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The Effect of Minimum Wages on Firm-Financed Apprenticeship Training

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Motivation

- The minimum wage is a popular labor market policy implemented worldwide
- Wage and employment effects have been studied extensively
- Little is known about minimum wage effects on job training of youths and apprenticeship training

Research Question

- What is the effect of a minimum wage introduction on firm-provided apprenticeship training?

Literature

Theory

- Becker 1964, Rosen 1972, Mincer 1974, Hashimoto 1982
  In competitive markets, minimum wages inhibit or lower firm-financed training in general skills
- Acemoglu & Pischke 1999, 2003, Wolter & Ryan 2011
  In non-competitive markets, minimum wages increase wage compression within firms giving them an incentive to increase investments

Empirics

- Leighton & Mincer (1981), Grossberg & Sicilian (1999)
  Decreased wage growth and fewer training hours
- Acemoglu & Pischke 2003, Arulampalam et al. 2004, Cardoso 2009
  No effects or slightly positive effects on training

Minimum Wage in Construction

- Minimum wage
  - Declaration 12.11.1996
  - Implementation: 01.01.1997
- Minimum wage in euros

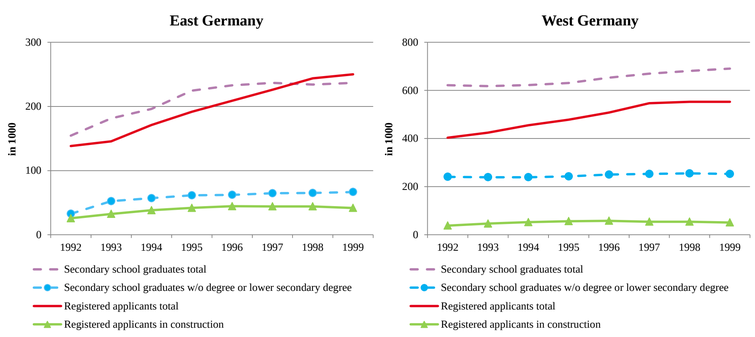
	01/1997	09/1997	09/1999	09/2000
West	8.69	8.18	9.46	9.65
East	8.00	7.74	8.32	8.48

- Binding for professional workers
- Apprentices and workers younger than 18 have been exempted
- Apel et al. 2012

	East	West
Kaitz index	85 %	64 %
Binding for workers	24 %	4 %

Apprenticeship System

- Demand for apprenticeships and number of school graduates



- Apprentice pay has been determined separately by collective bargaining
- Apprentices spend 3–4 days working in firms and 1–2 days in publicly financed vocational schools
- Firms' are granted the right to train and are monitored by chambers of commerce
- Apprentices are assessed by chambers of commerce and take centralized exams
- Apprenticeship training is costly for firms, e. g. 4,700 euros direct net costs per bricklayer apprentice a year (Beicht et al. 2004)

Data & Identification

Identification
- Difference-in-differences
- Treatment group: construction sub-sectors with minimum wage
- Control group: pool of several control groups

Data
- 50 % random sample of the IAB Establishment History Panel (BHP)
- Administrative firm-level data, 1993–1999

Estimation
- Firm fixed effects estimation (firm i, year t)

$$y_{it} = \alpha + \delta D_{it} + \beta X_{i,t-1} + \eta Z_{it} + \gamma Z_{i,t-1} + \lambda_t + \varphi_i + \varepsilon_{it}$$

- y_{it} Worker flows:
  1. Indicator whether firm started to train new apprentices
  2. Number of new apprentices
- D_{it} = 1 for firms of the construction sector from 1997 onwards
  = 0 otherwise
- $X_{i,t-1}$ Vector of firm level covariates in $t-1$ (firm size, median daily pay rate, age structure, share of females, qualification structure, share of part-time workers)
- Z_{it}, $Z_{i,t-1}$ Vector of the number school leavers by school type and federal state of the firm in t and $t-1$
- λ_t year indicators, φ_i firm indicators, ε_{it} error term

Treatment Group

- Construction sub-sectors with minimum wage
  - General civil engineering activities
  - Building construction and civil engineering
  - Civil and underground
  - Construction of chimneys and furnaces
  - Plasterers and foundry dressing shops
  - Carpentry and timber construction

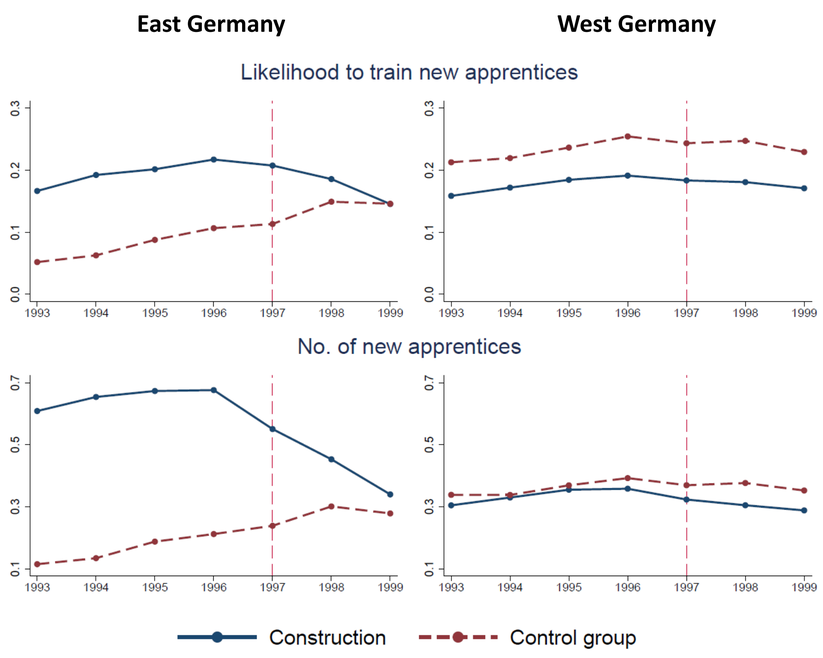
Control Group

Pool of manufacturing sub-sectors
- Selection criteria of control sub-sectors:
  1. Similarity index between treatment and potential control sub-sectors including the outcomes and sectoral employment growth rates in the pre-treatment period (similar to IAB, RWI, ISG 2011)
  2. Placebo regressions
  3. Graphical inspection of common trend plots

East Germany
- 5 sub-sectors
- e.g. manufacture of sand-lime brick, concrete and mortar, …

West Germany
- 6 sub-sectors
- e.g. quarrying, cutting, shaping and finishing of stone, …

Graphical Evidence



Estimation Sample

	East		West	
	Treat	Control	Treat	Control
Training new apprentices	0.234	0.119	0.209	0.246
No. of new apprentices	0.672	0.241	0.378	0.382
N	57,695	6,756	152,283	76,804

Results

Main results

	East			West		
	Likelihood to train new apprentices					
>1996*Construction	-0.085***	-0.059***	-0.043***	-0.008***	-0.003	0.004
	(0.008)	(0.009)	(0.009)	(0.003)	(0.003)	(0.003)
	Number of new apprentices					
>1996*Construction	-0.359***	-0.304***	-0.259***	-0.050***	-0.041***	-0.030***
	(0.032)	(0.028)	(0.027)	(0.007)	(0.007)	(0.007)
N	64,371	64,371	64,371	229,024	229,024	229,024
Sector indicators	Yes	No	No	Yes	No	No
Firm indicators	No	Yes	Yes	No	Yes	Yes
Firm structure t-1	No	No	Yes	No	No	Yes
Firm size t-1	No	No	Yes	No	No	Yes
Median pay rate t-1	No	No	Yes	No	No	Yes
School leavers t, t-1	No	No	Yes	No	No	Yes
Year indicators	Yes	Yes	Yes	Yes	Yes	Yes

Significance levels: *p<0.10, **p<0.05, ***p<0.01. S.E. clustered at firm level.

Placebo regressions

	Likelihood to train new apprentices		Number of new apprentices	
	East			
>1996*Construction	-0.051***	-0.031***	-0.278***	-0.226***
	(0.011)	(0.012)	(0.039)	(0.040)
1996*Construction	0.013	0.022*	0.042	0.058
	(0.012)	(0.012)	(0.038)	(0.039)
1995*Construction	0.008	0.011	0.025	0.030
	(0.011)	(0.011)	(0.033)	(0.033)
	West			
>1996*Construction	-0.004	0.006	-0.043***	-0.023***
	(0.004)	(0.005)	(0.009)	(0.009)
1996*Construction	-0.004	0.003	-0.009	0.0001
	(0.005)	(0.005)	(0.009)	(0.009)
1995*Construction	0.002	0.006	0.005	0.011
	(0.005)	(0.005)	(0.009)	(0.009)
Covariates	No	Yes	No	Yes
Year indicators	Yes	Yes	Yes	Yes
Firm indicators	Yes	Yes	Yes	Yes

Significance levels: *p<0.10, **p<0.05, ***p<0.01. S.E. clustered at firm level.

Conclusion

- The minimum wage introduction in the construction sector decreased firm-financed apprenticeship training in the east where the minimum wage bite was considerably high, but hardly affected firms in the west where the minimum wage bite was low
- Training incidence decreased by about 4.3 percentage points (19.8 %) on average in the east, but did not decrease in the west
- The number of newly trained apprentices declined by about 0.259 apprentices per firm (38.3 %) in the east and by about 0.03 apprentices per firm (8.4 %) in the west

Potential mechanisms
- The cost shock due to the minimum wage introduction may leave little scope for firms to invest in apprentices who themselves are a cost factor during their training period
- Firms may train fewer apprentices in expectation of increased labor costs after taking over apprentices

Outlook

- Synthetic control method
- Effect heterogeneity (e.g. firm size)
- Alternative standard errors

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