Permanent exemption from social security contributions in Belgium: The role of hiring frictions

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Disclaimer: The views expressed in this study are those of the authors and do not necessarily reflect those of the NBB.

The policy

In October 2015, the Belgian government unexpectedly announced that firms that started hiring after January 1, 2016, would be permanently exempt from the social security contributions (SSC) for one employee.

After the reform, new employers pay a rate of SSC on an employee's monthly gross wage of about 3% vs 18% before.

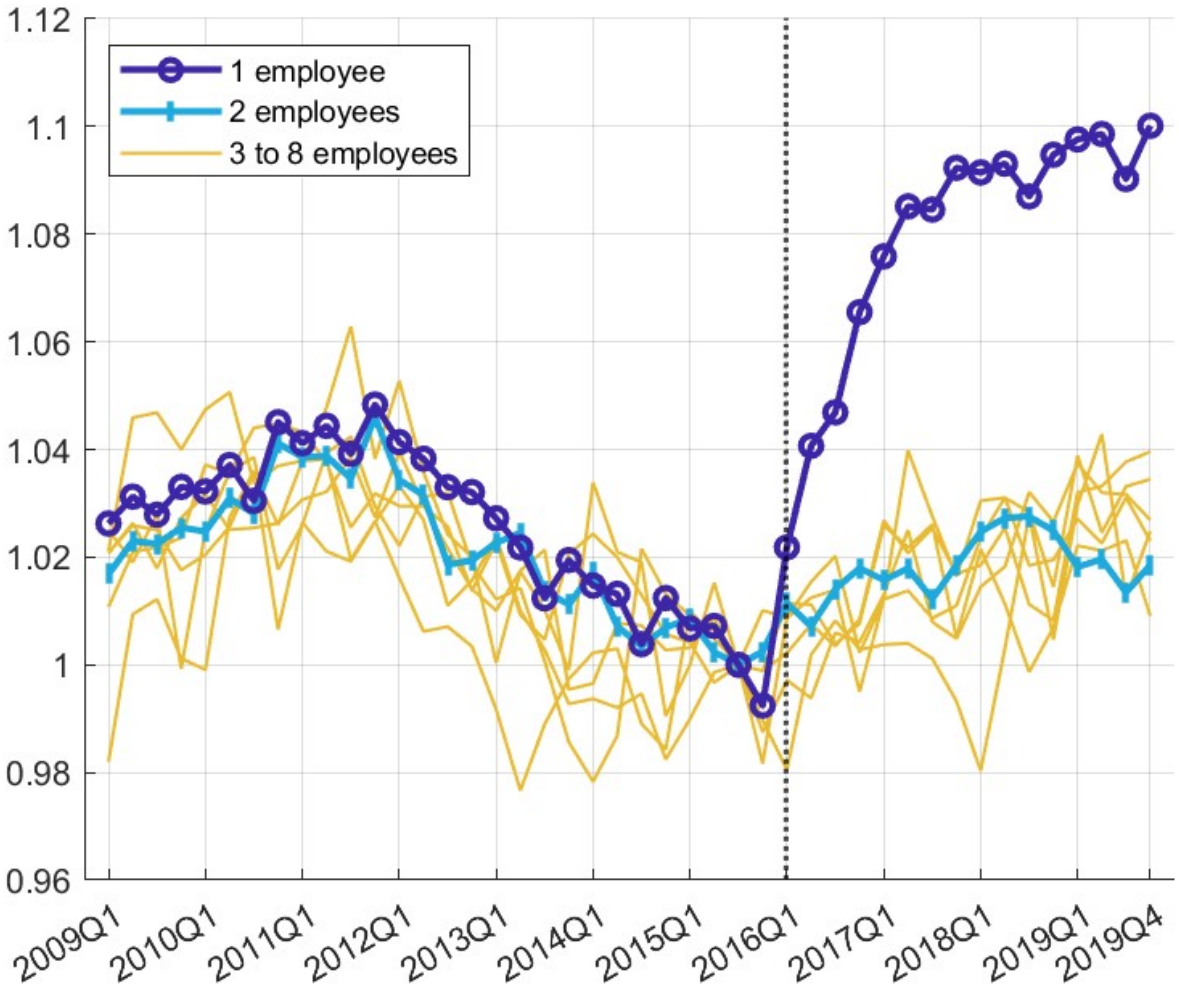
Motivation (1)

Cockx and Desiere (2024) and Deng et al. (2024) find that:

- The number of new employers increased following the reform;
- Most of these new employers remained single-employee firms.

Motivation (2)

Evolution stock of firms



The figure illustrates the changes in the stock of firms with 1 to 8 employees. For each firms' group, we normalize the number of firms to 1 in 2015Q3. The vertical dashed line marks the beginning of the policy in 2016.

The paper in brief (1)

We aim to examine whether and how the policy has influenced the hiring behavior of:

- Agents who would have become employers even without the policy - *infra-marginal* employers.
- Agents who would not have become employers without the policy - *marginal* employers;

The paper in brief (2)

Marginal employers account for the majority of the increase in the number of single-employee firms. Few of these new employers hire more than one employee:

- For marginal employers to grow beyond a single employee, they need to experience an increase in their idiosyncratic productivity $\Rightarrow$ Their estimated productivity is relatively stable over time.

Infra-marginal employers do not respond to the reduction in the SSC:

- Pre-reform, they were already filling their desired number of vacancies at the highest rate, leaving no room for the policy to increase their job-filling rate further.

Literature

Literature on size-dependent policies (Guner et al., 2008; Braguinsky et al., 2011; Gourio and Roys, 2014; Garicano et al., 2016; Cahuc et al., 2023; Rotemberg, 2019)

- Our policy influences the extensive margin decision to become an employer, rather than the decision concerning the number of employees;
- We differentiate eligible firms between the infra-marginal and marginal new employers.

Equilibrium job search models that examine spillover effects and labor market frictions in the context of payroll tax reductions (Shephard, 2017; Wang et al., 2023; Bíró et al., 2022; Cahuc et al., 2019, 2022):

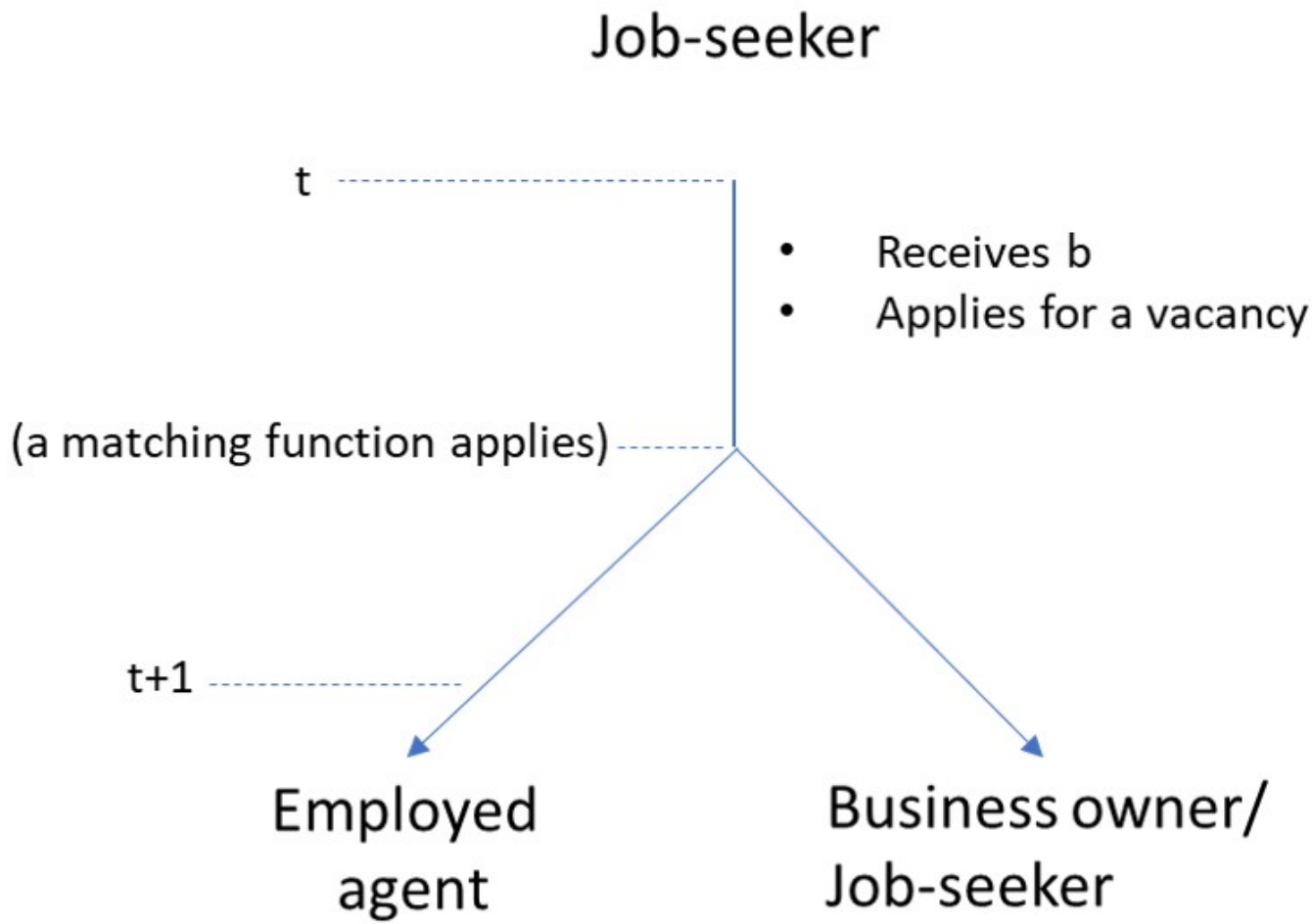
- We assess a permanent exemption rather than temporary reductions in SSC;
- The exemption is directly linked to the gross wages offered by firms.

The model (1)

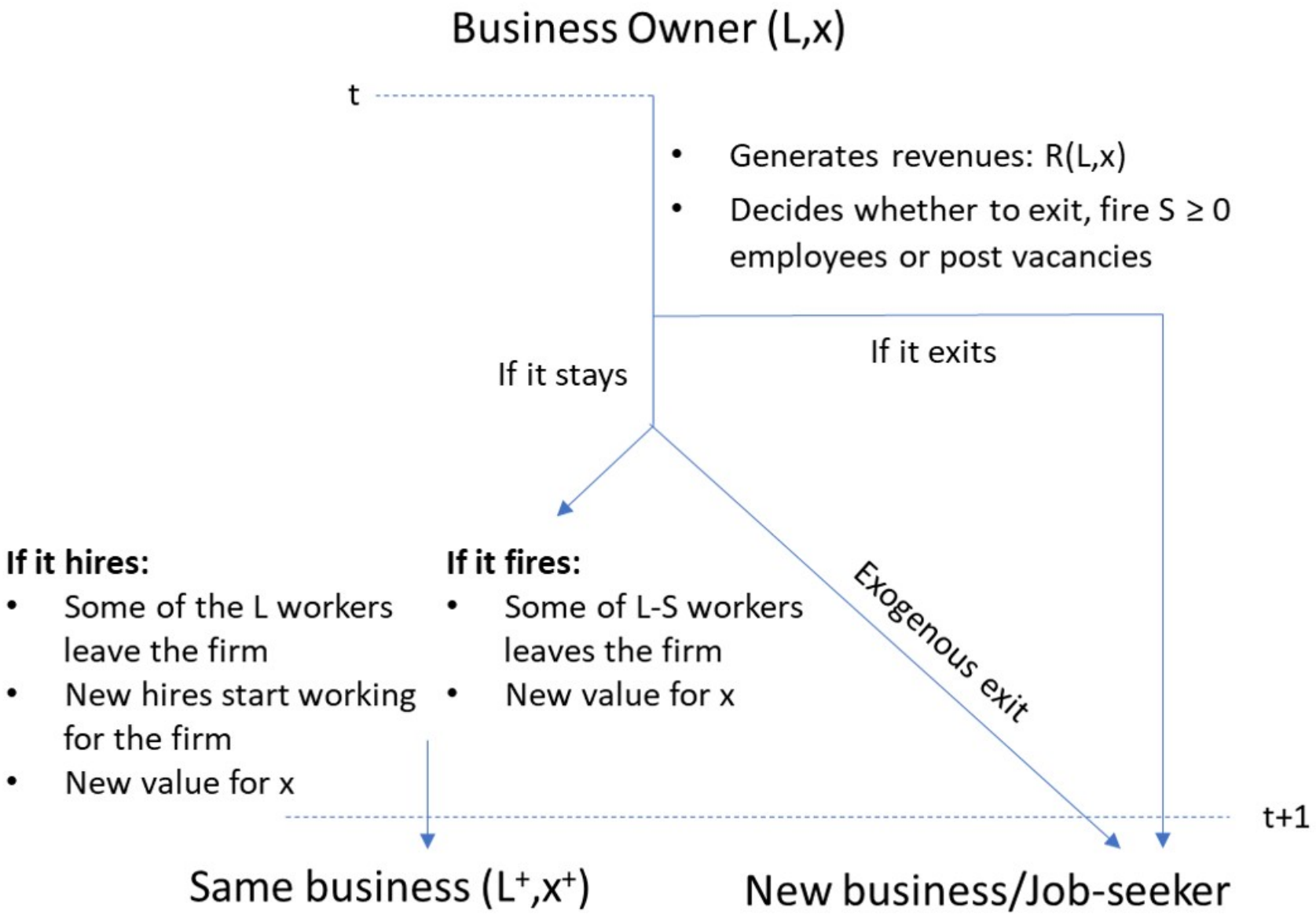
The model is based on the directed search model of Kaas and Kircher (2015).

- Constant mass of agents who are infinitely-lived, risk-neutral, and discount future income with a factor $\beta < 1$.
- At the beginning of each period, each agent can be employed, search for a job, or run a firm.
- Firms are multi-worker and heterogeneous in productivity; they produce a homogeneous good, using homogeneous labour, and the market for this good is perfectly competitive.

The model (2): Job-seekers' problem



The model (3): Business owners' problem



The model (4): How we introduce the exemption

- Before the reform, all firms pay a tax rate $\tau > 0$ on the wages of all their workers.
- Then, firms that begin hiring after the policy announcement pay a tax rate of $0 \leq \tau_1 < \tau$ on the wage of a single employee, while they continue to pay the rate τ on the wages of their other employees.

The model (4): How we introduce the exemption

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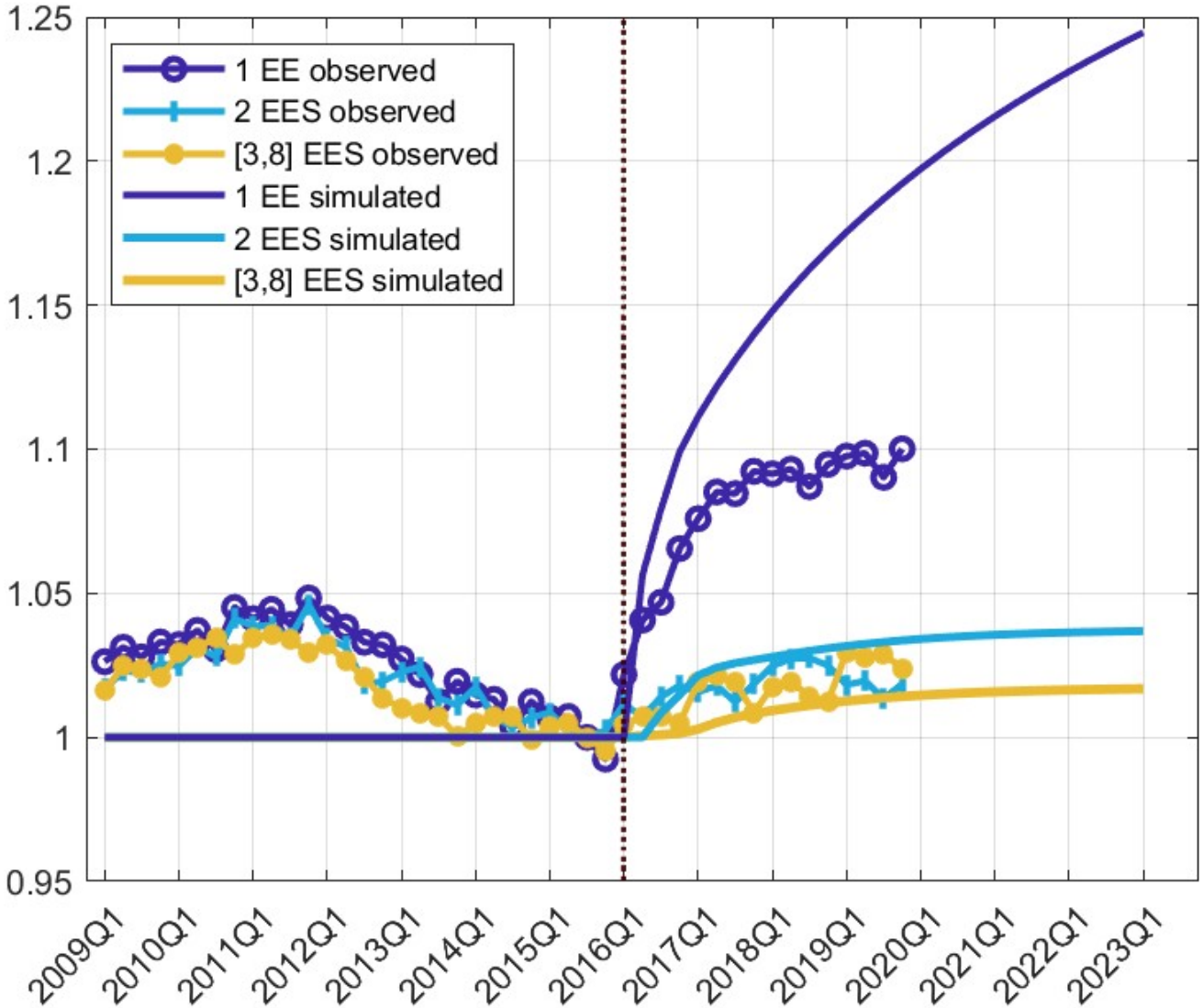
Estimation

We estimate internally 12 parameters, so as to minimize the square of the percentage difference between some moments computed using the data and the respective moments computed using the model.

- Data used in the estimation
- Estimation procedure
- External validation

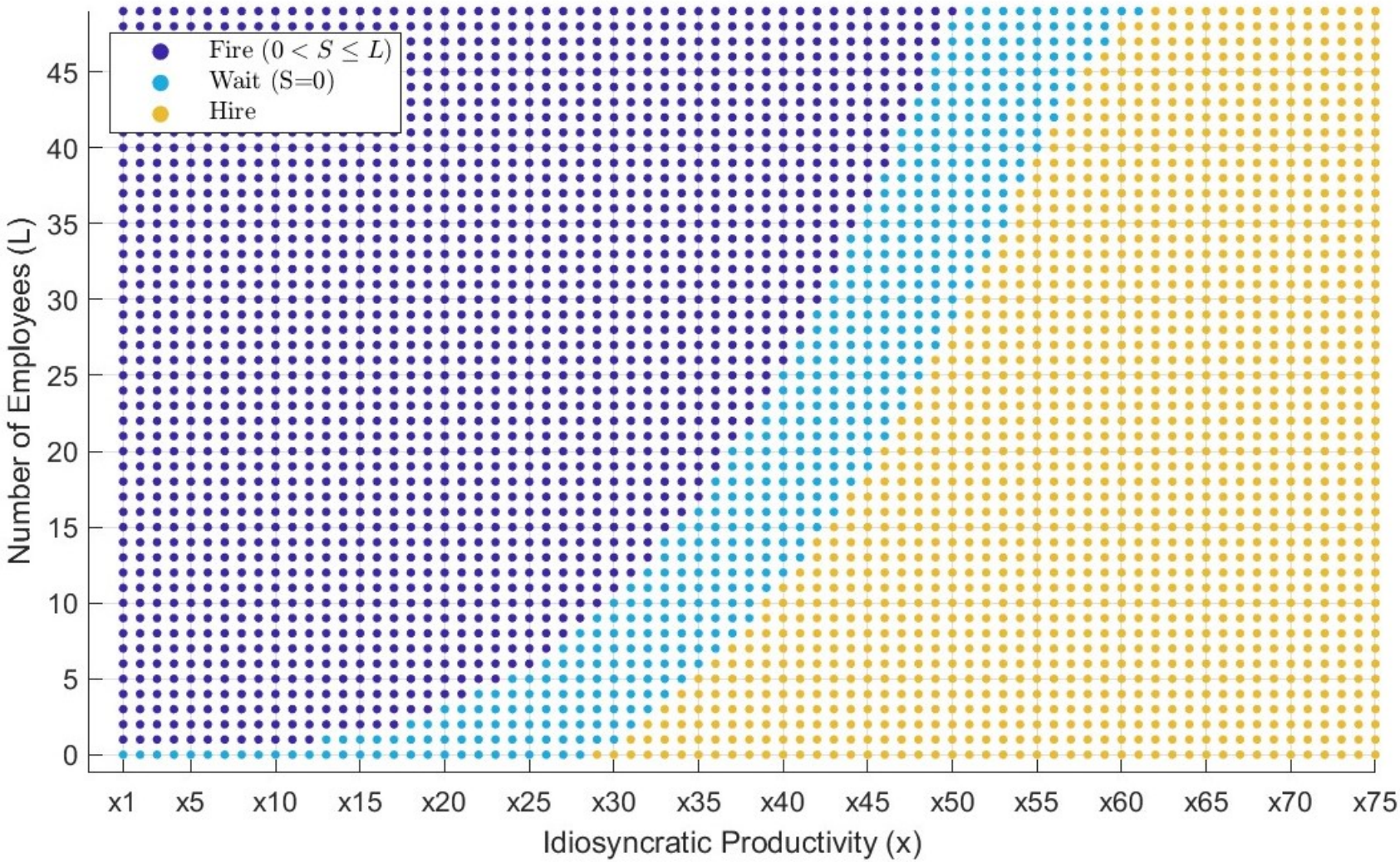
Evolution stock of firms

Observed vs. simulated

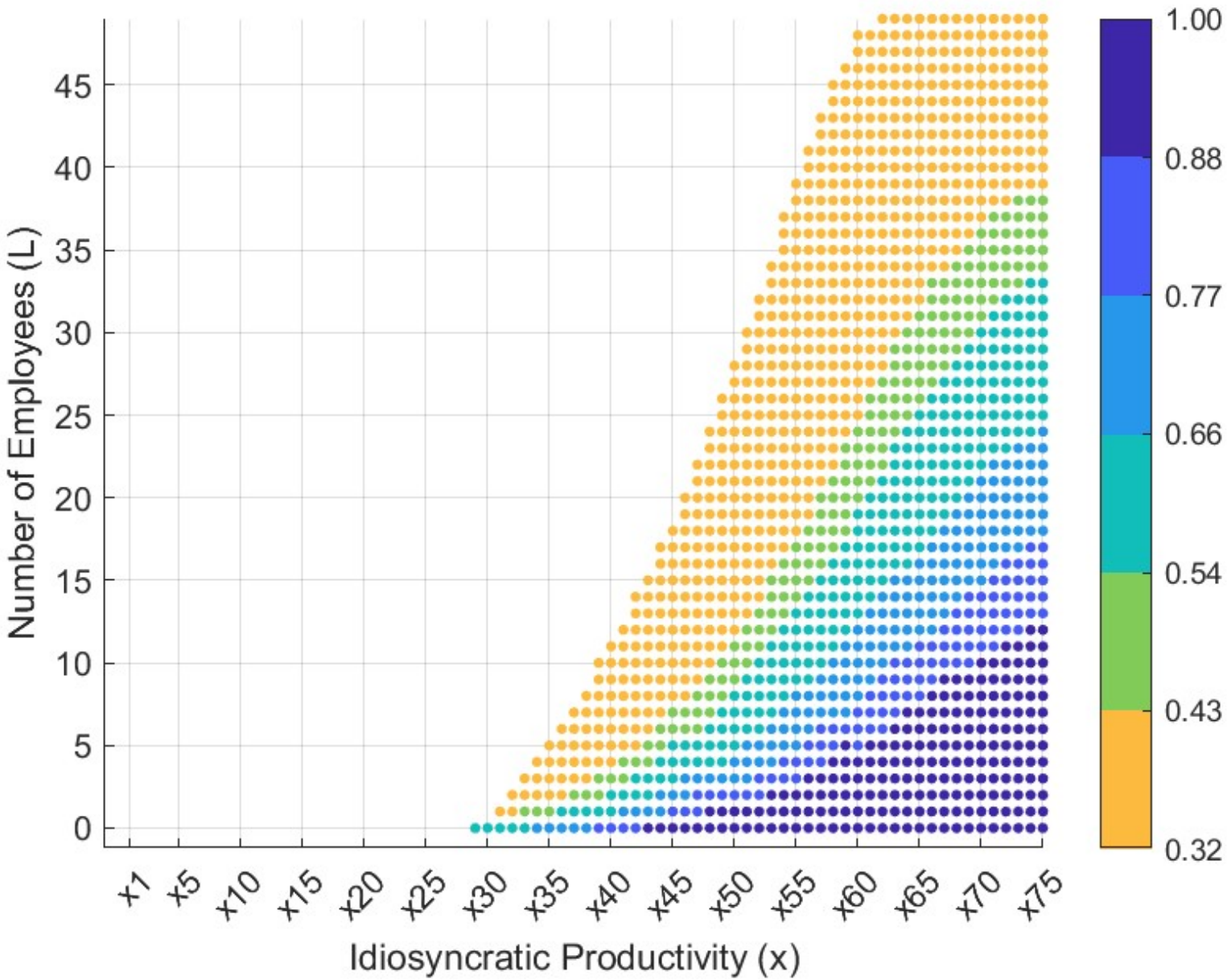


The figure illustrates changes in the stock of firms with 1, 2, and [3,8] employees. For each group of firms, we normalise the number of firms to 1 in 2015Q3. The vertical dotted line marks the beginning of the policy in 2016.

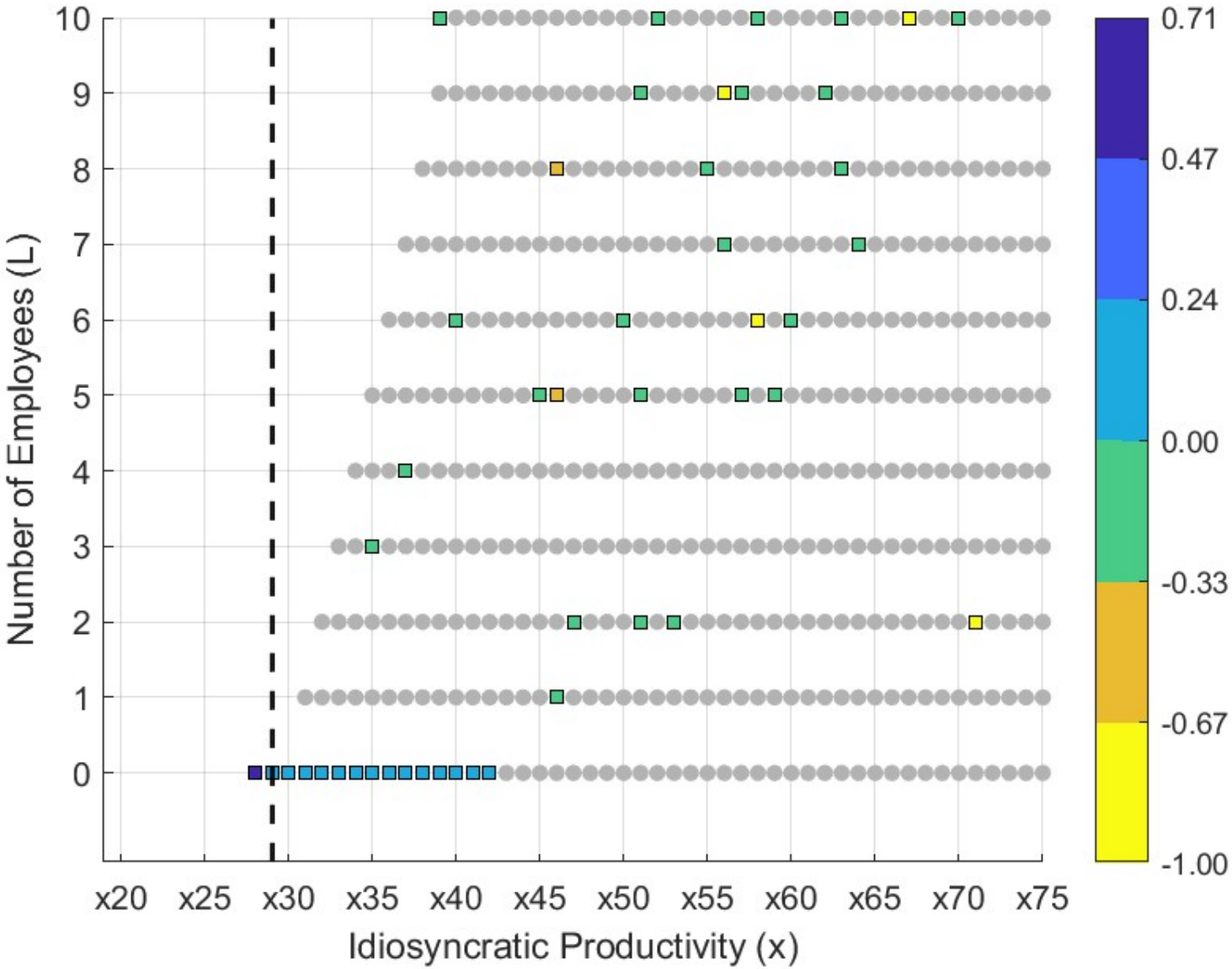
Firms' optimal policy before the reform



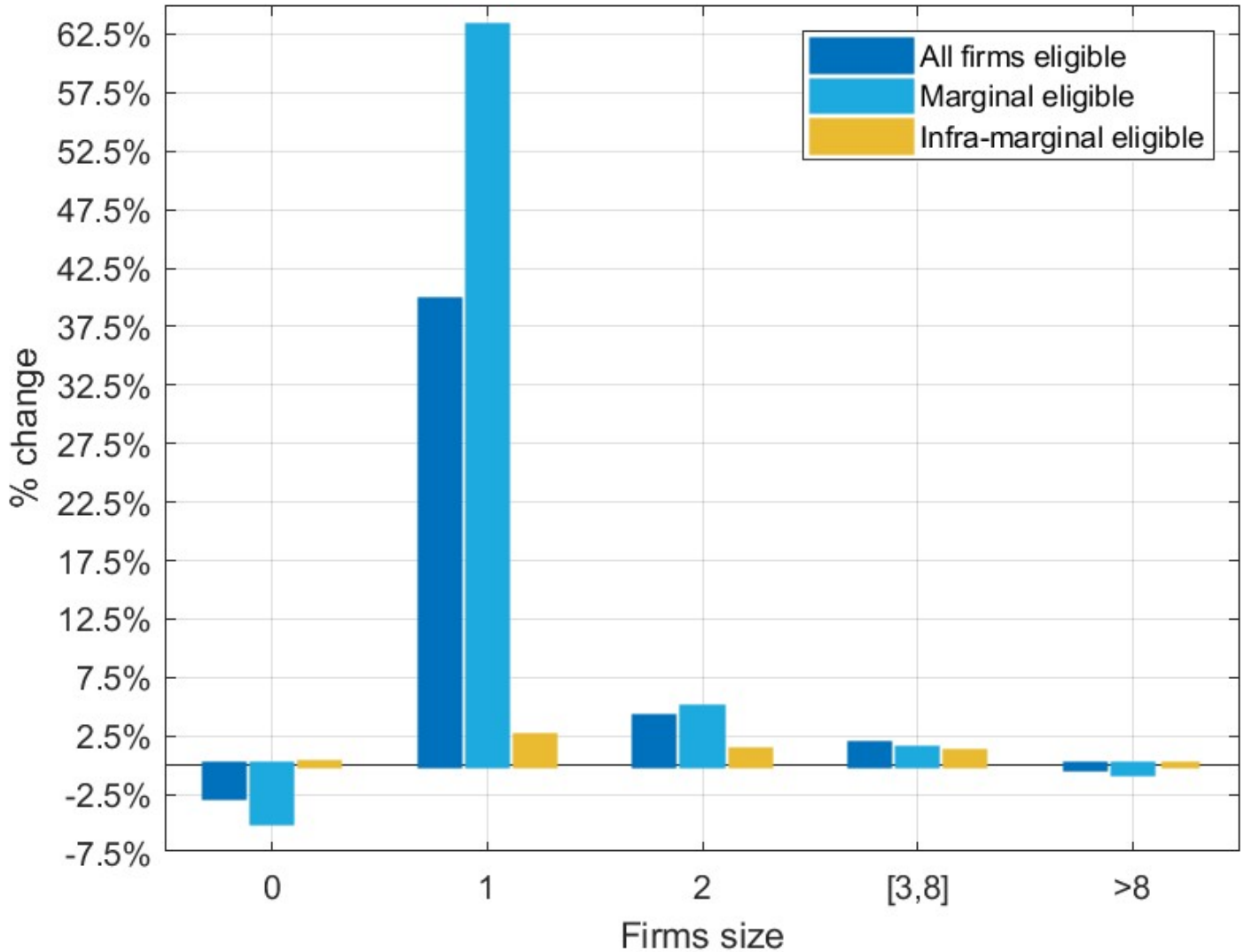
Firms' vacancy filling rate - before the reform



Change in the after-reform number of hires



Change (in %) in the stock of firms



This figure shows the change in the stock of firms with 0, 1, 2, [3,8], and more than 9 employees between the before and after steady states.

Conclusions

For a *marginal* employers to expand beyond a single employee, it needs to experience a positive idiosyncratic productivity shock:

- The probability of a quarterly productivity increase large enough to make them want to hire more than 1 employee is approximately 13%.
- Even if they experience a productivity increase, they would still likely post a few vacancies with a low job-filling rate.

Few *infra-marginal* employers respond to the reduction in SSC:

- Most firms with zero employees, who would have hired in the absence of the policy, were already filling their desired number of vacancies at the highest rate.

The increase in hiring costs caused by the policy is not substantial (about 1.36%) and only minimally affects the firms' employment distribution.

Thank you for your attention!

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Appendixes

The data used to calibrate the model:

- Panel of firms that have between 0 and 15 employees for at least one quarter between 2009q1 and 2020q4 from the National Bank of Belgium (NBB);
- The number of firms with more than 10 employees and their respective employees counts reported by the Belgian Statistical Office (Statbel);
- The unemployment rate reported by Stabel;
- The vacancy rate reported by Eurostat.

Appendix: NBB (National Bank of Belgium) dataset

For each of these firms, we know:

- Quarter in which the firm was founded – i.e. when the firm got the CBE number;
- Firm's official closure date (if any);
- Total firm' turnover in the quarter (this information is missing for firms that are not liable to VAT)
- Total firm' remuneration over the quarter (total wages + net employers' SSC);
- Net employer's SSC;
- Total SSC reductions.
- Number of full-time and part-time employees for whom the firm pays social security contributions (on the last day of the quarter);
- Sector (nace2);
- Region;
- District.

Parameters that are externally set or standardized

- The quarterly discount rate $\beta = 1.3\%$;
- For the pre-reform period, we set the rate of employers' SSC equal to 18.3% for all workers. For the post-reform period, we set the rate of employers' SSC to 2.9% for one employee for eligible firms;
- Number of levels for the idiosyncratic productivity $n = 75$;
- The minimum idiosyncratic productivity $x_1 = 1$;
- The value of home production b=0;
- The quarterly exogenous exit rate $\delta_0 = 0.0012$;
- The elasticity of the matching function with respect to λ.

Estimation

We jointly estimate the parameters of our model to minimize:

$$(\hat{\theta} - \theta)' W^{-1} (\hat{\theta} - \theta) \tag{1}$$

Where θ is the vector of empirical moments, $\hat{\theta}$ are the model simulated counterparts. The matrix W contains the square of $min(\theta, \hat{\theta})$ on the main diagonal, with zeros elsewhere.

Internally estimated parameters

Internally set parameters		
x_n	highest value X	17.98
μ_{ln}	mean log-normal distribution	780
σ_{ln}	sd log-normal distribution	113
$\sigma_{\mathcal{N}}$	standard deviation shocks random walk	0.52
α	production function elasticity	0.89
μ_V	scale parameter cost of posting vacancies	12.33
γ_V	elasticity cost of posting vacancies wrt vacancy number	2.85
γ_L	elasticity cost of posting vacancies wrt number of employees	1.10
μ_m	scale parameter matching function	0.32
μ_o	scale parameter operating cost employers	1.32
γ_o	elasticity operating cost wrt L	1.26
s_b	sunk cost to open a firm	221

Match between observed and simulated moments (1)

		From the data	Simulated
Firms with 0, 1, 2, 3, 4, and 5 over the total number of firms	N_0/N	79.09%	72.91%
	N_1/N	6.50%	4,54%
	N_2/N	3.51%	2.36%
	N_3/N	2.21%	1.93%
	N_4/N	1.52%	1.65%
	N_5/N	1.08%	1.45%
Proportion of employment in firms with [1,9] employees		11.63%	7.19%
Number of new firms with 0, 1, and 2 employees (EES) at entry	$N_{new,0}$	95.95%	94.65%
	$N_{new,1}$	2.30%	4.51%
	$N_{new,2}$	0.93%	0.83%
Firms with 0 EES that have 0, 1, and 2 EES in one year	$0 \to 0$	88.88%	94.13%
	$0 \to 1$	1.62%	1.30%
	$0 \to 2$	0.31%	0.38%
Firms with 0 EES that exit in one year	$0 \to$ Exit	8.89%	4.04%
	$1 \to$ Exit	4.73%	4.04%
	$2 \to$ Exit	4.43%	4.04%
Unemployment rate		8.50%	5.74%
Vacancy rate		2.45 %	8.81%
Revenues firms with 0 vs 1 EE		30.96%	25.18%

External validation

External validation with statistics not used for the estimation:

- Employment changes within newly established firms.

Appendix: The unemployed agents problem

the present value in unemployment is given by:

$$U = \max[\sum_{x \in X} \sigma_x J(L = 0, x) - s_b, \max_{i \in \bar{\mathcal{I}}}[S_i]]. \tag{2}$$

If employed in firm i, the agent gets:

$$W_i = \underline{w_i} + \beta \phi_i E_{x^+}[W_i^+] + \beta(1 - \phi_i) U^+. \tag{3}$$

The value of applying to a vacancy posted by firm i is given by:

$$S_i = b + \beta(1 - \delta_0) \frac{m(\lambda)}{\lambda(\bar{w}_i)} [E_{x^+}[W_i^+] + \bar{w}_i] + \beta(1 - (1 - \delta_0) \frac{m(\lambda)}{\lambda(\bar{w}_i)}) U^+. \tag{4}$$

Appendix: The firm's problem - BEFORE the reform (1)

Payoff of a firm that has the pair (L, x):

$$J(L,x) = \max[e(L,x), f(L,x), h(L,x)]. \tag{5}$$

The firm's payoff from exiting the market:

$$e(L,x) = R(L,x) - (1+\tau)\cdot \underline{w} \cdot L - c(L) + \beta \cdot U^{+}, \tag{6}$$

The firm's payoff from firing:

$$\begin{aligned} f(L,x) = \max_{S\in\{0,1,..,L\}} \Big[& R(L,x) - (1+\tau)\cdot \underline{w} \cdot L - c(L) \\ & + \beta \cdot (1-\delta_0) \cdot E_{x^+} J(L-S, x^+) + \beta \cdot \delta_0 \cdot U^{+} \Big]. \end{aligned} \tag{7}$$

Appendix: The firm's problem - BEFORE the reform (2)

The firm's payoff from hiring:

$$h(L,x) = \max_{V\in\mathbb{N}_0,\bar{w}\in\mathbb{R}} \Big[R(L,x) - (1+\tau)\cdot \underline{w}\cdot L - c(L) - C(V,L) + \beta\cdot(1-\delta_0)\cdot \Big[E_{x^+} \sum_{L^+\in\{L,\ldots,L+V\}} Pr(L^+,L,m(\bar{w}),V)\cdot J(L^+,x^+) - \sum_{H\in\{1,\ldots,V\}} Pr(H,m(\bar{w}),V)\cdot H\cdot(1+\tau)\cdot\bar{w}\Big] + \beta\cdot\delta_0\cdot U^+ \Big], \tag{8}$$

where $\bar{w}$ and $\underline{w}$ are derived from the unemployed agents problem.

Appendix: The firm's problem - AFTER the reform (1)

- First, the exemption modifies the rate of employers' SSC, which is applied to the continuation wages. Indeed, all eligible firms will pay $(1+\tau) \cdot \underline{w} \cdot \max[0, L-1] + \tau_1 \cdot \underline{w} \cdot \min[1, L]$ instead of $(1+\tau) \cdot \underline{w} \cdot L$.

Appendix: The firm's problem - AFTER the reform (2)

- Second, the payoff a firm with $L = 0$ obtains if it decides to hire becomes:

$$h(L=0,x) = \max_{V\in[1,2,3...],\bar{w}\in\mathbb{R}} \Bigg[R(L=0,x) - c(L=0) - C(V,L=0) + \beta\cdot(1-\delta_0)\cdot\Bigg[E_{x^+}\sum_{L^+\in\{0,\ldots,V\}} Pr\big(L^+, L=0, m(\bar{w}), V\big)\cdot J(L^+,x^+) - \sum_{H\in\{1,\ldots,V\}} Pr\big(H, m(\bar{w}), V\big)\cdot H\cdot\Big(\frac{1}{H}\tau_1 + \frac{(H-1)}{H}\cdot\tau\Big)\cdot\bar{w}\Bigg] + \beta\cdot\delta_0\cdot U^+\Bigg]; \tag{9}$$

Appendix: The firm's problem - AFTER the reform (3)

- The payoff a firm with $L > 0$ obtains if it decides to hire becomes:

$$
\begin{aligned}
h(L,x) = \max_{V \in [1,2,3...], \bar{w} \in \mathbb{R}} \Bigg[& R(L,x) - c(L) - C(V,L) \\
& - (1+\tau) \cdot \underline{w} \cdot \max[0, L-1] - \tau_1 \cdot \underline{w} \cdot \min[1, L] \\
& + \beta \cdot (1-\delta_0) \cdot \Bigg[E_{x^+} \sum_{L^+ \in \{L,\ldots,V+L\}} Pr\big(L^+, L, m(\bar{w}), V\big) \cdot J(L^+, x^+) \\
& - \sum_{H \in \{1,\ldots,V\}} Pr\big(H, m(\bar{w}), V\big) \cdot H \cdot (1+\tau) \cdot \bar{w} \Bigg] + \beta \cdot \delta_0 \cdot U^+ \Bigg].
\end{aligned}
\tag{10}
$$

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