Megváltozott munkaképességűek foglalkoztatása: segít a rehabilitációs hozzájárulás?

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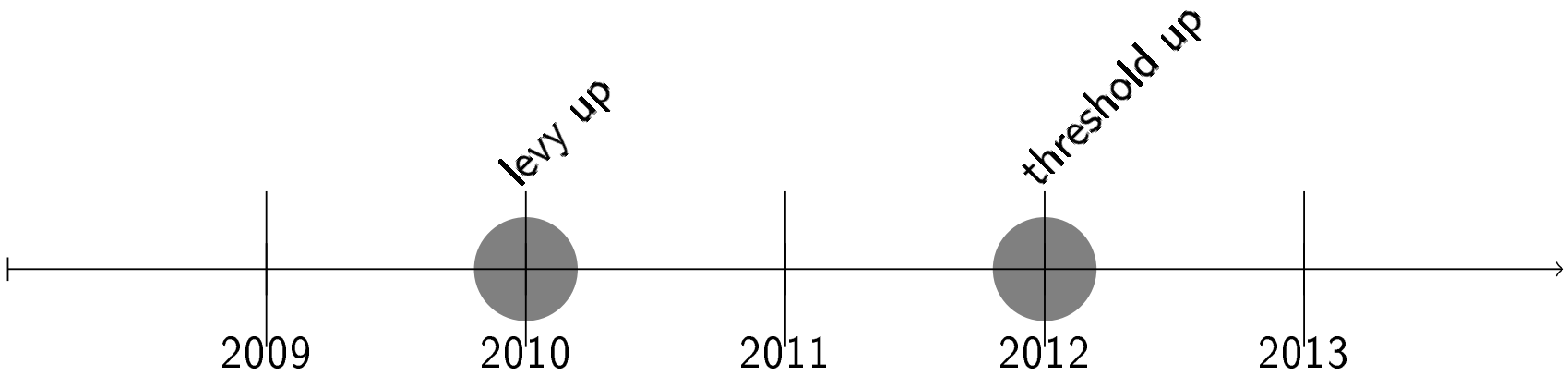
Some basic concepts

- Working age disabled: people with long term physical or mental health problem causing serious work limitation
  - Hungary: about 11% of working age population in 2011, close to EU average

- Quota-levy system: a policy tool, obligation for firms to employ of disabled people in a given proportion, levy in case of noncompliance ("Rehabilitációs hozzájárulás")
  - Affects labor demand of disabled people by increasing relative labor cost of non-disabled

Design of the Hungarian quota-levy

- up to 2010:firms only above 20 employees
- quota of disabled: 5% of employees (not necessarily integer)



Policy changes:

- 2010: the amount of levy was increased by 455 %
  - from 177 thousand to 964 thousand HUF/missing persons/year
  - 86% of total labor cost of a full time minimum wage earner, 31% of an average wage worker.
  - 170% of a half-time minimum wage worker
  - igh in international comparison (2% of payroll, usually 0.25-0.75)
- 2012: threshold increased from 20 to 25 employees

Research question

What is the effect of Hungarian disability quota-levy system

- on the employment of disabled?
- on firms? (what are the side effects of the regulation?)

Literature focuses on effect of disabled employment and finds low effect

- Lalive et al(2013): Austria; Nazarov et al (2015): South Korea; Mori and Sakamoto(2017)Japan; Malo and Pagan (2014): Spain

Specialty of the Hungarian case: exceptionally high levy

Data

- Firm level data from Corporate Income Tax Data (CIT)
  - Contains balance sheet data income statements, number of employees
  - Data on number of employed disabled people
  - Number of disabled employees: consistent with aggregate data on rehabilitation contribution
  - Contains all firms

Disabled employment effect with sharp regression discontinuity design (RDD)

We are looking for the treatment effect at the threshold:

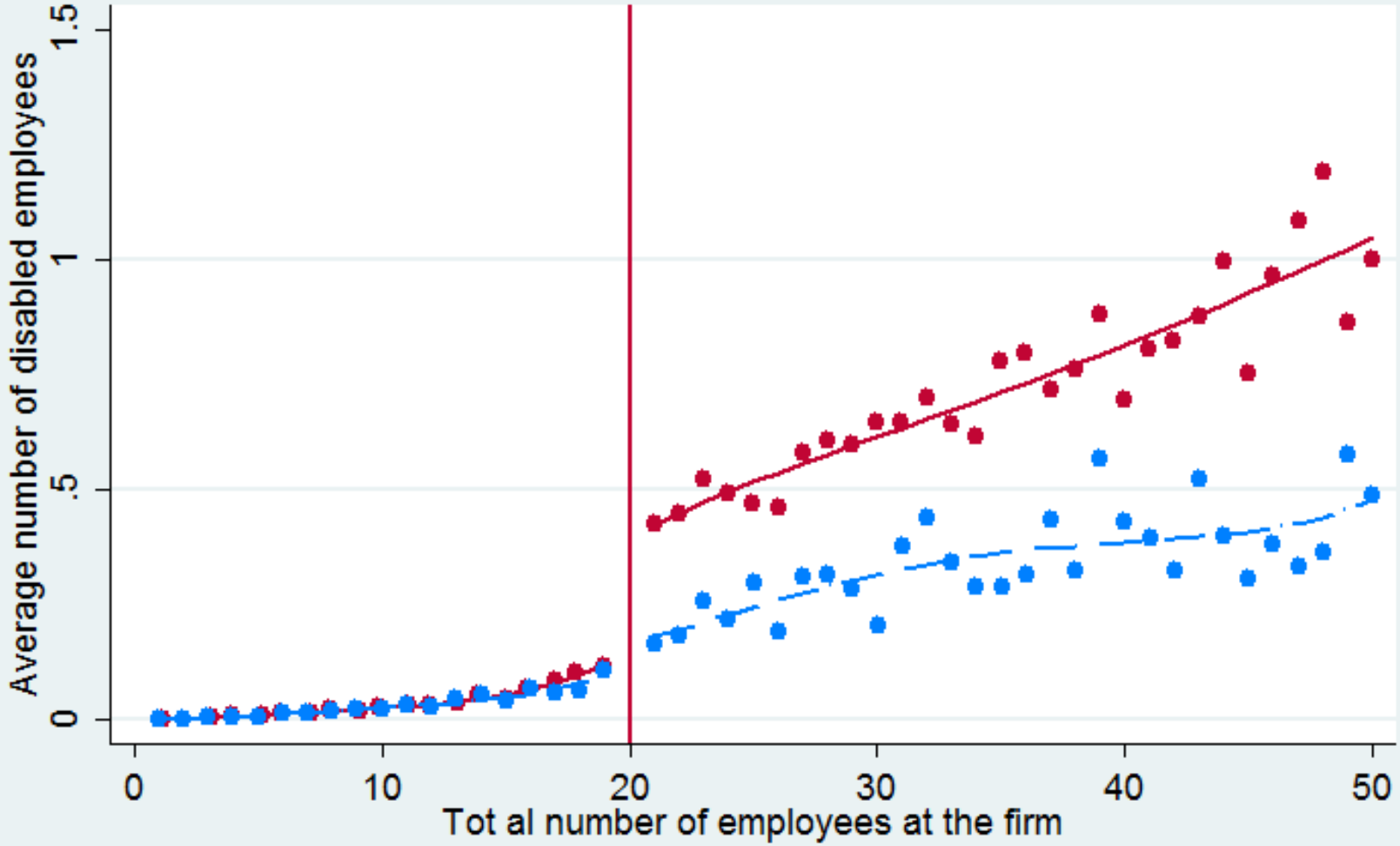
$$\tau = E(disemp_i(1) - disemp_i(0)|emp_i = c)$$

where $disemp_i$:number of disabled employees,emp_i:total number of employees

- the model is estimated with kernel based local polynomial regression method of Calonico et al(2014).
- identifying assumption:random firm selection between treated and control groups
- problem: firm size is not exogenous, firms can get below the threshold to avoid the regulation

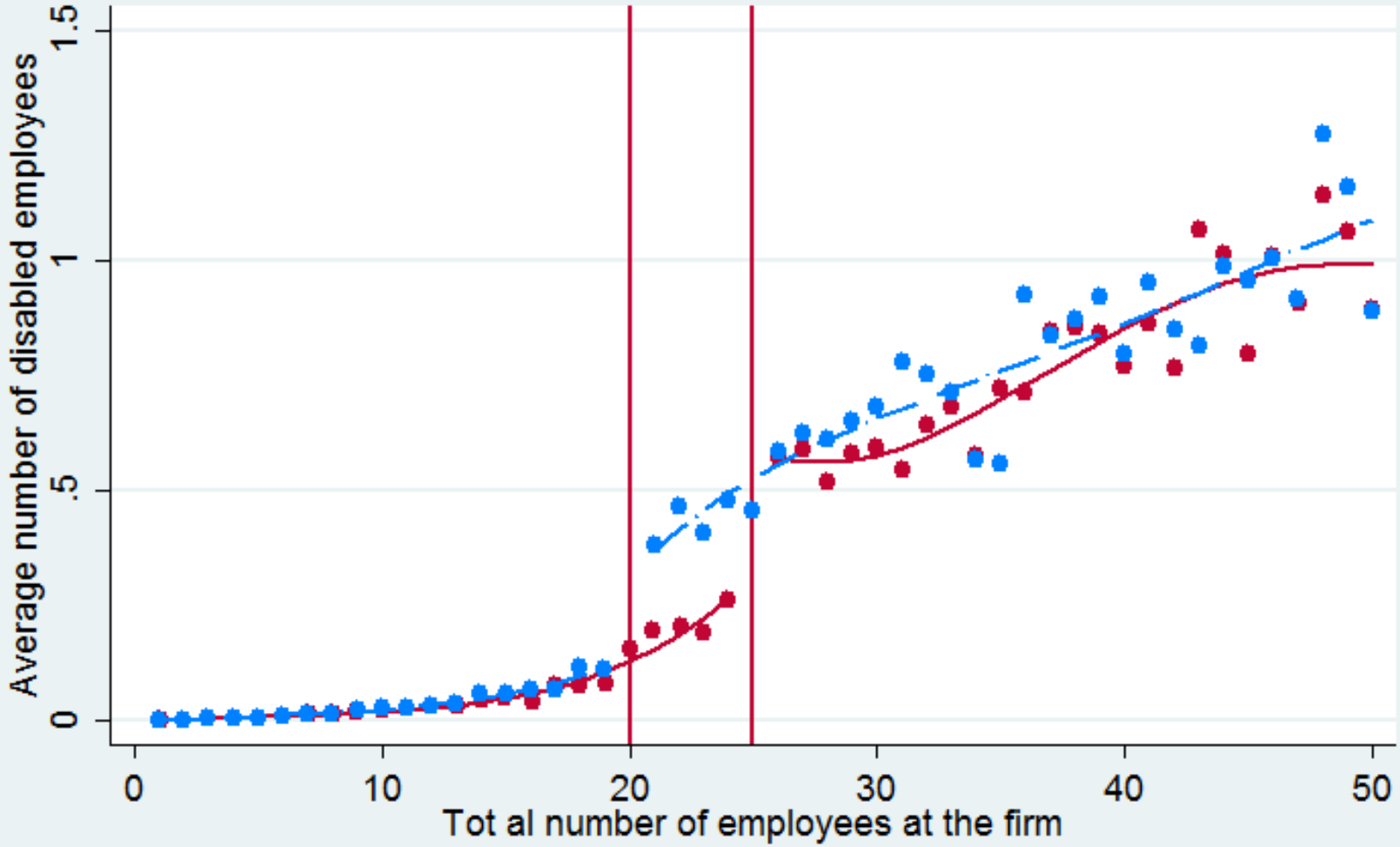
Discontinuity in disabled employment before and after the levy hike (2008 and 2010)

no discontinuity in 2008, but huge discontinuity emerges after levy hike



Discontinuity in disabled employment before and after the threshold increase 2011-2012

Threshold increase in 2012: discontinuity decreased at $c = 20$ and emerges at $c = 25$



"Naive" RD results, c=20, p=1

Table: Rdrobust results, c=20

	2008	**2009**	**2010**	**2011**	**2012**
τ **robust**	0.079	0.099*	0.285***	0.244***	0.063
SE robust	(0.061)	(0.05)	(0.056)	(0.053)	(0.055)
bandwidth	5.135	6.144	7.086	6.788	5.668
eff. # of obs(l)	5294	6672	8819	8188	5663
eff. # of obs(r)	2545	2766	2815	2733	2572

Naive RD results , c=25 p=1

Table: Rdrobust results, c=25

	2010	**2011**	**2012**
τ **robust**	-0.145	0.034	0.289
SE robust	0.122	0.118	0.067
bandwidth	4.792	5.203	8.163
eff. # of obs(l)	2000	2344	5461
eff. # of obs(r)	1501	1570	2269

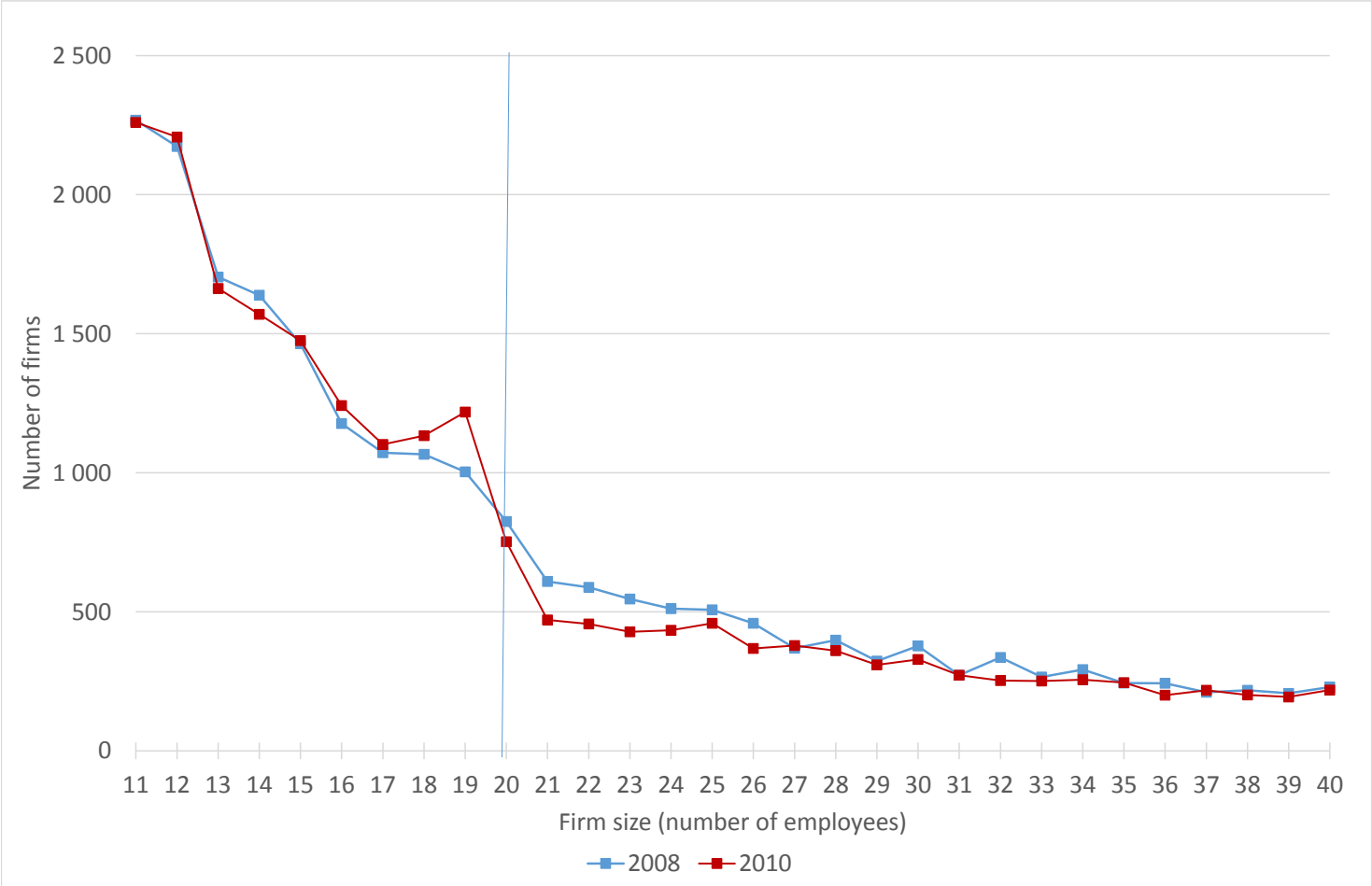
Results suggest intensive firm reaction

- No discontinuity in 2008, before he levy hike
- Discontinuity emerges already in 2009
- Huge treatment effect in 2010 and 2011
- Threshold increase in 2012: discontinuity decreased at $c = 20$ and emerges at $c = 25$
- Larger effects than usually found: levy increases average number of disabled employees by 0.25-0.3 around the threshold, compared e.g. to 0.04 in Austria (Lalive et al.)

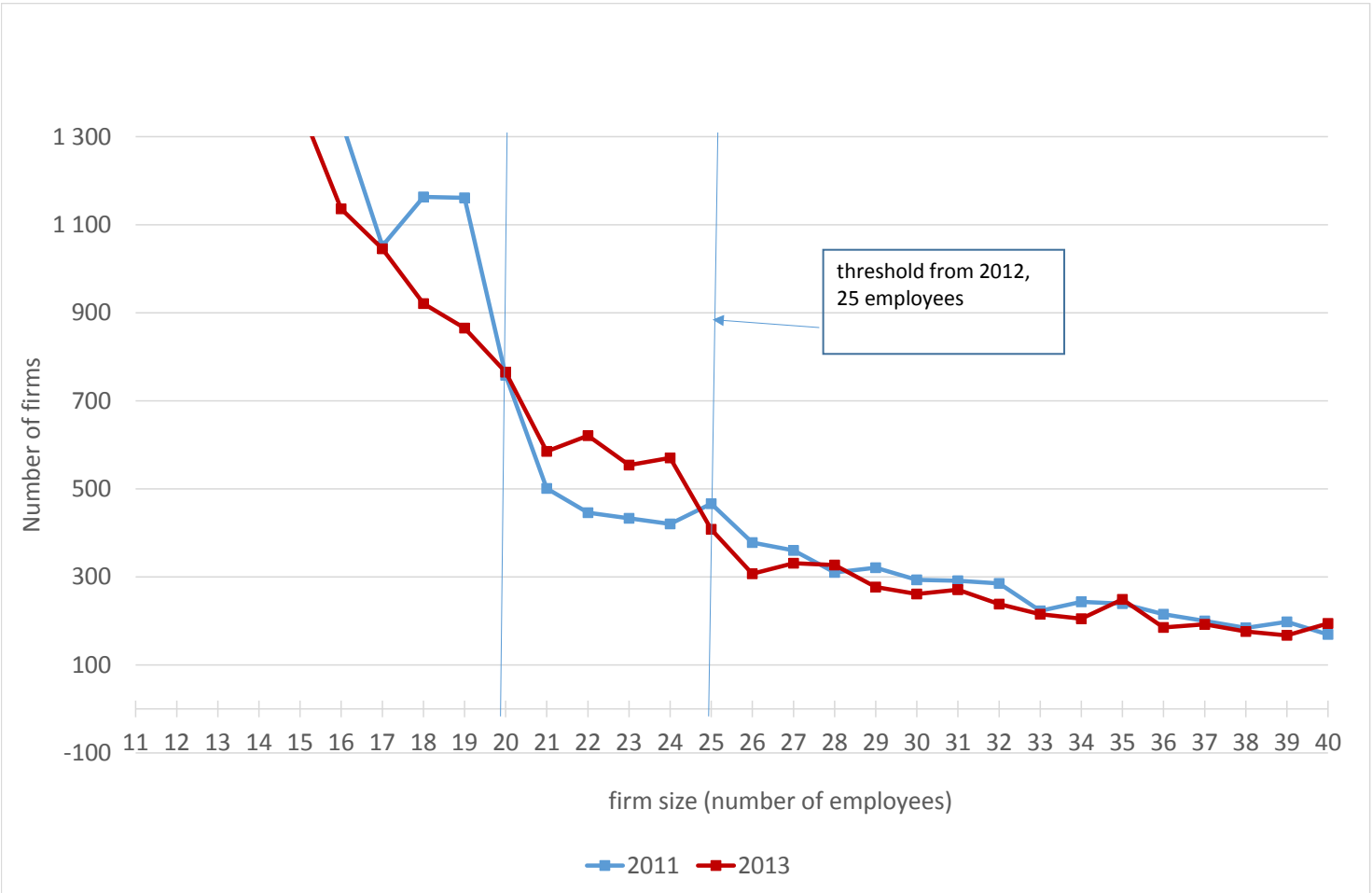
But what about assumption of random firm selection?

Bunching emerges below the threshold after levy hike, 2010

Figure: Distribution of firms by number of employees



Bunching moves away together with the threshold, 2012



No discontinuity in covariates

Table: RD on firm characteristics (2010, c=20,p=1)

	profitratio	lnaverwage	lnprod	lnprod_gdp	lnsales	firmage
τ robust	0.012	0.011	0.051	0.025	0.092	0.806
SE robust	(0.011)	(0.056)	(0.114)	(0.089)	(0.122)	(1.157)
bandwidth	4.847	5.349	6.155	6.175	5.534	4.149
eff. # of obs(l)	5223	5903	7063	6749	6113	4257
eff. # of obs(r)	1931	2159	2436	2320	2206	1631

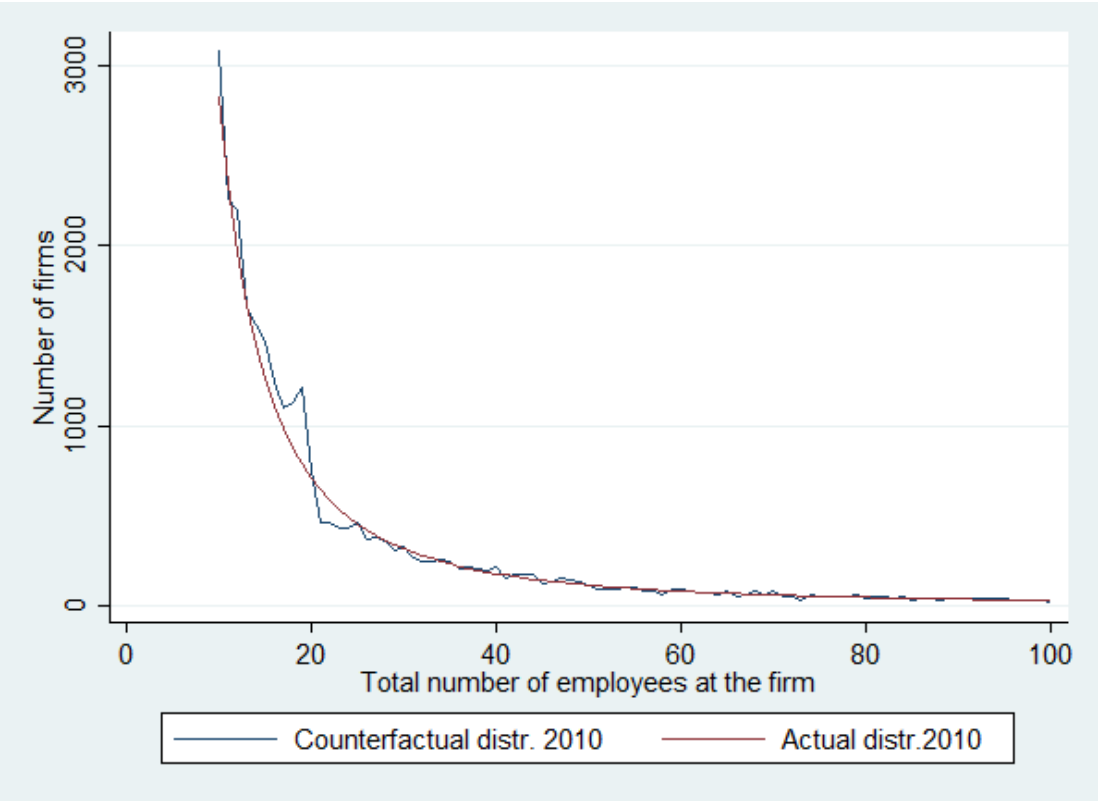
lnaverwage : logarithm of total wage bill/number of employees
prod_gdp :labor productivity (value added/number of employees)
profitratio:profit ratio (pretax profit/number of employees)
firmage : firm age (in years)

Correcting for potential bias of bunching

- Bunching shows that assumption of random firm selection is violated
- Formal manipulation test also confirms this (Cattaneo et al, 2017)
- Estimate the maximum bias (e.g.based on Lalive et al(2013),Gerard et al(2016))
    - Reshuffling of firms: calculate number of firms that are below the threshold to avoid the regulation ("bunchers")
    - by comparing actual and a hypothetical counterfactual distribution (eg.Harasztosi and Lindner, 2015)
    - moving calculated number of randomly selected bunchers just above the threshold (no change in number of disabled employees)
    - run RD with the simulated sample

RD with simulated counterfactual sample, 2010

Figure: Counterfactual distribution (fitted power law)



	2010
τ robust	0.158**
SE robust	(0.066)
bandwidth	5.351
eff. # of obs(l)	5137
eff. # of obs(r)	2709

Comparison of disabled employment effect estimations across countries

Elasticity of substitution is high compared to other estimations

	quota fulf. below threshold	%change in dis/non emp	% change in dis/nondis rel. wage	elast. of subst
Japan*	87%	30%	-10.2%	-2.97
Austria**	25%	12%	-5.9%	-2.0
Hun,naive,2010***,	11%	264%	-23.8%	-11.1
Hun,lower bound,2010	11%	144%	-23.8%	-6.0

Elasticity of substitution: % change of dis/nondis employment /%change dis/nondis relative labor cost
*based on Mori and Sakamoto(2017) and own calculation.
**based on Lalive et al(2015) and own calculation.
The Source of the employer contributions data is the OECD Taxing Wages database.
***Average labor cost is calculated as average gross earnings plus employer contributions.

The low quota fulfillment-high levy puzzle

- More than 70% of the quota is empty after the levy hike
- Total levy revenue: in 2011, 66 Mrd HUF, 0,24% of GDP (compare: corporate income tax is 2% of GDP)
- Although employing a part-time minimum wage earner disabled (even with zero productivity) is much cheaper than paying the levy
- Potential explanations:
  - supply shortage of disabled
  - high adjustment costs

Regional differences in disabled employment effect: the role of disabled population share

anecdotal evidence: firms in Western regions and near Budapest struggle with finding disabled

Table: Share of disabled population in regions

region code	Hungarian name	English name	% of disabled in the working age pop.
1	Közép-Magyarország	Central Hungary	7.3
2	Közép-Dunántúl	Central Transdanubia	9.2
3	Nyugat-Dunántúl	Western Transdanubia	9.2
4	Dél-Dunántúl	South Transdanubia	16.8
5	Észak-Magyarország	North Hungary	14.1
6	Észak-Alföld	North Great Plain	14.7
7	Dél-Alföld	South Great Plain	14.8

Source:Labor force survey 2011, Central Statistical Office

Naive RDD extended with disabled population share

DPR: disable population ratio: region specific variable from labor force survey, 2011

$$DPR_r = \frac{DP_r}{TP_r} - \frac{\overline{DP}}{\overline{TP}},$$

DP : working age (15-64 years) disabled population

TP: is the total working age population

Higher disabled share implies higher disabled employment effect

	(1)	(2)
YEARS	2010	2011
VARIABLES	disemp	disemp
D	0.316***	0.273***
	(0.0327)	(0.0317)
emp-c	0.0160***	0.0166***
	(0.00499)	(0.00491)
D*(emp-c)	0.00447	0.00592
	(0.00980)	(0.00949)
lnaverwage	-0.0129	0.00531
	(0.0171)	(0.0160)
lnprod_gdp	-0.000925	-0.00976
	(0.0101)	(0.00989)
D*lnprod_gdp	-0.0447**	-0.0119
	(0.0202)	(0.0199)
D*lnaverwage	-0.0927***	-0.0852***
	(0.0328)	(0.0310)
disabled pop.ratio	0.0159***	0.0150***
	(0.00204)	(0.00198)
D*disabled pop._ratio	0.0343***	0.0280***
	(0.00392)	(0.00379)
Constant	0.249***	0.191**
	(0.0953)	(0.0882)
Observations	7,841	7,888
R-squared	0.131	0.117

h=5

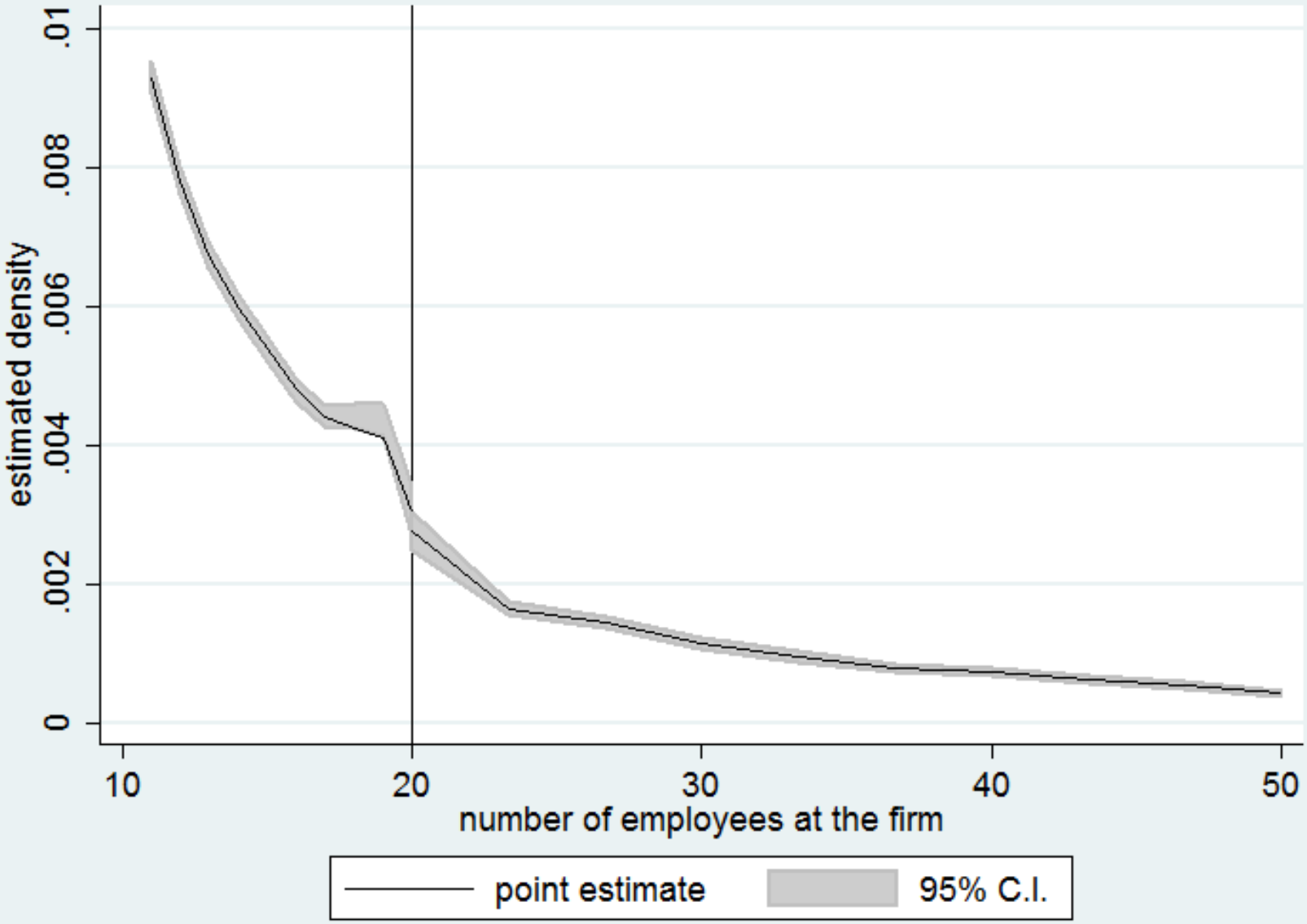
Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1

Köszönöm a figyelmet!*

*Köszönet a hasznos észrevételekért:Kézdi Gábor,Lieli Róbert, Scharle Ágota, Szabó-Morvai Ágnes, Telegdy Álmos, Andrea Weber és a Phd research seminar tagjainak

Estimated firm density by *rddensity* and disctontinuity at the threshold



Results of manipulation test *rddensity* for different years and placebo cutoffs

c=20			c=25			2010		
	T	$P > \|T\|$		T	P $P > \|T\|$	c	T	$P > \|T\|$
2007	-2.447	.014	2007	-.032	.974	15	1.373	.17
2008	-1.837	.066	2008	.447	.655	20	-4.989	0.00
2009	-1.969	.049	2009	-.628	.53	25	-.693	.488
2010	-4.989	0.00	2010	-.693	.488	30	-.465	.642
2011	-3.69	0.00	2011	-.101	.919			
2012	-1.726	.084	2012	-2.301	.021			

Restriction:equal c.d.f. and higher order derivatives assumed on the two sides of the cutoff.Bandwidth selection is based on MSE of difference and sum of densities, assuming one common bandwidth. Optimal bandwidth is the selected as the lower of the two above criteria