Worker Social Networks and Firm-Level Job Creation

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Les 4 Suédois

The main question

- Assess "does privileged access to workers - through social networks - cause firm-level job creation?"
  - 30-60 percent of workers state that they found their jobs through social contacts
  - About two thirds of (Swedish) firms state that they used informal channels when filling their last vacancy. Hence, firms use social ties for hiring.
- This contrasts with "does job creation cause (the maintenance and the use of) social networks?"

Background

Network theory offer two broad explanations for the use of job-search networks:

- Contacts spread information about available jobs (e.g. Jackson and Calvo-Armengol, 2004)
- Employers use employee referrals to screen (or monitor) applicants (e.g. Montgomery, 1991)

Both deal with information problems typically summarized in the "matching function"

What do networks do to workers?

- Consistent evidence that a higher employment rate among social contacts help workers find jobs (Bayer et al, 2008; Cingano and Rosolia, 2012)

- (Strong) Social contacts direct workers to the very establishments where these contacts are employed (Kramarz and Skans, *ReStud,* forthcoming, **KS** hereafter)

What do networks do to firms?

Very scarce evidence:

- Most (network) theories suggest that the existence of networks changes the way firms choose to fill an exogenous set of existing vacancies.

- **KS** show that small firms recruit more young workers overall in the (exogenous) years when children of employees graduate

- This suggests that job creation might be endogenous to the supply of workers with which the firm's employees have (strong) social ties

KS
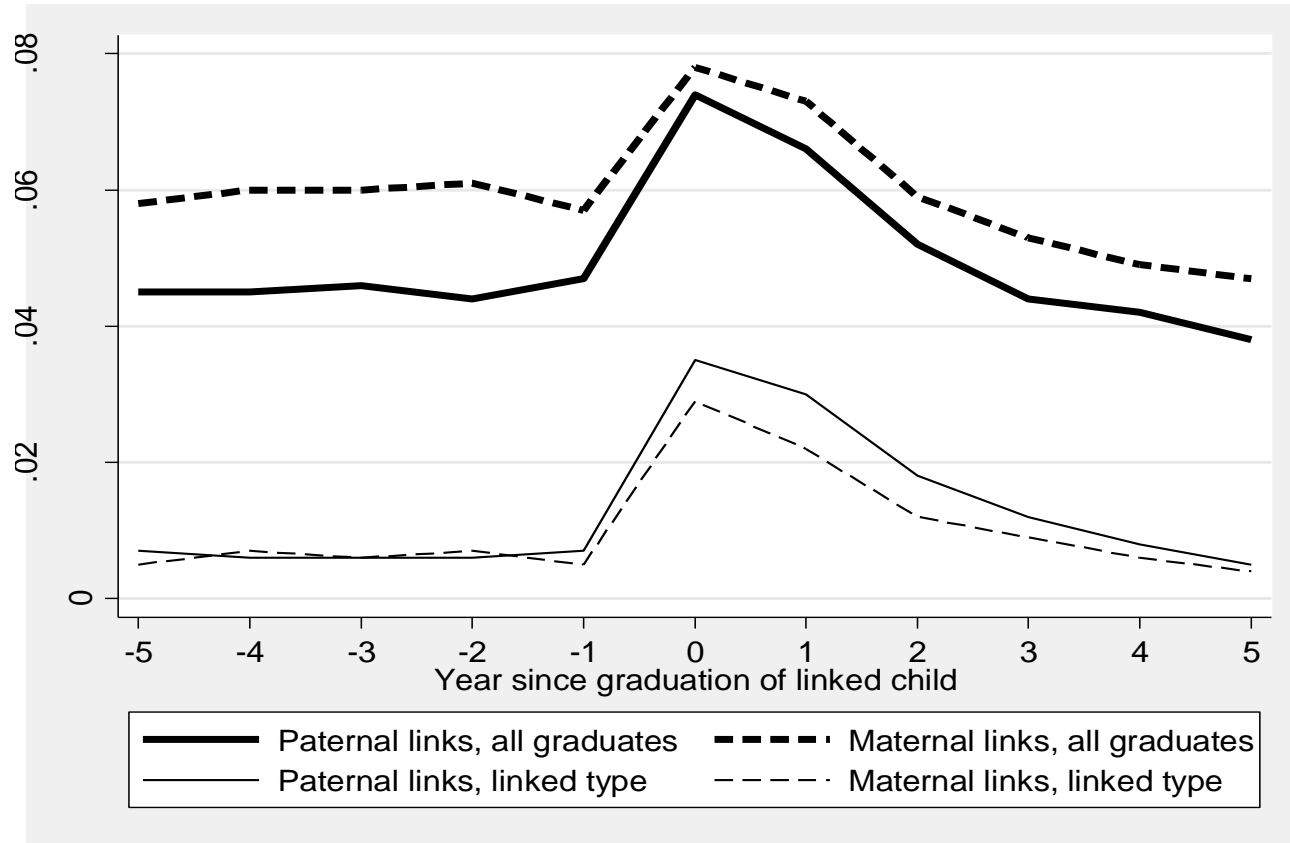
In this paper

- We analyze different types of networks to explore the firm-level job creation responses to supply shocks (affecting firms' social ties) that hit firms

- We use mass-layoffs of linked (among others) workers as our measure of "network-supply" (supply of social ties) shocks

- We measure family, co-worker, neighbors, or school networks (parce qu'on est très forts…)

What do we hope to learn?

1. Are some social contacts are more important than others ?

2. Facing such shocks, do firms respond by filling vacancies (substituting normal for linked candidates), or by creating jobs?

3. Do these responses differ between strong and weak social ties?

4. How are firms' profits affected?

Why do we need "shocks"?

- **KS** show the existence of a positive link between firm profits and recruitments through social networks (relative to recruitments of un-connected young workers).

- This relationship exists for both small and large firms, suggesting that (expected) increased profits induces hiring using strong social ties

Profits relative to network recruitments (Kramarz and Skans, 2013)
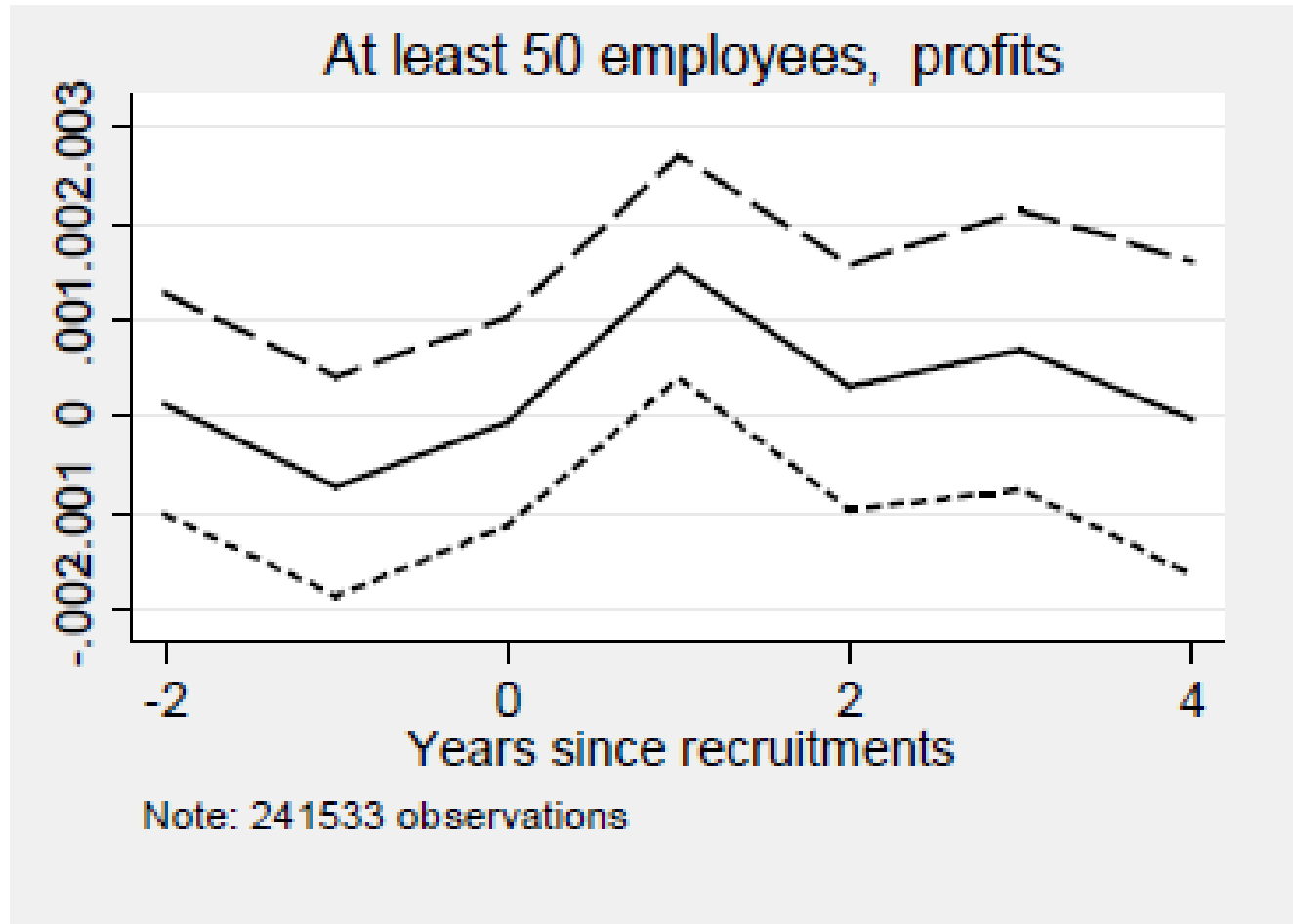
Data

- Swedish longitudinal matched employer-employee data
- All workers 1985-2006
- Unique person, plant and firm identifiers.
- Additional information on individual (age, gender) and plant (sector, size and location) characteristics.

Sample consists of 3 main players:

(1) Workers (*i*) displaced due to plant closures between *t-1* and *t*.

➤ Closures between 1990-2005.

➤ Single-plant firms in the private sector.

➤ At least 10 employees in year *t-1*.

➤ **Closure=1** if the firm reduced workforce with more than 90 percent between *t-1* and *t*.

(2) Contacts of the displaced workers (C_i) defined as:

➢ Previous co-workers: shared work history in **previous** establishments between *t-2* and *t-11*.

➢ Parents

➢ College classmates: same school, field (7 digit ISCO) and graduation year.

(3) The displaced contacts' current employers.

Data: some statistics

	mean	sd	min	max
Displaced	**311.942**			
Size closure firm	70.0	213.3	10	2681
Employment the year after displacement	0.67	0.47	0	1
Age	35.2	12.7	16	74
Female	0.38	0.49	0	1
At least college	0.20	0.40	0	1
Co-worker contacts				
Number of former co-workers	76.7	66.1	1	627
Co-worker employment rate at displacement	0.76	0.15	0	1
Parent contacts				
Number of parents	1.74	0.64	0	2
Parent employment rate at displacement	0.42	0.44	0	1
College contacts (conditional on own college attendance)				
Number of college class-mates	29.9	25.0	1	98
Class-mate employment rate at displacement	0.86	0.14	0	1

Summary of the firm's set of social ties

- *Previous coworkers*: Defined as workers who have worked at the same establishment as a current employee in the past (but at another workplace than the one which is closing)

- *Family members*: Children of current employees

- *Former classmates*: Sharing graduation year, school, and field (7-digit ISCO).

- *Neighbors* (will come but super small)of those who have a job in the firm under study

Analysis in 3 steps:

(1) From the displaced worker's side:

- Network employment rate and re-employment

(2) Sorting after displacement:

- Matching of displaced workers with networked plants

(3) From the firm's side:

- Hiring responses to displacements within current employees networks

Summary of results (last)

From the worker side:

- Variation in employment rate of previous co-workers and parents are equally important for re-employment.

- Parents relatively more important for the low educated.

Summary of results (last)

Systematic sorting:

- Previous co-workers and parents predict *where displaced* workers find employment

- Parents matter substantially more in this dimension

Summary of results (last)

From the firm side:

- Firms are more likely to hire displaced family members than displaced co-workers.

- Both ties increase recruitments of displaced workers.

- Both ties increase total hires by about as much (although imprecisely estimated).

Social ties and re-employment (from the worker side as in Cingano and Rosolia, 2012)

We relate the contact employment rate at the year prior to displacement (t_o) of individual i to the probability of re-employment the year following displacement (t):

$$E_{it} = \alpha_j + \gamma ER_{it_0} + \theta \log(N_{it_0}) + X_{it_0}\beta + e_{it_0}$$

where E_{it} takes the value one if individual i is employed in year t , N_{it_0} is the size of the network measured as the number of contacts, and ER_{it_0} is the contact employment rate as of the year (prior to) of displacement, t_0 . Finally, α_j a vector of closing-firm fixed effects.

We focus on three types of contacts: (i) previous co-workers (same previous plant and year), (ii) parents and (iii) high-school contacts (same school*field*graduation year).

Social ties and re-employment (continued)

Table 1 Effect of contact employment status on own employment status

	(1)	(2)	(3)
Sample:	All displaced	College education	Below college education
	Previous co-workers		
Standardized contact employment rate	0.0145***	0.0151***	0.0151***
	(0.001)	(0.003)	(0.001)
Mean dependent variable	0.666		
Observations	310,238	60,985	249,253
R-squared	0.198	0.322	0.207
	Family members		
Standardized contact employment rate	0.0180***	0.0137***	0.0217***
	(0.001)	(0.003)	(0.001)
Mean dependent variable	0.636		
Observations	380,367	70,132	310,235
R-squared	0.193	0.308	0.197
	Former class-mates		
Standardized contact employment rate		0.0050	
		(0.006)	
Mean dependent variable		0.795	
Observations		11,788	
R-squared		0.476	
Closing firm fixed effects	yes	yes	Yes

Notes: *** p<0.01, ** p<0.05, * p<0.1. Standard errors are clustered at closure firm. The outcome takes the value one if the displaced was employed in year *t*. Specification controls for the (log of) the number of contacts, age, sex, tenure and education of the displaced worker as well as closing firm fixed effects.

Social ties
and the direction of employment

Here, we identify all the plants with links to the closing firm by currently employing a contact of the displaced. (In the case of former co-workers, we require that this plant is different from the plant where the link was established.) Linked employers are considered as potential destination plants j for the displaced workers. However, some plants will have actual links to one or a subset of the displaced from the closing plant.

In practice we generate a sample of matched pairs (dyads) of displaced workers i and destination plants j by expanding each displaced worker with all employers of own and co-displaced contacts. To avoid generating a too large dataset, we restrict the closing plants to 1000 employees.

Social ties and
the direction of employment (ctd)

Given this data structure we estimate the role of contacts on the sorting of displaced employees to particular plants. The empirical strategy relates the recruitment of worker i in plant j, to the existence of a contact between the displaced and the plant's incumbent workers.

$$E_{ijt} = \gamma Contact_{ij} + \theta_{kjt} + \varepsilon_{ikjt}$$

Where E_{ij} takes the value 1 if plant j employ displaced worker i in year t; $Contact_{ij}$ is an indicator for whether the plant has a link (a contact) to worker i through its incumbent employees. It is defined as having at least one contact or by the number of employees being linked to worker i. Finally, θ_{kjt} is a vector of Closing firm×Contact plant×Year dummies.

	All	Number of contacts
Previous co-workers		
Contact in firm j	0.00161***	
	(0.000)	
Number of contacts in firm j		0.00127***
		(0.000)
Mean dependent variable	.00021	.00021
Observations	43,434,246	43,434,246
R-squared	0.322	0.325
Parents		
Contact in firm j	0.01616***	
	(0.001)	
Number of contacts in firm j		0.01623***
		(0.001)
Mean dependent variable	.00074	.00074
Observations	1,198,735	1,198,735
R-squared	0.323	0.324
Former class-mates		
Contact in firm j	0.00027***	
	(0.000)	
Number of contacts in firm j		0.00025***
		(0.000)
Mean dependent variable	.00022	.00022
Observations	1,226,518	1,226,518
R-squared	0.263	0.263
Closing firm*Contact firm* Year fixed effects	yes	yes

	Main	Main	Placebo
	All	Private multi-firm destination plants	Private multi-firm destination plants
Dep. Var:	Pr(Enter plant j)	Pr(Enter plant j)	Pr(Enter another plant in same firm)
<u>Previous co-workers</u>			
Contact in plant j	0.00161***	0 .00163***	0.00017***
	(0.0000)	(0.0001)	(0.0000)
	0.00021	0.00021	0.00006
Observations	43,434,246	10,793,158	6,870,799
R-squared	0.322	0.326	0.333
<u>Parents</u>			
Contact in plant j	0.01616***	0 .01630***	0.00009***
	(0.001)	(0.00175)	(0.00001)
Mean dependent variable	0.00074	.000903	.000018
Observations	1,198,735	357.556	7,459,007
R-squared	0.323	0.542	0.204
<u>Former class-mates</u>			
Contact in plant j	0.00027***	0.00026***	0.00002*
	(0.000)	(0.00013)	(0.0000)
Mean dependent variable	0.00022	0.00025	0.00001
Observations	1,226,518	311.978	3,058,490
R-squared	0.263	0.395	0.277
Closing firm*Contact firm* Year fixed effects	yes	yes	yes

How do the firms respond?

- Relate hiring patterns to displacement frequency of linked workers.
- Focus on relatively small firms (<50) to get variation in the fraction of linked workers that are displaced
- Use establishment fixed effect
- Capture market effect by
  - detailed controls and
  - placebo-type control (displacement of workers with links to similar firms)

The empirical model:

Our covariate of interest is displacements with links (*LD*) to the receiving plant (*j*). We also control for the total number links (*LN*) and the displacements with links to plants within the Local, industry-specific, Labor Market (*LLM* = 3-digit industry*County*Year) of the receiving plant (*LLM_LD*), as well as displacements from plants operating within the *LLM* of the receiving plant (*LLM_D*). The model also controls for plant fixed effects and time dummies:

$$Y_{jt} = \alpha_j + \gamma LD_{jt} + \theta LN_{jt} + \mu LLM\_LD_{LLM(j)t} + \varphi LLM\_D_{LLM(j)t} + Year_t + \varepsilon_{j,t}$$

Main result

Table 1 Network hires, total hires and job creation responses to displacements of linked workers.

| | Outcomes | | | | | |
	Linked hires		Total hires		Net job creation	
Displaced links (LD)	0.362***	0.435***	0.315***	0.336***	0.330***	0.274**
	(0.0205)	(0.0203)	(0.109)	(0.107)	(0.128)	(0.127)
Links (LN)	0.0221***		0.00640		-0.0173***	
	(0.000929)		(0.00492)		(0.00580)	
LLM_LD	-0.000183	-0.000173	-0.00136	-0.00136	-0.00400***	-0.00401***
	(0.000224)	(0.000224)	(0.00119)	(0.00119)	(0.00140)	(0.00140)
LLM_D	0.000669***	0.000653***	0.000625	0.000621	0.00605***	0.00606***
	(8.86e-05)	(8.86e-05)	(0.000469)	(0.000469)	(0.000553)	(0.000553)
Constant	3.517***	4.669***	182.3***	182.6***	22.50***	21.60***
	(0.112)	(0.101)	(0.593)	(0.535)	(0.699)	(0.630)
R2						
N (plant years)	1,205,428	1,205,428	1,205,428	1,205,428	1,205,428	1,205,428
N (unique plants)	263,224	263,224	263,224	263,224	263,224	263,224

Note: Data cover recruitments during 1997-2006 in plants with between 2 and 50 employees in the pre-recruitment year. All variables are measured by the number of workers. The dependent variables are multiplied by 100 for ease of exposition. Linked workers had been working with an incumbent worker at a different plant in the 10 years before the year of analysis. Displacements are reductions in employment by at least 90 percent during the year. The model also includes year dummies and plant fixed effects. *** (**,*) Significant at the 1 (5,10) percent level.

A modified empirical model:

In order to analyze the evolution over time we rewrite the model to account for leads and lags of the displacement variable. The model, which also includes a complete set of dummies for cases when particular leads and lags are missing, is set up as follows.

$$\widetilde{Y_{jt}} = \alpha_j + \sum_{\tau=-4}^{5} \gamma \widetilde{LD}_{jt+\tau} + \theta LN_{jt} + \mu LLM\_LD_{LLM(j)t} + \varphi LLM\_D_{LLM(j)t} + Year_t + \varepsilon_{j,t}$$

Where ~ indicates that the variable is deflated with plant-level employment (average between first and last year within the sample range).

Estimated effect of the number of displaced with coworker links
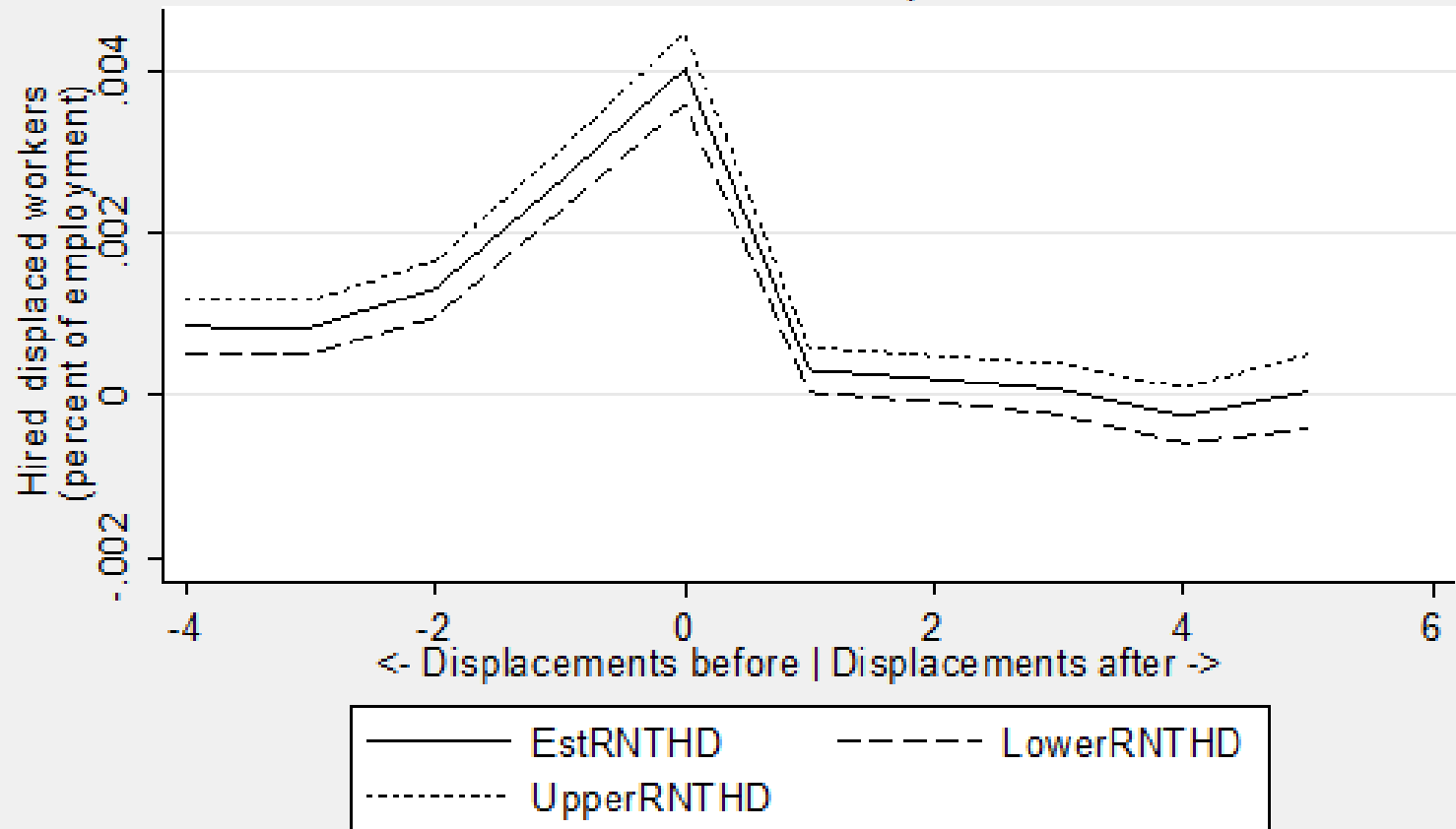
Note: Estimated impact of displacements before and after. Model includes firm fixed effects, year dummies, network size and displacements within local labor market, displacements with links to the local labor market and controls for missing leads or lags due to censoring. 1575504 observations

First order firm-side responses to displacements of linked workers

	# Hired displaced prev. coworkers	# Hired prev. coworkers	# Hired displaced children	# Hired children
# Displaced previous coworkers	0.384***	0.288***	0.00548*	-0.0326**
	(0.0145)	(0.0333)	(0.00317)	(0.0154)
# Displaced children	0.191***	0.283	1.973***	0.896***
	(0.0329)	(0.218)	(0.0660)	(0.135)
# Displaced in local industry	0.000145*	0.000102	-4.29e-05	0.000266
	(7.47e-05)	(0.000585)	(5.76e-05)	(0.000348)
N	1,027,132	1,027,133	1,027,134	1,027,135
Mean Dependent Var (100s)	0.158	10.490	0.098	4.444
Plant fixed effects	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Controls for				
...network size	Yes	Yes	Yes	Yes
...displaced w. links to local industry	Yes	Yes	Yes	Yes

Note: Plant-level panel 1995-2007. Plants smaller than 50 employees where at least one employee has a link to a previous coworker and at least one employee has a link to an employed child in the year before are included. All regressions are run in levels with dependent variables multiplied by 100. Local industry is defined by county times 3-digit industry. Robust standard errors in parentheses.
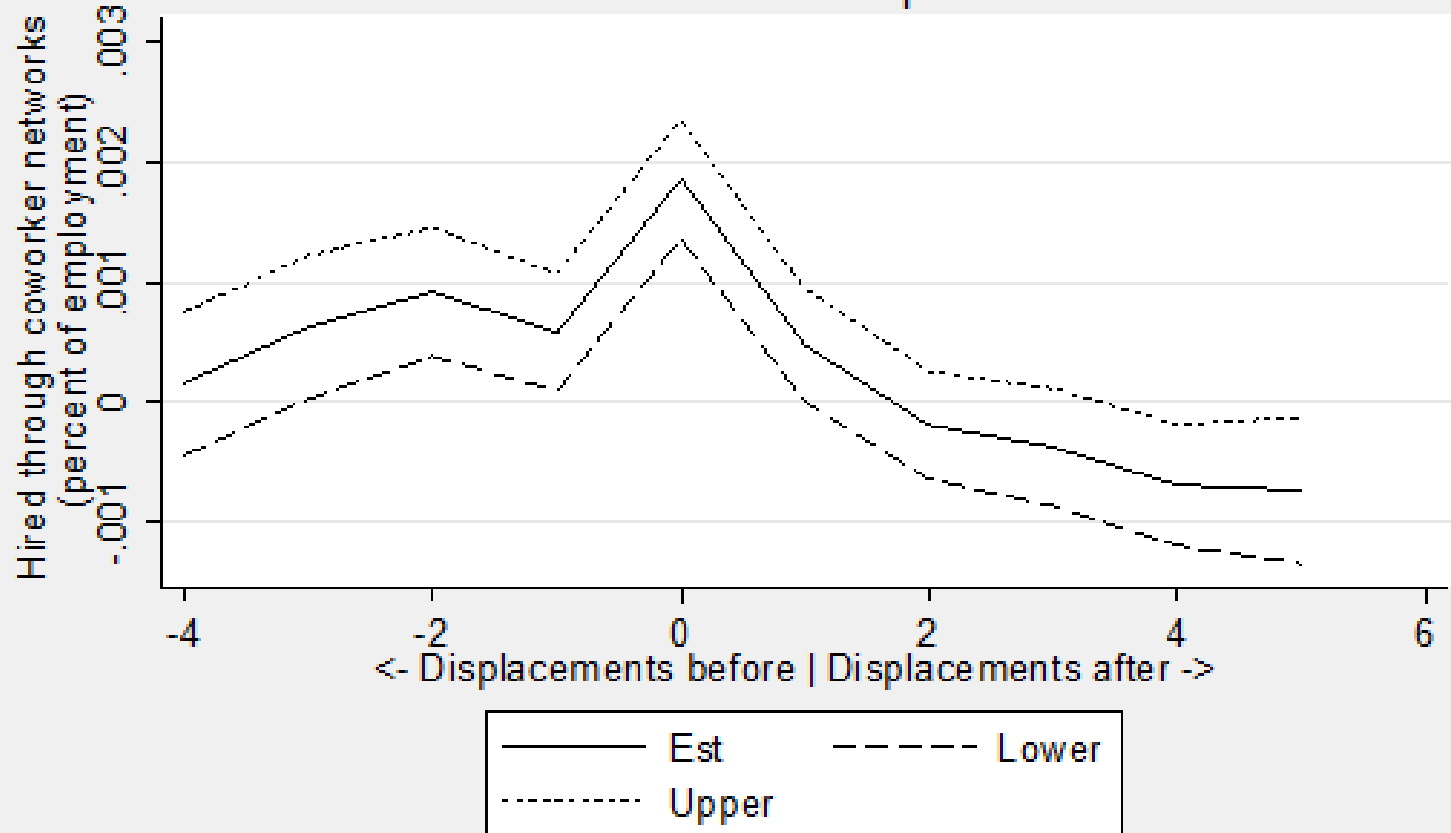
Firm-side responses in terms of hires of displaced overall and total hires (first two columns repeated from prev table)

	# Hired displaced prev. coworkers	# Hired displaced children	# Hired displaced overall	# Hired total
# Displaced previous coworkers	0.384***	0.00548*	0.577***	0.377**
	(0.0145)	(0.00317)	(0.0241)	(0.169)
# Displaced children	0.191***	1.973***	2.789***	2.943**
	(0.0329)	(0.0660)	(0.144)	(1.444)
# Displaced in local industry	0.000145*	-4.29e-05	0.00341***	0.00937**
	(7.47e-05)	(5.76e-05)	(0.000376)	(0.00401)
N	1,027,132	1,027,134	1,027,136	1,027,137
Mean Dependent Var (100s)	0.158	0.098	3.654	245.200
Plant fixed effects	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes
Controls for				
...network size	Yes	Yes	Yes	Yes
...displaced w. links to local industry	Yes	Yes	Yes	Yes

Note: Plant-level panel 1995-2007. Plants smaller than 50 employees where at least one employee has a link to a previous coworker and at least one employee has a link to an employed child in the year before are included. All regressions are run in levels with dependent variables multiplied by 100. Local industry is defined by county times 3-digit industry. Robust standard errors in parentheses.
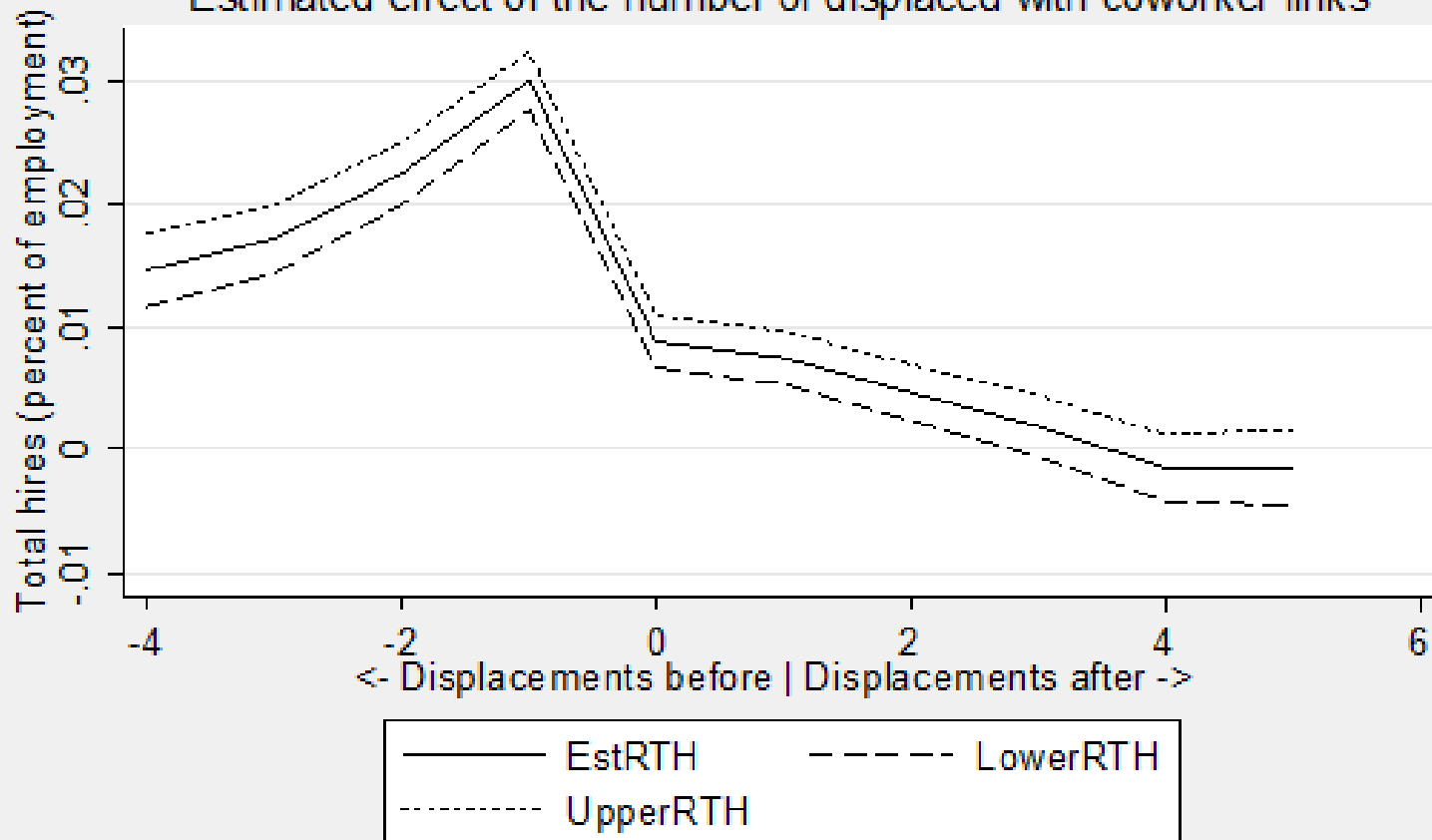
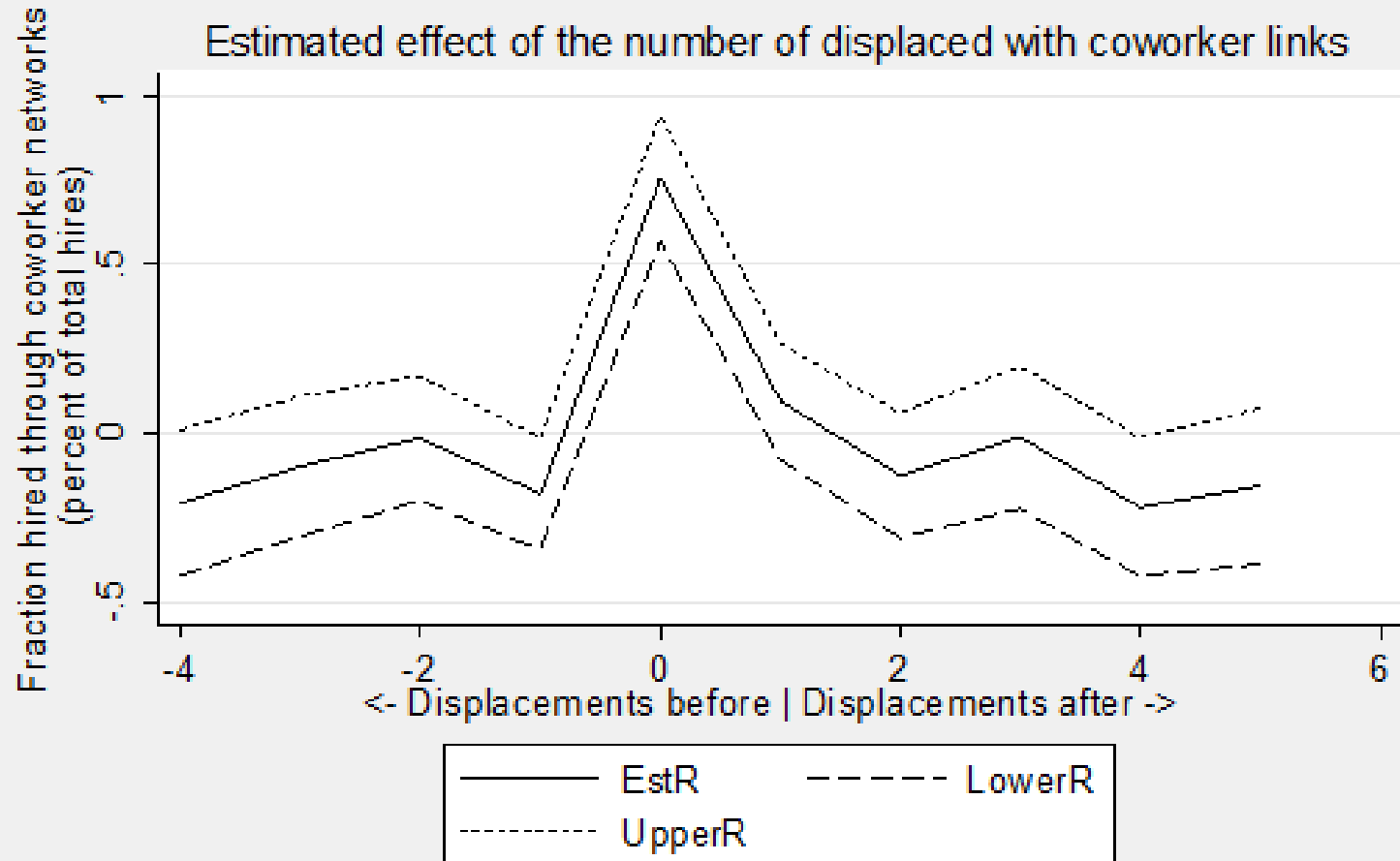Estimated effect of the number of displaced with coworker links

Note: Estimated impact of displacements before and after. Model includes firm fixed effects, year dummies, network size and displacements within local labor market, displacements with links to the local labor market and controls for missing leads or lags due to censoring. 1575504 observations

Estimated effect of the number of displaced with coworker links

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Estimated effect of the number of displaced with coworker links

<- Displacements before | Displacements after ->

EstR ——— LowerR
UpperR

Note: Estimated impact of displacements before and after. Model includes firm fixed effects, year dummies, network size and displacements within local labor market, displacements with links to the local labor market and controls for missing leads or lags due to censoring. 1054037 observations