Employer Responsibility in Disability Insurance:
Evidence from the Netherlands

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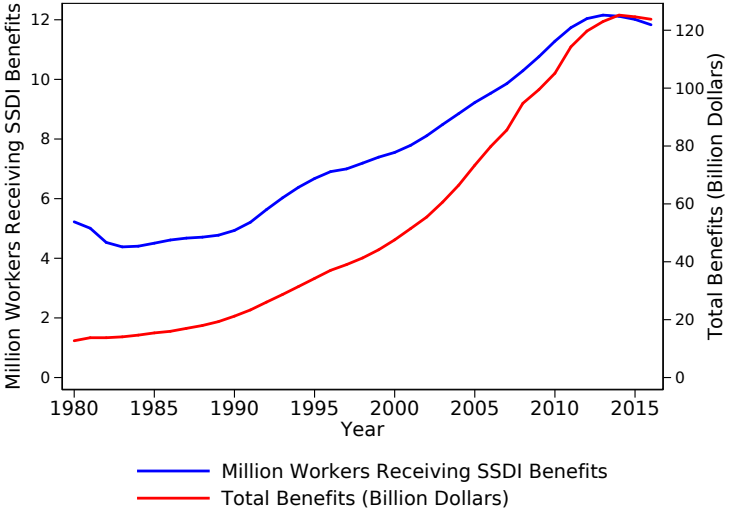
Disability Insurance Takeup and Spending Increasing



Source: Annual Statistical Report on the Social Security Disability Insurance Program

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- One possible policy: Put more responsibility on employers—employer cost sharing/experience rating
  - Employers who have more workers enter DI would pay more payroll tax
- But little evidence on such policies

Research Question

What are the impacts of **employer cost sharing / experience rating policies** in disability insurance?

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- Simple welfare calculation + optimal rate

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Welfare calculation suggests that policy improved welfare

- Cost sharing was set at approximately 47%
- Optimal rate could be close to 100%

Contributions

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1. Model potential tradeoffs of employer responsibility in DI
   - *Literature on employer responsibility in unemployment insurance:* Topel (1984), Burdett and Wright (1989), Fath and Fuest (2005), Blanchard and Tirole (2008)
   - *Literautre on optimal worker side replacement rate:* Baily (1978), Chetty (2006), Diamond and Sheshinski (1995)
   - *Moral hazard in health insurance and optimal cost sharing:* Zeckhauser (1970), McGuire (2012)

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2. Quasi-experimental evidence on employer-side moral hazard and the impact of employer-side policies in disability insurance
   - *Long literature on employee-side finds substantial moral hazard:* Bound (1989), von Wachter, Song and Manchester (2011), Maestas, Mullen and Strand (2013), French and Song (2014), ...
   - *Descriptive work finds cross-firm and cross-industry variation in disability insurance claiming:* Stapleton, Mann, Singh and Song (2017), Maestas, Prinz and Ravesteijn (2018), Lurie, Maestas, Miller and Prinz (2019)
   - *Some quasi-experimental evidence that experience rating decreases DI claiming:* De Groot and Koning (2016), Kyyrä and Paukkeri (2018), Hawkins and Simola (2020)
   - *Recent structural work:* Kim and Rhee (2018), Aizawa, Kim and Rhee (2020)

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3. Evidence on employer labor demand response to employer-side policies in social insurance
   - *Unemployment insurance literature finds experience rating can reduce layoffs but also hiring:* Anderson and Meyer (1993, 2000), Johnston (2020)

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3. Evidence on employer labor demand response to employer-side policies in social insurance
4. Evidence on social insurance for contingent workers
   - *Recent descriptive work finds contingent work on the rise:* Katz and Krueger (2019*a*,*b*), Collins et al. (2019)
   - *Recent descriptive work finds that DI claiming is lower among contingent workers but disability risk is higher following an injury:* Broten, Dworsky and Powell (2018), Rutledge, Zulkarnain and King (2018)

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Theoretical Framework

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- Goal of the model: Under what assumptions these mechanisms work?

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- Benefit is financed from a payroll tax $(1-\eta)\rho w$ and firm cost sharing $\eta\rho w$

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- Wage is not dependent on realized productivity λ
  - No ex post wage bargaining
  - Optimal contract with risk-averse workers and risk-neutral firms

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5. If not retained, worker enters DI

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$$\underbrace{\lambda - (1+\tau)w}_{\text{Retained: Productivity Net of Cost}} > \underbrace{-\eta\rho w}_{\text{Not Retained: Employer Share of Benefit Costs}} . \tag{2}$$

or

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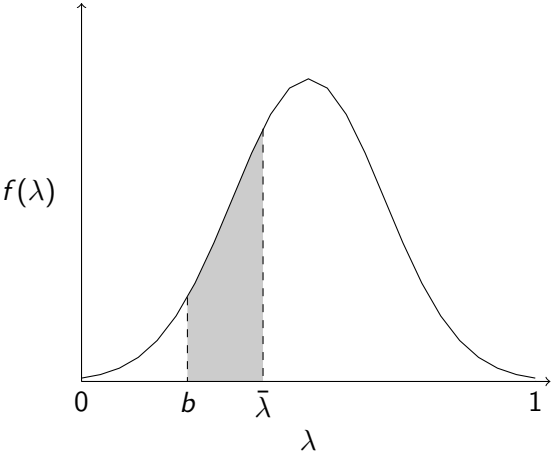
- Threshold $\bar{\lambda}$:

$$\bar{\lambda}(\eta) = (1+\tau-\eta\rho)w \tag{4}$$

Optimal Policy With No Selection

- Assume no worker heterogeneity ($F_\theta(\lambda) = F(\lambda)$ for all θ)



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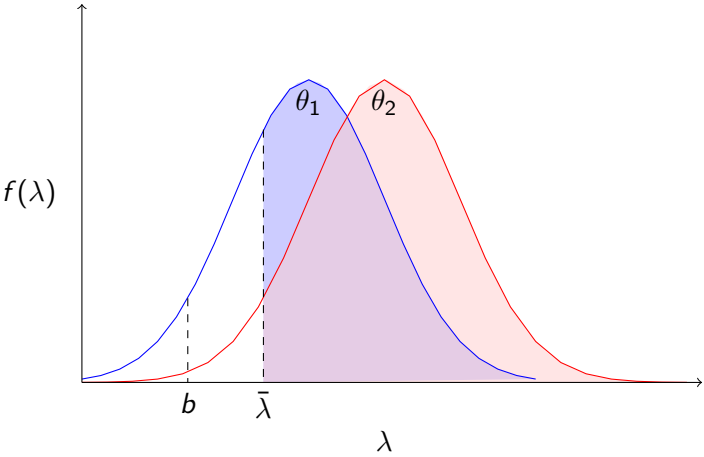
- With risk neutral employers, it's optimal to set $\eta^* = 1$, which minimizes $\bar{\lambda}$ and welfare loss
- Corresponding wage w must satisfy the economy's budget constraint:

$$\underbrace{F\left(\bar{\lambda}\right)}_{\text{Disabled}} + \underbrace{\left(1 - F\left(\bar{\lambda}\right)\right) w}_{\text{Working}} = \int_{\bar{\lambda}}^{1} \lambda dF(\lambda) - M \tag{6}$$

  or

$$w = \frac{\int_{\bar{\lambda}}^{1} \lambda dF(\lambda) - M}{\rho F\left(\bar{\lambda}\right) + \left(1 - F\left(\bar{\lambda}\right)\right)}. \tag{7}$$

Firms Can Choose Among Heterogeneous Workers



$\bar{\lambda}$ is the same for all θ: retention depends on realized productivity not on ex ante type

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- A type θ worker is hired by a risk neutral firm if

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- The total lost productivity is

$$L(\eta) = \underbrace{\int_0^{\bar{\theta}(\eta)} \int_b^1 \lambda f_\theta(\lambda) g(\theta) d\lambda d\theta}_{\text{Not Hired } (L_S)} + \underbrace{\int_{\bar{\theta}(\eta)}^1 \int_b^{\bar{\lambda}(\eta)} \lambda f_\theta(\lambda) g(\theta) d\lambda d\theta}_{\text{Inefficiently Not Retained } (L_R)} \tag{9}$$

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- Optimal cost sharing η now needs to balance
  - Loss from increasing $\bar{\theta}$ (selection)
  - Gain from decreasing $\bar{\lambda}$ (retention)

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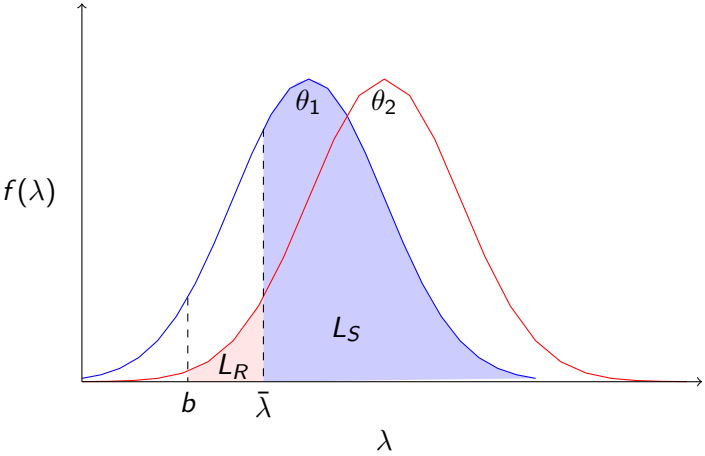

L_R: loss from inefficiently not retained

L_S: loss from selection

Firms Can Choose Among Heterogeneous Workers

- Tradeoff captured in first order condition:

$$\frac{d}{d\eta}L(\eta^*) =$$

$$\underbrace{\underbrace{\frac{d}{d\eta}\bar{\theta}(\eta^*)}_{\text{Change in } \bar{\theta}} \cdot \underbrace{g(\bar{\theta}(\eta^*))}_{\text{Density Affected}} \cdot \underbrace{\left(E_{\bar{\theta}(\eta^*)}\left[\lambda \mid b \leq \lambda\right] - E_{\bar{\theta}(\eta^*)}\left[\lambda \mid b \leq \lambda \leq \bar{\lambda}(\eta^*)\right]\right)}_{\text{Change in Expected Lost Productivity at } \bar{\theta}}}_{\text{Cost of Selection}}$$

$$+ \underbrace{\underbrace{\frac{d}{d\eta}\bar{\lambda}(\eta^*)}_{\text{Change in } \bar{\lambda}} \cdot \underbrace{\int_{\bar{\theta}(\eta^*)}^{1} f_\theta(\bar{\lambda}(\eta^*))g(\theta)d\theta}_{\text{Density Affected}} \cdot \underbrace{\bar{\lambda}(\eta^*)}_{\text{Productivity}}}_{\text{Benefit of Retention}}$$

$$= 0.$$

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  - Worker with realized productivity λ captures a portion γ of the surplus she brings to the employer
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  - $\bar{\lambda}$ can be more efficient
- Risk-averse firms Details
  - Type ranking θ will also depend on higher moments
  - $\bar{\theta}$ set differently

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  - $\bar{\lambda}$ can be more efficient
- Risk-averse firms Details
  - Type ranking θ will also depend on higher moments
  - $\bar{\theta}$ set differently
- Type-specific wages Details
  - Wage combination of average and type-specific productivity:
$$\hat{w}(\theta) = \alpha w(\theta) + (1 - \alpha) w \tag{11}$$
  - With no type-specific wages ($\alpha = 0$), only extensive margin selection
  - With fully type specific wages ($\alpha = 1$), incidence is completely on wages, no selection, but distributional consequences
  - In between ($0 < \alpha < 1$), some selection, some distributional consequences, $\bar{\theta}$ higher

Empirical Context and Data

Temp Workers in Netherlands

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  - Can only be fired after payment of a substantial severance package
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Temp Workers in Netherlands

- Permanent workers (66%)
  - Can only be fired after payment of a substantial severance package
  - DI experience rated since 1998
- Temp workers (7.5%)
  - Contract does not guarantee work and earnings
  - Employer can notify worker one day in advance that their work is no longer needed
  - Most work in temp agencies
  - Logistics, industrial production most common ▸ Job Types
  - Much weaker labor market attachment, lower hours and wages, much less educated, lower-SES
  - Higher initial DI receipt ▸ Summary Statistics
  - DI experience rated since 2012/2013

Detailed Administrative Data from the Netherlands

Combine several administrative datasets 2009-2016:

- Matched employer-employee data: contract durations, contract types, earnings
- Employer characteristics: sector, industry
  - Limitation: temporary work agencies are observed employer, count as one industry
- Disability insurance and sickness uptake: timing, type of disability, benefits amounts
- Healthcare spending
- Other information on individuals: ethnicity, education, etc.

Premium Calculation

$$\text{Premium}_j = \text{Balance Correction} + \text{Correction Factor} \times (\text{Risk}_j - \text{Average Risk}).$$

Risk is calculated as the ratio of benefit costs of the former workers of the employer and wages:

$$\text{Risk}_j = \frac{\text{Benefit Costs}_j}{\text{Wage Bill}_j}.$$

- Maximum: 3.28% (DI) and 7.77% (Sickness)
- Calculated over benefits that started over last up to 10 years
- First premiums in 2014 calculated over benefits starting 2012-2013

Empirical Cost Sharing Factor η

- Premiums are not fully experience rated ($\eta < 1$): firms don't pay all DI costs
  - Minimum/maximum rate
  - 10-year lookback period
- Average temp agency worker claims DI at 43.9 and retirement age is 65
- $\eta = \frac{10}{21.1} = 0.47$

Estimation and Results

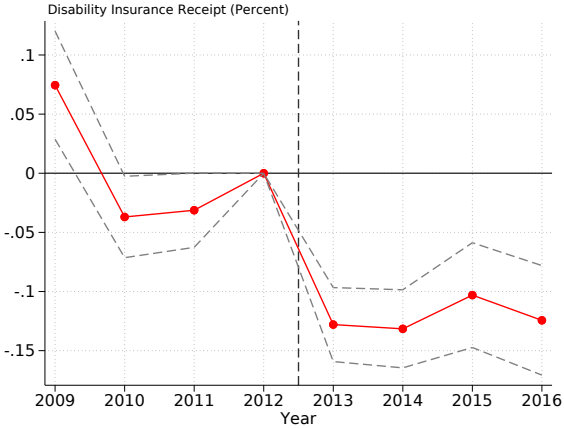
Disability Insurance Benefit Receipt—Estimation

$$y_{ijt} = \beta_0 + \sum_{t=2009}^{2016} \beta_{1t} T_{it} + \mathbf{X}_{it}\beta + \rho_{rt} + \gamma_j + \varepsilon_{ijt} \tag{12}$$

where

- i indexes individuals, j indexes firms, and t indexes time
- $T_{it} \in \{0, 1\}$ is an indicator for whether worker i is a temp worker
- $\mathbf{X}_{it}$ is vector of controls (education, age, healthcare spending percentile)
- τ_t are year fixed effects
- γ_j are firm fixed effects
- Coefficient of interest: β_{1t}, year-specific temp vs permanent difference

Disability Insurance Benefit Receipt—Results



Pooled estimate: -24%

Alternative Specifications | Heterogeneity 1 | Heterogeneity 2 | Comparison with Prior Studies

Short-Term Disability Insurance Benefit Receipt—Estimation

- For temp agency workers, can also observe sickness/short-term DI take up
- Became experience rated at the same time
- Permanent workers not available as control group

$$y_{ijt} = \beta_0 + \sum_{t=2009}^{2016} \beta_{1t} + \mathbf{X}_{it}\beta + \rho_r + \gamma_j + \varepsilon_{ijt} \tag{13}$$

where

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- τ_t are year fixed effects
- γ_j are firm fixed effects
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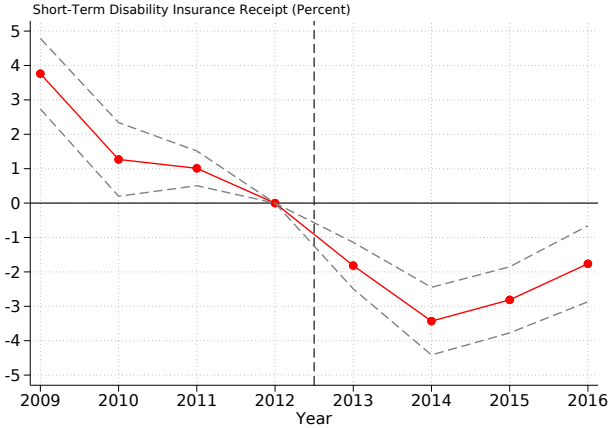
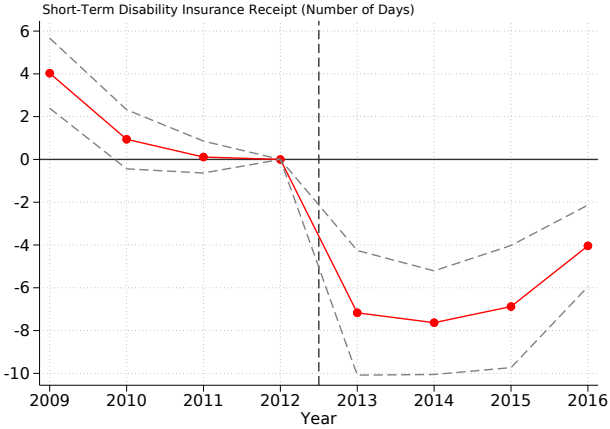
Short-Term Disability Insurance Benefit Receipt–Results



Pooled estimate: -20%

Alternative Specifications Heterogeneity 1 Heterogeneity 2

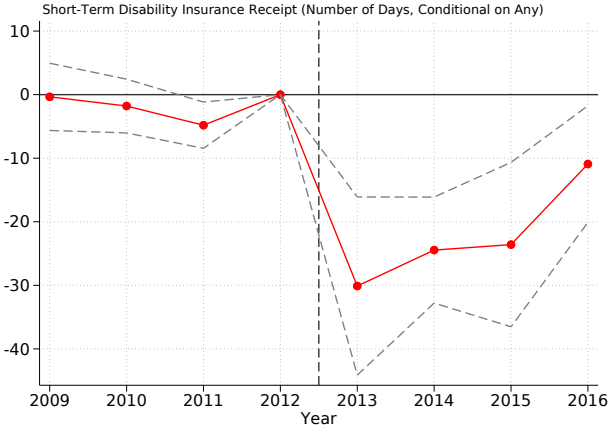
Short-Term Disability Insurance Benefit Receipt–Results



Pooled estimate: -36%

Alternative Specifications Heterogeneity 1 Heterogeneity 2

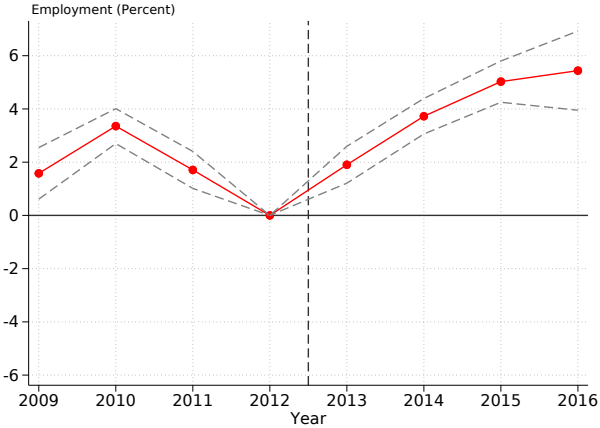
Short-Term Disability Insurance Benefit Receipt–Results



Pooled estimate: -26%

Alternative Specifications Heterogeneity 1 Heterogeneity 2

Employment—Results



Pooled estimate: 2.5%

Alternative Specifications | Heterogeneity 1 | Heterogeneity 2

What Do Temp Work Agencies Do?

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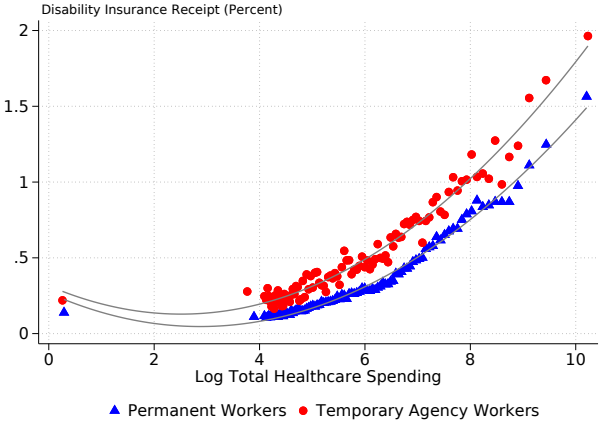
  - regular follow up with worker on plan
  - if they can't perform original tasks, evaluate what work would be appropriate given the changes in his/her working capacity.

Estimation: Worker Selection

Previous Year's Healthcare Spending Predictive of DI Takeup



Worker Selection—Estimation

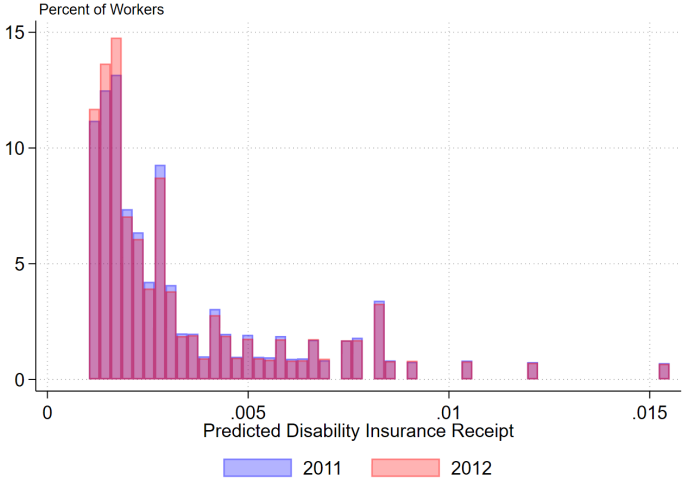
Estimate predicted DI takeup

$$d_{ijt} = \alpha + \sum_{p=1}^{100} \gamma_p \delta_p + \varepsilon_{ijt} \tag{14}$$

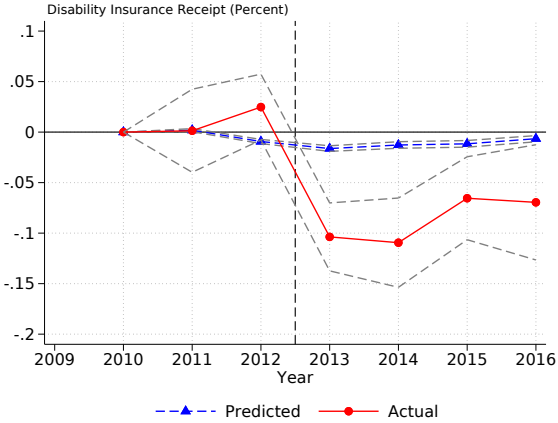
where

- i indexes individuals, j indexes firms, and t indexes time
- $T_{it} \in \{0, 1\}$ is an indicator for whether worker i is a temp worker
- δ_p are indicators for spending in the pth percentile of the healthcare spending distribution in the previous year

Worker Selection—Composition



Worker Selection—Results



Pooled estimate: selection is 14% of overall effect

Alternative Specifications

Welfare Estimation

Optimality Condition

$$\frac{d}{d\eta}L(\eta^*) =$$

$$\underbrace{\underbrace{\frac{d}{d\eta}\bar{\theta}(\eta^*)}_{\text{Change in } \bar{\theta}} \cdot \underbrace{g(\bar{\theta}(\eta^*))}_{\text{Density Affected}} \cdot \underbrace{\left(E_{\bar{\theta}(\eta^*)}\left[\lambda \mid b \leq \lambda\right] - E_{\bar{\theta}(\eta^*)}\left[\lambda \mid b \leq \lambda \leq \bar{\lambda}(\eta^*)\right]\right)}_{\text{Change in Expected Lost Productivity at } \bar{\theta}}}_{\text{Cost of Selection}}$$

$$+ \underbrace{\underbrace{\frac{d}{d\eta}\bar{\lambda}(\eta^*)}_{\text{Change in } \bar{\lambda}} \cdot \underbrace{\int_{\bar{\theta}(\eta^*)}^{1} f_\theta(\bar{\lambda}(\eta^*))g(\theta)d\theta}_{\text{Density Affected}} \cdot \underbrace{\bar{\lambda}(\eta^*)}_{\text{Productivity}}}_{\text{Benefit of Retention}}$$

$$= 0.$$

Optimality Condition

$$\frac{\underbrace{\underbrace{\frac{d}{d\eta}\bar{\theta}(\eta^\star)}_{\text{Change in } \bar{\theta}} \cdot \underbrace{g(\bar{\theta}(\eta^\star))}_{\text{Density Affected}} \cdot \underbrace{\left(E_{\bar{\theta}(\eta^\star)}\left[\lambda \mid b \leq \lambda\right] - E_{\bar{\theta}(\eta^\star)}\left[\lambda \mid b \leq \lambda \leq \bar{\lambda}(\eta^\star)\right]\right)}_{\text{Expected Lost Productivity at } \bar{\theta}}}_{\text{Cost of Selection}}}{\underbrace{\underbrace{\frac{d}{d\eta}\bar{\lambda}(\eta^\star)}_{\text{Change in } \bar{\lambda}} \cdot \underbrace{\int_{\bar{\theta}(\eta^\star)}^{1} f_\theta(\bar{\lambda}(\eta^\star))g(\theta)d\theta}_{\text{Density Affected}} \cdot \underbrace{\bar{\lambda}(\eta^\star)}_{\text{Productivity}}}_{\text{Benefit of Retention}}} = 1.$$

Connecting Empirical Estimates

$$\frac{\underbrace{\frac{d}{d\eta}\bar{\theta}(\eta^\star)}_{\text{Change in } \bar{\theta}} \cdot \underbrace{g(\bar{\theta}(\eta^\star))}_{\text{Density Affected}}}{\underbrace{\frac{d}{d\eta}\bar{\lambda}(\eta^\star)}_{\text{Change in } \bar{\lambda}} \cdot \underbrace{\int_{\bar{\theta}(\eta^\star)}^{1} f_\theta(\bar{\lambda}(\eta^\star))g(\theta)d\theta}_{\text{Density Affected}}} \cdot \frac{\underbrace{\left(E_{\bar{\theta}(\eta^\star)}\left[\lambda \mid b \leq \lambda\right] - E_{\bar{\theta}(\eta^\star)}\left[\lambda \mid b \leq \lambda \leq \bar{\lambda}(\eta^\star)\right]\right)}_{\text{Expected Lost Productivity at } \bar{\theta}}}{\underbrace{\bar{\lambda}(\eta^\star)}_{\text{Productivity}}} = \frac{0.03}{0.17} \cdot \frac{13}{13} = 0.176$$

Proxying productivity with wages of workers who are less likely to be hired vs more likely to be retained (based on predicted disability receipt)

Connecting Empirical Estimates

$$\frac{\underbrace{\frac{d}{d\eta}\bar{\theta}(\eta^\star)}_{\text{Change in } \bar{\theta}} \cdot \underbrace{g(\bar{\theta}(\eta^\star))}_{\text{Density Affected}}}{\underbrace{\frac{d}{d\eta}\bar{\lambda}(\eta^\star)}_{\text{Change in } \bar{\lambda}} \cdot \underbrace{\int_{\bar{\theta}(\eta^\star)}^{1} f_\theta(\bar{\lambda}(\eta^\star))g(\theta)d\theta}_{\text{Density Affected}}} \cdot \frac{\underbrace{\left(E_{\bar{\theta}(\eta^\star)}\left[\lambda \mid b \leq \lambda\right] - E_{\bar{\theta}(\eta^\star)}\left[\lambda \mid b \leq \lambda \leq \bar{\lambda}(\eta^\star)\right]\right)}_{\text{Expected Lost Productivity at } \bar{\theta}}}{\underbrace{\bar{\lambda}(\eta^\star)}_{\text{Productivity}}} = \frac{0.03}{0.17} \cdot \frac{8.77}{14.95} = 0.104$$

Proxying productivity with wages of workers who are less likely to be hired vs more likely to be retained (based on wage)

Optimal Rate

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- If we assume that the response parameters are linear in experience rating factor $\eta = 0.47$ (strong assumption), we would find that the optimal rate can be 100%

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- Intuition:
  - Retention response significantly larger than selection response
  - Productivity wedge is small

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- Developed model to incorporate the intended and unintended effects of such policies

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- Increased employer responsibility can decrease DI claiming and increase retention
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- Small but meaningful selection effects estimated
- Under some assumptions, the large retention and small selection response suggest that full experience rating could be optimal
- May be a way to provide social insurance to contingent workers

Extension: Risk-Averse Firms

- Firms may act as if risk averse (perhaps small and not fully diversified)
- Maximize a concave and separable function of productivity and cost: the hiring threshold must solve

$$\int_{\bar{\lambda}}^{1} v(\lambda) dF_{\bar{\theta}}(\lambda) - \left[F_{\bar{\theta}}\left(\bar{\lambda}\right) c_1\left(\eta\right) + \left(1 - F_{\bar{\theta}}\left(\bar{\lambda}\right)\right) c_2\left(w\right)\right] = 0. \tag{15}$$

- Different ranking of types: take into account higher moments
- $\bar{\theta}$ higher

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Extension: Type-Specific Wages

- Wage combination of average and type-specific productivity:

$$\hat{w}(\theta) = \alpha w(\theta) + (1-\alpha) w. \tag{16}$$

where

$$w = \frac{\int_{\bar{\theta}}^{1} \int_{\bar{\lambda}}^{1} \lambda dF_{\theta}(\lambda) dG(\theta) - M}{\rho \left(F\left(\bar{\theta}\right) + \int_{\bar{\theta}}^{1} F_{\theta}\left(\bar{\lambda}\right) dG(\theta) \right) + \int_{\bar{\theta}}^{1} \left(1 - F_{\theta}\left(\bar{\lambda}\right)\right) dG(\theta)}. \tag{17}$$

and

$$w(\theta) = \frac{\int_{\bar{\lambda}}^{1} \lambda dF_{\theta}(\lambda) - M}{\rho F_{\theta}\left(\bar{\lambda}\right) + \left(1 - F_{\theta}\left(\bar{\lambda}\right)\right)}. \tag{18}$$

Extension: Type-Specific Wages

- If wages are fully type-specific ($\alpha = 1$, $\hat{w}(\theta) = w(\theta)$):

$$\underbrace{\int_{\bar{\lambda}}^{1} \lambda dF_\theta(\lambda)}_{\text{Expected Output}} - \left[\underbrace{F_\theta\left(\bar{\lambda}\right) \eta\rho w(\theta)}_{\text{Disabled}} + \underbrace{\left(1 - F_\theta\left(\bar{\lambda}\right)\right) w(\theta)}_{\text{Working}} \right] > M \tag{19}$$

$$\int_{\bar{\lambda}}^{1} \lambda dF_\theta(\lambda) - \frac{\eta\rho F_\theta\left(\bar{\lambda}\right) + \left(1 - F_\theta\left(\bar{\lambda}\right)\right)}{\rho F_\theta\left(\bar{\lambda}\right) + \left(1 - F_\theta\left(\bar{\lambda}\right)\right)} \left(\int_{\bar{\lambda}}^{1} \lambda dF_\theta(\lambda) - M \right) > M \tag{20}$$

- Since $\eta \leq 1$, this condition is equally satisfied for all θ
- If all workers can be offered their own expected product in wage, there is no loss on the selection margin, but there are distributional consequences (differentiated wages and pass-through)

Type-Specific Wages

- In the general case ($\hat{w}(\theta) = \alpha w(\theta) + (1-\alpha)w$), the hiring threshold $\bar{\theta}$ solves

$$\underbrace{\int_{\bar{\lambda}}^{1} \lambda dF_{\bar{\theta}}(\lambda)}_{\text{Expected Output}} - \left[\underbrace{F_{\bar{\theta}}\left(\bar{\lambda}\right)\eta\rho}_{\text{Disabled}} + \underbrace{\left(1 - F_{\bar{\theta}}\left(\bar{\lambda}\right)\right)}_{\text{Working}} \right] \left(\alpha w\left(\bar{\theta}\right) + (1-\alpha)w\right) = 0. \tag{21}$$

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Summary Statistics

	Permanent Workers	Temporary Work Agency Workers
Mean Hourly Wage (euros)	22.3	13.0
Female (%)	46	54
Age 18-30 (%)	15.2	54.3
Age 31-40 (%)	23.3	18.7
Age 41-50 (%)	29.2	15.5
Age 51-65 (%)	32.4	11.4
Mean Healthcare Spending (euros)	1482	1224
Vocational Education (%)	48.1	63.7
Secondary Education (%)	6.6	9.0
Tertiary Education (%)	45.3	27.3
Disability Insurance Benefit Receipt (%)	0.36	0.47
Employed Next Year (%)	96.3	87.3
At Same Firm Next Year (%)	83.9	38.9
Worker-years	40,496,153	2,020,368

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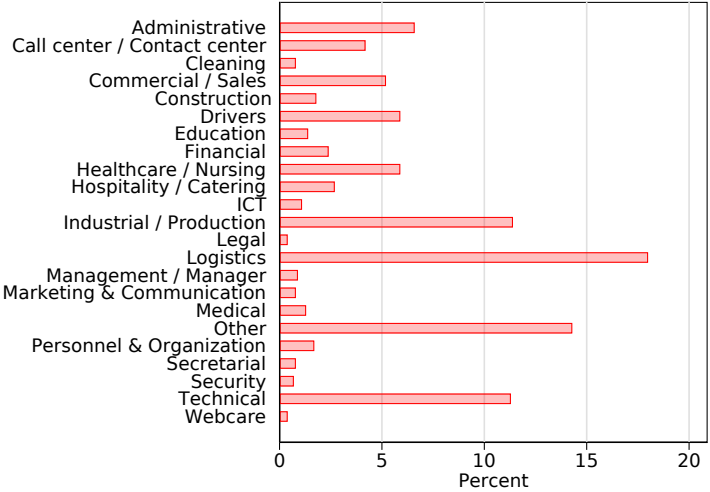
Job Types in Largest Temp Work Agency



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Disability Insurance Benefit Receipt—Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	0.0297	0.0645*	0.0307***	0.0344***	-0.0244	0.0292	0.0575***	0.0601***
	(0.0425)	(0.0366)	(0.0034)	(0.0035)	(0.0396)	(0.0351)	(0.0024)	(0.0025)
Treatment	0.02819***	0.2571***	0.1679***	0.1468***	0.3459***	0.3246***	0.01664***	0.1411***
	(0.0345)	(0.0338)	(0.0184)	(0.0179)	(0.0182)	(0.0171)	(0.0394)	(0.0402)
Post × Treatment	-0.1203***	-0.1022***	-0.0835***	-0.0624***	-0.098***	-0.0766***	-0.1182***	-0.0996***
	(0.0113)	(0.0099)	(0.0169)	(0.0163)	(0.0154)	(0.0143)	(0.0106)	(0.0100)
Pre-2013 Mean	0.508	0.483	0.508	0.483	0.508	0.483	0.508	0.483
Observations	41,323,389	36,056,213	42,516,521	36,998,766	41,323,389	36,056,213	42,516,521	36,998,766
Controls	×	×			×	×		
Firm Fixed Effects	×	×					×	×
Exclude 2009		×		×		×		×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Disability Insurance Benefit Receipt—Results

	(1) Overall	(2) Musculo-skeletal	(3) Mental Health	(4) Male	(5) Female	(6) Age 18-30	(7) Age 31-40	(8) Age 41-50	(9) Age 51-65
Post	0.0297	0.0039	0.0504***	0.0119	0.0714	-0.0419	0.0557	-0.1358	0.2033**
	(0.0425)	(0.0230)	(0.0194)	(0.0659)	(0.0670)	(0.0759)	(0.0791)	(0.0833)	(0.1020)
Treatment	0.2819***	0.0853***	0.1203***	0.2573***	0.2935***	0.0985***	0.4455***	0.4795***	0.5340***
	(0.0345)	(0.0103)	(0.0159)	(0.0222)	(0.0515)	(0.0306)	(0.0555)	(0.0662)	(0.0588)
Post	-0.1203***	-0.0251***	-0.0451***	-0.1100***	-0.1392***	-0.0110	-0.2002***	-0.2359***	-0.2564***
× Treatment	(0.0113)	(0.0051)	(0.0067)	(0.0119)	(0.0178)	(0.0088)	(0.0295)	(0.0324)	(0.0838)
Pre-2013 Mean	0.508	0.123	0.206	0.473	0.559	0.212	0.731	0.969	1.18
Observations	41,323,389	41,323,389	41,323,389	22,241,289	19,082,100	7,063,749	9,489,728	11,781,079	12,988,833
Controls	×	×	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Disability Insurance Benefit Receipt—Results

	(10) Overall	(11) Wage Q1	(12) Wage Q2	(13) Wage Q3	(14) Wage Q4	(15) Predicted DI Q1	(16) Predicted DI Q2	(17) Predicted DI Q3	(18) Predicted DI Q4
Post	0.0297	-0.0908	0.0206	0.2726*	0.0046	0.0621	0.0399	-0.0142	0.1816*
	(0.0425)	(0.1686)	(0.2074)	(0.1451)	(0.0495)	(0.0450)	(0.0610)	(0.0843)	(0.1072)
Treatment	0.2819***	-0.054	-0.009	0.1867***	0.5558***	0.1401***	0.2412***	0.2940***	0.5441***
	(0.0345)	(0.0409)	(0.0697)	(0.0535)	(0.0379)	(0.0172)	(0.0258)	(0.0551)	(0.0897)
Post	-0.1203	-0.0241	-0.0581***	-0.1412***	-0.1880***	-0.0693***	-0.0798***	-0.1263***	-0.2433***
× Treatment	(0.0113)	(0.0169)	(0.0238)	(0.0276)	(0.0317)	(0.0127)	(0.0200)	(0.0225)	(0.0315)
Pre-2013 Mean	0.508	0.228	0.449	0.584	0.787	0.255	0.354	0.583	1.08
Observations	41,323,389	2,123,230	2,869,229	4,631,303	31,699,627	9,073,541	8,935,310	8,841,373	8,664,911
Controls	×	×	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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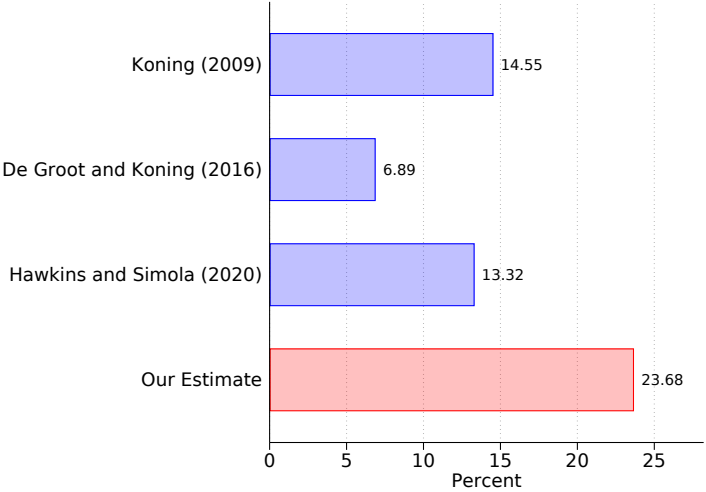
Disability Insurance Benefit Receipt—Comparison with Prior Studies



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Short-Term Disability Insurance Benefit Receipt—Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-3.7244***	-2.9726***	-4.6376***	-3.8700***	-3.0668***	-2.5043***	-3.8153***	-3.2389***
	(0.4897)	(0.4893)	(0.3922)	(0.3915)	(0.3491)	(0.3387)	(0.3439)	(0.3387)
Pre-2013 Mean	19.5	18.7	19.5	18.7	19.5	18.7	19.5	18.7
Observations	2,020,368	1,746,064	1,913,287	1,662,019	2,020,368	1,746,064	1,913,287	1,662,019
Controls	×	×			×	×		
Firm Fixed Effects	×	×					×	×
Exclude 2009		×		×		×		×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(1) Overall	(2) Male	(3) Female	(4) Age 18-30	(5) Age 31-40	(6) Age 41-50	(7) Age 51-65
Post	-3.8153***	-3.9316***	-3.7034***	-3.6759***	-4.8185***	-3.9931***	-2.6326***
	(0.3439)	(0.3685)	(0.4413)	(0.408)	(0.4143)	(0.2816)	(0.2954)
Pre-2013 Mean	19.5	18.5	21	17.2	24.9	22.7	18.3
Observations	1,913,287	1,168,804	744,483	1,055,882	353,359	291,982	212,064
Controls	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(10) Overall	(11) Wage Q1	(12) Wage Q2	(13) Wage Q3	(14) Wage Q4	(15) Predicted DI Q1	(16) Predicted DI Q2	(17) Predicted DI Q3	(18) Predicted DI Q4
Post	-3.8153***	-1.9311***	-3.8879***	-4.5295***	-4.4635***	-3.6991***	-3.7534***	-4.0143***	-4.0256***
	(0.3439)	(0.3054)	(0.5630)	(0.2746)	(0.4319)	(0.3025)	(0.3167)	(0.3474)	(0.4478)
Pre-2013 Mean	19.5	18.8	23.0	20.3	15.1	16	18	22.2	28.2
Observations	1,913,287	475,323	470,879	480,969	486,116	393,647	437,209	366,642	309,221
Controls	×	×	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-6.9019***	-6.0110***	-8.2342***	-7.3050***	-6.5590***	-5.8989***	-7.6911***	-6.9972***
	(1.2330)	(1.3052)	(1.0734)	(1.1744)	(1.2157)	(1.2276)	(1.1781)	(1.2045)
Pre-2013 Mean	21.15	20.26	21.15	20.26	21.15	20.26	21.15	20.26
Observations	2,020,368	1,746,064	1,913,287	1,662,019	2,020,368	1,746,064	1,913,287	1,662,019
Controls	×	×			×	×		
Firm Fixed Effects	×	×					×	×
Exclude 2009		×		×		×		×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(1) Overall	(2) Male	(3) Female	(4) Age 18-30	(5) Age 31-40	(6) Age 41-50	(7) Age 51-65
Post	-7.6911***	-7.5524***	-7.9795***	-5.5777***	-10.5455***	-11.3022***	-8.2219***
	(1.1781)	(0.9529)	(1.5764)	(1.0069)	(1.6348)	(1.5532)	(1.0338)
Pre-2013 Mean	21.15	18.83	24.56	14.76	29.84	31.25	28.1
Observations	1,913,287	1,168,804	744,483	1,055,882	353,359	291,982	212,064
Controls	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(10) Overall	(11) Wage Q1	(12) Wage Q2	(13) Wage Q3	(14) Wage Q4	(15) Predicted DI Q1	(16) Predicted DI Q2	(17) Predicted DI Q3	(18) Predicted DI Q4
Post	-7.691***	-4.2224***	-8.1151***	-9.5852***	-8.7047***	-5.5327***	-6.6775***	-8.9551***	-11.6762***
	(1.1781)	(0.7942)	(1.4833)	(1.2493)	(1.0832)	(0.7905)	(0.9632)	(1.3784)	(2.0100)
Pre-2103 Mean	21.15	12.51	21.15	24.88	26.43	13.19	16.75	24.58	39.30
Observations	1,913,287	475323	470879	480,969	486,116	393,647	437,209	366,642	309,221
Controls	×	×	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-18.148***	-17.746***	-27.917***	-26.627***	-19.242***	-19.134***	-27.668***	-26.861***
	(4.997)	(5.298)	(4.063)	(4.505)	(5.847)	(5.962)	(4.800)	(5.030)
Pre Mean	108.5	108.1	108.5	108.1	108.5	108.1	108.5	108.1
Observations	360,551	300,675	349,857	292,879	360,551	300,675	349,857	292,879
Controls	×	×			×	×		
Firm Fixed Effects	×	×					×	×
Exclude 2009		×		×		×		×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(1) Overall	(2) Male	(3) Female	(4) Age 18-30	(5) Age 31-40	(6) Age 41-50	(7) Age 51-65
Post	-27.6677***	-28.5402***	-26.576***	-20.8513***	-30.0137***	-37.9391***	-35.9832***
	(4.8000)	(4.3240)	(5.7626)	(4.3708)	(5.3618)	(6.2672)	(5.4601)
Pre-2013 Mean	108.5	101.8	117.2	85.77	119.7	137.9	153.8
Observations	349,857	203,487	146,370	171,151	81,576	60,796	36,334
Controls	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Short-Term Disability Insurance Benefit Receipt—Results

	(10) Overall	(11) Wage Q1	(12) Wage Q2	(13) Wage Q3	(14) Wage Q4	(15) Predicted DI Q1	(16) Predicted DI Q2	(17) Predicted DI Q3	(18) Predicted DI Q4
Post	-27.6677***	-23.6906***	-28.1704***	-30.6312***	-27.5563***	-25.3541***	-25.3432***	-27.9697***	-29.4047***
	(4.8001)	(4.5064)	(5.5027)	(4.5490)	(5.0051)	(3.9138)	(4.4296)	(5.0702)	(6.1795)
Pre-2013 Mean	108.5	97.42	105.6	106.9	119.6	82.56	93.29	110.6	139.3
Observations	349,857	59,089	89,324	103,372	98,072	53,397	70,358	74,258	80,715
Controls	×	×	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Employment—Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-0.0233	-0.2717	-0.0003	0.0597	0.9830***	0.7550***	-0.7666***	-0.7522***
	(0.1903)	(0.2060)	(0.0411)	(0.0407)	(0.2107)	(0.1651)	(0.0249)	(0.0248)
Treatment	-8.7358***	-8.8754***	-10.2225***	-10.1437***	-10.1190***	-10.0357***	-8.6107***	-8.7738***
	(0.8585)	(0.7821)	(0.3605)	(0.3906)	(0.3340)	(0.3537)	(0.9360)	(0.8538)
Post	2.5264***	2.5712***	0.27485***	2.6697***	2.2655***	2.2425***	3.0867***	3.064***
× Treatment	(0.1515)	(0.1787)	(0.2928)	(0.3142)	(0.2674)	(0.2767)	(0.1639)	(0.1967)
Pre-2013	86	86.1	86	86.1	86	86.1	86	86.1
Mean								
Observations	41,323,389	36,056,213	42,516,521	36,998,766	41,323,389	36,056,213	42,516,521	36,998,766
Controls	×	×			×	×		
Firm Fixed Effects	×	×					×	×
Exclude 2009		×		×		×		×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Employment—Results

	(1) Overall	(2) Male	(3) Female	(4) Age 18-30	(5) Age 31-40	(6) Age 41-50	(7) Age 51-65
Post	-0.0233	0.2487	-0.5186*	-0.3879	-1.3757***	-0.9889***	1.7182***
	(0.1903)	(0.1983)	(0.3006)	(0.3906)	(0.2259)	(0.1917)	(0.4079)
Treatment	-8.7358***	-8.4303***	-9.0336***	-6.9677***	-10.689***	-10.423***	-10.9235***
	(0.8585)	(0.7592)	(0.9773)	(0.7704)	(0.6664)	(0.9527)	(1.1812)
Post	2.5264***	2.7077***	2.2325***	2.0561***	3.5479***	3.8426***	3.7762***
× Treatment	(0.1515)	(0.1418)	(0.2331)	(0.1761)	(0.1879)	(0.1732)	(0.4376)
Pre-2013 Mean	86.0	86.0	86.1	88.0	84.8	84.2	79.5
Observations	41,323,389	22,241,289	19,082,100	7,063,749	9,489,728	11,781,079	12,988,833
Controls	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Employment—Results

	(10) Overall	(11) Wage Q1	(12) Wage Q2	(13) Wage Q3	(14) Wage Q4	(15) Predicted DI Q1	(16) Predicted DI Q2	(17) Predicted DI Q3	(18) Predicted DI Q4
Post	-0.0233	-0.4469	-0.778	-1.0057**	0.2212	-0.4525**	-0.5605**	0.4168	0.009
	(0.1903)	(1.2131)	(0.7135)	(0.4911)	(0.1871)	(0.2161)	(0.2405)	(0.2858)	(0.3738)
Treatment	-8.7358***	-7.8843***	-7.6922***	-7.8030***	-8.9649***	-7.6470***	-7.5332***	-8.2668***	-9.8901***
	(0.8585)	(0.9026)	(1.6078)	(1.1024)	(0.69825)	(0.6707)	(0.7614)	(0.7715)	(0.9203)
Post	2.5264***	3.3352***	2.4907***	2.8234***	2.2723***	2.3539***	1.5961***	1.9149***	2.7113***
× Treatment	(0.1515)	(0.3981)	(0.2500)	(0.2063)	(0.2094)	(0.2323)	(0.1441)	(0.1990)	(0.2564)
Pre-2013 Mean	86	83.5	86.6	88	86.1	88.4	87.9	87.2	83.9
Observations	41,323,389	2,123,230	2,869,229	4,631,303	31,699,627	9,073,541	8,935,310	8,841,373	8,664,911
Controls	×	×	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Employment—Results

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Post	-0.0233	-0.2717	-0.0003	0.0597	0.9830***	0.7550***	-0.7666***	-0.7522***
	(0.1903)	(0.2060)	(0.0411)	(0.0407)	(0.2107)	(0.1651)	(0.0249)	(0.0248)
Treatment	-8.7358***	-8.8754***	-10.2225***	-10.1437***	-10.1190***	-10.0357***	-8.6107***	-8.7738***
	(0.8585)	(0.7821)	(0.3605)	(0.3906)	(0.3340)	(0.3537)	(0.9360)	(0.8538)
Post	2.5264***	2.5712***	0.27485***	2.6697***	2.2655***	2.2425***	3.0867***	3.064***
× Treatment	(0.1515)	(0.1787)	(0.2928)	(0.3142)	(0.2674)	(0.2767)	(0.1639)	(0.1967)
Pre-2013	86	86.1	86	86.1	86	86.1	86	86.1
Mean								
Observations	41,323,389	36,056,213	42,516,521	36,998,766	41,323,389	36,056,213	42,516,521	36,998,766
Controls	×	×			×	×		
Firm Fixed Effects	×	×					×	×
Exclude 2009		×		×		×		×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Employment—Results

	(1) Overall	(2) Male	(3) Female	(4) Age 18-30	(5) Age 31-40	(6) Age 41-50	(7) Age 51-65
Post	-0.0233	0.2487	-0.5186*	-0.3879	-1.3757***	-0.9889***	1.7182***
	(0.1903)	(0.1983)	(0.3006)	(0.3906)	(0.2259)	(0.1917)	(0.4079)
Treatment	-8.7358***	-8.4303***	-9.0336***	-6.9677***	-10.689***	-10.423***	-10.9235***
	(0.8585)	(0.7592)	(0.9773)	(0.7704)	(0.6664)	(0.9527)	(1.1812)
Post	2.5264***	2.7077***	2.2325***	2.0561***	3.5479***	3.8426***	3.7762***
× Treatment	(0.1515)	(0.1418)	(0.2331)	(0.1761)	(0.1879)	(0.1732)	(0.4376)
Pre-2013 Mean	86.0	86.0	86.1	88.0	84.8	84.2	79.5
Observations	41,323,389	22,241,289	19,082,100	7,063,749	9,489,728	11,781,079	12,988,833
Controls	×	×	×	×	×	×	×
Firm Fixed Effects	×	×	×	×	×	×	×

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Worker Selection—Results

	(1) Actual	(2) Actual	(3) Predicted	(4) Predicted
Post	0.0601***	0.0344***	0.0061***	0.0045***
	(0.0025)	(0.0035)	(0.0002)	(0.0004)
Treatment	0.1411***	0.1468***	-0.0164***	-0.0245***
	(0.0402)	(0.0179)	(0.0035)	0.0018
Post × Treatment	-0.0996***	-0.0624***	-0.0098***	-0.0083***
	(0.0100)	(0.0163)	(0.0010)	(0.0013)
Pre-2013 Mean	0.483	0.483	0.33	0.33
Observations	36,998,766	36,998,766	35,997,218	35,997,218
Firm Fixed Effects	×		×	

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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