

# Effects of Mandated Maternity Leave on Labor Market Outcomes in India

Pulak Ghosh, Stephanie Hao, Lisa Ho, Garima Sharma and Shreya Tandon

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## Motivation

- Over 140 countries offer paid maternity leave to young mothers (World Bank 2020)
  - ▶ India (2017), Nigeria (2018), Pakistan (2020)

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- Over 140 countries offer paid maternity leave to young mothers (World Bank 2020)
  - ▶ India (2017), Nigeria (2018), Pakistan (2020)
- Impact on mothers, children
  - ▶ Lalive & Zweimuller (2009), Dustmann & Schönberg (2012), Schönberg & Ludsteck (2014), Bailey, Byker, Patel & Ramnath (2019), Rossin-Slater (2011), and more
- **This paper:** young women in anticipation of motherhood, older women, men
  - ▶ Wages, employment, careers

## This Paper: Effects of 2017 Maternity Leave Law in India

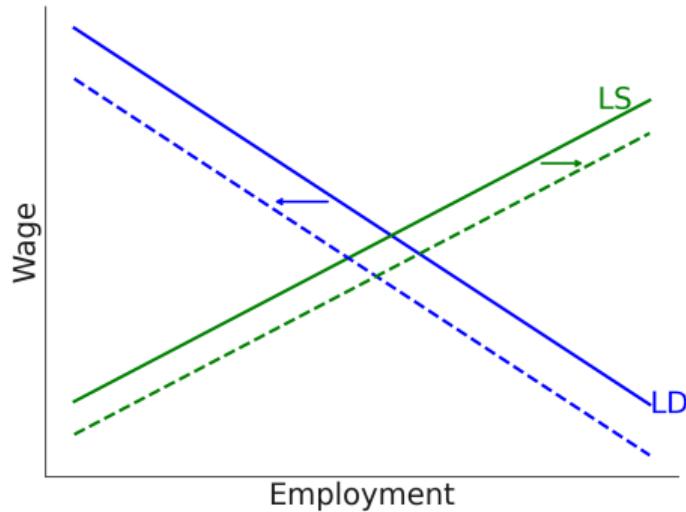
- Landmark legislation: increased duration of paid maternity leave **from 12 to 26 weeks**
  - ▶ Became fifth most generous after Canada, Norway, Bulgaria, Serbia
  - ▶ Labor supply lever: described as way to keep women in labor market after childbirth
  - ▶ Labor demand: if price of women workers increases, supply response could be undone

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  - ▶ Labor demand: if price of women workers increases, supply response could be undone
- Design: DiD comparing treated (policy binding) vs control firms (already had longer leave)
- Data: Social security records and LinkedIn profiles covering formal workers, 41% of non-agricultural, 84% of formal workforce in India

## Mandate: predicted effect

- Valued amenity: labor supply shifts right, labor demand shifts left



- $W \downarrow, E \text{ may } \downarrow$

# This Paper

## ① Results: employment, wages, career trajectories

- ▶ Employment: Women's employment declines by 6% within six months, 10% by year four  
Concentrated among 18-35 year old women
- ▶ Wages: No impact on women's wages, small positive effect for men
- ▶ Male employment: No average impact on male or older women's employment

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- Incidence on employment not wage (wage rigidity)

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① **Results:** employment, wages, career trajectories

② **Cost-benefit**

- ▶ Benefit: valued by women
- ▶ Cost: employers, some workers
- ▶ Benefit: Adverse selection

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- ▶ Benefit: Adverse selection

③ **Counterfactual policies:** shorter durations, cost-sharing, insurance to offset employer losses

# Outline

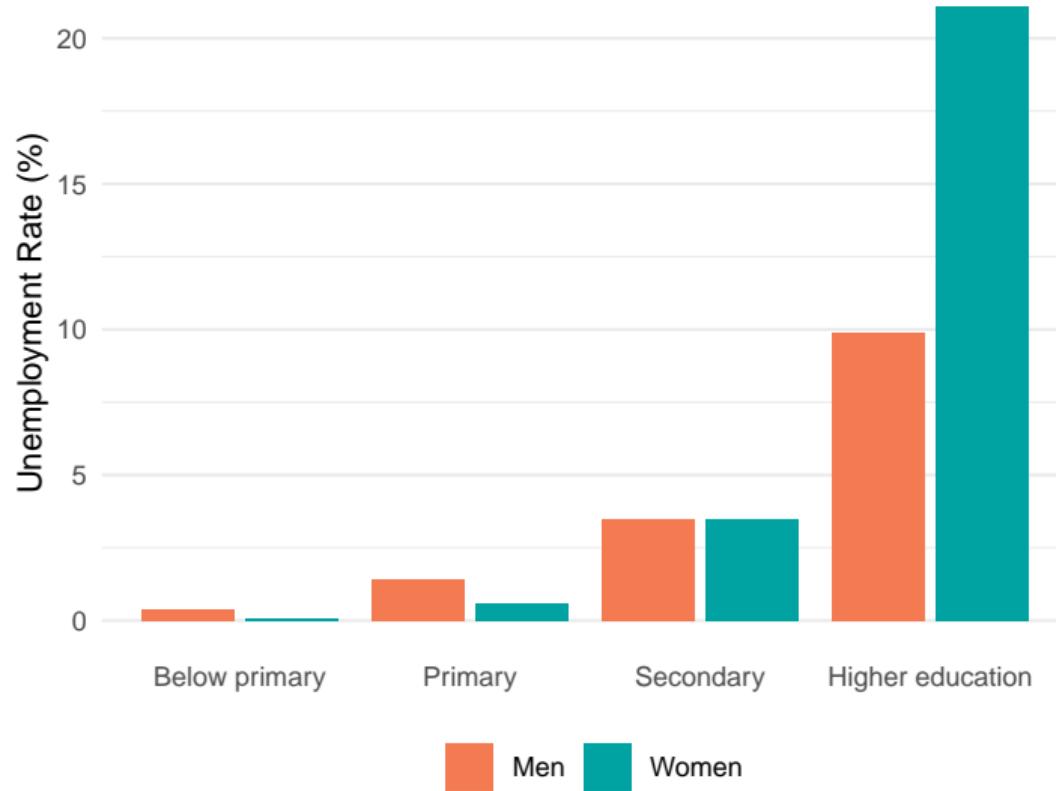
- **Setting and empirical strategy**
- Results
- Cost-benefit
- Counterfactual policies

## Labor Market formality in India

- Non-agricultural, non-self-employed (151 million workers): 125 men, 26 women
- Formal: 45% are formal (40% of men, 62% of women)
- Formal workers more educated (65% completed secondary school, 40% among informal)

Source: Periodic Labor Force Survey 2017

## High unemployment among educated women



(PLFS)

## This Paper: Effects of 2017 Maternity Leave Law in India

- Maternity Benefits Amendment Act (2017)
- Increased duration of paid maternity leave from 12 to 26 weeks

# Different costs for two distinct worker groups

## Blue-Collar Workers



- $\leq$ Rs.15,000 (727 USD PPP, 67th pct)
- Lose worker for 14 additional weeks
- Government pays salary

## White-Collar Workers



- $>$ Rs.15,000
- Lose worker for 14 additional weeks
- Employer pays salary

## DiD Empirical Strategy

- Compare establishments already offering 26 weeks (control) to those offering 12 weeks (treated)
- Parent company policies (Johnson & Johnson, Nestlé, Canara Bank)
- Data: Glassdoor reviews, newspaper announcements, survey of representative sample of 500 large firms (> 200 workers); coverage: 40% of formal workers

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- Data: Glassdoor reviews, newspaper announcements, survey of representative sample of 500 large firms (> 200 workers); coverage: 40% of formal workers
- Control: 7% of employment
  - ▶ Same industry mix
  - ▶ Slightly larger (160 vs. 84)

## DiD specification

(1) Control for size differences:

$$Y_{jt} = \sum_{t=-4}^{t=7} \beta_t Treat_j 1_t + \alpha_j + \lambda_{kbt} + \epsilon_{jt}$$

- $j$  = establishment,  $t$  = month relative to April 2017
- $\lambda_{kbt}$  = **Industry**  $\times$  **Size-quartile-bin**  $\times$  **Time fixed effects**

(2) Report effects for large firms ( $> 75$  workers); 77% of formal workers

Identifying assumption: parallel evolution

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Identifying assumption: parallel evolution (common demand and supply shocks)

# Data

## Blue-Collar Workers



- Employer-employee linked social security records (EPFO)
- Wage, employment, 2014 - 2018

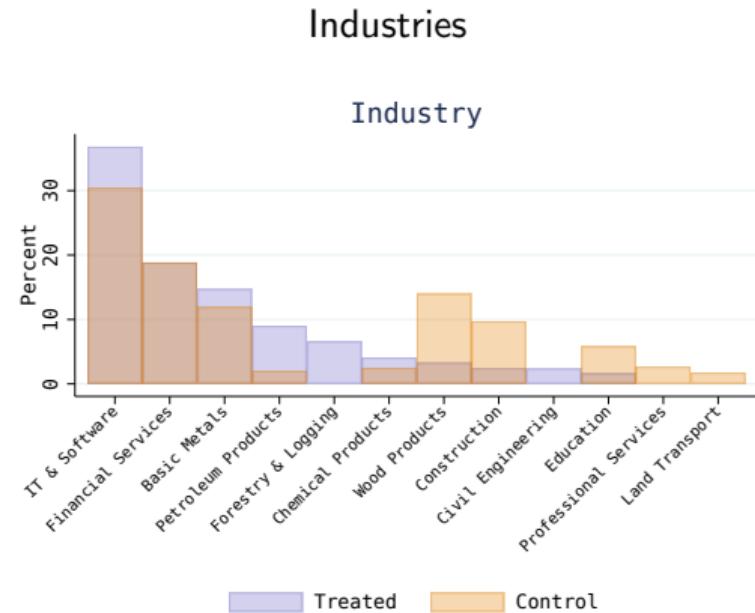
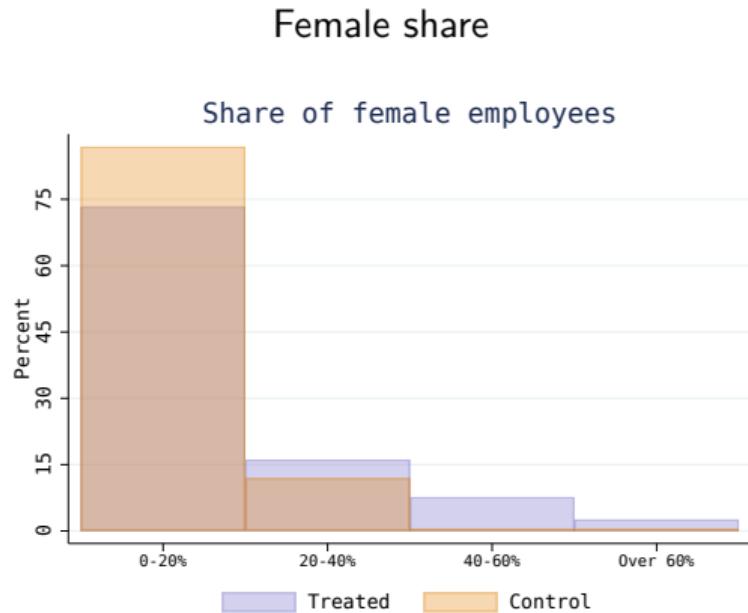
→ Coverage: 57 million workers (40 million EPFO, 17 million LinkedIn)  
→ 41% of non-agricultural workforce

## White-Collar Workers



- LinkedIn profiles (universe)
- Education, Careers, 2012 - 2023

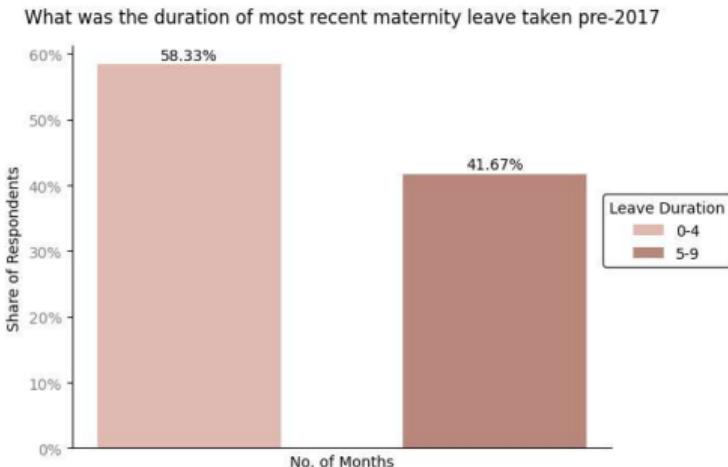
# Baseline characteristics



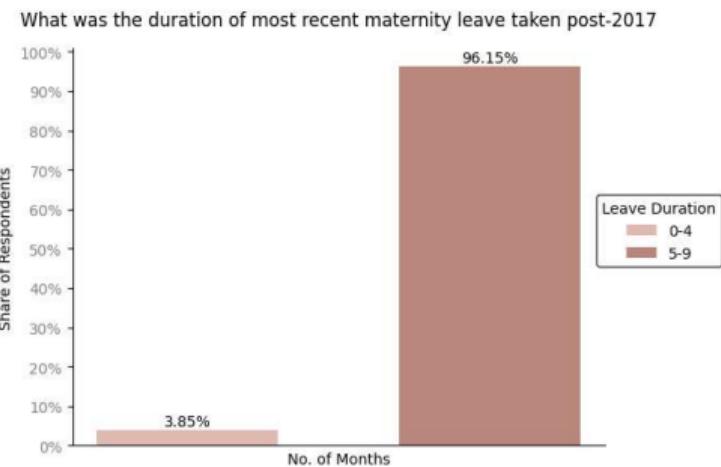
- Average: 22% female

# First-stage: high compliance

Pre-period leave



Post-period leave



- 500 white-collar women (LinkedIn, representative sample from large firms > 200 workers)

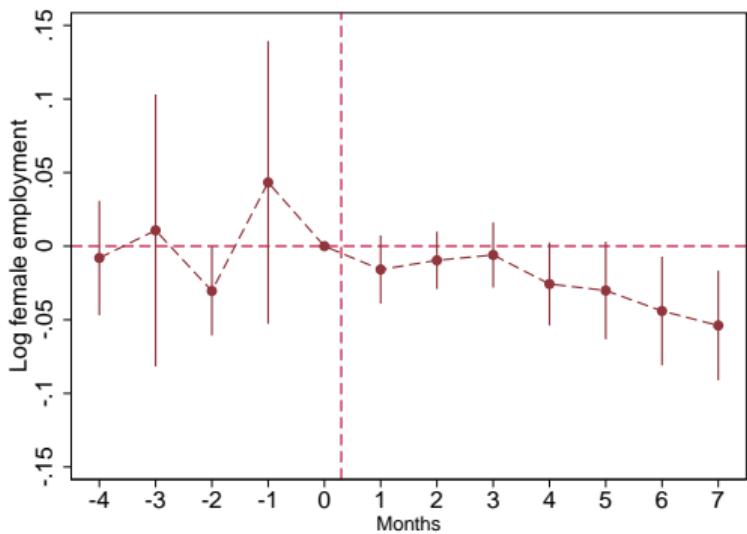
# Outline

- Setting and Empirical Strategy
- **Results**
- Cost-benefit
- Counterfactual policies

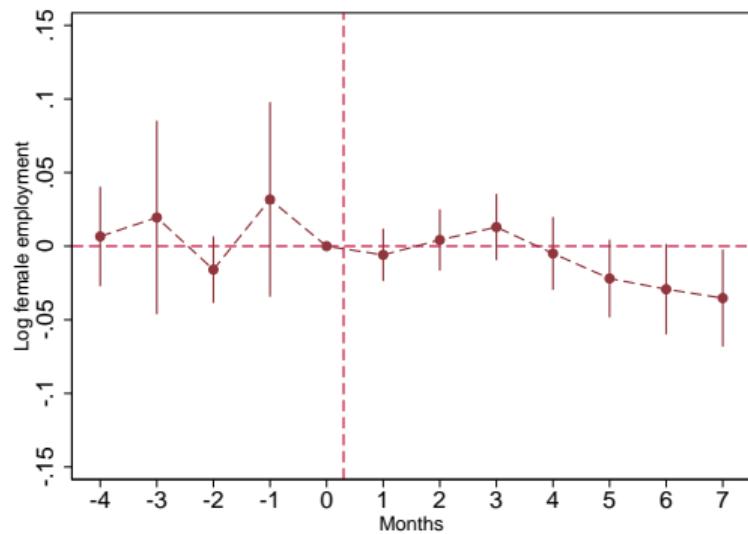
Blue-Collar Workers  
(social security records,  $n = 40$  million workers)

# Decreases women's employment by 6% within six months

Large firms ( $>75$  workers)



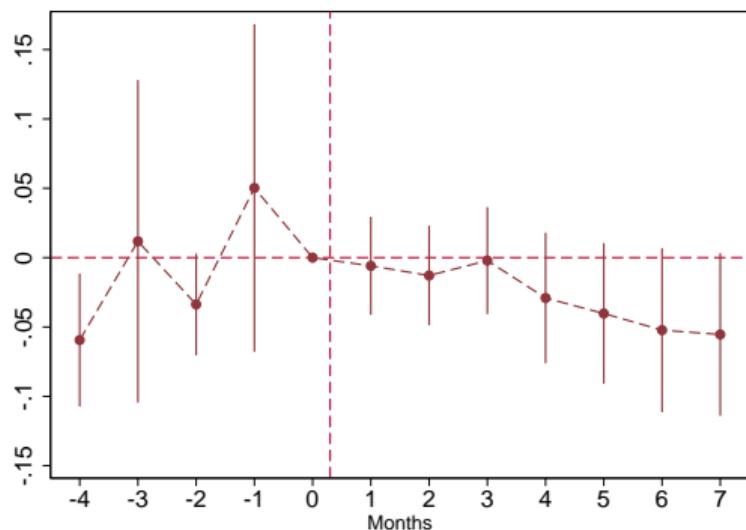
All firms



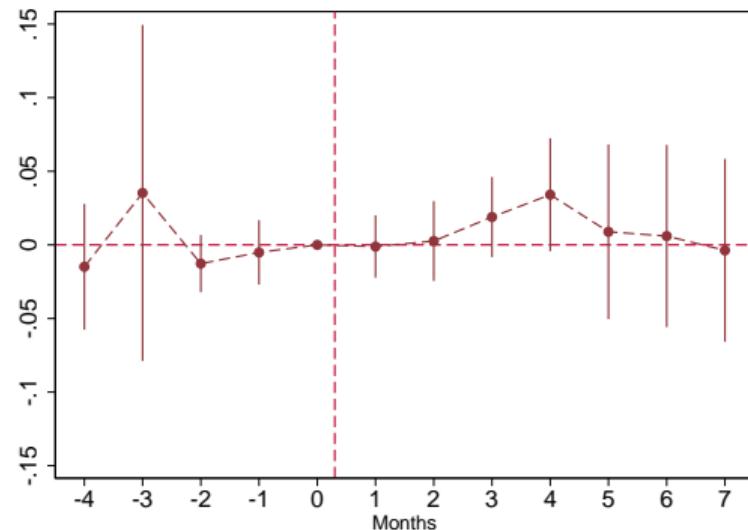
(78% of employment)

## Effects concentrated among young women (18 - 35 years)

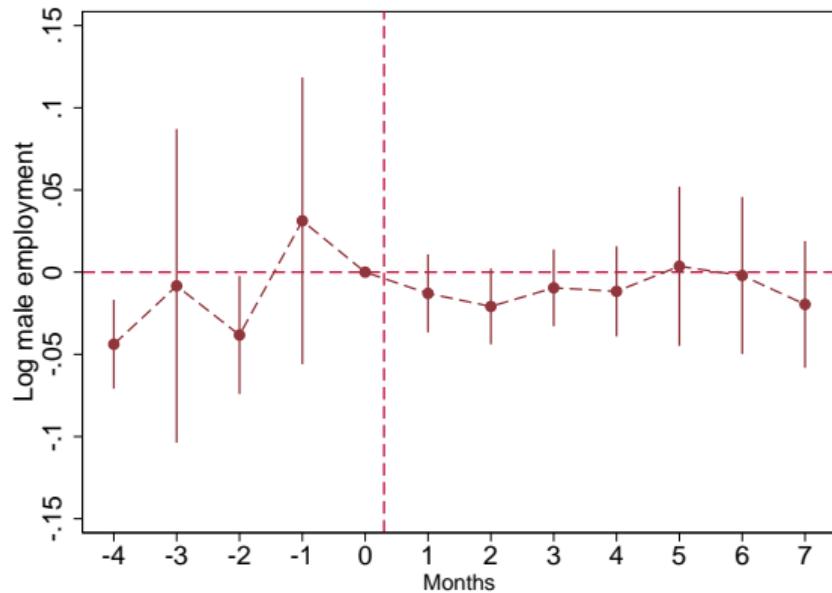
Young (18-35 years)



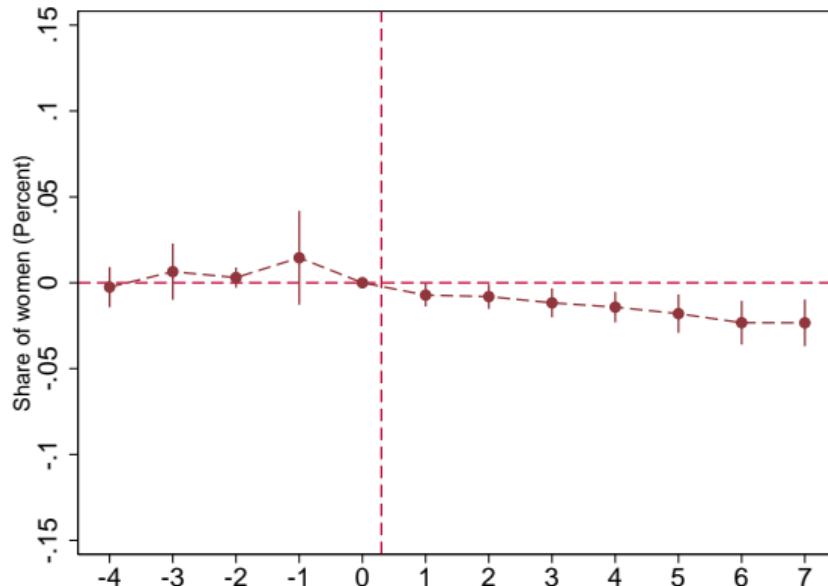
Over 35 years



## No effect on male employment



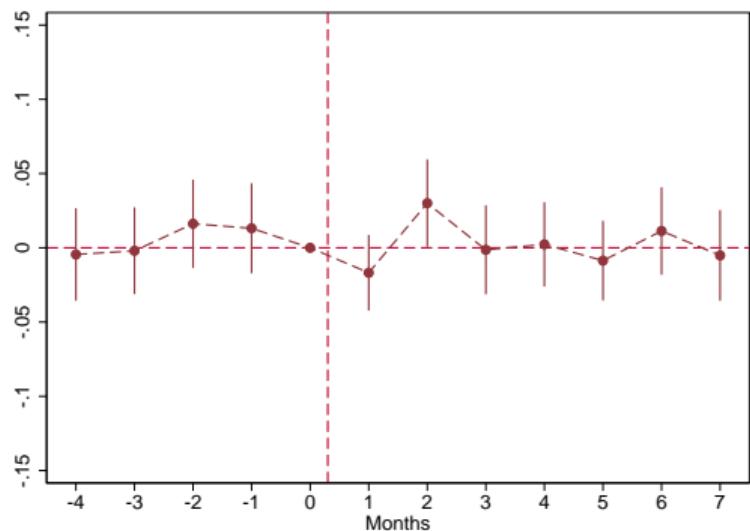
## Share of women declines by 2.4%



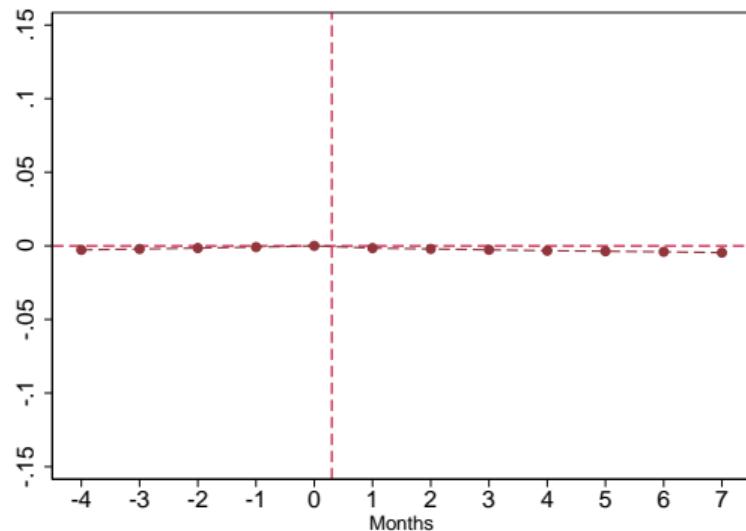
- Loss of 250,000 jobs within six months
- Decomposition: 55% from incumbents, 45% from reduced hiring

## Contract work? (No)

Female share, contract firms



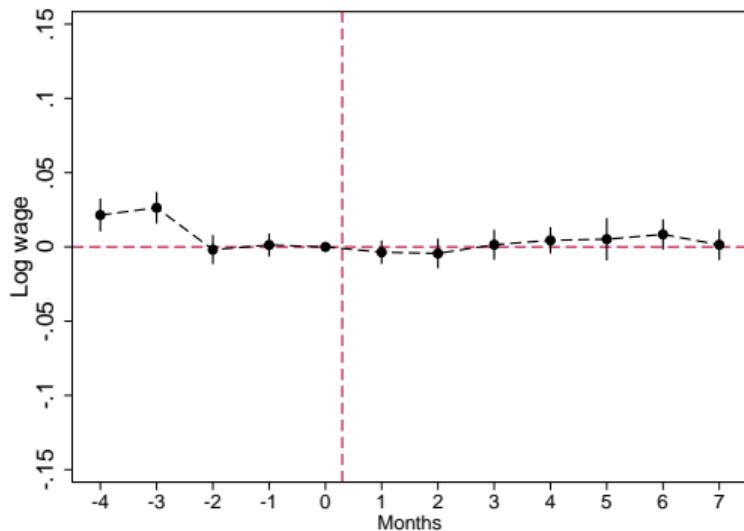
Female incumbent, switch to contract firm



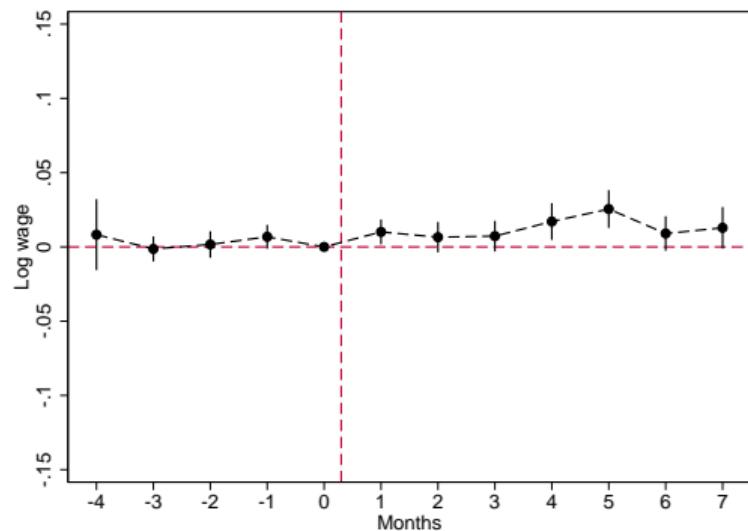
- Top 30 contract firms in India ( $\sim 1/3$  of workers)
- Not switching to informality (PLFS)

## Wages: no effect for women, small increase for men

Female incumbents



Male incumbents



- Magnitude, men: 1.8%

## No effect on new workers' wages

Table 1: New worker wages

	Women (1)	Men (2)
$T_i \times \text{post}$	-0.013 (0.008)	-0.013 (0.009)
Observations	389,143	389,143

Heterogeneity by industry: Larger  $E \downarrow$  where women easily substituted in production, higher increase in replacement cost

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- Small  $s_{f,industry}$ , Employer FOC:

$$mrpl_i = w_i + c_i$$

- Predicted change (total derivative):

$$d\ln l_{fi} = \frac{dc_i}{mrpl_i * \underbrace{\frac{\partial \ln mrpl_{fi}}{\partial \ln f_i}}_{<0}}$$

- Production:

$$Y = ZK^{\alpha_1}L^{\alpha_2}, \quad L = (\beta_k f^{\frac{\sigma-1}{\sigma}} + m^{\frac{\sigma-1}{\sigma}})$$

- Low female-share industries (low  $\beta_k$ , high  $\sigma$ ) have high substitutability

Full expression

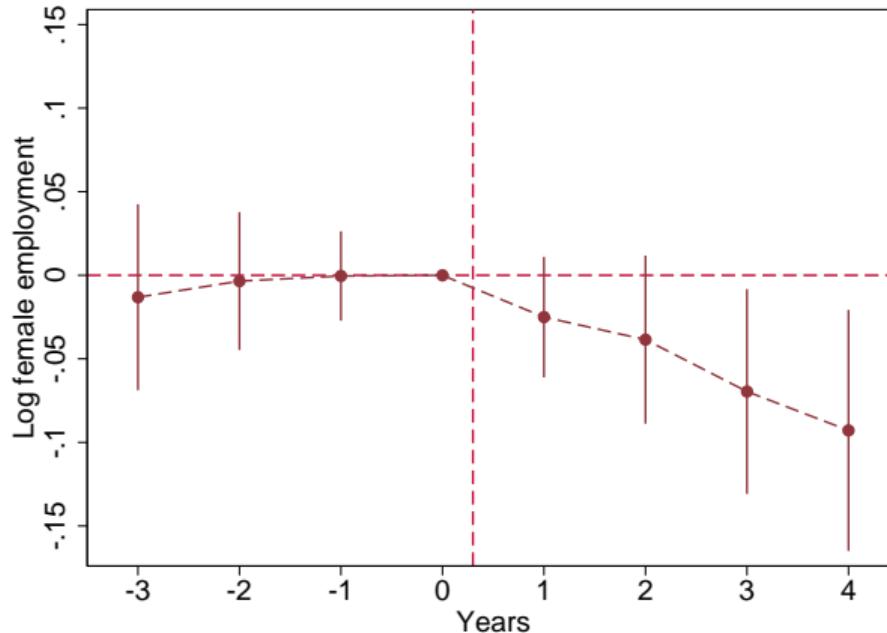
Heterogeneity:  $\Delta$  employment concentrated in industries with high substitutability between male and female workers (low female shares)

Panel A: Female share of industry			
	Low	Medium	High
$T_i \times \text{post1}$	-0.057** (0.026)	-0.017 (0.034)	-0.003 (0.045)
$T_i \times \text{post2}$	-0.080** (0.041)	-0.061** (0.031)	0.003 (0.055)
N	105,559	505,708	208,553

- Low and medium-share: wholesale trade, financial services, manufacture of chemical products, manufacture of electronics
- High-female-share: textile manufacturing, education Mfg vs Services, Number

White-Collar Workers  
(LinkedIn, n = 17 million workers)

## White collar workers (LinkedIn): Decreases women's employment by 10% in four years



- $t = 1$  in 2017

## Summary: Effects of 2017 Maternity Benefit Law on Women's Labor Market outcomes

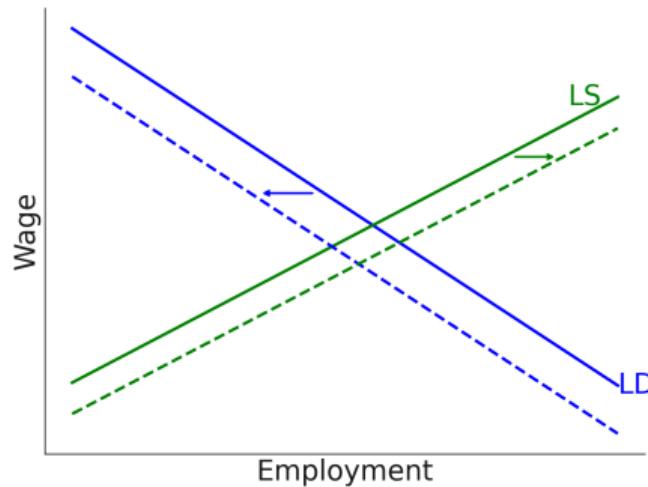
- Employment: Reduced female employment by 6% within 6 months (250,000 jobs)
  - ▶ 10% in four years
- Effects concentrated among young women (18 - 35 years)
- Wages: No impact on women's wages, increased male wages by 1.8%

## Economics of mandates: incidence on employment not wages

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- Two explanations for no wage change:
  - ① Women don't value leave
  - ② Wage rigidity (equity norms, nominal wage rigidity, binding minimum wages — e.g., Breza et al. 2018, Kaur 2019, Sharma 2025)

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  - ② Wage rigidity (equity norms, nominal wage rigidity, binding minimum wages — e.g., Breza et al. 2018, Kaur 2019, Sharma 2025) → binding minimum wages: 17% of establishments

# Labor supply

- ① Intensive margin (reallocate to more desirable firms): no effect
  - ▶ simultaneous improvement in amenities Labor supply forms
- ② Extensive margin, return from leave: small effect
- ③ Extensive margin, labor force entry: 2% for white collar workers

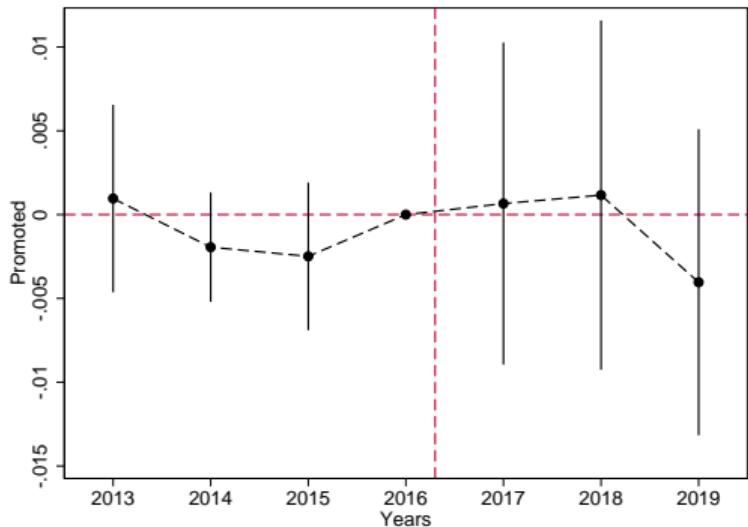
→ Employment decline reflects labor demand

# Outline

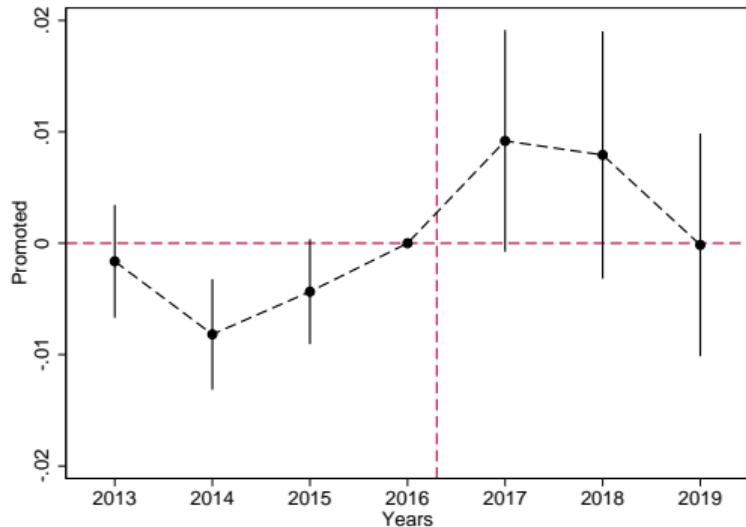
- Setting and Empirical Strategy
- Results: employment, wages, **career trajectories**
  - ▶ Low firm-specific capital (non-managerial, routine)
  - ▶ High firm-specific capital (managerial, abstract)
- Cost-benefit
- Counterfactual policies

## Careers: men promoted to managerial positions

Female incumbent manager



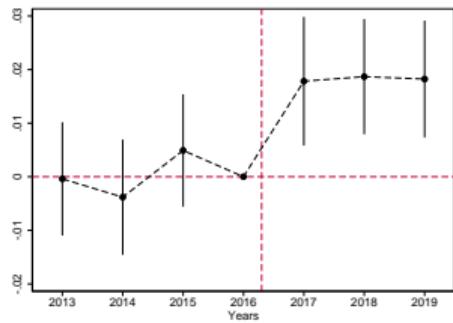
Male incumbent manager



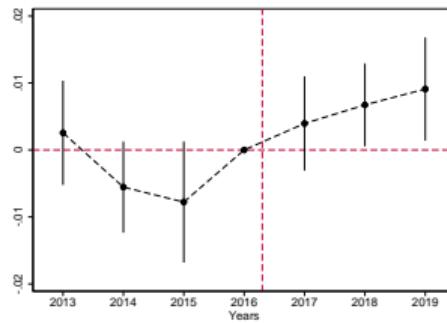
- Managers: Men are 1pp (or 10%) more likely to be promoted as managers
- Worker fixed-effect:  $Y_{ijt} = \sum_{time} \beta_t Treat_{ij} 1_t + \eta_i + \lambda_{sbt} + \epsilon_{ijt}$ ,  $i = \text{worker}$

# Careers: men and older women move into abstract positions

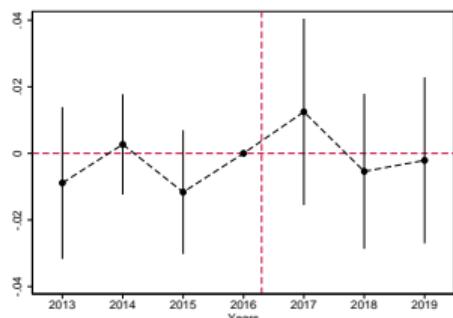
Female incumbents (over 35 yrs): Abstract



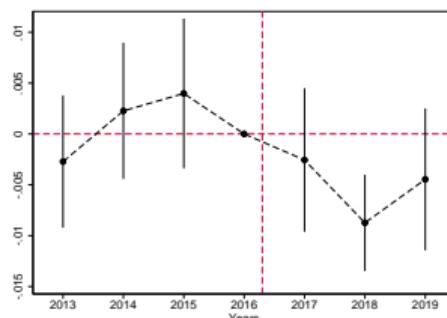
Male incumbents: Abstract



Female incumbents: Routine



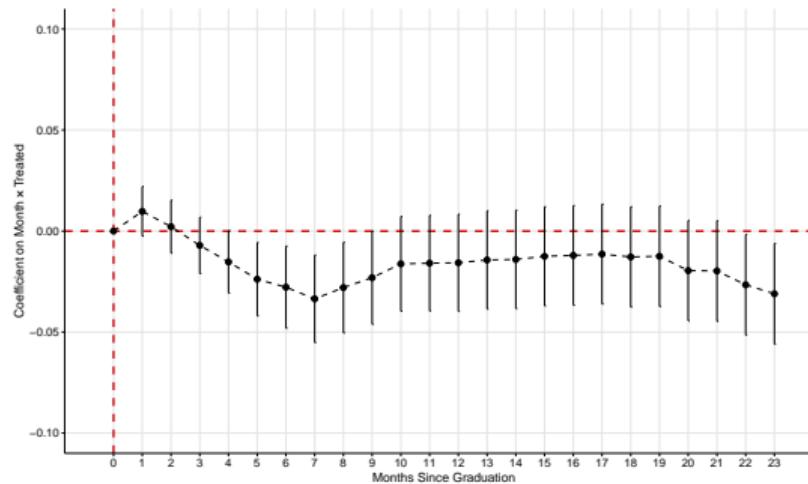
Male incumbents: Routine



- Abstract: Sales or HR manager; Routine: sales or recruitment officer

# Labor market entrants (university graduates): men more likely to be promoted

Triple difference in promotion



- “Career clone” design: compare labor market entrants from same university-degree program (B.Sc. in Electrical Engineering from IIT Bombay) who enter just after vs. just before policy in 2017
- Magnitude: 2pp or 12%

## Taking stock: Effects of 2017 Maternity Leave Expansion

- **Employment:** reduced female employment by 6% within 6 months (250,000 jobs)
- **Wages:** no impact on women's wages, small positive effect for men
- **Careers:** moderately benefited men and older female workers (promotions, abstract roles)
- **Take-up:** full

# Outline

- Setting and Empirical Strategy
- Results
- **Cost-benefit**
- Counterfactual policies

# Cost-benefit impact of mandate

Focus: women and employers

- Benefit
  - ▶ Valued by women
  - ▶ Eliminate adverse selection at firms offering long leaves in pre-period
- Cost
  - ▶ Job loss
  - ▶ Employer costs
  - ▶ Profits net of labor cost

## Net-benefit

- Pre-period:

$$W_{old} = \sum_{i \in firms} D_i E_i (V_{26} - c_{i,26} - \delta_i) + (1 - D_i) E_i (V_{12} - c_{i,12}) + \pi_i$$

- $D_i$  = offered long leave in pre-period
- $E_i$  = employment (female)
- $V_{26}$  = value of 26 weeks of leave
- $c_{i,26}$  = cost when everyone offers 26 weeks
- $\delta_i$  = adverse selection penalty, extra cost of hiring woman if  $i$  one of only few firms offering long leave in pre-period (note: could be advantageous)

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- Post-period:

$$W_{new} = \sum_{firms} E_{i,new} (V_{26} - c_{i,26})$$

## Cost-benefit impact of mandate

- Difference:

$$\Delta W = \underbrace{\sum_{firms} (1 - D_i) E_{i,new} ((V_{26} - V_{12}) - (c_{i,26} - c_{i,12}))}_{\text{Expanded coverage}} + \underbrace{\sum D_i \delta_i}_{\text{Eliminate adverse selection}} + \underbrace{\sum (1 - D_i) (E_{i,new} - E_i) (V_{12} - c_{i,12}) + \sum \Delta \pi_i}_{\text{Job loss Profits}}$$

# Cost-benefit impact of mandate

Today:

- Difference:

$$\Delta W = \underbrace{\sum_{firms} (1 - D_i) E_{i,new} ((V_{26} - V_{12}) - (c_{i,26} - c_{i,12}))}_{\text{Expanded coverage}} + \underbrace{\sum D_i \delta_i}_{\text{Eliminate adverse selection}} + \underbrace{\sum (1 - D_i)(E_{i,new} - E_i)(V_{12} - c_i)}_{\text{Job loss}} + \underbrace{\sum \Delta \pi_i}_{\text{Profits}}$$

- Profit change likely small given 2% decline in employment, 4.5% at most impacted firms

## Measuring four components

- ① Worker valuation ( $V_{26} - V_{12}$ )
- ② Employer cost ( $\Delta c_i$ )
- ③ Adverse selection ( $\delta_i$ )
- ④ Job loss

# Measuring four components

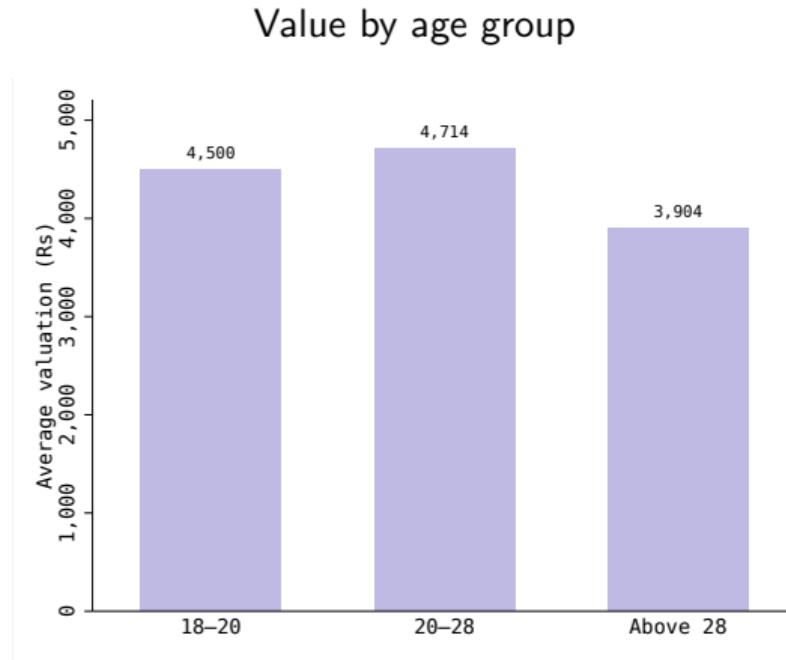
## ① Worker valuation

Survey: blue-collar factory workers near Delhi (412), white-collar LinkedIn workers (500)

- What is your monthly salary?
- In your current job under current labour law, you are entitled to 26 weeks of paid maternity leave. How much more would your monthly salary have to be for you to prefer the higher salary but with 12 weeks of paid maternity leave? (options from Rs.500, 6 USD PPP to Rs.20000, 232 USD PPP) (blue-collar wage: Rs.13,000)
- Incentivized: guess what women like you report; those close to the truth enter a lottery to win 50 USD, 30% of monthly wage

## Women value leave worth 32% of salary

- Average: Rs.4399 (\$50 or 32% of salary) number of children, incentivized, benchmark



- Monetary cost + non-pecuniary benefit worth 7.2 months of pay (predicted tenure: 3.5 years)

## Employer cost

- Use employment change to back out employer cost:

$$d\ln f_i = \frac{dc_i + dw_i}{mrpl_{fi} * \frac{\partial \ln mrpl_{fi}}{\partial \ln f_i}}$$

- Employment declines more if greater change in cost,  $dc_i$ , or higher substitutability i.e. low  $\left| \frac{\partial \ln mrpl_{fi}}{\partial \ln f_i} \right|$

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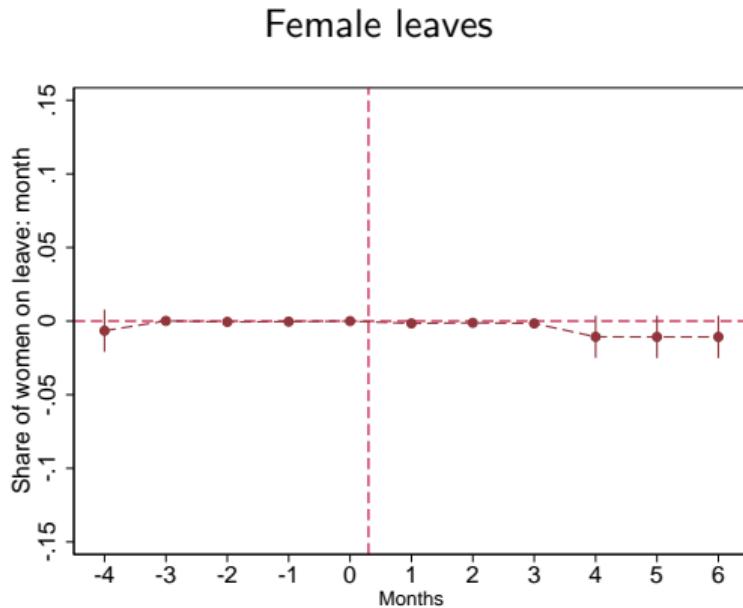
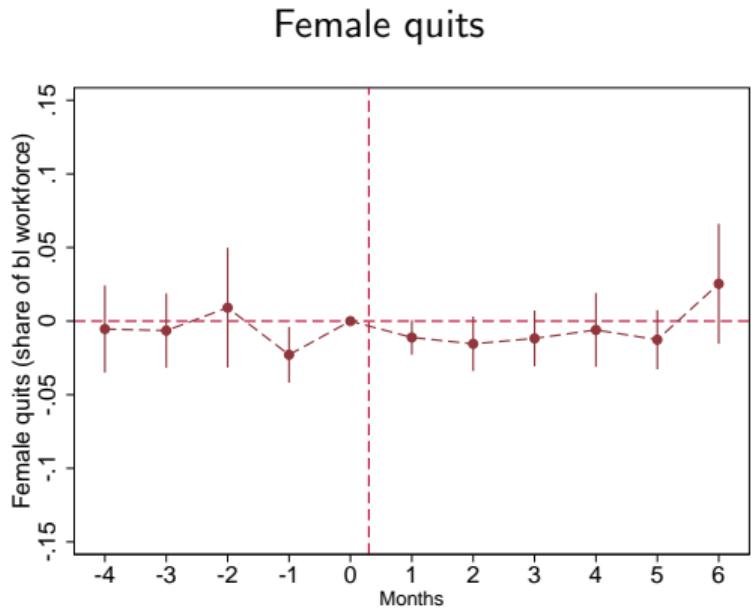
- Low-, medium-, high-female-share industries
- Estimate  $d\ln f_i$ ,  $dw_i$
- Assume:  $Y_i = z_i K_i^{\alpha_{k1}} L_j^{\alpha_{k2}}$ , with  $L$  a CES aggregation  $L_j = [\beta_k f_i^\sigma + m_i^\sigma]^{\frac{1}{\sigma}}$

## Adverse selection ( $\delta_i$ ): Comparison firms

- Extra cost of hiring woman if  $i$  is one of the only firms offering long pre-period leave
- Extra cost of permanent replacement or temporary replacement

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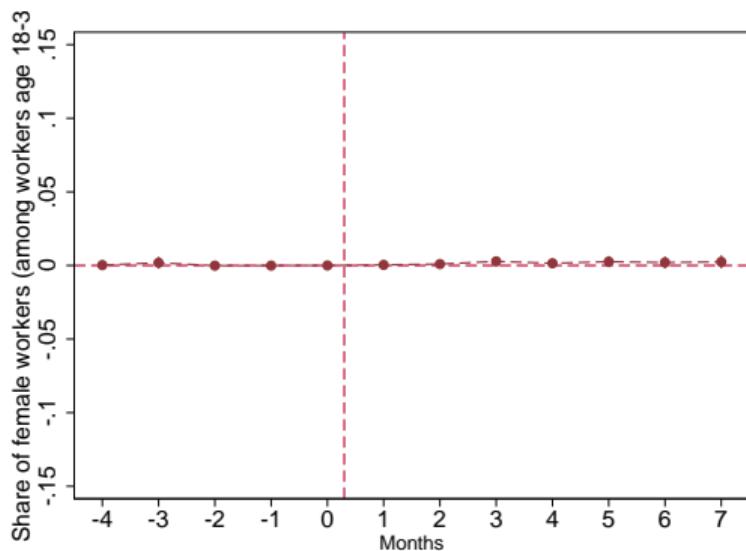
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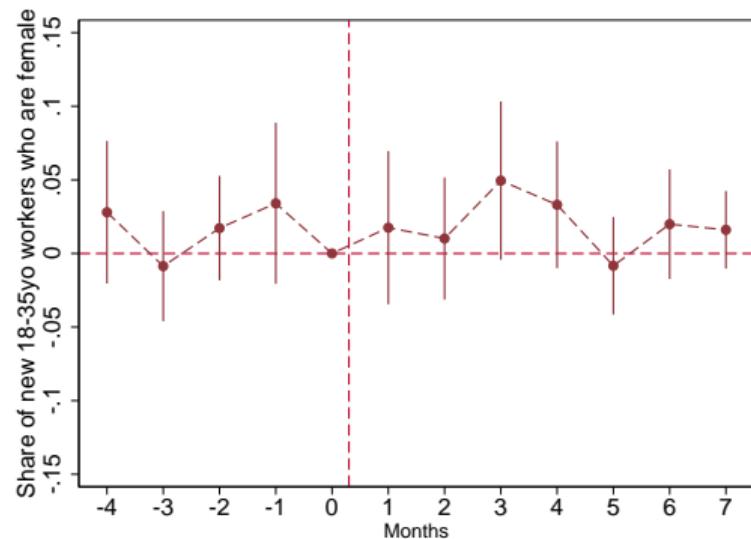
## Adverse selection ( $\delta_i$ ): Comparison firms

- Should expect fewer 18-35yo women at control firms (offered long pre-period leave)

Employment: 18-35yo women



New employment: 18-35yo women



## Measuring four components

- ① Worker valuation
- ② Employer cost
- ③ Adverse selection
- ④ **Job loss**

DiD estimate of  $d\ln n_i$

## Results

- Gain to workers approximately as large as cost to employers

	Workers			Employers		Profits (5)
	Coverage (1)	Job loss (2)	Cost (3)	Adverse selection eliminated (4)		
Million worker salaries per month	2.610	-0.152	-2.196	0.013		NA
As share of wage bill	0.303	-0.018	-0.255	0.002		NA

- Overstate value by 21% for benefits to equal costs

# Conclusion

- Employment loss: maternity leave expansion in India, from 12 to 26 weeks, reduced female employment by 6% in six months; 10% in four years
  - ▶ Disproportionately impacted young women (18-35 years)
- Benefits equal costs
- Policy alternatives: shorter durations, insurance to offset firm losses (ongoing)
  - ▶ preserve benefits and mitigate employment losses
- Not covered today: Employer misperceptions Misperceptions

Policy

Thank you!

# Outline

- ① Employment, Wages, Career trajectories
- ② Welfare
- ③ Counterfactual policies (ongoing)
- ④ **Employer Misperceptions**

## Magnitudes: Employer misperceptions

To justify the magnitude of employment decline, employers must greatly overestimate rate of maternity leave taking

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Given:

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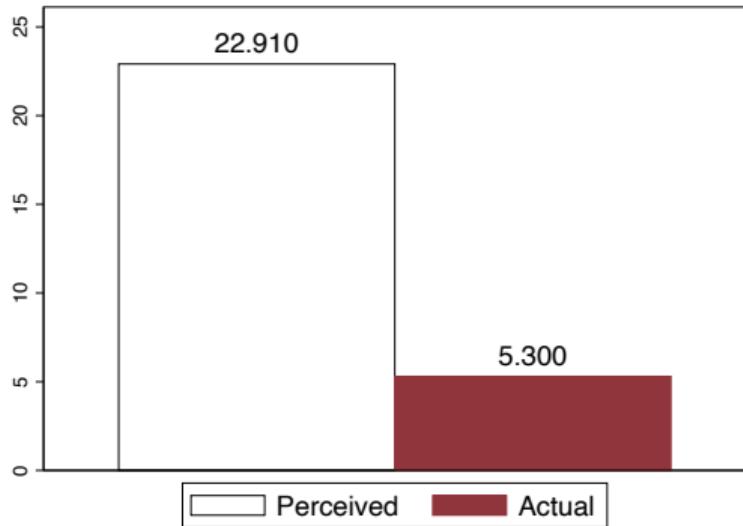
$$\Delta \log(f) = -0.06$$

→ Perceived probability of maternity leave in first year  $\sim 27\%$ . Actual  $\sim 5\%$  [Details](#)

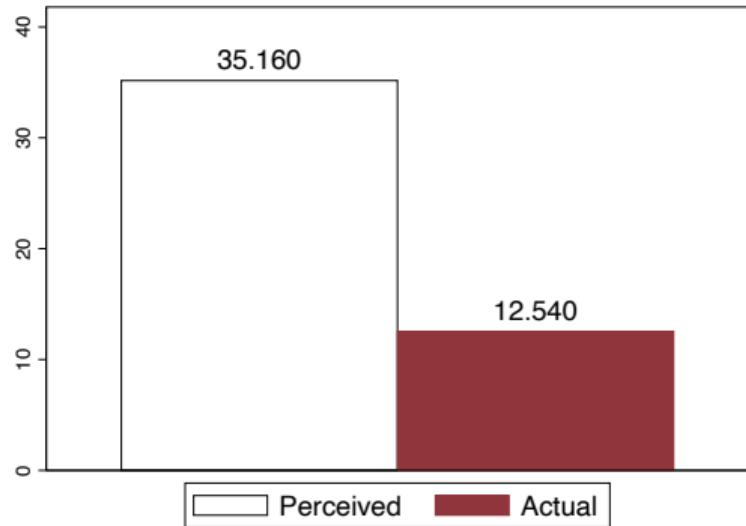
# Survey evidence of misperceptions

- Pilot survey of 40 HR managers at Indian IT firms (Conlon & Sharma 2024)

Year 0-1: Perceived vs. Actual



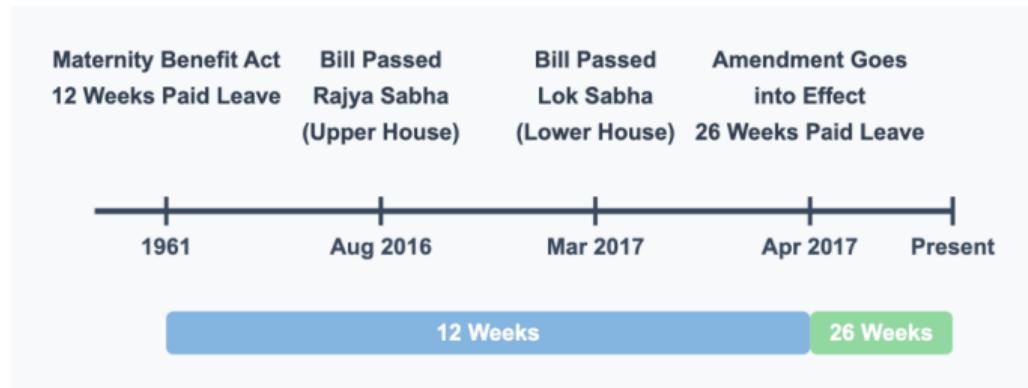
Year 0-2: Perceived vs. Actual



- Ongoing: Can correcting misperceptions reduce discrimination? Question

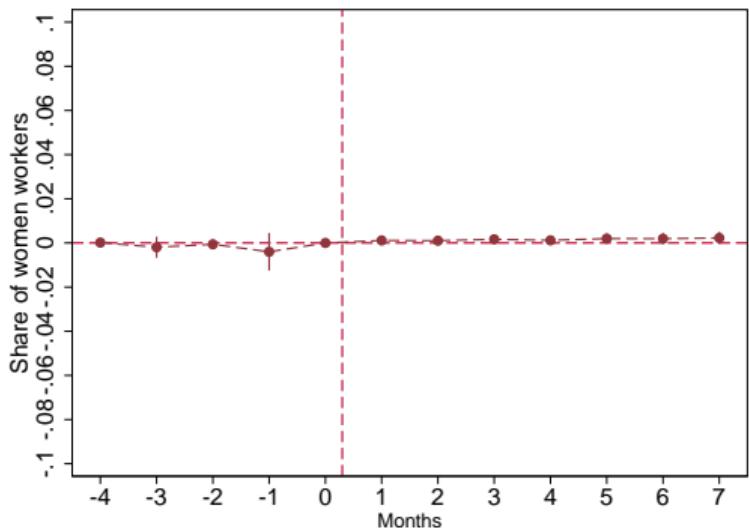
# Timeline: 2017 Maternity Leave Law in India

Applies to all establishments with  $\geq 10$  employees

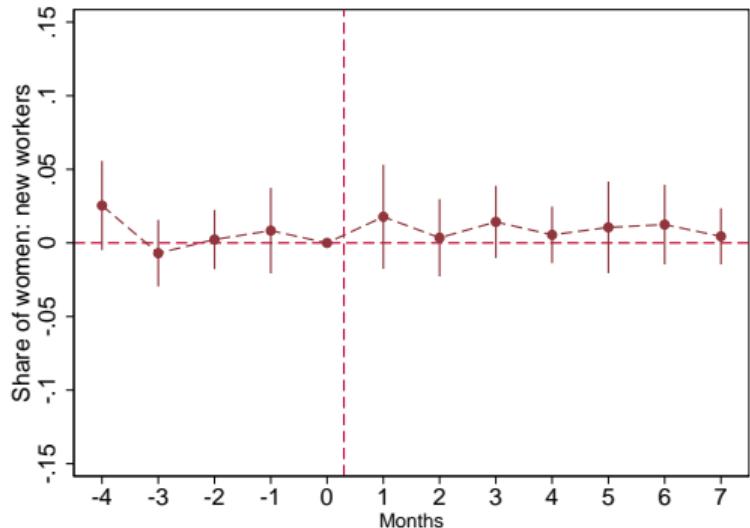


# SUTVA test: share of women

Female share of all workers



Female share of new workers



- No change in age composition.

[Back to employment](#)

## Predicted decline in female employment: full expression

- Larger decline in female employment when larger increase in replacement cost, especially when women less substitutable in production
- + when male substitution
- - wage adjustment

$$d\ln l_{fi} = \underbrace{\frac{dc_i}{mrpl_i * \frac{\partial \ln mrpl_f}{\partial \ln f_i}}}_{\text{cost}<0} - \underbrace{\frac{\frac{\partial \ln mrpl_f}{\partial \ln m_i} d\ln m_i}{\frac{\partial \ln mrpl_f}{\partial \ln f_i}}}_{\text{male substitution}<0} + \underbrace{\frac{dw_i}{\mu_i * mrpl_i * \frac{\partial \ln mrpl_f}{\partial \ln f_i}}}_{\text{wage adjustment}>0}$$

Back

## Effects larger in manufacturing than services

	Manufacturing (1)	Services (2)
$T_i \times \text{post1}$	-0.031 (0.023)	-0.013 (0.031)
$T_i \times \text{post2}$	-0.095** (0.040)	-0.043* (0.024)
N	247,266	572,554

- High retraining, replacement costs (Adhvaryu et al. 2023, 2025)

## Heterogeneity: Number of women

Panel B: Number of female workers			
	Low	Medium	High
$T_i \times \text{post1}$	0.012 (0.022)	-0.028 (0.024)	-0.026 (0.018)
$T_i \times \text{post2}$	-0.005 (0.063)	-0.086** (0.040)	-0.069** (0.026)
N	200,073	386,579	204,914

- Below 25th percentile, 25th to 75th percentile, above 75th percentile

Back

## Heterogeneity: prediction

Larger when women more easily substituted in production

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Production:

$$Y = ZK^{\alpha_1}L^{\alpha_2}, \quad L = (\beta_k f^{\frac{\sigma-1}{\sigma}} + m^{\frac{\sigma-1}{\sigma}})$$

Employer FOC:

$$mrpl_i = w_i + c_i$$

Predicted change in employment (total derivative wrt benefit change):

$$d\ln f_i = f \left( \frac{dc_i}{\frac{\partial \ln mrpl_i}{\partial \ln f_i}} \right)$$

- Employment declines more when women more substitutable: low female-share industries (low  $\beta_k$ , high  $\sigma$ )

## Standard labor supply models: mandate doesn't $\Delta$ relative attractiveness

Utility of worker  $i$  working at employer  $j$ :

$$u_{ij} = \log(w_j) + \beta \log(a_j) + \epsilon_{ij}$$

Amenity log-linear in weeks of leave:

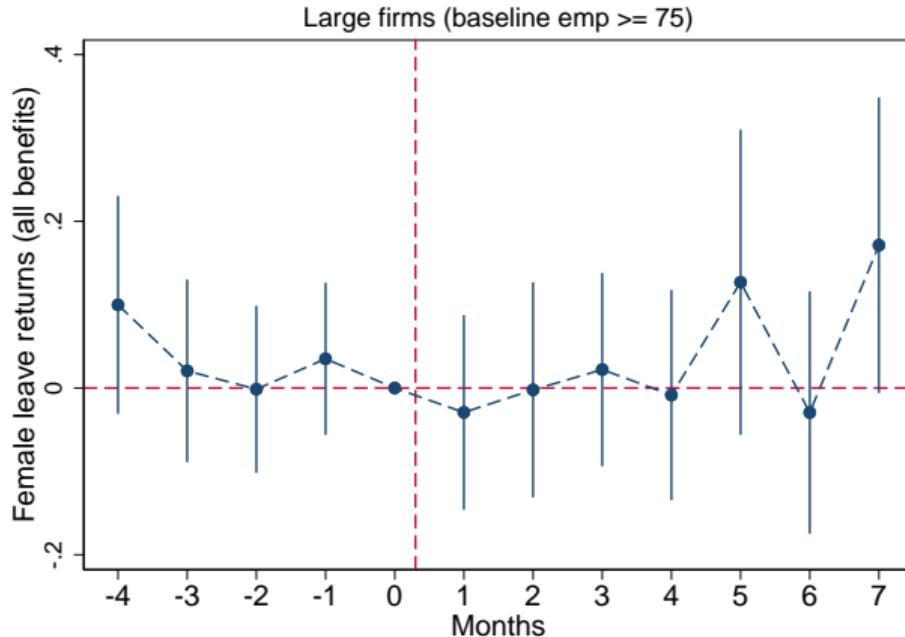
$$\log(a_j) = \psi^T X_j + \alpha \log(L_j)$$

Amenity concave in weeks of leave:

$$\log(a_j) = \psi^T X_j + \alpha g(L_j), \quad g'(L) > 0, \quad g''(L) < 0$$

- Both yield diminishing MU in weeks of leave
- Both leave relative attractiveness of employers unchanged

# Returning from maternity leave



## Employment change prediction

- Use employment change to back out employer cost. FOC:

$$mrpl_{fi} = w_i + c_i$$

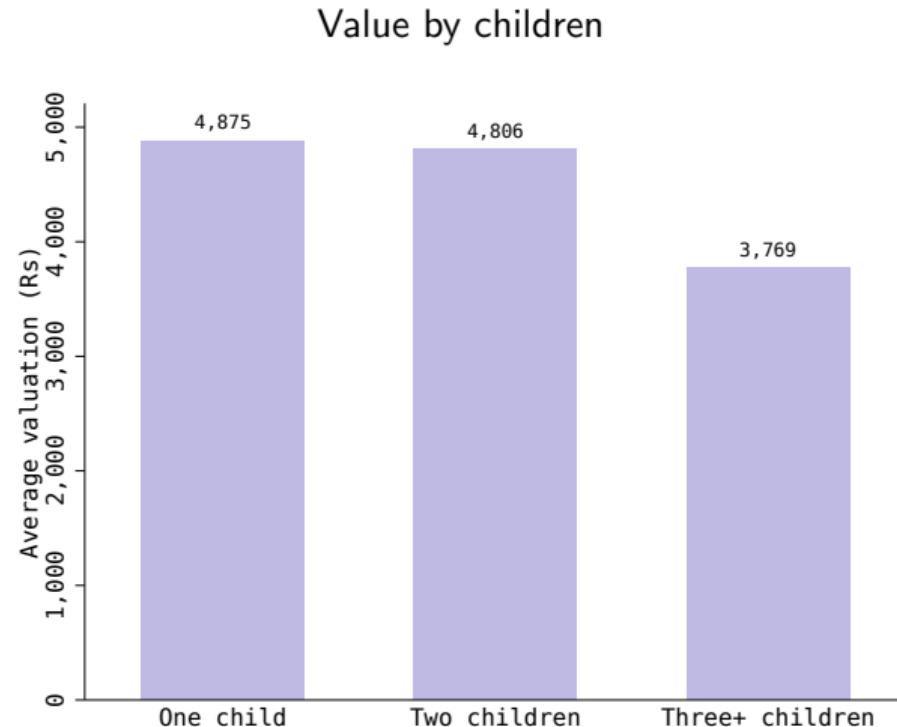
- Take the total derivative and re-arrange:

$$d(\ln f_i) = \frac{dc_i + dw_i}{mrpl_{fi} * \frac{\partial \ln mrpl_{fi}}{\partial \ln f_i}}$$

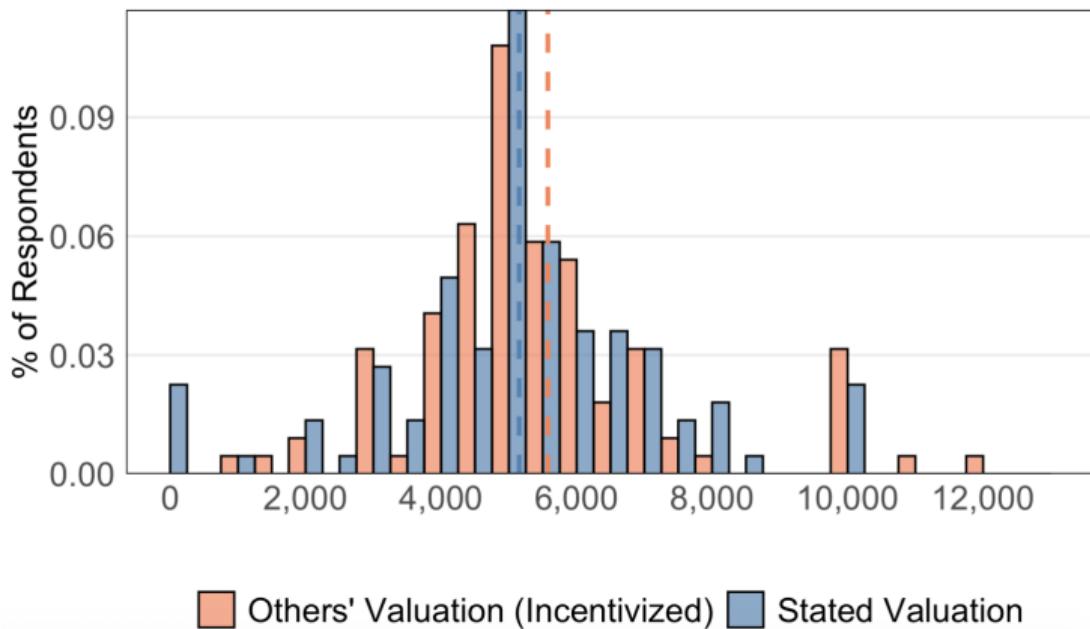
- Employment declines more if greater change in cost,  $dc_i$ , or higher substitutability i.e. low  $\left| \frac{\partial \ln mrpl_{fi}}{\partial \ln f_i} \right|$

Back

## Value: Heterogeneity by number of children



## Comparison of incentivized versus non-incentivized valuations



Mean difference: 8%

Back

## Benchmark

- Value of 20 days of paid time off in the U.S. (23% in Maestas et al. 2023) and women's willingness to pay for flexible work arrangements that grant them control over their schedules in Colombia (26% in Bustelo et al. 2023).

Back

## Misperceptions: Details

- Assume the 14 week expansion cost  $\Delta c = 3.5 \text{ months} * \text{salary}$ , although employers did not have to pay salary (Social security did for these workers, earning < Rs.15,000). Employers only lost the worker for 14 additional weeks.
- $B = mp - \text{wage}$ . Assume 18% markdown/can pay equally productive woman 18pp less than man (Sharma 2023 monopsony estimate).
- $\Delta \log(f) = P[B > p * c_{new}] - P[B > p * c_{old}]$
- Use CDF of uniform distribution (+ new women's hiring declines by 0.22, incumbent women's employment declines 0.042)

Back

## Survey Question

At IT firms like yours in Tamil Nadu (between x1 and x2 employees, and with a similar turnover). For every 100 female employees that these firms hired in entry-level roles since 2016, how many women do you think:

- Took maternity leave within the first year?
- Took maternity leave between the first and second year?
- Did not take maternity leave within the first two years?

Back

## Policy implications

- Correcting Misperceptions 0.1cm
  - ▶ Win-win for worker, employer
- Cost-sharing
- Screening

Back

## Employer cost

- Use employment change to back out employer cost. FOC:

$$mrpl_{fi} = w_i + c_i$$

- Take the total derivative and re-arrange:

$$d(\ln f_i) = \frac{dc_i + dw_i}{mrpl_{fi} * \frac{\partial \ln mrpl_{fi}}{\partial \ln f_i}}$$

- Employment declines more if greater change in cost,  $dc_i$ , or higher substitutability i.e. low  $\left| \frac{\partial \ln mrpl_{fi}}{\partial \ln f_i} \right|$

## Proposed order

- Employment declines, wages don't change, employment of white collar workers declines. Contrasts with simple economics of mandates: due to wage rigidities.
- Then: heterogeneity.
- Ideal addition: heterogeneity by replacement costs.
- Labor supply: place after heterogeneity – just have fertility results. (just have answer: intensive margin, extensive margin, fertility)
- Response to LD vs. LS: employment decline is entirely due to labor demand changes (labor supply could change on three margins: intensive, extensive, fertility + return from leave). Don't see effects on fertility + return from leave (EVIDENCE?) Don't see effects on extensive margin. Don't see effects on intensive margin (move from control to treated firms: how to estimate?).