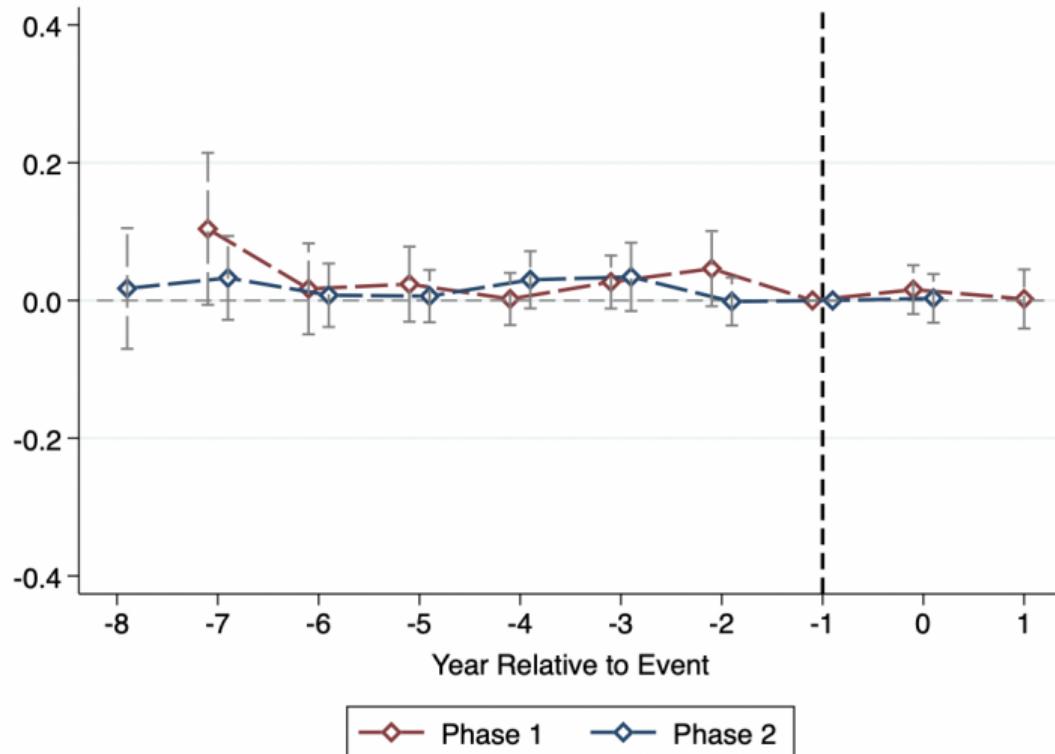
Parallel Pre-Trend in Employment

Back



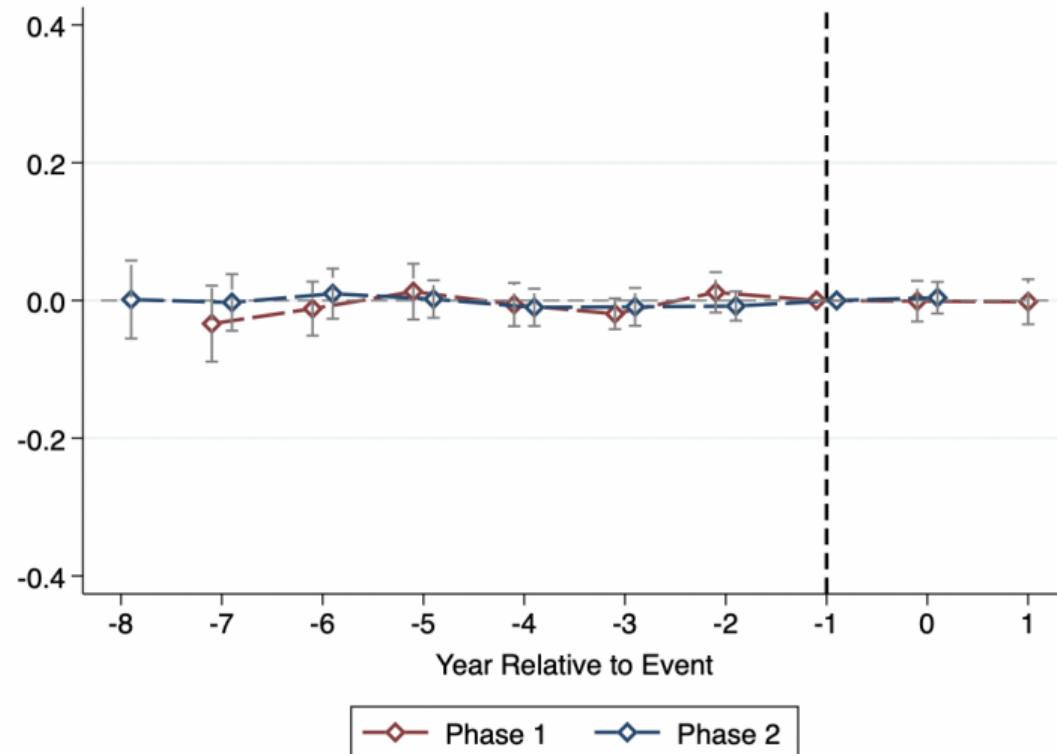
Parallel Pre-Trend in Markdown

[Back](#)



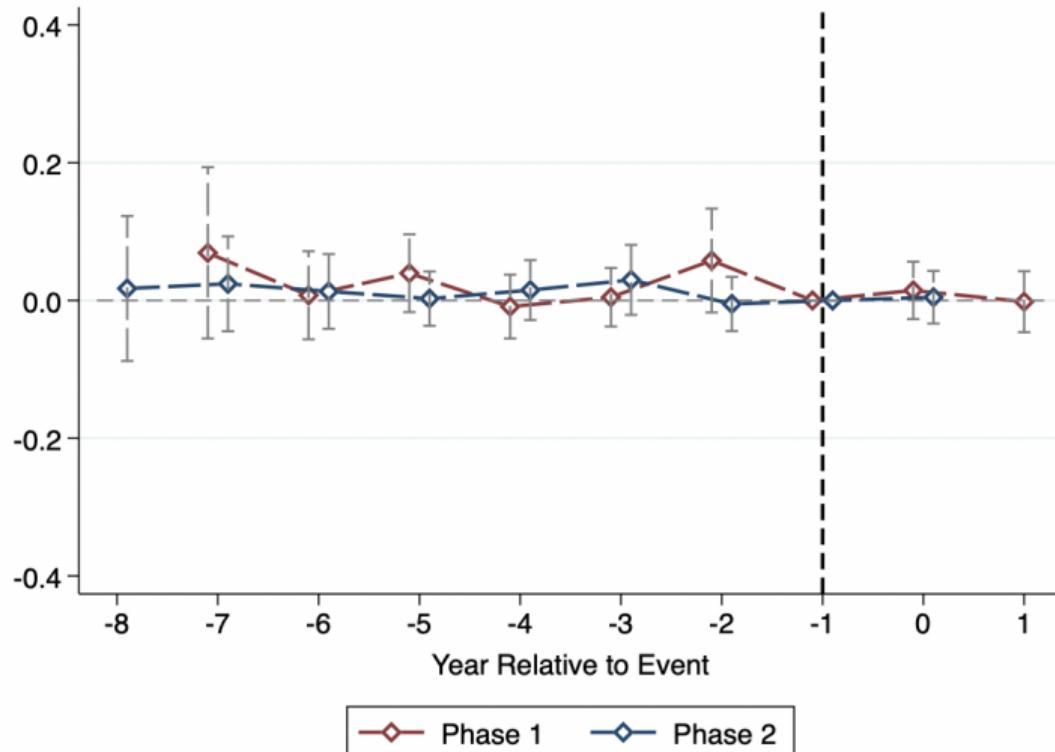
Parallel Pre-Trend in Wage

[Back](#)



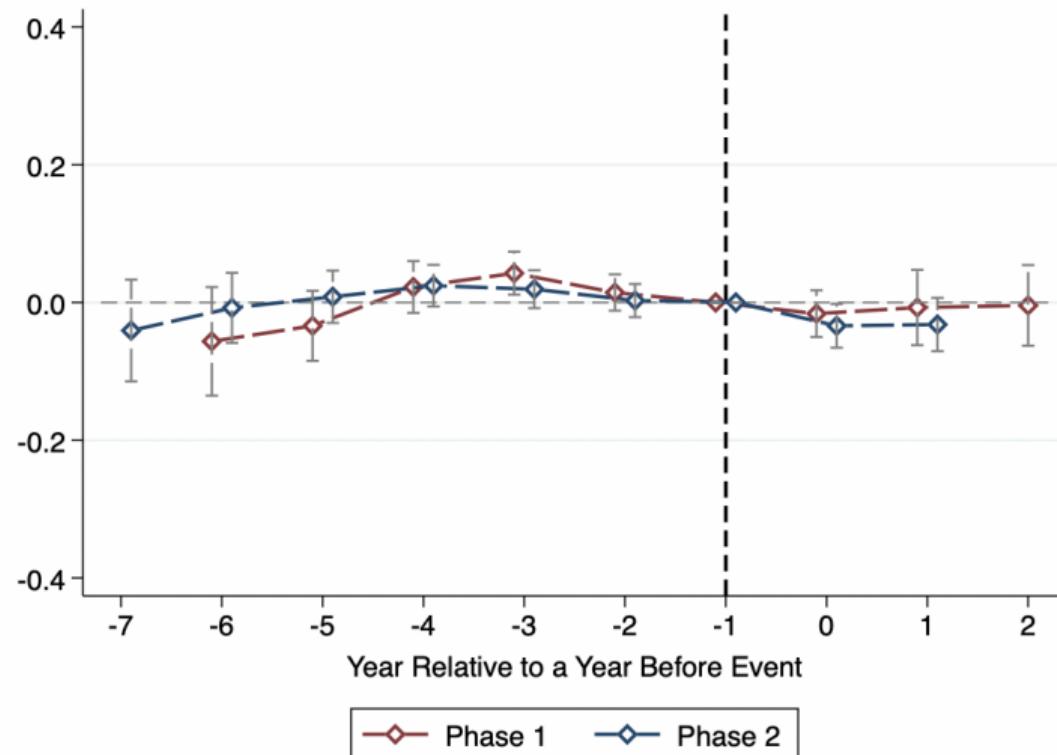
Parallel Pre-Trend in MRPL

[Back](#)



No Anticipation Effect in Employment

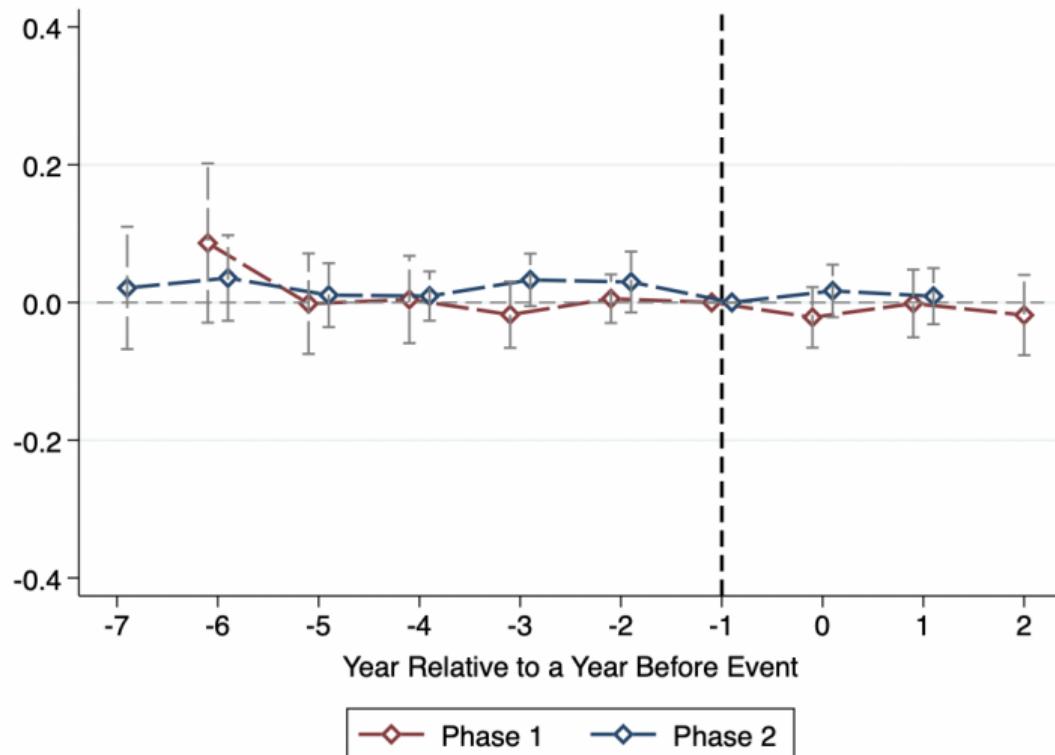
» Back



» Two-year lag

No Anticipation Effect in Markdown

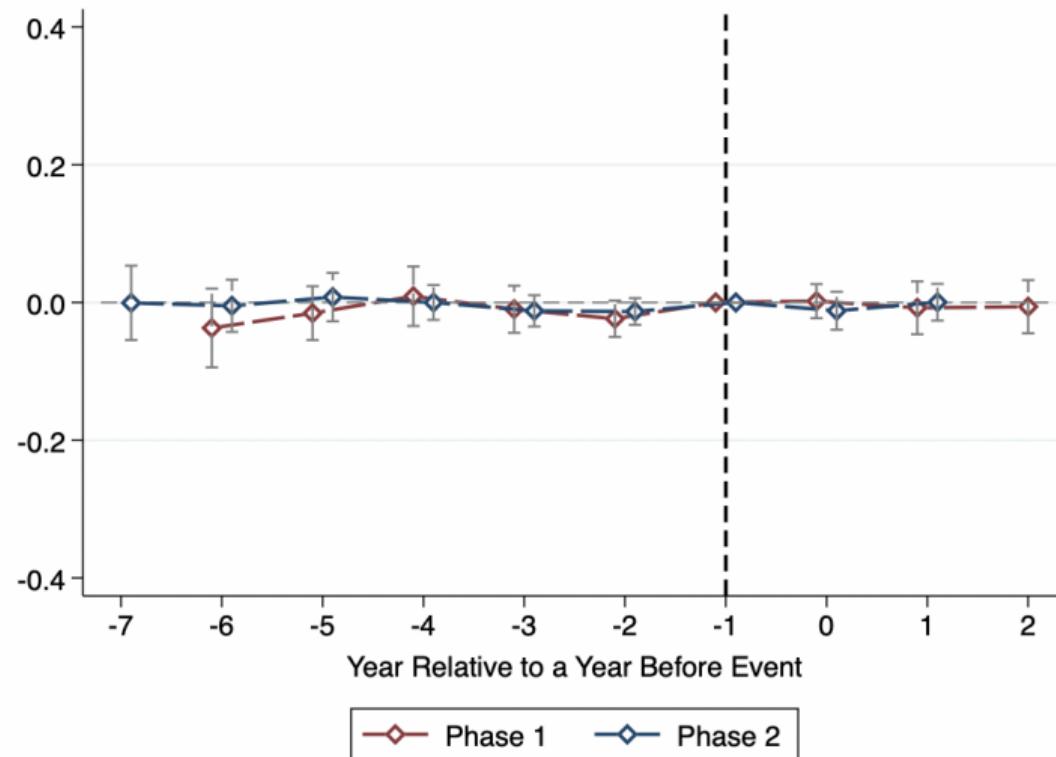
▶ Back



▶ Two-year lag

No Anticipation Effect in Wage

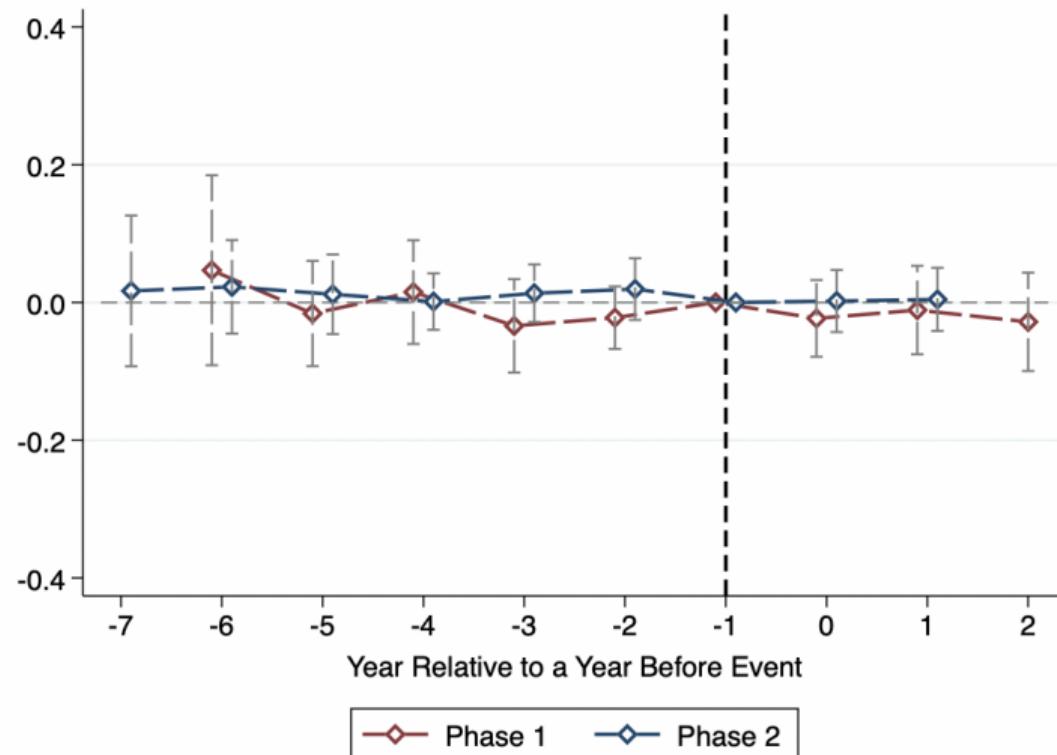
▶ Back



▶ Two-year lag

No Anticipation Effect in MRPL

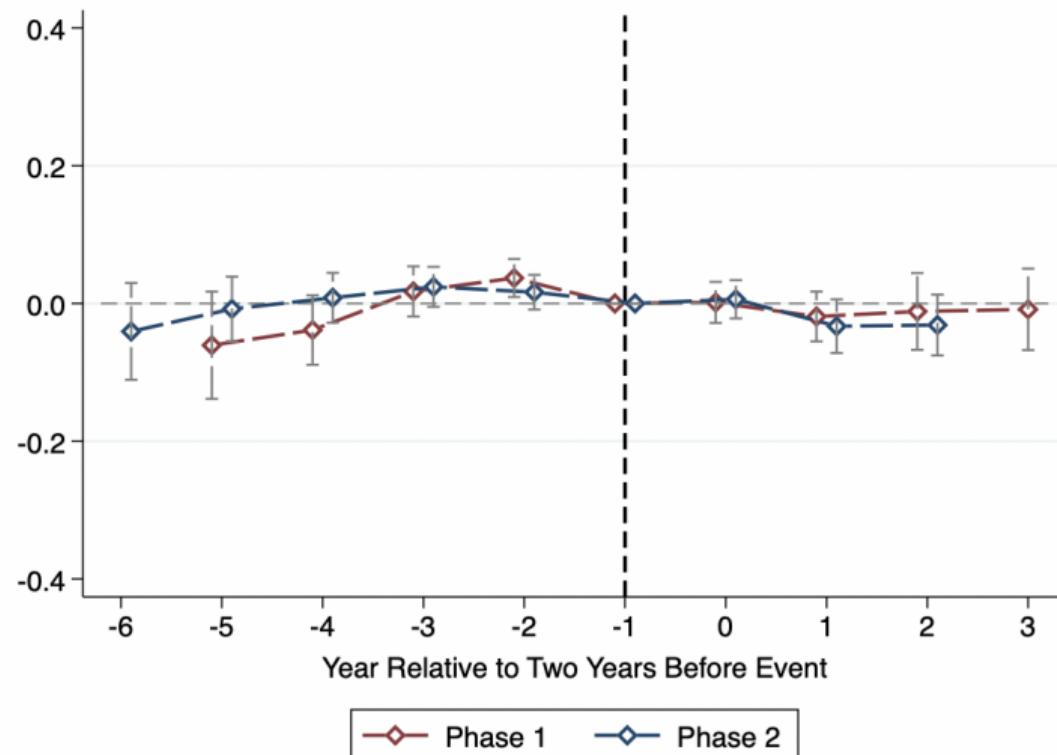
» Back



» Two-year lag

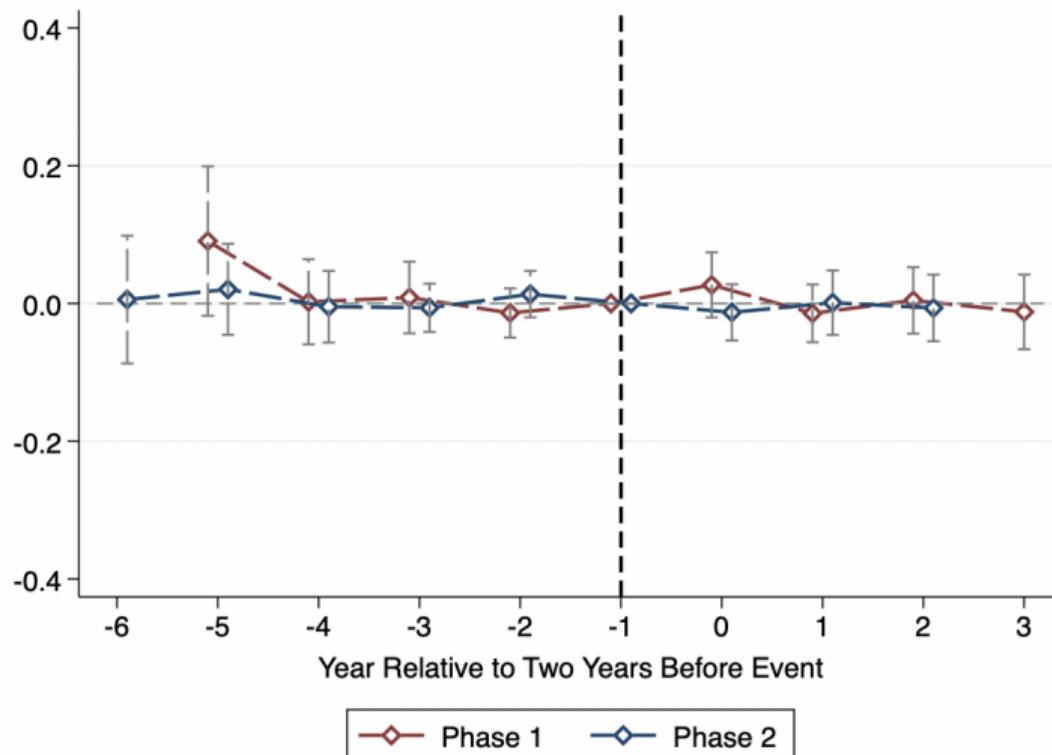
No Anticipation Effect in Employment (Two-Year Lag)

[» Back](#)



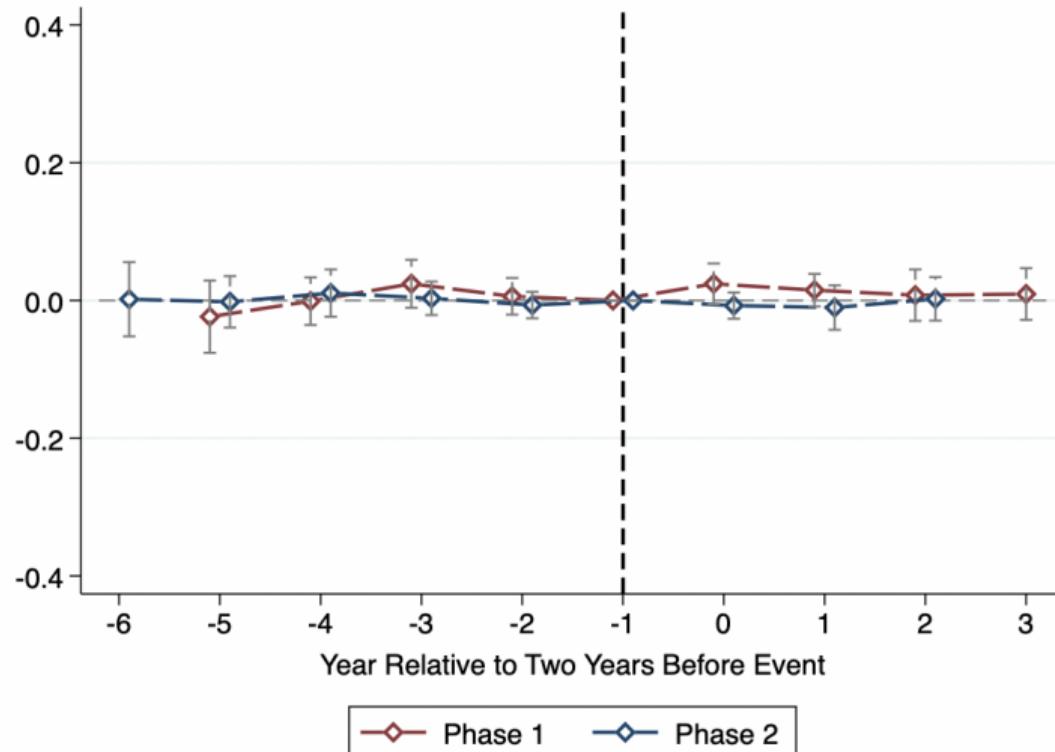
No Anticipation Effect in Markdown (Two-Year Lag)

➡ Back



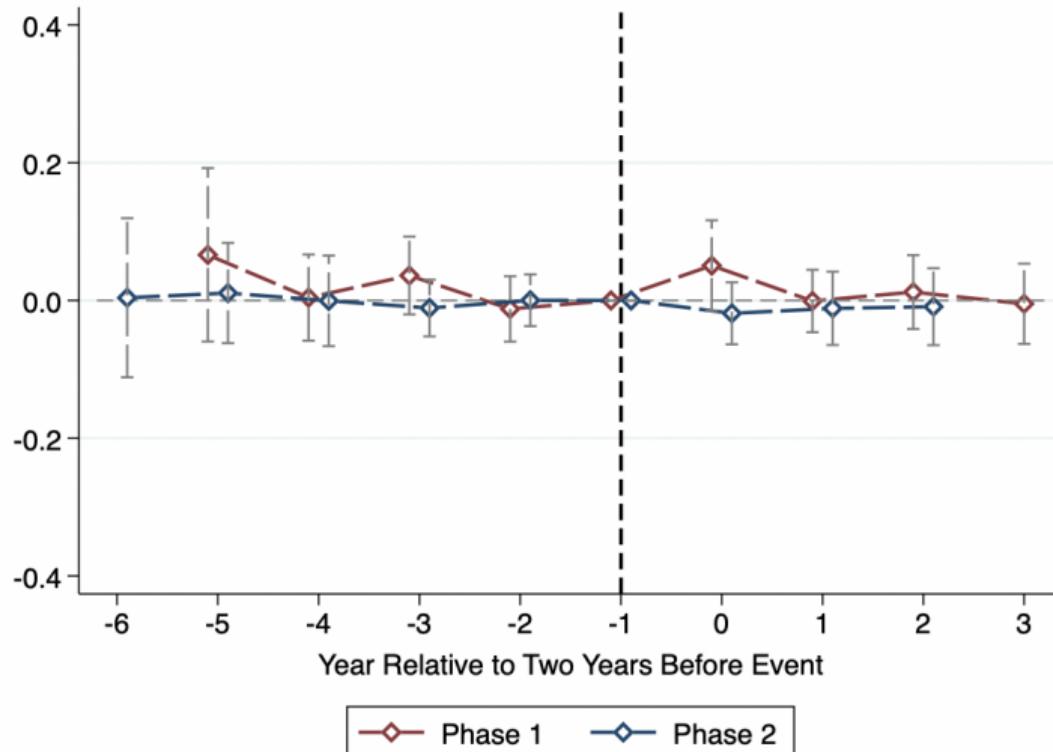
No Anticipation Effect in Wage (Two-Year Lag)

[Back](#)



No Anticipation Effect in MRPL (Two-Year Lag)

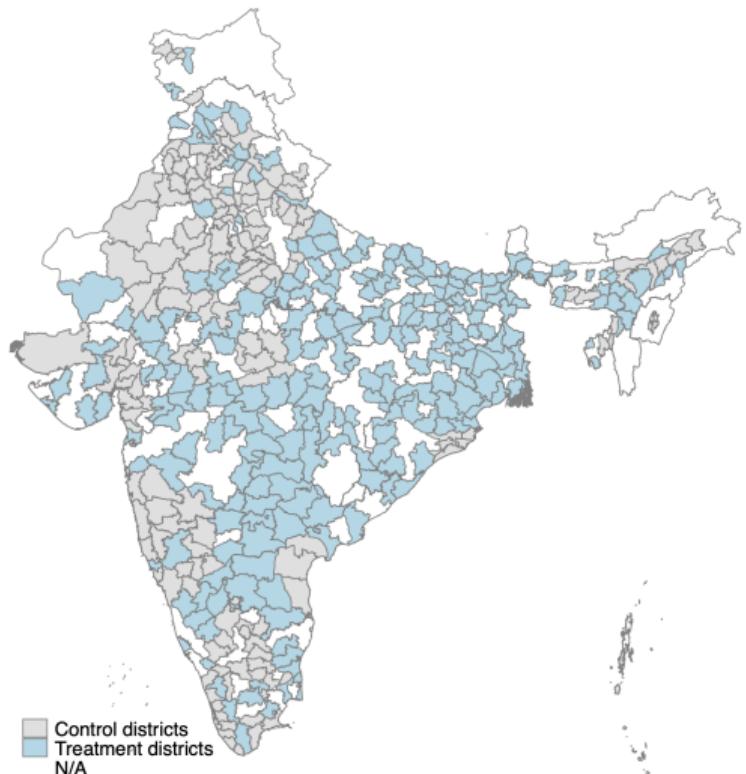
[Back](#)



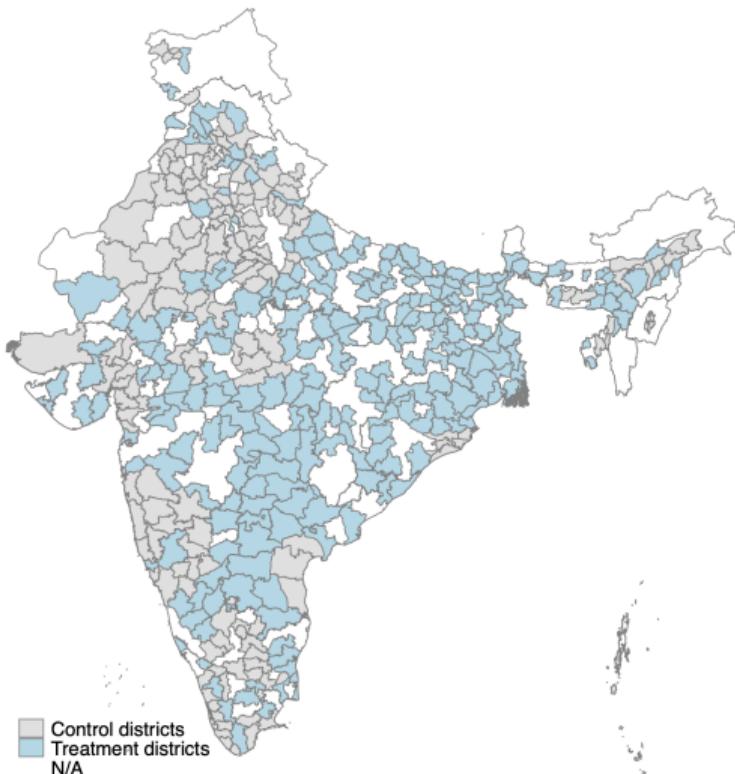
Alternative Control Groups

Back

(a) First alternative



(b) Second alternative



Measuring Labor Market Power: Definition

- The wage markdown, ν , is defined as a wedge between marginal revenue product of labor (MRPL) and wage:

$$\nu = \frac{R_l(l)}{w(l)} = \varepsilon_S^{-1} + 1,$$

where $R_l(l) = \frac{\partial R(l)}{\partial l}$ is the MRPL, $w(l)$ is the wage, and $\varepsilon_S = \frac{\partial l}{\partial w(l)} \frac{w(l)}{l}$ is the elasticity of labor supply.

- In perfectly competitive labor markets: $\nu = 1$
- Employer has market power: $\nu > 1$

▶ Back

Measuring Labor Market Power: Markdown Estimation

- ▶ Markdown is defined by (Yeh et al., 2022)

$$\nu_{jt} = \frac{\theta_{jt}^L}{\alpha_{jt}^L} \mu_{jt}^{-1}$$

- θ_{jt}^L : output elasticity of labor
- α_{jt}^L : share of labor expenditure in revenue
- μ_{jt} : price markup

$$\mu_{jt} = \frac{\theta_{jt}^M}{\alpha_{jt}^M}$$

- θ_{jt}^M : output elasticity of any flexible input M_{jt} (e.g., materials, energy, etc.)
- α_{jt}^M : share of expenditure on input M_{jt} in revenue

▶ Back

Measuring Labor Market Power: Markdown Estimation

- ▶ Estimate plant-level markdowns ν_{jt} using “production” approach following Yeh et al. (2022)
 - Estimate plant-level markup μ_{jt} in the spirit of De Loecker and Warzynski (2012)
 - Estimate production function using “proxy variable” method (Olley and Pakes, 1996; Levinsohn and Petrin, 2003; Ackerberg et al., 2015)
 - Compute output elasticities, under translog production function, as

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► Back

Production Function Estimation

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▶ Back

Estimation Results: Average Effects

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA	-0.022 (0.020)	0.000 (0.018)	0.000 (0.014)	-0.001 (0.020)
Controls	✓	✓	✓	✓
Firm FE	✓	✓	✓	✓
State-Industry-Year FE	✓	✓	✓	✓
N	72394	72394	68584	68584
R ²	0.97	0.89	0.91	0.89

▶ Back

Heterogeneous Effects of NREGA on Unskilled Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel A. Below median				
Post-NREGA	-0.083*** (0.026)	0.066** (0.030)	0.011 (0.017)	0.077** (0.030)
N	28244	28244	28241	28241
R ²	0.97	0.89	0.93	0.89
Panel B. Above median				
Post-NREGA	0.014 (0.027)	-0.023 (0.031)	-0.011 (0.020)	-0.034 (0.036)
N	30086	30086	30084	30084
R ²	0.96	0.86	0.91	0.84

Heterogeneous Effects of NREGA on Skilled Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel A. Below median				
Post-NREGA	-0.027 (0.026)	0.043 (0.039)	0.001 (0.032)	0.043 (0.037)
N	28244	28244	28228	28228
R ²	0.93	0.87	0.86	0.89
Panel B. Above median				
Post-NREGA	0.003 (0.027)	-0.035 (0.041)	-0.011 (0.028)	-0.046 (0.031)
N	30086	30086	30080	30080
R ²	0.93	0.83	0.81	0.85

Heterogeneous Effects of NREGA on Regular Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA \times Below median	-0.072* (0.037)	0.001 (0.049)	-0.030 (0.036)	-0.026 (0.066)
Below median	0.009 (0.026)	-0.003 (0.049)	-0.031 (0.032)	-0.031 (0.059)
Post-NREGA	-0.012 (0.026)	0.054 (0.036)	0.035 (0.028)	0.101** (0.043)
N	17633	17633	15207	15207
R^2	0.98	0.86	0.91	0.89

► Back

Heterogeneous Effects of NREGA on Contract Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA \times Below median	-0.071 (0.059)	0.056 (0.064)	-0.043 (0.028)	0.012 (0.063)
Below median	-0.011 (0.055)	0.012 (0.063)	-0.003 (0.027)	0.008 (0.064)
Post-NREGA	0.045 (0.057)	0.009 (0.053)	0.016 (0.027)	0.027 (0.046)
N	17633	17633	17613	17613
R ²	0.89	0.89	0.79	0.91

▶ Back

Heterogeneous Effects by Labor Intensity

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA × Above median	-0.087*** (0.018)	0.083*** (0.024)	-0.016 (0.015)	0.066** (0.026)
Above median	0.023 (0.017)	0.010 (0.023)	0.004 (0.012)	0.011 (0.022)
Post-NREGA	0.016 (0.022)	-0.035* (0.021)	0.006 (0.017)	-0.027 (0.024)
N	71921	71921	68151	68151
R^2	0.97	0.88	0.91	0.89

► Back

Heterogeneous Effects along the Wage Distribution

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA \times Low-wage dummy	-0.055** (0.023)	0.041 (0.025)	0.030* (0.016)	0.073*** (0.028)
Low-wage dummy	0.007 (0.015)	0.025 (0.018)	-0.050*** (0.012)	-0.026 (0.021)
Post-NREGA	-0.004 (0.021)	-0.015 (0.020)	-0.006 (0.015)	-0.021 (0.022)
N	68202	68202	67596	67596
R ²	0.97	0.89	0.91	0.89

» Back

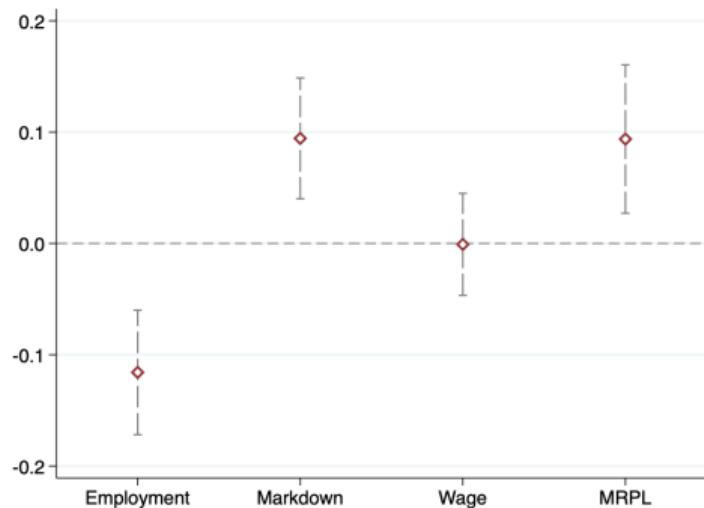
Heterogeneous Effects around the Minimum Wage

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA \times Low W-to-MW dummy	-0.081* (0.043)	0.097* (0.055)	0.049 (0.032)	0.142** (0.058)
Low W-to-MW dummy	-0.019 (0.047)	0.015 (0.057)	0.018 (0.020)	0.015 (0.052)
Post-NREGA	-0.019 (0.036)	-0.040 (0.036)	0.000 (0.022)	-0.046 (0.038)
N	23075	23075	22750	22750
R ²	0.96	0.86	0.92	0.86

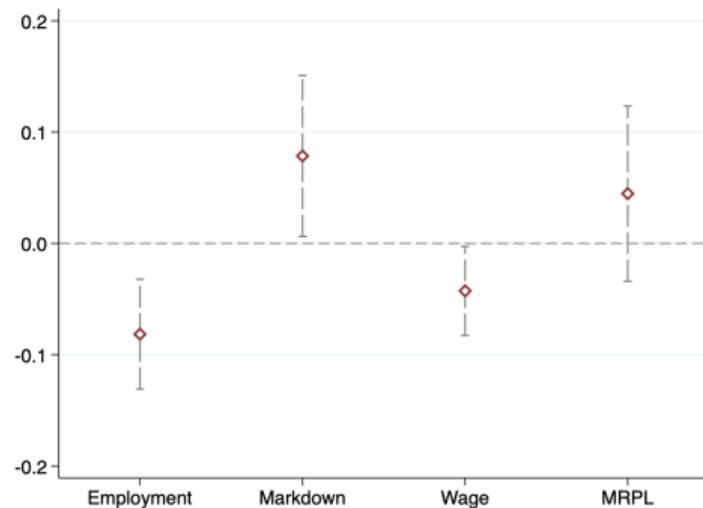
► Back

Heterogeneous Effects in Top Five Industries

(a) Top five industries



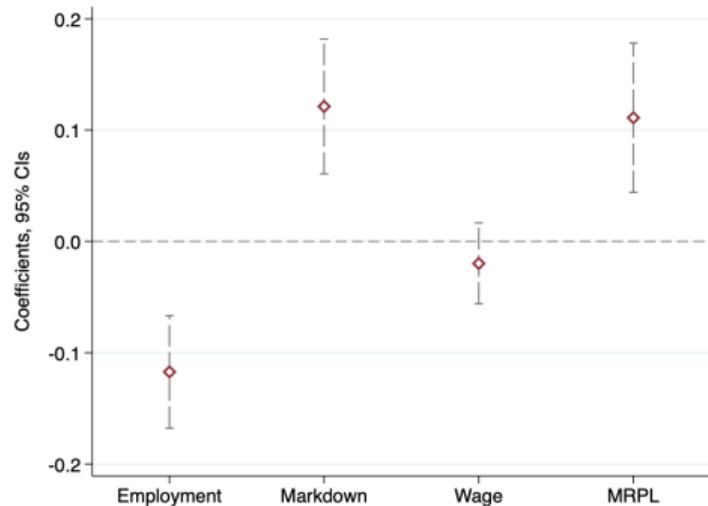
(b) Other industries



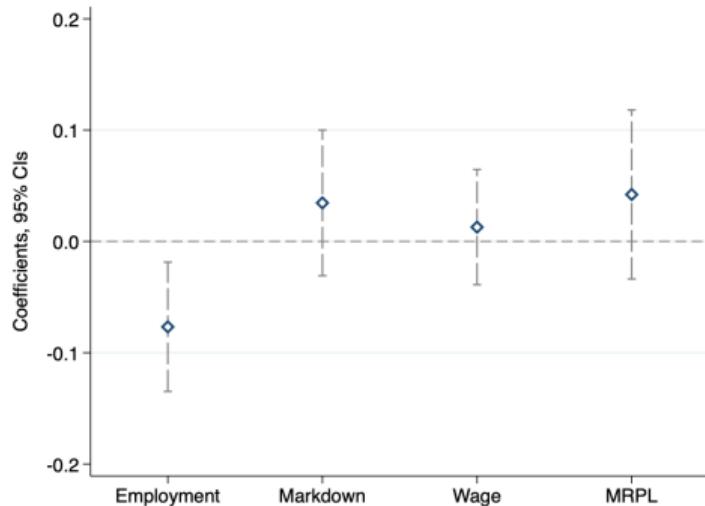
▶ Back

Heterogeneous Effects in Urban/Rural Firms

(a) Urban



(b) Rural



▶ Back

Sub-sampling Method: Hetero. Effects by Labor Productivity

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel A. Below median				
Post-NREGA	-0.061** (0.028)	0.026 (0.022)	0.021 (0.014)	0.047* (0.025)
N	30992	30992	30992	30992
R ²	0.97	0.90	0.92	0.89
Panel A. Above median				
Post-NREGA	0.022 (0.024)	-0.024 (0.027)	-0.010 (0.021)	-0.034 (0.032)
N	35210	35210	35210	35210
R ²	0.96	0.89	0.90	0.86

► Back

Full Sample: Hetero. Effects on Employment by Labor Productivity

	(1)	(2)	(3)	(4)	(5)
Dependent variable: $\ln L_{it}$					
Post-NREGA \times Below median	-0.146*** (0.018)	-0.146*** (0.018)	-0.135*** (0.017)	-0.130*** (0.016)	-0.134*** (0.016)
Below median	0.018 (0.013)	0.020 (0.013)	0.016 (0.012)	0.018 (0.012)	0.019 (0.012)
Post-NREGA	0.017 (0.023)	0.018 (0.023)	0.027 (0.021)	0.035* (0.019)	0.029* (0.018)
N	225808	221566	221566	221566	221215
R ²	0.95	0.95	0.95	0.95	0.95
Firm FE	✓	✓	✓	✓	✓
Year FE	✓	✓			
Controls		✓	✓	✓	✓
Industry-Year FE			✓	✓	
State-Year FE				✓	
State-Industry-Year FE					✓

Full Sample: Hetero. Effects on Wage by Labor Productivity

	(1)	(2)	(3)	(4)	(5)
Dependent variable: $\ln W_{it}$					
Post-NREGA × Below median	-0.011 (0.012)	-0.011 (0.012)	-0.010 (0.012)	-0.007 (0.011)	-0.003 (0.011)
Below median	-0.003 (0.007)	-0.002 (0.007)	-0.003 (0.007)	-0.001 (0.007)	-0.000 (0.006)
Post-NREGA	-0.001 (0.015)	-0.001 (0.015)	0.003 (0.013)	-0.004 (0.013)	-0.002 (0.012)
N	196160	192520	192520	192520	192203
R ²	0.87	0.87	0.87	0.87	0.87
Firm FE	✓	✓	✓	✓	✓
Year FE	✓	✓			
Controls		✓	✓	✓	✓
Industry-Year FE			✓	✓	
State-Year FE				✓	
State-Industry-Year FE					✓

Total Mandays: Hetero. Effects by Labor Productivity

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln MRPL_{it}$
Panel A. Below median			
Post-NREGA	-0.063** (0.026)	0.060*** (0.020)	0.070*** (0.023)
N	32632	32632	32632
R ²	0.97	0.91	0.90
Panel B. Above median			
Post-NREGA	0.023 (0.025)	-0.008 (0.017)	-0.012 (0.024)
N	36496	36496	36496
R ²	0.96	0.89	0.85

► Back

Total Mandays: Hetero. Effects on Skilled and Unskilled Workers

Back

	Unskilled workers			Skilled workers		
	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln MRPL_{it}$	(4) $\ln L_{it}$	(5) $\ln \nu_{it}$	(6) $\ln MRPL_{it}$
Panel A. Below median						
Post-NREGA	-0.091*** (0.025)	0.068** (0.028)	0.073*** (0.027)	-0.043 (0.029)	0.059* (0.035)	0.061** (0.028)
N	28806	28806	28803	28806	28806	28792
R ²	0.97	0.90	0.89	0.93	0.88	0.91
Panel B. Above median						
Post-NREGA	0.009 (0.028)	-0.028 (0.034)	-0.036 (0.038)	0.017 (0.029)	-0.016 (0.035)	-0.039 (0.026)
N	30289	30289	30277	30289	30289	30272
R ²	0.96	0.85	0.84	0.93	0.84	0.86

Total Mandays: Hetero. Effects on Regular and Contract Workers

[Back](#)

	Regular workers			Contract workers		
	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln MRPL_{it}$	(4) $\ln L_{it}$	(5) $\ln \nu_{it}$	(6) $\ln MRPL_{it}$
Panel A. Below median						
Post-NREGA	-0.119** (0.051)	0.097* (0.050)	0.130** (0.056)	-0.094 (0.068)	0.048 (0.062)	0.079 (0.065)
N	8006	8006	5961	8006	8006	8006
R ²	0.98	0.86	0.90	0.91	0.91	0.93
Panel B. Above median						
Post-NREGA	-0.016 (0.029)	0.023 (0.036)	0.039 (0.041)	0.078 (0.058)	-0.025 (0.062)	-0.007 (0.057)
N	9144	9144	8806	9144	9144	9127
R ²	0.97	0.85	0.85	0.87	0.85	0.86

Alt. Control Group: Hetero. Effects by Labor Productivity

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Post-NREGA × Below median	-0.114*** (0.021)	0.100*** (0.022)	-0.019 (0.016)	0.082*** (0.026)
Below median	0.032** (0.016)	0.005 (0.018)	-0.014 (0.010)	-0.010 (0.017)
Post-NREGA	0.014 (0.023)	-0.041* (0.023)	0.005 (0.018)	-0.036 (0.025)
N	59763	59763	59763	59763
R^2	0.97	0.89	0.92	0.89

» Back

Alt. Control Group: Hetero. Effects on Unskilled Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel A. Unskilled workers				
Post-NREGA × Below median	-0.107*** (0.018)	0.097*** (0.027)	-0.035** (0.014)	0.061** (0.030)
Below median	0.027 (0.019)	0.039 (0.026)	-0.024** (0.011)	0.015 (0.024)
Post-NREGA	0.006 (0.024)	-0.015 (0.025)	0.012 (0.018)	-0.003 (0.029)
N	52523	52523	52523	52523
R ²	0.96	0.87	0.93	0.89

► Back

Alt. Control Group: Hetero. Effects on Skilled Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel B. Skilled workers				
Post-NREGA × Below median	-0.071*** (0.025)	0.023 (0.036)	-0.083*** (0.028)	-0.059** (0.030)
Below median	-0.001 (0.022)	-0.002 (0.024)	0.024 (0.022)	0.022 (0.024)
Post-NREGA	0.014 (0.021)	0.007 (0.034)	0.039 (0.026)	0.046* (0.026)
N	52523	52523	52523	52523
R^2	0.94	0.85	0.84	0.89

► Back

Alt. Control Group: Hetero. Effects on Regular Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel A. Regular workers				
Post-NREGA × Below median	-0.093** (0.040)	0.008 (0.053)	-0.025 (0.036)	-0.017 (0.067)
Below median	0.018 (0.029)	-0.007 (0.054)	-0.036 (0.031)	-0.042 (0.065)
Post-NREGA	-0.012 (0.027)	0.062 (0.038)	0.036 (0.030)	0.098** (0.046)
N	13453	13453	13453	13453
R ²	0.97	0.87	0.91	0.89

► Back

Alt. Control Group: Hetero. Effects on Contract Workers

	(1) $\ln L_{it}$	(2) $\ln \nu_{it}$	(3) $\ln W_{it}$	(4) $\ln MRPL_{it}$
Panel B. Contract workers				
Post-NREGA × Below median	-0.082 (0.064)	0.058 (0.070)	-0.043 (0.031)	0.014 (0.070)
Below median	-0.007 (0.061)	-0.013 (0.062)	-0.010 (0.031)	-0.023 (0.063)
Post-NREGA	0.013 (0.061)	0.017 (0.059)	0.018 (0.030)	0.035 (0.052)
N	13453	13453	13453	13453
R^2	0.89	0.88	0.77	0.91

► Back