Labor Market Competition and Inequality

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The views expressed here do not necessarily reflect the position of Bank of Lithuania or the Eurosystem

Labor market inequality

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Differences in labor earnings across individuals are key sources of income inequality
(Hoffmann et al., 2020)

Firms are key determinants of workers' pay, regardless of labor supply characteristics
(Card et al., 2018)

Labor market inequality and employer market power

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Labor market power of firms is a common phenomenon worldwide (Manning, 2021)

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Does labor market competition among firms affect wage dispersion among employees?

A sneak peek at this paper

Monopsony theory predicts that imperfect competition in the labor market gives firms the power to set wages ! higher degree of wage dispersion (Robinson, 1933; Manning, 2003)

Test this hypothesis using Lithuanian Social Security data throughout 2000-2020

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   firms explain almost entirely the dynamics of inequality

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2. characterize the dynamics of labor market competition
   firms' market power has been decreasing

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1. document the role of firm-specific components in the decline of wage inequality
   firms explain almost entirely the dynamics of inequality
2. characterize the dynamics of labor market competition
   firms' market power has been decreasing
3. theory-based relationship to quantify the role of competition on inequality
   greater labor market competition accounts for 15% of the fall in inequality

Contribution to the state of knowledge

Firms explain around 20% of wage dispersion in developed economies and even more in developing countries (Card et al., 2013; Card et al. 2018; Alvarez et al., 2018; Song et al., 2019; Perez Perez and Nuno-Ledesma, 2022; Bassier, 2023)

+ dynamics of firm-driven wage dispersion over the course of development

Measuring labor market power and its dynamics (Hirsch et al., 2018; Azar et al., 2022; Bassier et al., 2022; Lamadon et al., 2022; Diez et al., 2022; Webber, 2022; Armangue-Jubert et al., 2023)

+ labor market competition in a context of economic growth

Labor market power and wages (Webber 2015; Deb et al., 2022; Bassier, 2023; Autor et al., 2023)

+ labor market competition as a driver of inequality

Decreasing inequality in CEE typically linked to minimum wage legislation (Magda et al., 2021, Garcia-Louzao and Tarasonis, 2023)

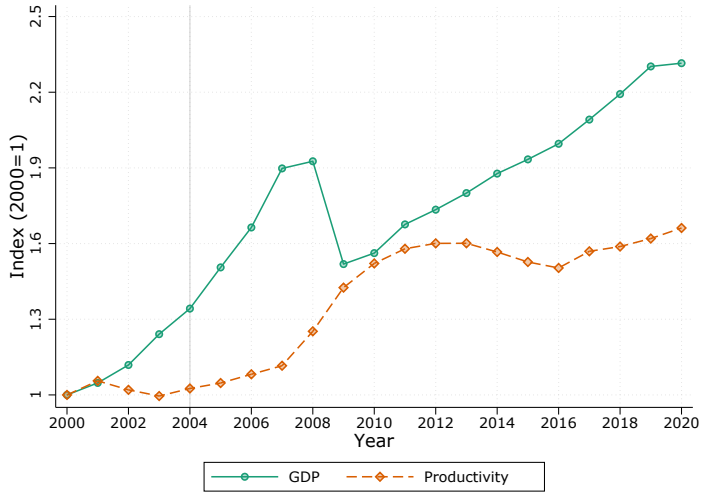
+ explanation coming from market forces: competition

Plan of the talk

1. The Lithuanian economy between 2000 and 2020
2. Econometric framework to decompose wage inequality
3. Social Security data
4. The role of firm and worker heterogeneity in the dispersion of wages
5. The link between labor market competition and wage inequality
6. Conclusions and implications

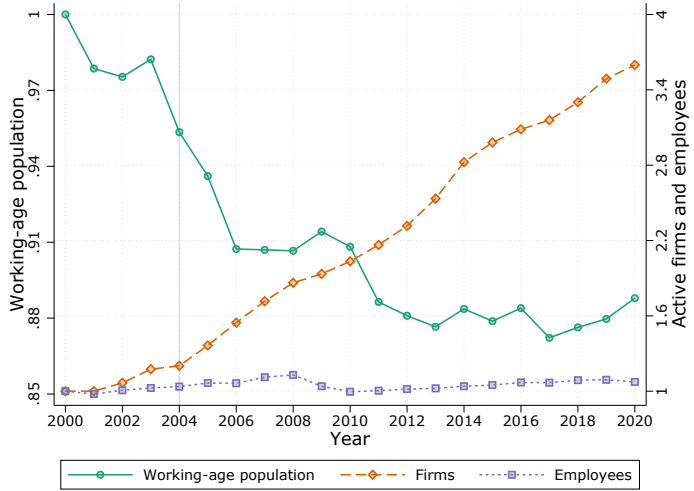
The Lithuanian Economy

The economy more than doubled between 2000 and 2020



openness cross-country

Economic growth paired with large firm entry and a shrinking labor force



workers' remuneration

Three key labor market reforms were enacted with implications for wage-setting

Minimum wage as flagship policy to boost wages at the bottom of the distribution

- increased from 160 to 607 euros 235% in real terms

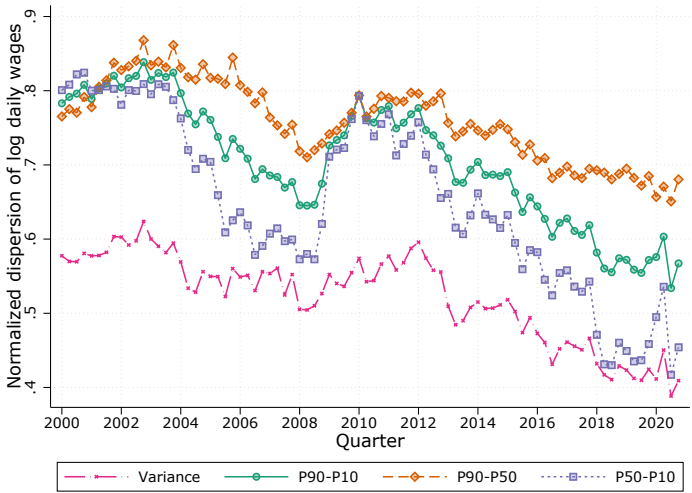
New labor code in 2017 to modernize the regulation of labor relations

- reduced employment protection & allow for more flexible forms of employment
- de-facto affected minimum wage policy

Unemployment insurance law in 2017 to provide more protection to workers

- more flexible eligibility requirements
- increased generosity in both the level and duration of benefits

Wage inequality largely decreased over the course of development



wage vs labor earnings | wage vs disposable income | inequality index | cross-country

Econometric Framework

Firms and workers in the variance of wages

From the AKM model (Abowd, Kramarz, and Margolis, 1999)

$$\underbrace{y_{it}}_{\text{log wages}} = \underbrace{h_i}_{\text{worker FE}} + \underbrace{y_{j(i,t)}}_{\text{firm FE}} + \underbrace{X_{it}\mathrm{W}}_{\text{age, time}} + \underbrace{e_{it}}_{\text{residuals}}$$

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to the variance decomposition

$$\begin{aligned} var(y_{it}) &= var(h_i) + var(y_{j(i,t)}) + var(X_{it}\mathrm{W}) + var(e_{it}) \\ &+ 2 \left[\underbrace{cov(h_i, y_{j(i,t)})}_{\text{sorting}} + cov(h_i, X_{it}\mathrm{W}) + cov(y_{j(i,t)}, X_{it}\mathrm{W}) \right] \end{aligned}$$

Identification of worker and firm effects

Connected set

only connected firms and their workers contribute to the identification

connected firms firms through which workers move

Identifying assumptions

a1 exogenous mobility *!* no correlation between mobility and the time-varying component of the residual

a2 additive separability *!* no interaction of worker and firm heterogeneity

Limited mobility bias

sufficient mobility to quantify the dispersion of firm-specific wage components

s1 KSS leave-one-out estimator to correct the bias (Kline et al., 2020)

s2 BLM firm-clusters to reduce dimensionality (Bonhomme et al., 2019, 2022)

Administrative Records

Social Security data

Administrative data from the *State Social Insurance Fund Board (SoDra)*

- 25% random sample of Social Security population between 2000 and 2020
- workers: identifier, gender, age, employment status, length of employment relationship, insured labor income but no hours or education info!
- firms: identifier, location, sector, wage bill, and firm size at the end of the year

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Estimation sample

quarterly panel of private sector workers, 2000Q1 to 2020Q4

workers employed for 15days & earning 0.5 monthly MW in a quarter

wage metric: **real daily wages** = quarterly labor earnings / days worked in the quarter

cleaned data: 532,500 workers in 143,177 firms over 16,735,075 observations

connected set: 526,549 workers in 137,514 firms over 16,637,948 observations

summary stats

Firms, Workers, and Wage Inequality

Firm and worker heterogeneity explain two-thirds of cross-sectional inequality

	AKM		KSS		BLM	
	Component	Share	Component	Share	Component	Share
$Var(y)$	0.604	-	0.595	-	0.606	-
$Var(h)$	0.165	0.274	0.156	0.263	0.203	0.335
$Var(y)$	0.189	0.312	0.171	0.287	0.092	0.153
$Var(X\mathrm{W})$	0.089	0.147	0.089	0.149	0.066	0.110
$Var(e)$	0.121	0.200	0.121	0.204	0.148	0.245
$2 \quad Cov(h, y)$	0.041	0.068	0.053	0.088	0.078	0.129
$2 \quad Cov(h, X\mathrm{W})$	-0.002	-0.004	-0.003	-0.005	-0.007	-0.012
$2 \quad Cov(y, X\mathrm{W})$	0.002	0.003	0.003	0.004	0.024	0.040

validation twfe | time-varying effects | estimation sample | leave-one-out estimator | firm clusters

Falling inequality mainly due to compression of firm-specific wage components

	2000-05 to 2015-20		
	AKM	KSS	BLM
Change in $Var(y)$	-0.131	-0.136	-0.123
Contribution			
$Var(h)$	-0.088	-0.043	-0.233
$Var(y)$	0.898	0.930	0.639
$Var(XW)$	-0.067	-0.068	-0.148
$Var(e)$	0.058	0.059	0.096
$2 \quad Cov(h, y)$	0.184	0.109	0.504
$2 \quad Cov(h, XW)$	0.036	0.038	0.121
$2 \quad Cov(y, XW)$	-0.021	-0.024	0.022
Counterfactual change in $Var(y)$			
1. Fixed variance of firm effects	-0.013	-0.017	-0.045
2. Fixed corr. of firm and worker effects	-0.117	-0.150	-0.109
3. Both 1 and 2	0.012	-0.024	0.024

changes in a cross-country perspective

Pit stop: What do we know so far?

1. Wage inequality experienced a sharp decline between 2000 and 2020
2. Firms almost entirely drove the fall in wage dispersion

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Monopsony theory. Employer market power and firm-driven wage dispersion closely linked (Manning, 2003, 2021)

- textbook model linking labor market competition and wage inequality
- estimate labor market competition over time
- quantify the role of competition in decreasing inequality

Monopsony Power and Inequality

Firms wage-setting power

Static economy populated by

- L homogeneous workers
- large number of heterogeneous firms, $j = 1, \ldots, J$

Firms post wages to maximize profits subject to a labor supply curve

$$\max_{w_j} \quad p_j = z_j \log \ell_j \quad w_j \ell_j \quad \text{s.t.} \quad \ell_j(w_j) = w_j^{\#}$$

with $\# <$ ¥ governing the elasticity of labor supply to wages of firm j

The solution is a wage function of the form

$$\log w_j = \left(\frac{1}{1+\#}\right) \log z_j + \left(\frac{1}{1+\#}\right) \log \left(\frac{\#}{1+\#}\right)$$

with the dispersion of wages being equal to

$$\text{var}[\log w_j] = \left(\frac{1}{1+\#}\right)^2 \text{var}[\log z_j]$$

A theory-based relationship between competition and inequality

From the monopsony theory

$$\mathrm{Dvar}_{t+1}[\log w_j] \qquad 2\mathrm{var}_t[\log z_j]\mathrm{D}\#_{t+1} + (1 \quad 2\#_{t+1})\,\mathrm{Dvar}_{t+1}[\log z_j]$$
$$2\mathrm{var}_t[\log z_j]\mathrm{D}\#_{t+1} + \mathrm{Dvar}_{t+1}[\log z_j] \quad 2\#_{t+1}\mathrm{Dvar}_{t+1}[\log z_j]$$

to the regression analysis with variation across sectors

$$\mathrm{Dvar}_{st+1}[y_j] = b_0 + b_1\mathrm{D}\#_{st+1} + b_2\mathrm{Dvar}_{st+1}[\log \ell] + b_3\#_{st+1} + u_{st+1}$$

Proposition. An increase in the labor supply elasticity, akin to labor market competition, reduces wage dispersion across employers ! $b_1 < 0$

Estimating the firm labor supply elasticity labor market competition

separation elasticity

$$P(s_{ijt} = 1) = a + \#_{sep} \log w_{ijt} + X_{ijt} \mathsf{L} + x_{ijt}$$

s_{ijt} stands for the separation of worker i from employer j at quarter t

all separations and EE transitions at quarterly frequency

w_{ijt} is the corresponding wage measure

worker's wage and firm-specific wage component

X_{ijt} is a vector of controls

estimated AKM worker fixed effect + age, gender, industry, and time effects

x_{ijt} is the error term

Firm labor supply elasticity 2 $\#_{sep}$ (Manning, 2003)

Labor market competition has increased over the last two decades

A. 2000-2005	Worker wage		Firm fixed effect		IV-Firm fixed effect	
	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep
	(1)	(2)	(3)	(4)	(5)	(6)
$\#_{sep}$	-0.0600	-0.0250	-0.0484	-0.0219	-0.0799	-0.0432
	(0.0004)	(0.0003)	(0.0019)	(0.0010)	(0.0024)	(0.0014)
Firm LSE	0.5254	0.2074	0.4159	0.1810	0.7204	0.3689
	(0.0038)	(0.0023)	(0.0173)	(0.0085)	(0.0244)	(0.0130)
First stage F-statistic					3,063.87	
Observations	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087

B. 2015-2020	Worker wage		Firm fixed effect		IV-Firm fixed effect	
	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep
	(1)	(2)	(3)	(4)	(5)	(6)
$\#_{sep}$	-0.0773	-0.0288	-0.0566	-0.0245	-0.0980	-0.0505
	(0.0005)	(0.0003)	(0.0015)	(0.0009)	(0.0023)	(0.0013)
Firm LSE	0.6943	0.2408	0.4923	0.2029	0.9070	0.4360
	(0.0048)	(0.0028)	(0.0139)	(0.0079)	(0.0248)	(0.0125)
First stage F-statistic					13,723.70	
Observations	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246

complementary log-log alternative controls

Increased competition in the labor market leads to lower dispersion of firm-specific wage components, reducing overall wage inequality

	Worker wage			Firm fixed effect		
	OLS	OLS	IV	OLS	OLS	IV
	(1)	(2)	(3)	(4)	(5)	(6)
D Firm LSE	-0.1270	-0.1032	-0.2566	-0.0188	-0.0355	-0.0600
	(0.0277)	(0.0361)	(0.1197)	(0.0095)	(0.0122)	(0.0233)
D Wage Inequality Explained, %	23.59	19.17	47.66	4.20	7.92	13.40
First stage F-statistic			8.49			26.40
Controls		✓	✓		✓	✓
No. sectors	74	74	74	74	74	74

counterfactual calculation

Taking stock and implications

We analyze the link between labor market competition and wage inequality

- firms play a critical role in driving wage inequality dynamics
- changes in labor market competition explains about to 15% of those dynamics

Our results indicate that inequality emerges partially as a market failure

Labor market and competition policies can help tackle inequality and increase welfare

- limit labor market concentration
- reduce barriers to worker mobility
- strengthen workers' bargaining power

THANK YOU

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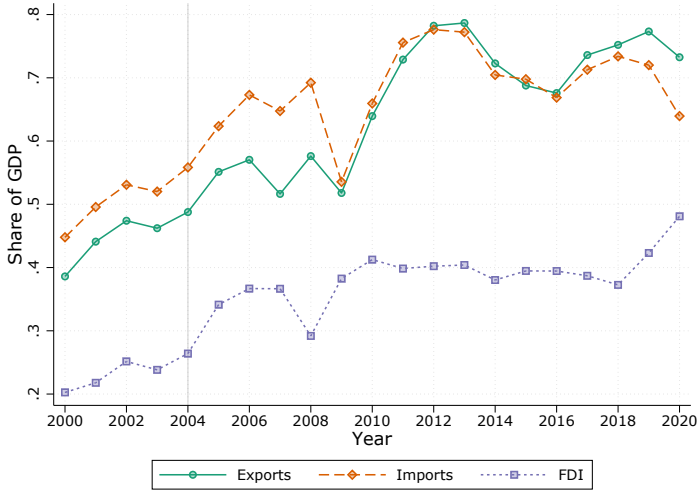
APPENDIX

International trade and foreign investment spurred economic growth



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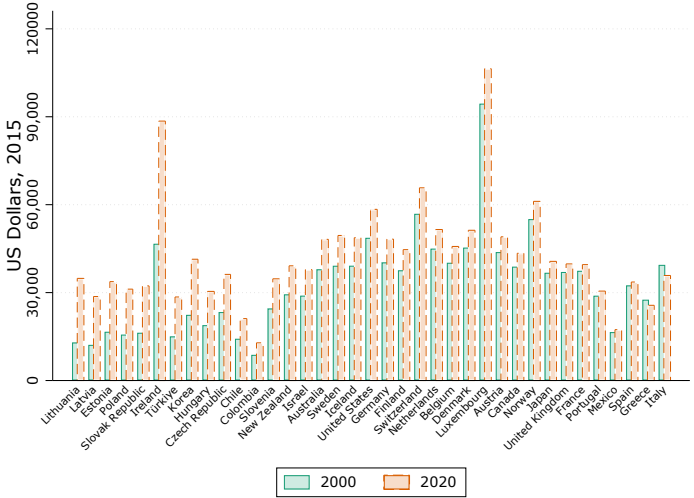
Among OECD countries, Lithuania experienced the largest growth in GDP per capita



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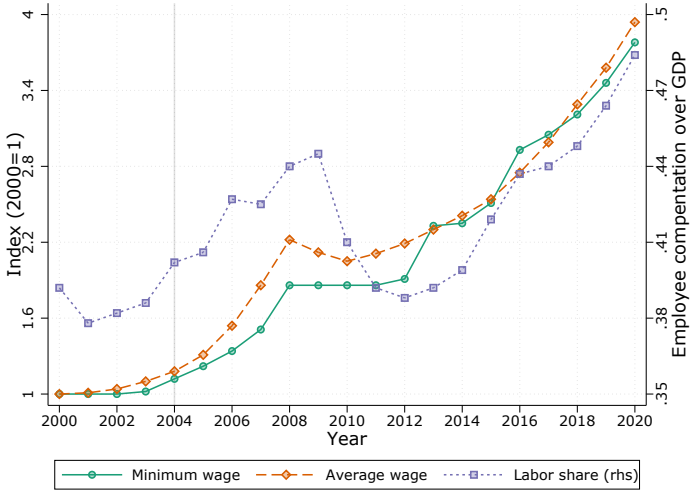
Workers' remuneration skyrocketed over the course of economic development



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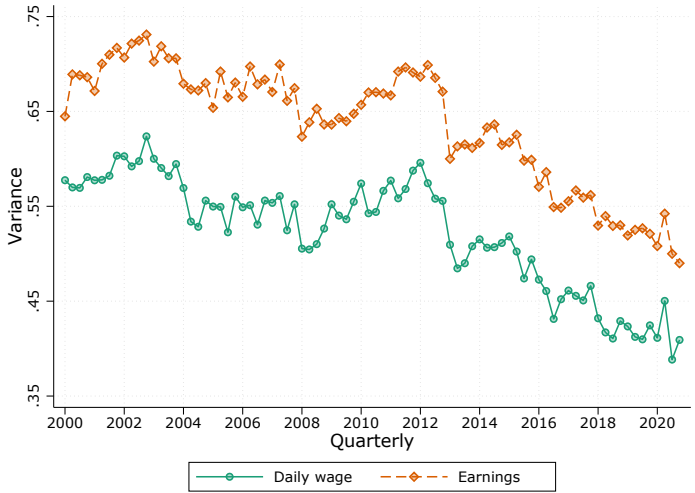
Wage versus labor earnings inequality



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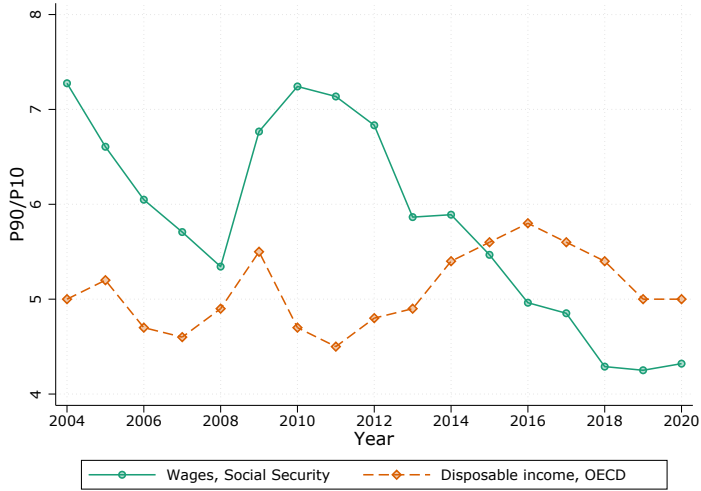
Wage inequality vs disposable income inequality



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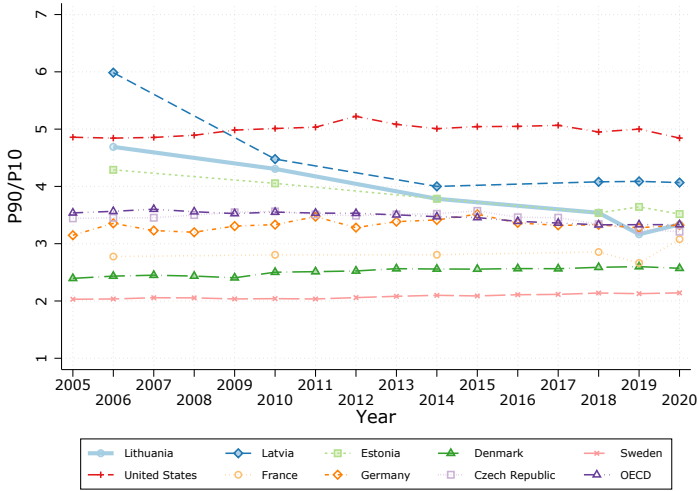
Among OECD countries, the fall in wage inequality was outstanding



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High degree of mobility allows to capture most of workers and firms in the connected set

	Cleaned data	Connected set
Wages		
Mean	2.905	2.909
Std.Dev.	0.779	0.777
Firms	143,177	137,514
Direct movers	297,536	297,313
Movers	392,639	392,197
Workers	532,500	526,549
Direct moves	820,728	820,343
Job changes	1,404,732	1,404,081
Worker-quarters	16,735,075	16,637,948

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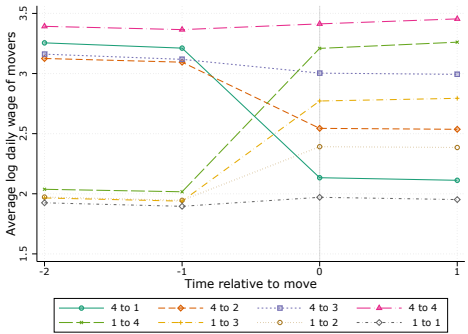
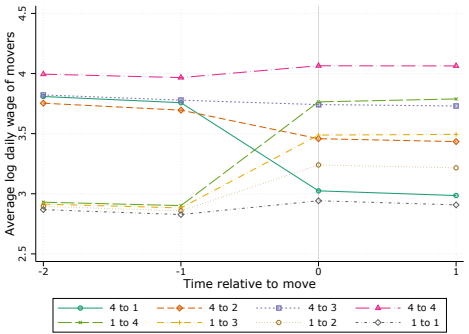
Wage changes after a switch by quarterly of firm fixed effects are nearly symmetric

exogenous mobility satisfied

(a) 2000-2005

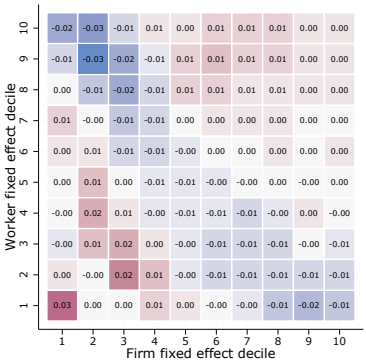


(b) 2015-2020

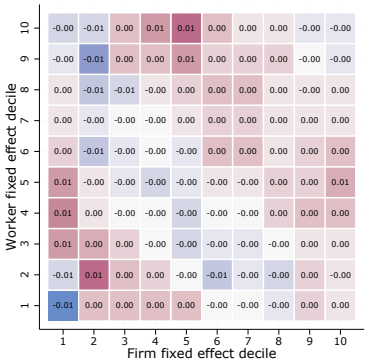


Average residuals by deciles of worker and firm fixed effects suggest match effects are not critical additive separability satisfied

(a) 2000-2005



(b) 2015-2020



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Contribution of workers and firms under alternative specifications of time-varying effects

	Sex-specific time effects		Wages centered		Residual wages	
	Component	Share	Component	Share	Component	Share
$Var(y)$	0.604	-	0.518	-	0.511	-
$Var(h)$	0.170	0.281	0.164	0.317	0.163	0.319
$Var(y)$	0.189	0.313	0.190	0.367	0.188	0.368
$Var(X\mathrm{W})$	0.090	0.149	0.007	0.013	-	-
$Var(\mathrm{e})$	0.120	0.199	0.121	0.234	0.121	0.238
$2 \quad Cov(h, y)$	0.042	0.069	0.041	0.080	0.039	0.077
$2 \quad Cov(h, X\mathrm{W})$	-0.007	-0.011	-0.004	-0.007	-	-
$2 \quad Cov(y, X\mathrm{W})$	0.001	0.001	-0.001	-0.002	-	-

back

Contribution of workers and firms under alternative sample selection

	LM attachment		MW		Public sector		No welfare benefits	
	Component	Share	Component	Share	Component	Share	Component	Share
$Var(y)$	0.618	-	0.395	-	0.564	-	0.608	-
$Var(h)$	0.178	0.289	0.146	0.369	0.183	0.325	0.169	0.300
$Var(y)$	0.205	0.332	0.102	0.259	0.148	0.263	0.205	0.364
$Var(X\mathrm{W})$	0.088	0.143	0.077	0.194	0.088	0.156	0.100	0.177
$Var(e)$	0.117	0.189	0.067	0.171	0.115	0.203	0.099	0.175
2 $Cov(h, y)$	0.031	0.050	0.018	0.045	0.034	0.060	0.041	0.072
2 $Cov(h, X\mathrm{W})$	-0.003	-0.004	-0.005	-0.014	-0.007	-0.012	-0.004	-0.007
2 $Cov(y, X\mathrm{W})$	0.000	0.001	-0.009	-0.023	0.002	0.004	-0.002	-0.003

back

Contribution of workers and firms under alternative wage definitions to classify firms

	BLM w/ worker variables		BLM w/ firm variables	
	Component	Share	Component	Share
$Var(y)$	0.607	-	0.607	-
$Var(h)$	0.195	0.322	0.251	0.415
$Var(y)$	0.103	0.170	0.074	0.122
$Var(X\mathrm{W})$	0.082	0.136	0.083	0.137
$Var(\mathrm{e})$	0.145	0.238	0.153	0.252
2 $Cov(h, y)$	0.078	0.128	0.044	0.072
2 $Cov(h, X\mathrm{W})$	-0.004	-0.007	-0.007	-0.011
2 $Cov(y, X\mathrm{W})$	0.008	0.013	0.009	0.015

Contribution of workers and firms under alternative cluster sizes

	BLM w/ worker variables		BLM w/ firm variables	
	Component	Share	Component	Share
$Var(y)$	0.607	-	0.607	-
$Var(h)$	0.195	0.322	0.251	0.415
$Var(y)$	0.103	0.170	0.074	0.122
$Var(X\mathrm{W})$	0.082	0.136	0.083	0.137
$Var(e)$	0.145	0.238	0.153	0.252
2 $Cov(h, y)$	0.078	0.128	0.044	0.072
2 $Cov(h, X\mathrm{W})$	-0.004	-0.007	-0.007	-0.011
2 $Cov(y, X\mathrm{W})$	0.008	0.013	0.009	0.015

back

Contribution of workers and firms under alternative leave-one-out units

	Leave-out-observations		Leave-out-workers	
	Component	Share	Component	Share
$Var(y)$	0.599	-	0.595	-
$Var(h)$	0.157	0.263	0.156	0.263
$Var(y)$	0.177	0.295	0.171	0.287
$Var(X\mathrm{W})$	0.088	0.148	0.089	0.149
$Var(e)$	0.121	0.202	0.121	0.204
$2 \quad Cov(h, y)$	0.050	0.084	0.053	0.089
$2 \quad Cov(h, X\mathrm{W})$	-0.003	-0.004	-0.003	-0.005
$2 \quad Cov(y, X\mathrm{W})$	0.002	0.004	0.003	0.004

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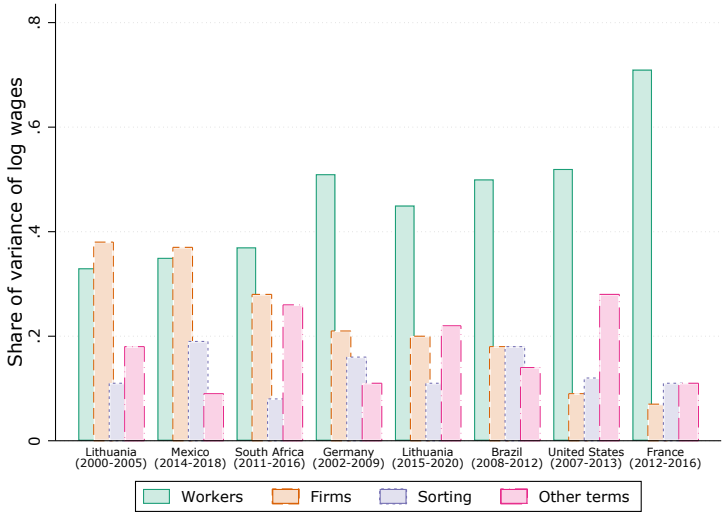
The change in the contribution of firms to inequality resembles economic development



Separation elasticity using a complementary log-log model

A. 2000-2005	Worker wage		IV-Firm fixed effect	
	Sep	EE Sep	Sep	EE Sep
$\#_{sep}$	-0.5544	-0.4735	-0.6707	-0.7601
	(0.0034)	(0.0046)	(0.0365)	(0.0480)
Observations	4,150,087	4,150,087	4,150,087	4,150,087

B. 2015-2020	Worker wage		IV-Firm fixed effect	
	Sep	EE Sep	Sep	EE Sep
$\#_{sep}$	-0.6696	-0.5069	-0.8467	-0.8644
	(0.0030)	(0.0044)	(0.0054)	(0.0076)
Observations	4,404,246	4,404,246	4,404,246	4,404,246

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Separation elasticity using alternative controls

A. 2000-2005	Worker wage								IV-Firm fixed effect							
	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep
$\hat{s}_{sep}$	-0.0474***	-0.0208***	-0.0621***	-0.0267***	-0.0597***	-0.0249***	-0.0646***	-0.0190***	-0.0627***	-0.0378***	-0.0812***	-0.0469***	-0.0793***	-0.0430***	-0.0988***	-0.0459***
	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0004)	(0.0003)	(0.0003)	(0.0002)	(0.0022)	(0.0014)	(0.0023)	(0.0015)	(0.0024)	(0.0014)	(0.0024)	(0.0014)
Observations	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,087	4,150,043	4,150,043	4,150,087	4,150,087	4,150,087	4,150,087
A. 2015-2020	Worker wage								IV-Firm fixed effect							
	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep	Sep	EE Sep
$\hat{s}_{sep}$	-0.0684***	-0.0253***	-0.0795***	-0.0296***	-0.0766***	-0.0286***	-0.0750***	-0.0222***	-0.0852***	-0.0455***	-0.1063***	-0.0664***	-0.0971***	-0.0501***	-0.1395***	-0.0599***
	(0.0004)	(0.0003)	(0.0005)	(0.0003)	(0.0005)	(0.0003)	(0.0004)	(0.0002)	(0.0021)	(0.0013)	(0.0025)	(0.0015)	(0.0023)	(0.0013)	(0.0026)	(0.0014)
Observations	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246	4,404,246
Tenure FE	Y	Y	N	N	N	N	N	N	Y	Y	N	N	N	N	N	N
Sector Municipality FE	N	N	Y	Y	N	N	N	N	N	N	Y	Y	N	N	N	N
Family controls	N	N	N	N	Y	Y	N	N	N	N	N	N	Y	Y	N	N
AKM worker type	Y	Y	Y	Y	Y	Y	N	N	Y	Y	Y	Y	Y	Y	N	N

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