

Employment effects of the new German minimum wage

Workshop on minimum wages:
Lessons from recent experiences and European perspectives

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1. Employment effects of the new German minimum wage:
Evidence from establishment-level micro data
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Employment effects of the new German minimum wage: Evidence from establishment-level micro data (Joint with Hans-Dieter Gerner)

- On 1 January 2015, for the first time a federal minimum wage came into force in Germany.
- Traditionally, wages were mostly collectively bargained by unions and employer associations.
- After collective bargaining coverage decreased over the last two decades, a minimum wage was introduced.
- The minimum wage required an hourly wages of at least €8.50, with exemptions only for:
 - Individuals of age under 18
 - Apprentices
 - Internships with a duration of less than 3 months
 - Long-term unemployed in the first 6 months after re-employment

- A complementary paper by Garloff (2016) uses regional variation and does not detect (large) significant effects on employment.
- We analyze employment effects of the new German minimum wage and provide (first) causal evidence w.r.t.
 - Employment
 - Average wages
 - (Labor flows)
 - Other adjustment margins: standard contractual working hours and freelance employment
- We exploit variation in the establishment level affectedness by the minimum wage.
- Using the longitudinal dimension of the IAB Establishment Panel, we estimate treatment effects on the treated establishments from difference-in-differences specifications.

The IAB Establishment Panel



- Large annual survey on firm policies and personnel developments.
- Units of observations are establishments, which are workplaces not firms: $N \approx 15,000$ each year
- Gross population unit are all establishments located in Germany with at least one employee liable to social security.
- A unique establishment identifier allows to track establishments over time.
- Information is collected (by TNS Infratest Sozialforschung) in personal interviews with plant managers, which ensures a continuation response rate of about 83 percent each year.

Treatment assignment

- We exploit variation in the affectedness by the minimum wage, which we were able to include in the 2014 survey.
 1. Extensive margin affectedness: We ask whether at least one employee is paid an hourly wage below €8.50.
 2. Intensive margin affectedness: We ask how many employees are paid an hourly wage below €8.50 and from this we calculate the fraction of affected employees.
- We also asked whether wages were already adjusted due to the discussion about the minimum wage introduction (within the last 12 months).
- We exclude these establishments as they contaminate the treatment assignment.

Fraction of affected establishments

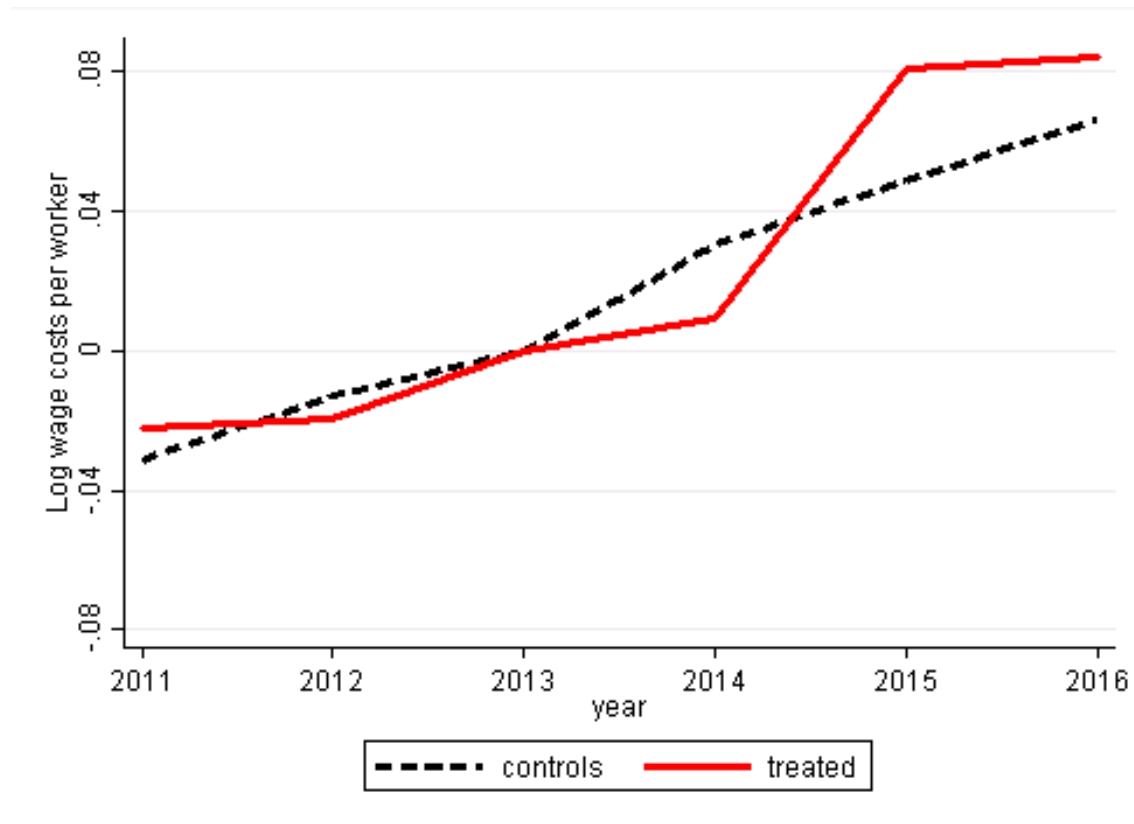


Intensive margin bite



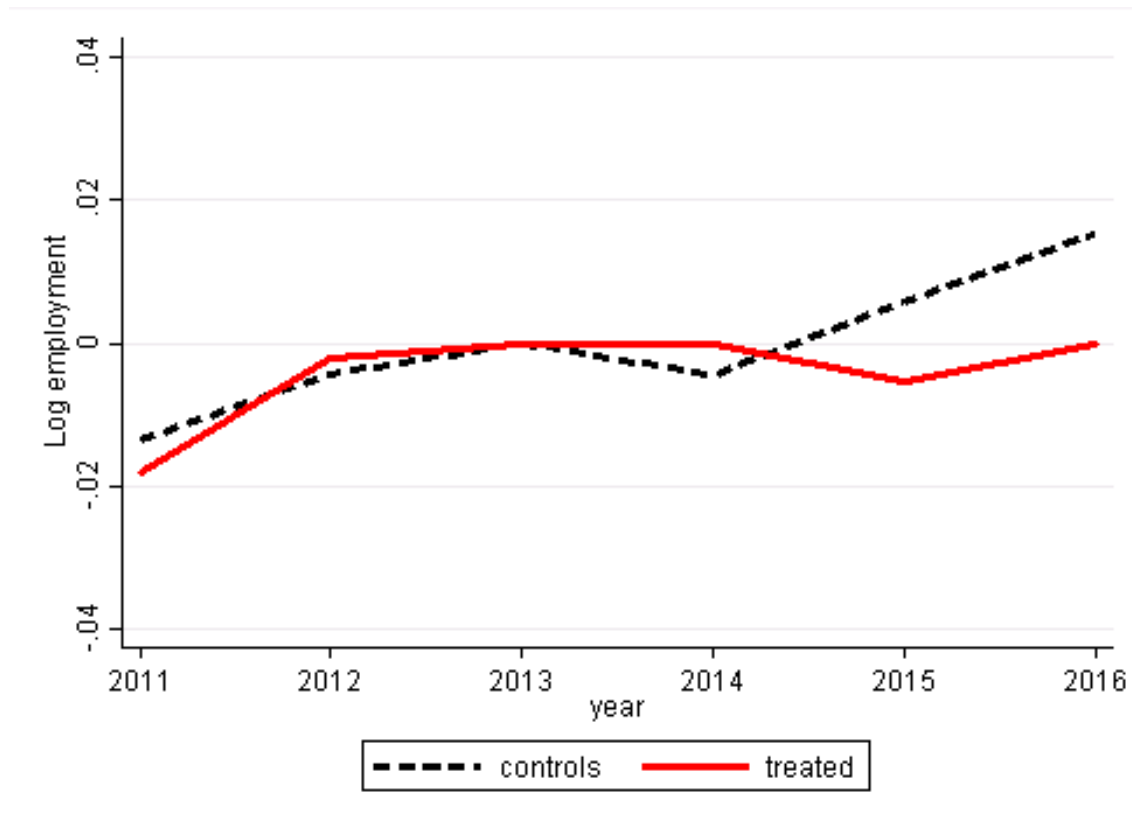
Graphical analysis (1)

- Time-series pattern of log wages by treatment status:



Graphical analysis (2)

- Time-series pattern of log employment by treatment status:



Estimation strategy (1)

$$y_{it} = \text{treated}_i * \text{treatment time}_t * \delta_{ToT} + X_{it}\beta + \gamma_t + \theta_i + \varepsilon_{it}$$

- Specification includes
 - time fixed effects γ_t
 - establishment fixed effects θ_i
 - control variables X_{it} which include the share of female employees and dummies for collective bargaining participation and the presence of a works council.
- δ_{ToT} is the treatment effect on the treated establishments.
- To estimate a labor demand elasticity with respect to wages, we can use a simple Wald estimator:

$$\eta_{elasticity} = \frac{\widehat{\delta_{ToT(employment)}}}{\widehat{\delta_{ToT(wages)}}}$$

Baseline results (1)

	Wage effect	Employment effect	Employment elasticity
	(1)	(2)	(3)
	Log wages per worker	Log employment	IV
Panel A: Extensive margin treatment (0/1)			
ToT _{DiD}	0.038*** (0.009)	-0.017** (0.008)	-0.447 (0.224)
Placebo _{DiD}	-0.021** (0.010)	0.004 (0.007)	
Panel B: Intensive margin treatment [0,1]			
ToT _{DiD}	0.105*** (0.021)	-0.026 (0.020)	-0.278 (0.234)
Placebo _{DiD}	-0.054** (0.024)	-0.003 (0.019)	

Baseline results (2)

Panel C: Differing treatment intensities		
ToT _{DiD}	0.022**	-0.020**
0 < a ≤ 0.2	(0.011)	(0.010)
(522 establishments)		
ToT _{DiD}	0.018	-0.011
0.2 < a ≤ 0.4	(0.020)	(0.014)
(339 establishments)		
ToT _{DiD}	0.074***	-0.019
0.4 < a ≤ 0.6	(0.023)	(0.019)
(297 establishments)		
ToT _{DiD}	0.077***	-0.037
0.6 < a ≤ 0.8	(0.024)	(0.025)
(220 establishments)		
ToT _{DiD}	0.071**	0.012
0.8 < a ≤ 1	(0.032)	(0.033)
(156 establishments)		
Observations	49,654	61,271
Establishments	11,979	13,447

Plant closure in 2015 by affectedness

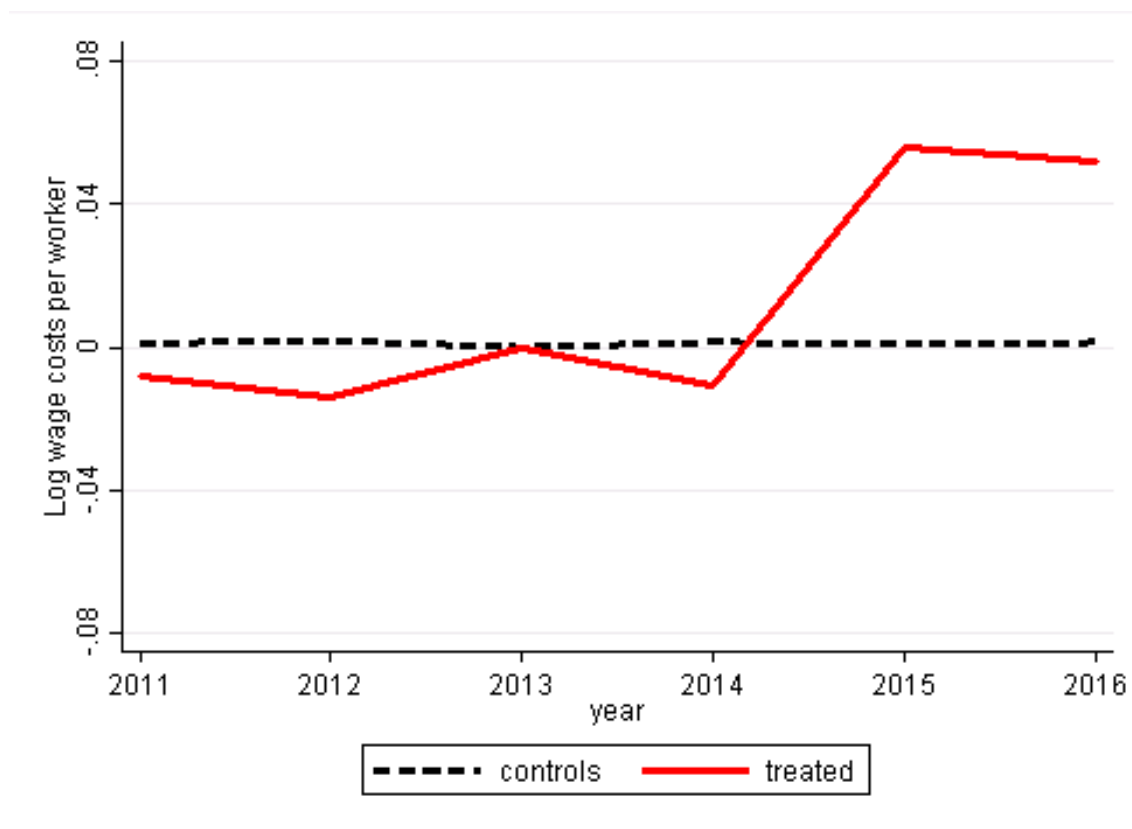
	(1)	(2)
	Baseline	Controlling for initial size, profitability and the technical state of the capital stock
$0 < a \leq 0.2$	-0.016	-0.009
(522 establishments)	(0.008)	(0.009)
$0.2 < a \leq 0.4$	-0.010	-0.013
(339 establishments)	(0.009)	(0.009)
$0.4 < a \leq 0.6$	0.020	0.010
(297 establishments)	(0.010)	(0.010)
$0.6 < a \leq 0.8$	0.018	0.010
(220 establishments)	(0.011)	(0.011)
$0.8 < a \leq 1$	0.028	0.026
(156 establishments)	(0.014)	(0.013)
Establishments	11,237	11,237

Notes: Coefficients are partial effects from a linear probability model explaining the incidence of firm closure between the 2014 and 2015 survey collection of the IAB Establishment Panel. Controls as in Table 2. Further controls in column (2) are the initial 2014 establishment size measured by 10 categories (0-4, 5-9, 10-19, 20-49, 50-99, 100-199, 200-499, 500-999, 1000-1999, and 2000+ employees), the profitability (5 categories), and the technical state of the capital stock (5 categories).

Data source: IAB Establishment Panel 2014, analysis sample. The sample size shrinks as we include further control variables.

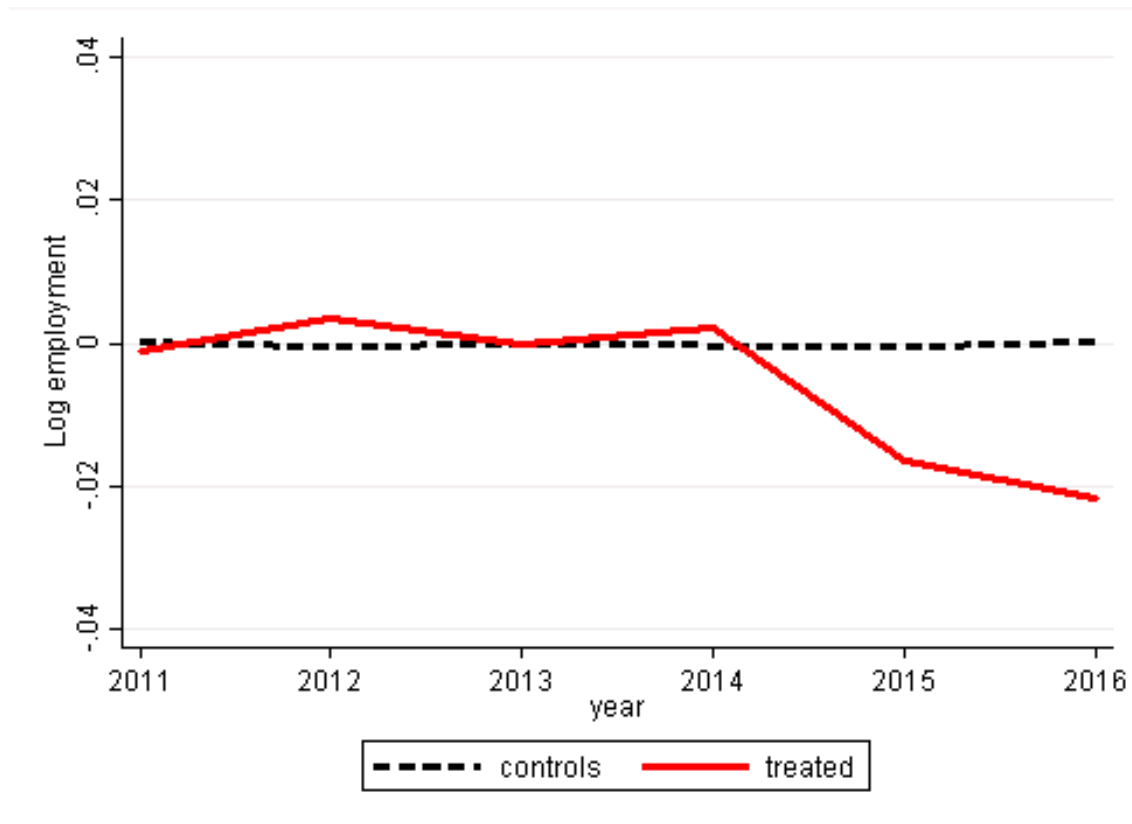
Treatment group specific trends (1)

- Trend-adjusted time-series of log wages by treatment status:



Treatment group specific trends (2)

- Trend-adjusted time-series of log employment by treatment status:



Treatment group specific trends (3)

	(1)	(2)	(3)	(4)
	Log wages per worker		Log employment	
ToT _{DiD}	0.063*** (0.013)		-0.022** (0.009)	
Placebo _{DiD}		0.008 (0.013)		0.004 (0.008)
Observations	49,654	49,654	61,271	61,271
Establishments	11,979	11,979	13,447	13,447

- The wage effect increases.
- The employment effect remains robust.

Excluding potential spillovers

- The SUTVA-Assumption could well be violated:
 - Wage-spillovers along the wage distribution, or
 - Indirect effects (spillovers across establishments)
- Did you conduct one of the following wage adjustments in response to the minimum wage introduction:
 - (a) wages above € 8.50 were reduced,
 - (b) wages above € 8.50 were increased,
 - (c) extra payments were reduced or cut.
- Is this firm indirectly affected by the minimum wage along the lines of the product or labor market, e.g., through changes in prices or a change in competition?

Excluding potential spillovers

	Excluding wage spillovers		Excluding indirect effects	
	(1)	(2)	(3)	(4)
	Log wages per worker	Log employment	Log wages per worker	Log employment
ToT _{DiD}	0.039*** (0.009)	-0.017** (0.008)	0.040*** (0.009)	-0.017** (0.008)
Observations	47,963	59,199	44,461	55,026
Establishments	11,604	13,038	10,845	12,215

Effect heterogeneities (1)

	(1)	(2)
	Log wages per worker	Log employment
<i>East/West differences:</i>		
ToT _{West}	0.011 (0.014)	0.001 (0.012)
ToT _{East}	0.046*** (0.011)	-0.027*** (0.010)
<i>Effects by (pre-determined) competitive pressure:</i>		
ToT _{high comp}	0.030 (0.020)	-0.060*** (0.019)
ToT _{low comp}	0.033*** (0.010)	-0.009 (0.009)

Notes: Coefficients are treatment effects on the treated from difference-in-difference specifications with establishment-level fixed effects. The respective heterogeneities are obtained from treatment effect interactions and the respective linear-combinations. For further notes, see Panel A of Table 2.

Data source: IAB Establishment Panel 2011-2015, analysis sample.

Effect heterogeneities (2)

	(1)	(2)
	Log wages per worker	Log employment
<i>Effects with and without positive wage spillovers:</i>		
ToT _{pos wage spillovers}	0.039** (0.017)	0.014 (0.015)
ToT _{no pos wage spillovers}	0.036*** (0.010)	-0.022** (0.009)
<i>Effects with and without negative wage spillovers:</i>		
ToT _{neg wage spillovers}	0.015 (0.025)	-0.041 (0.028)
ToT _{no neg wage spillovers}	0.038*** (0.009)	-0.015* (0.008)

Notes: Coefficients are treatment effects on the treated from difference-in-difference specifications with establishment-level fixed effects. The respective heterogeneities are obtained from treatment effect interactions and the respective linear-combinations. For further notes, see Panel A of Table 2.

Data source: IAB Establishment Panel 2011-2015, analysis sample.

Other adjustment margins: working hours

	Employment effect		Hours adjustment	
	(1)	(2)	(3)	(4)
	Baseline	Controlling for working time composition	Contracted working hours	Log contracted working hours
ToT _{DiD}	-0.015* (0.007)	-0.019*** (0.008)	-0.147*** (0.048)	-0.004*** (0.001)
Placebo _{DiD}	0.001 (0.007)	-0.003 (0.007)	-0.024 (0.047)	-0.001 (0.001)
Separate effects by treatment years:				
ToT2015 _{DiD}	-0.013* (0.008)	-0.017** (0.008)	-0.222*** (0.056)	-0.006*** (0.002)
ToT2016 _{DiD}	-0.016* (0.009)	-0.021** (0.009)	-0.060 (0.054)	-0.001 (0.001)
Observations	59,820	59,820	59,820	59,820
Establishments	13,307	13,307	13,307	13,307

Other adjustment margins: freelance employment

	(1)	(2)	(3)	(4)
	DFreelancers>0	Fraction of freelancers	DFreelancers>0	Fraction of freelancers
ToT _{DiD}	-0.0004 (0.0059)	0.001 (0.001)		
Placebo _{DiD}	-0.0059 (0.007)	-0.0001 (0.0014)		
Separate effects by treatment years:				
ToT2015 _{DiD}			-0.002 (0.007)	0.0003 (0.0012)
ToT2016 _{DiD}			0.002 (0.007)	0.0023** (0.0012)
Observations	60,755	60,755	60,755	60,755
Establishments	13,424	13,424	13,424	13,424

The German “generation internship” and the minimum wage introduction: Evidence from big data (Joint with Jakob Wegmann)

- Effects of the minimum wage on internship positions are still highly debated.
- Exemption clause:
 - For students with compulsory internships (which are required for graduation)
 - Voluntary internships with a duration up to 3 months
- Possible effects:
 - Overall demand for interns may decrease
 - Possible shift towards compulsory internships
 - Search intensity may increase (due to higher attractiveness)
 - Search intensity may also change in response to demand adjustments

- Conventional observational data barely provide insights:
 - Establishment surveys cover only little qualitative information on internships and typical treatment assignments are infeasible.
 - Household surveys cover only few interns.
 - Administrative data cover interns only selectively as they can be reported as minijobs or short term employment.
- We use a rather innovative approach and analyze Google search data:
 - Highly frequent user generated data
 - Allow us to analyze latent variables such as the „generation internship“
 - The data only project the supply side

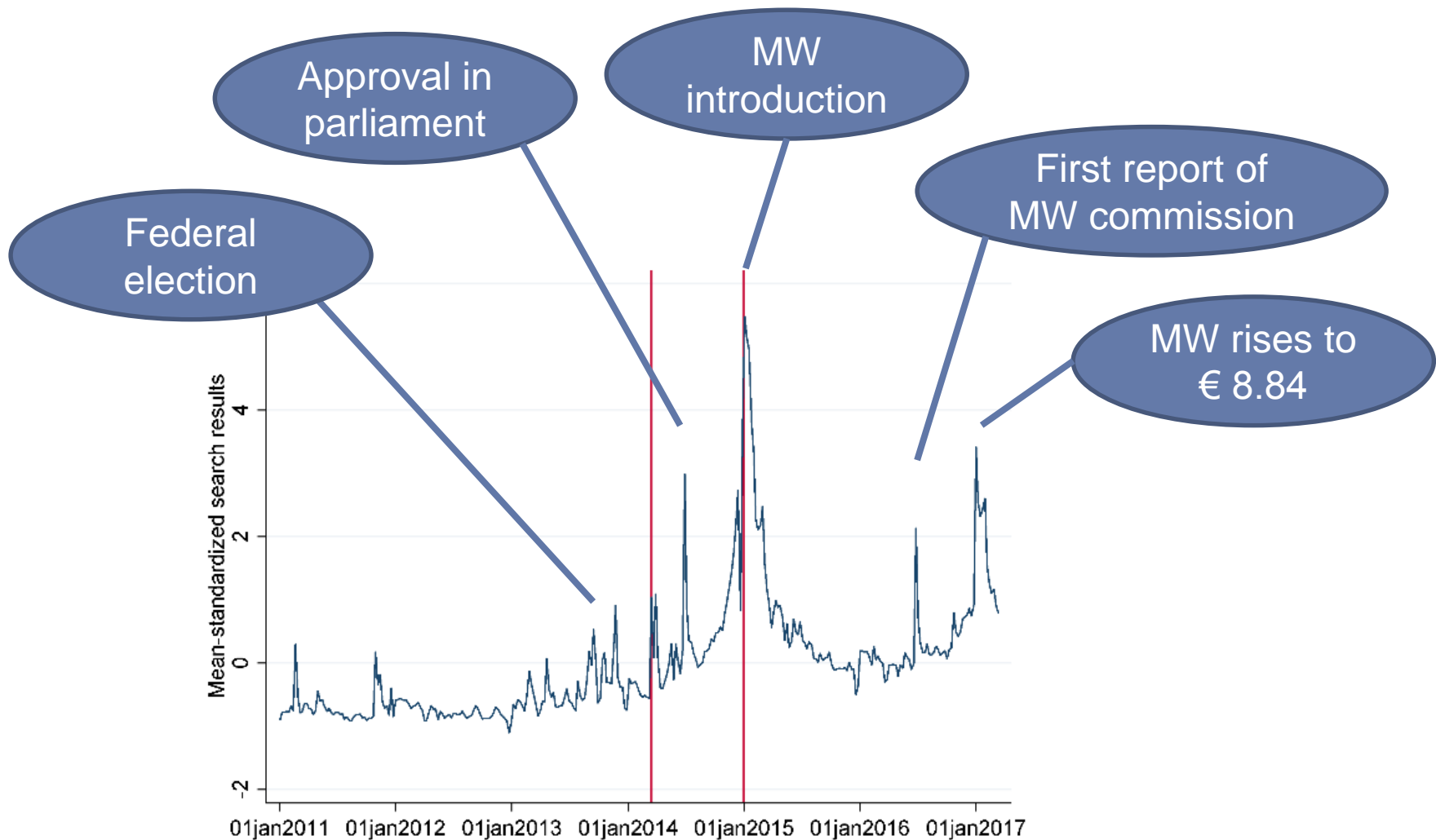
Search for „minimum wage“ and „internship“

Start of public discussion on minimum wage and internships

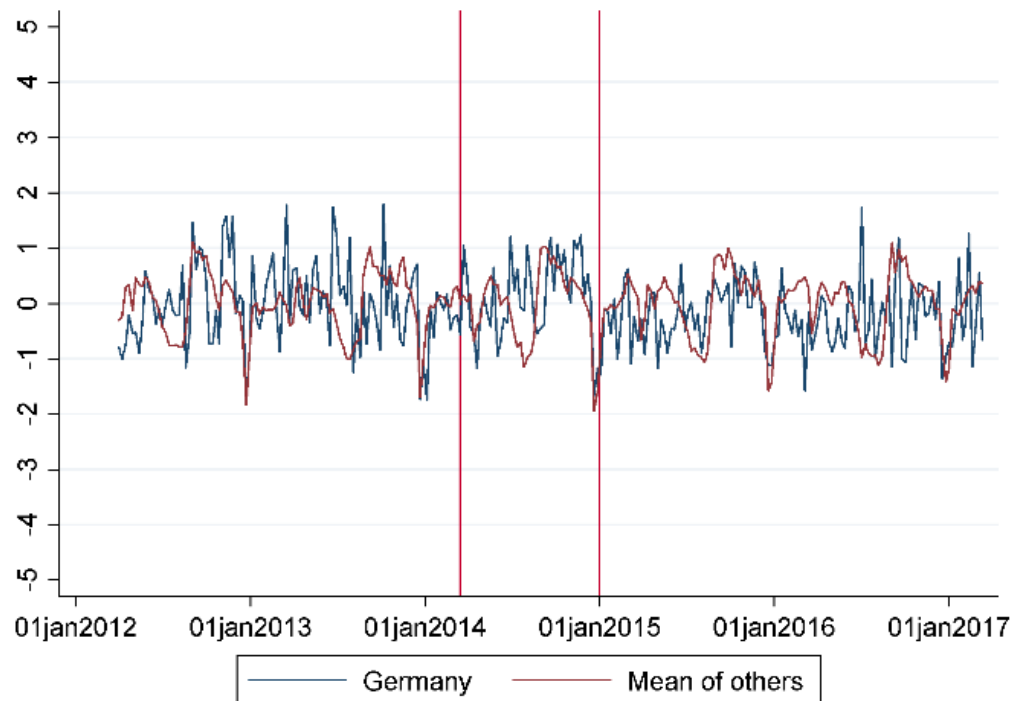
MW introduction



Search for „minimum wage“

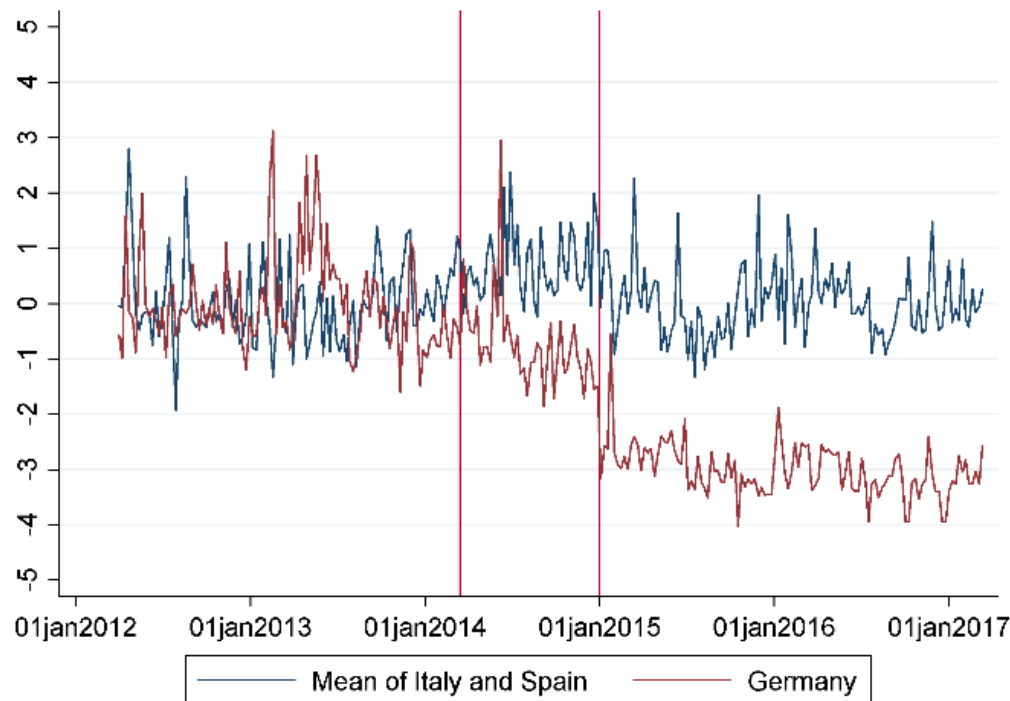


Search for „internship position“



- No effect on job search.
- We checked variations in spelling, but effects shrink towards zero as soon as we include country-specific trends.

Search for „generation internship“



- Reduced relevance of the “generation internship” compared with similar phenomena in Italy and Spain.
- Robust to different specifications and when we use monthly data.

Labor demand adjustments in course of a changing minimum wage:
A survey experiment
(Joint with Michael Oberfichtner and Claus Schnabel)

- We know very little about labor demand adjustments when changes of the minimum wage are large.
- Employment effects are typically analyzed in ex-post evaluations, but these studies are not very informative ex-ante for potentially large minimum wage increases (Neumark 2017).
- Manning (2016) emphasizes that it is still an open research question at which level minimum wages start to hurt.
- In Germany, predictions based on theory failed to provide an accurate estimate (Knabe, Thum and Schöb 2014).

The survey experiment

- We use the German Job Vacancy Survey which includes questions on vacancies and labor demand.
- We randomly assign a minimum wage to each employer that participates in the survey.
- E.g., Please consider a minimum wage increase/decrease to...
 - 8 € implies a 9.5 per cent decrease
 - 9 € implies a 1.8 per cent increase
 - 10 € implies a 13.1 per cent increase
 - 11 € implies a 24.4 per cent increase
 - 12 € implies a 35.7 per cent increase

What would be your level of employment in a year from today?

Results (1)

	Baseline effects on the expected employment growth		Extensive and intensive margin effects on the expected employment growth	
	Without controls	With controls	Probability of closure	Employment expectation excluding closures
	(1)	(2)	(3)	(4)
<i>Assigned minimum wage:</i>				
8 €	-0.005 (0.004)	-0.006 (0.004)	0.004 (0.003)	-0.002 (0.003)
9 €	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
10 €	-0.018*** (0.004)	-0.019*** (0.004)	0.006** (0.003)	-0.013*** (0.003)
11 €	-0.033*** (0.005)	-0.033*** (0.005)	0.012*** (0.004)	-0.022*** (0.003)
12 €	-0.050*** (0.006)	-0.052*** (0.006)	0.021*** (0.005)	-0.032*** (0.004)
<i>Controls:</i>				
Sectors (24 cat.)	No	Yes***	Yes***	Yes***
Eastern Germany	No	Yes***	Yes**	Yes***
Plant size (6 cat.)	No	Yes*	Yes***	Yes
Other controls	No	Yes	Yes	Yes**
Observations	6118	6118	6118	6052
R-squared	0.017	0.046	0.016	0.040
F	27.787	5.515	1.740	5.394

Results (2)

	Separate regressions by industry bite		Separate regressions by establishment-level bite	
	High bite (1)	Low bite (2)	High bite (3)	Low bite (4)
<i>Assigned minimum wage:</i>				
8 €	-0.001 (0.009)	-0.008** (0.004)	0.071*** (0.022)	-0.013*** (0.004)
9 €	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
10 €	-0.035*** (0.009)	-0.012*** (0.004)	-0.058** (0.027)	-0.014*** (0.004)
11 €	-0.070*** (0.012)	-0.017*** (0.005)	-0.115*** (0.030)	-0.022*** (0.004)
12 €	-0.095*** (0.014)	-0.032*** (0.006)	-0.217*** (0.034)	-0.035*** (0.005)
<i>Controls:</i>				
Sectors	Yes**	Yes**	Yes**	Yes***
Eastern Germany	Yes***	Yes***	Yes	Yes**
Plant size (6 cat.)	Yes*	Yes	Yes	Yes
Other controls	Yes	Yes	Yes*	Yes
Observations	1903	4215	612	5347
R-squared	0.074	0.029	0.184	0.025
F	5.828	3.120	3.286	3.262

Results (3)

	Separate regressions for establishments...			
	without collective agreement and without works council (1)	with collective agreement (2)	with works council (3)	with both collective agreement and works council (4)
<i>Assigned minimum wage:</i>				
8 €	-0.001 (0.006)	-0.012** (0.006)	-0.004 (0.004)	-0.004 (0.004)
9 €	<i>reference</i>	<i>reference</i>	<i>reference</i>	<i>reference</i>
10 €	-0.024*** (0.007)	-0.015*** (0.005)	-0.010* (0.005)	-0.012* (0.006)
11 €	-0.036*** (0.008)	-0.031*** (0.006)	-0.001 (0.004)	0.003 (0.003)
12 €	-0.070*** (0.010)	-0.033*** (0.007)	-0.012** (0.006)	-0.007 (0.005)
<i>Controls:</i>				
Sectors (24 cat.)	Yes***	Yes***	Yes	Yes
Eastern Germany	Yes***	Yes	Yes	Yes
Plant size (6 cat.)	Yes	Yes*	Yes	Yes
Other controls w/o industrial relations	Yes	Yes	Yes	Yes
Observations	2899	2963	1632	1376
R-squared	0.069	0.045	0.035	0.037
F	3.510	2.340	0.784	0.687

- We identify employment effects of the minimum wage introduction in Germany from difference-in-differences estimation:
 - Preferred specification shows a wage effect of about 6.3 percent.
 - Employment of treated establishments decreases by 1.5 to 2.2 percent.
 - These estimates imply a labor demand elasticity ranging between -0.2 and -0.4.
 - The employment loss amounts to about 40,000 to 60,000 jobs.
- Effect heterogeneities:
 - Employment is adjusted through fewer hires rather than separations.
 - Most of the employment effect is driven by plants in eastern Germany and those who report high competition.
 - We observe a negative transitory effect on the typical contracted full-time hours.

Conclusions (2)

- Using Google search data:
 - We do not observe effects on the search for internship positions.
 - The distinction between compulsory and voluntary internships became more important.
 - The phenomenon of a „generation internship“ lost in relevance.
- Results from a survey experiment:
 - We observe an asymmetric employment effect of the MW:
 - Negative employment expectations when MW increases,
 - Absence of an effect when MW decreases.
 - High bite establishments show stronger disemployment expectations, but positive employment expectations when MW decreases.
 - Substantial heterogeneities depending on the presence of industrial relations.

Thanks for your attention!

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Employment turnover (1): Hires and separations

- Labor flows allow us to disentangle the employment effect into a hires and separations margin.

- We estimate effects on separation and hiring rates, e.g.,

$$separation\ rate_{it} = \frac{separations_{it}}{N_{it-1}}$$

- Theoretically, labor demand adjustments can be achieved by a reduction in hires or an increase in layoffs.
- Moreover, van den Berg and Ridder (1998) show that quits should fall as the minimum wage reduces on-the-job-search through a compressed wage distribution.
Hence, overall turnover may decrease.

Employment turnover (2): Hires and separations

	(1)	(2)	(3)	(4)
	Hiring rate	Separation rate	Gross turnover	Chirning rate
ToT _{DiD}	-0.019 (0.015)	-0.006 (0.014)	-0.022 (0.025)	-0.051 (0.036)
Placebo _{DiD}	0.011 (0.012)	-0.009 (0.010)	0.008 (0.013)	0.002 (0.019)
Observations	60,962	60,962	60,962	60,962
Establishments	13,436	13,436	13,436	13,436

Some more descriptive evidence on hires and separations

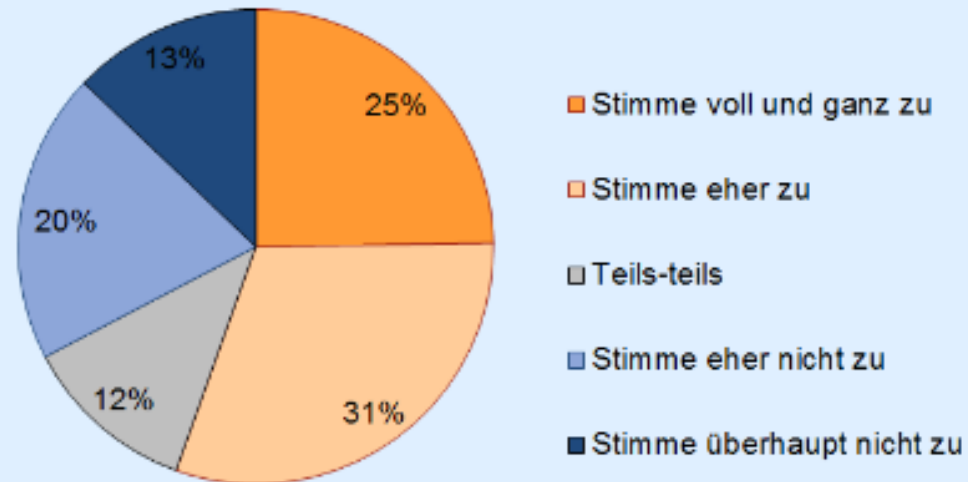
	Carried out	Intended	Not relevant
Due to the minimum wage, have you been ...			
cautious in hiring workers	10.1 %	4.3 %	85.6 %
laid-off workers	4.4 %	1.5 %	94.1 %

Notes: Descriptive average over all treated establishments as defined in the analysis (N=1,240).

Data source: Questions 67 a) and b) of the 2015 IAB Establishment Panel, analysis sample.

- Minimum wages experience a strong support in the public:
 - In the US, public polls show approval rates for a minimum wage increase of 76 percent (Gallup 2013)
 - Even among conservative voters the majority favors an increase.
- Economists are much more divided when it comes to minimum wages:
 - O'Neill (2015) shows stronger support among young labor economists in the US.
 - In the ifo-Ökonomenpanel 56 to 68 percent assess the minimum wage introduction in Germany as a political failure.

Die Einführung des flächendeckenden Mindestlohns zum 1. Januar 2015 war ein wirtschaftspolitischer Fehler.



Quelle: Ökonomenpanel Februar 2016.

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- The literature gained momentum after Card and Krueger (1994) published their study comparing fast food restaurants before and after the 1992 New Jersey minimum wage increase with the neighboring state Pennsylvania.
- Proponents of minimum wages claim of no or even positive effects (Card/Krueger 1994, 2000), while opponents claim to find a negative effect in the same setting (Neumark/Wascher 2000).
- Similar case studies exist for other states, or more recently, for city specific minimum wages (Dube/Naidu/Reich 2007).
- Studies that exploit variation across several states and analyze state and federal minimum wage increases are similarly divided on whether there is or is not an adverse employment effect.

- Recent literature investigates minimum wages across states by controlling for variation, which is not captured in the simple two-way-fixed effects model:
 - By controlling for state specific time trends (Addison/Blackburn/Cotti 2015; Allegretto/Dube/Reich 2011; Neumark/Salas/Wascher 2014)
 - By using region discontinuities comparing counties across state borders (Dube/Lester/Reich 2010)
 - By using the synthetic control method (Dube/Zipper 2016)
 - By using interactive fixed effects (Bai 2009; Totty 2015)

Effects of minimum wages are commonly interpreted using elasticities



- Direct employment elasticities w.r.t. changes in the minimum wage:

$$\eta_{direct} = \frac{\Delta employment}{\Delta minimum\ wage}$$

- Implicit employment elasticities w.r.t. changing wages:

$$\eta_{implicit} = \frac{\Delta employment}{\Delta average\ wage(minimum\ wage)}$$

- The first allows for direct policy implications. However, it is infeasible to calculate such an elasticity for minimum wage introductions.
- In the same setting estimates of the direct elasticity are smaller than the corresponding implicit elasticity. (As soon as the increase in minimum wages affects average wages by less than 1.)

Treatment group specific trends (1)

- Addison, Blackburn, and Cotti (2015), Allegretto, Dube, and Reich (2011) and Neumark, Salas, and Wascher (2014) control for additional treatment group and time specific heterogeneity.

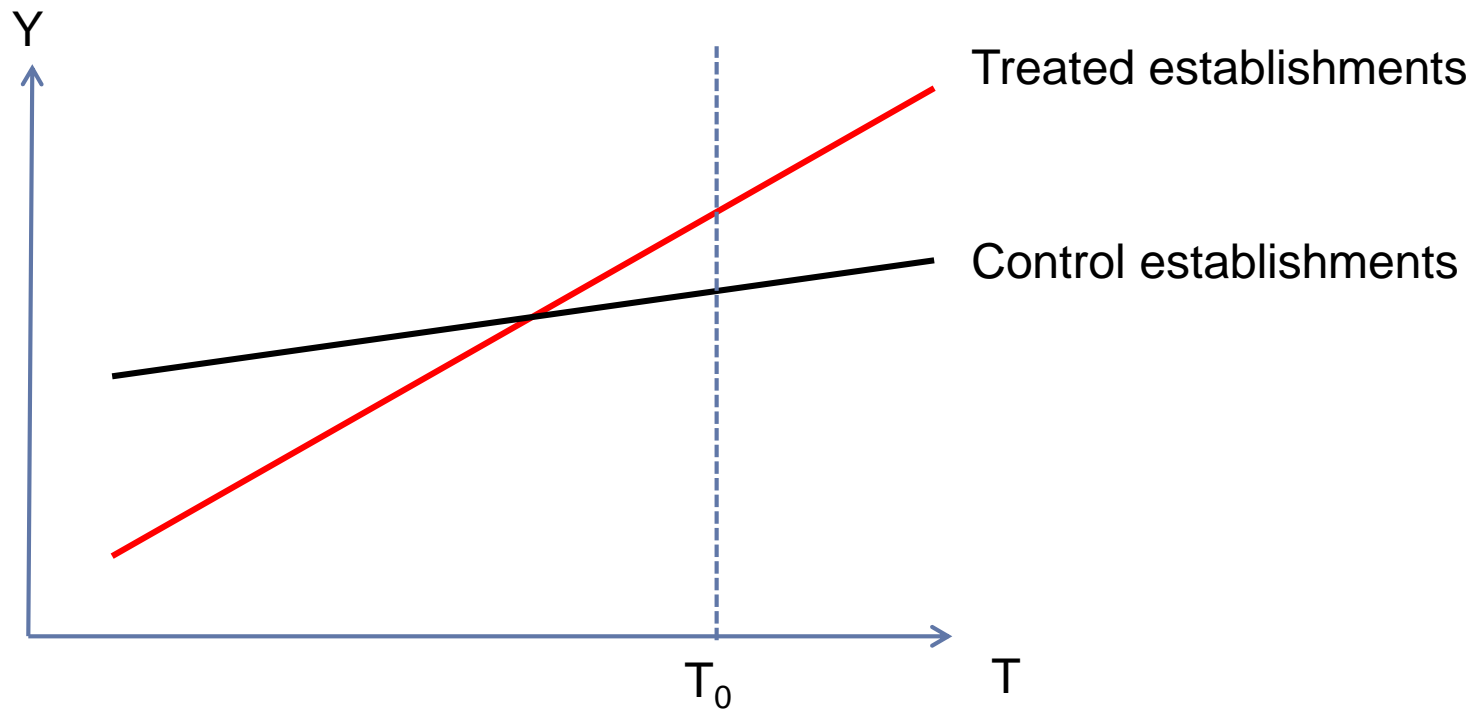
$$\begin{aligned} & \ln(\text{employment})_{it} \\ &= \text{treated}_i * \text{treatment time}_t * \delta_{ToT} + X_{it}\beta + \gamma_t + \theta_i + \psi(\text{treated}, t) \\ &+ \varepsilon_{it} \end{aligned}$$

- We model $\psi(\text{treated}, t)$ as a linear and quadratic trend:

$$\begin{aligned} & \ln(\text{employment})_{it} \\ &= \text{treated}_i * \text{treatment time}_t * \delta_{ToT} + X_{it}\beta + \gamma_t + \theta_i + \text{treated}_i * t * \lambda_1 \\ &+ \text{treated}_i * t * t * \lambda_2 + \varepsilon_{it} \end{aligned}$$

Treatment group specific trends (2)

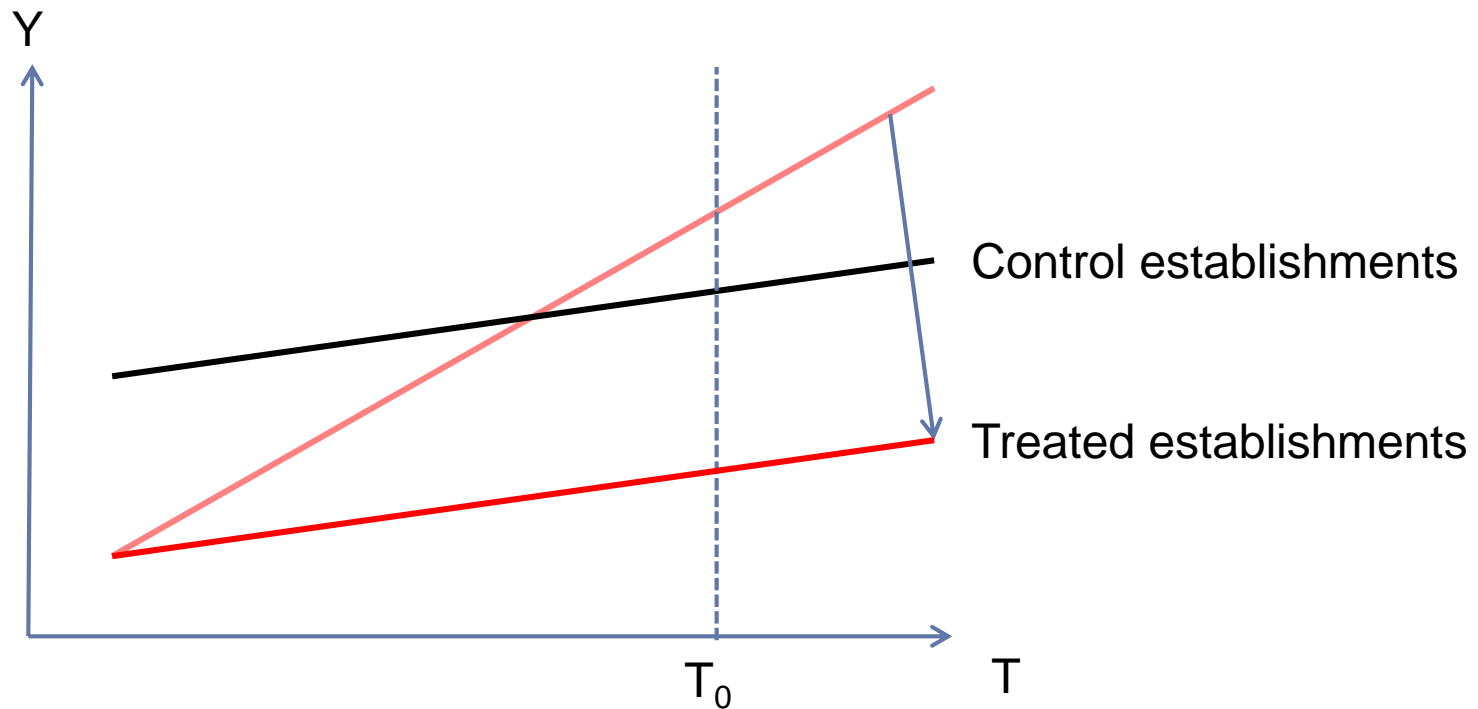
- Differences-in-differences without controlling for treatment group specific trends:



→ We observe a positive effect.

Treatment group specific trends (3)

- Differences-in-differences after controlling for treatment group specific trends:



→ We would observe a treatment effect that is zero.

Analysis sample description

	(1)	(2)	(3)
	Analysis sample	Treatment group	Control group
<i>Establishments and employees in the analysis sample:</i>			
Establishments	13,453	1,599	11,854
Avg. establishment size	123.8	65.3	131.7
Median establishment size	17	16	17
Represented establishments in the population	1,873,200	179,042	1,694,158
Represented employees in the population	32,027,189	3,090,626	28,936,563
<i>Analysis sample averages:</i>			
Extensive margin bite	0.119	1	0
Intensive margin bite	0.044	0.378	0
Log employment in 2014	3.002	2.872	3.019
Log wages per worker in 2014	7.377	6.932	7.441

Notes: The upper part of the table provides an overview on the number of establishments and the number of employees represented in the sample and the gross population. The lower part shows descriptive sample averages of the major variables for the analysis sample. Column (1) covers the analysis sample, column (2) covers the treatment group, column (3) covers the control group, and column (4) covers the group of anticipating establishments which we exclude from our baseline analysis sample.

Data source: IAB Establishment Panel 2014, analysis sample.

Table 5: Cross sample validity of the employment effect

	(1)	(2)
	Extensive margin effects (0/1) on log employment	Intensive margin effects [0,1] on log employment
ToT	-0.023 (0.017)	-0.078 (0.061)
Placebo	-0.003 (0.012)	-0.022 (0.027)
Observations	4,192	4,192
Establishments	1,408	1,408

Notes: Coefficients are treatment effects on the treated from difference-in-difference specifications with establishment-level fixed effects. For further notes, see Table 2.

Data source: IAB QUEST Survey 2013-2015.

Robustness check adding anticipating establishments

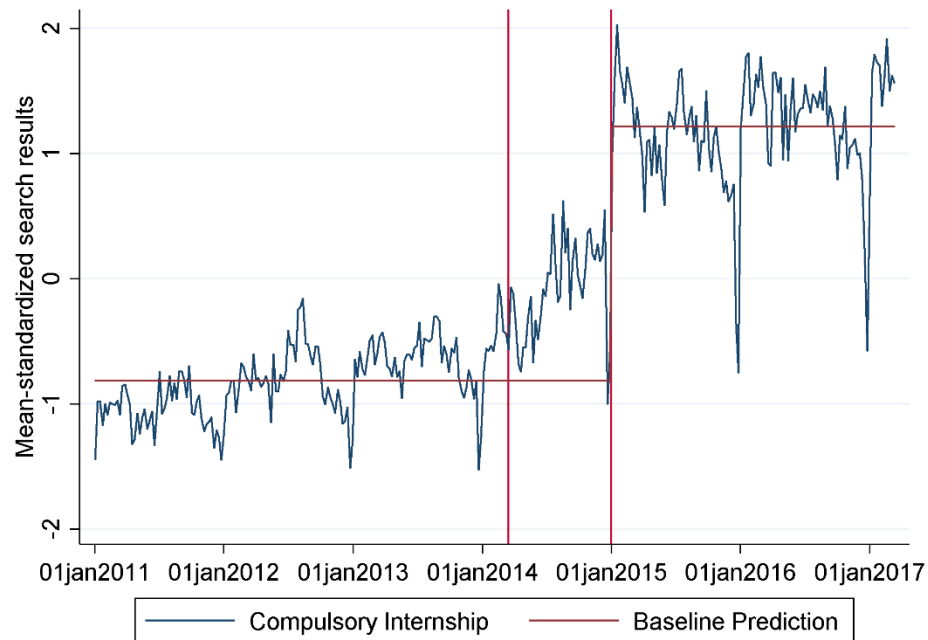
	(1)	(2)
	Log wages per worker	Log employment
Panel A: Extensive margin effects (0/1)		
ToT _{DID}	0.036*** (0.009)	-0.017** (0.008)
Treatment effect on anticipating plants _{DID}	0.060*** (0.011)	0.003 (0.012)
Panel B: Intensive margin effects [0,1]		
ToT _{DID}	0.101 (0.021)	-0.028 (0.020)
Treatment effect on anticipating plants _{DID}	0.142 (0.026)	-0.024 (0.029)
Observations	55,886	68,803
Establishments	13,480	15,083

Notes: Coefficients are treatment effects on the treated from difference-in-difference specifications with establishment-level fixed effects, including a separate treatment interaction for anticipating plants. For further notes, see Panel A of Table 2.

Data source: IAB Establishment Panel 2011-2016, analysis sample.

Search queries for „Pflichtpraktikum“ (compulsory internship)

- Search for „Pflichtpraktikum BMW“ would be included because data is broadly matched
- Level increase after the introduction of the minimum wage



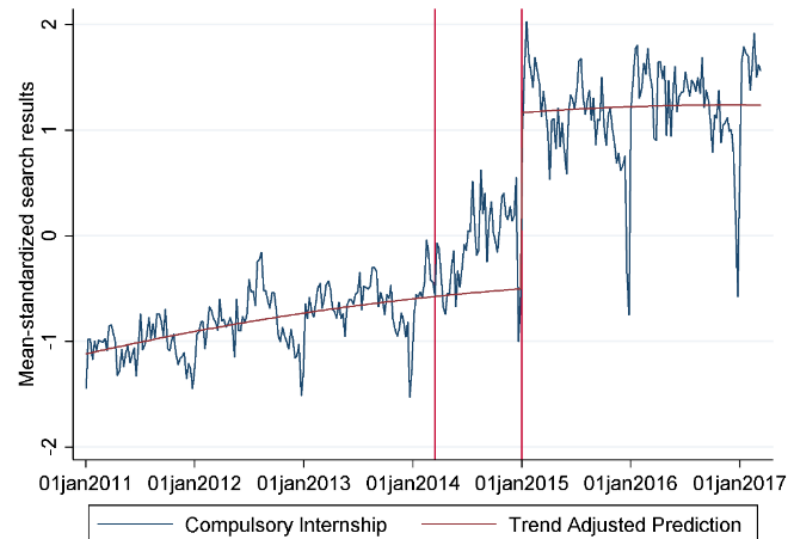
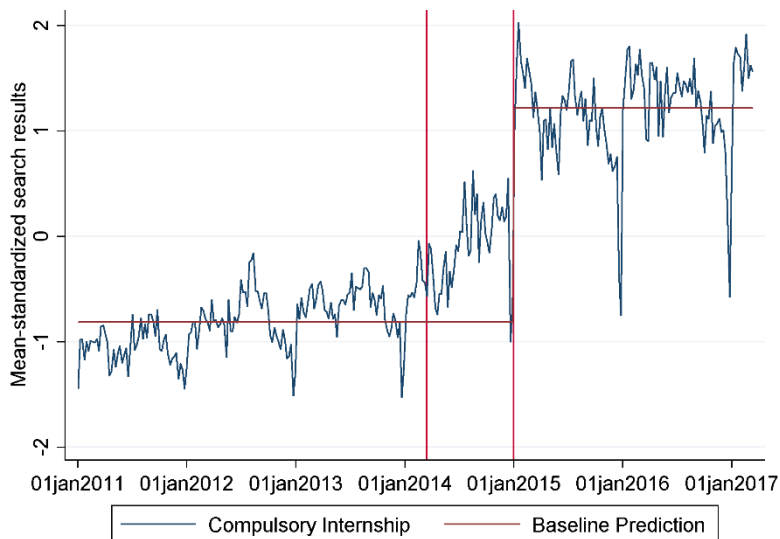
Regression analysis

- Regression analysis without trend controls:

$$y_t = \text{minimum wage}_t * \delta + X_t * \beta + \varepsilon_t$$

- and with trend controls:

$$y_t = \text{minimum wage}_t * \delta + \tau_t + X_t * \beta + \varepsilon_t$$



Search queries for „Pflichtpraktikum“ (compulsory internship)

Table 4: Regression results on compulsory internship

	Baseline effect	Linear trend controls	Quadratic trend controls
	(1)	(2)	(3)
Minimum wage	2.021*** (0.036)	1.387*** (0.070)	1.499*** (0.091)
Time		0.003*** (0.000)	0.005*** (0.000)
Time squared			-0.000007* (0.000003)
Month	Yes***	Yes***	Yes***
N	282	282	282
R squared	0.931	0.949	0.951
AIC	104.32	18.974	9.2872
BIC	151.67	69.961	63.916

Notes: Reported coefficients are marginal effects of linear regressions. Dependent variable is the mean-standardized google search for “internship position”. Standard deviations are in parentheses. Asterisks indicate significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Data: Google search data, 1 Jan 2011 – 12 March 2017, anticipation period excluded.

Search queries for „freiwilliges Praktikum“ (voluntary internship)

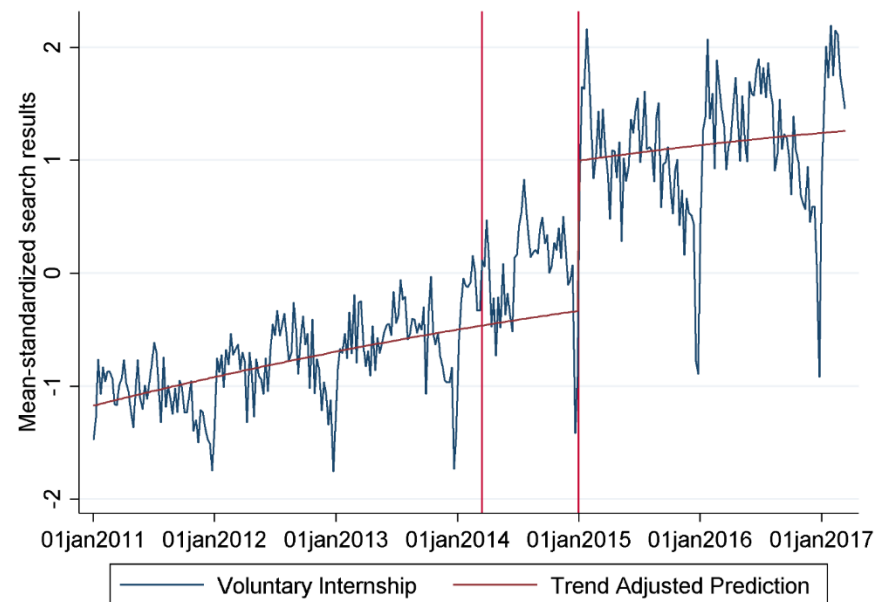
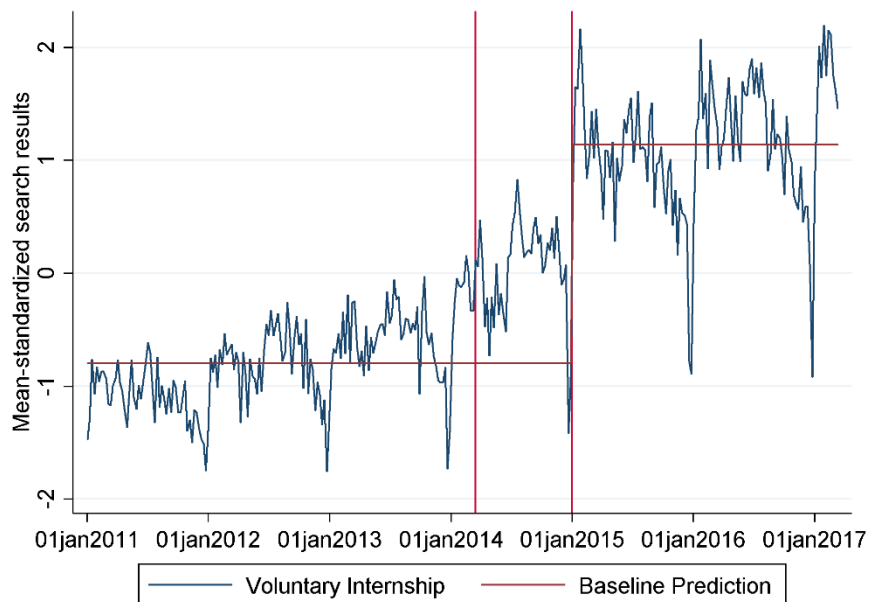


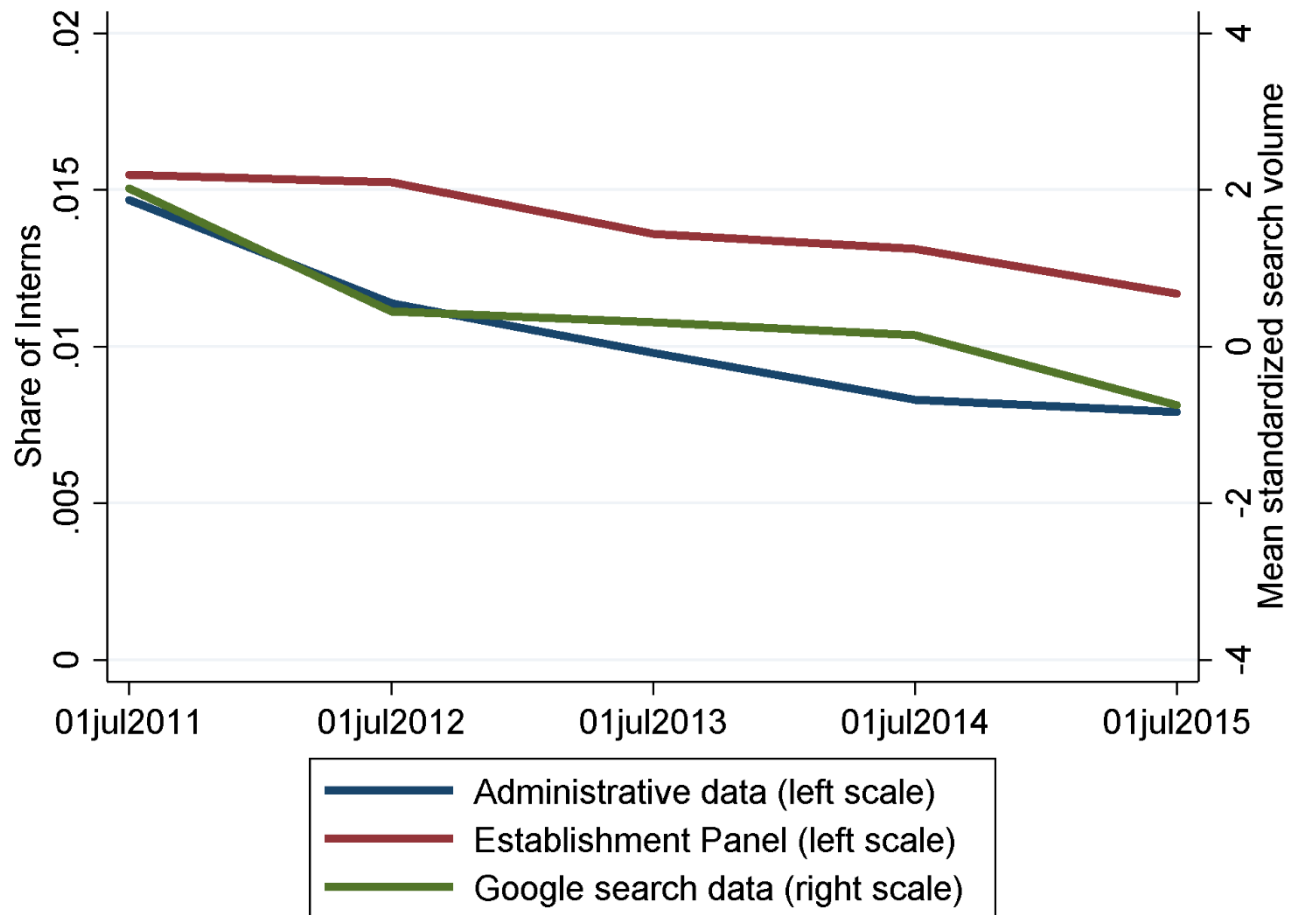
Table 5: Regression results on voluntary internship

	Baseline effect	Linear trend controls	Quadratic trend controls
	(1)	(2)	(3)
Minimum wage	1.923*** (0.047)	1.001*** (0.084)	1.081*** (0.113)
Time		0.005*** (0.0004)	0.006*** (0.0007)
Time Squared			-0.000005 (0.000003)
Month	Yes***	Yes***	Yes***
N	282	282	282
R squared	0.883	0.922	0.923
AIC	251.7	139.07	137.19
BIC	299.05	190.06	191.82

Notes: Reported coefficients are marginal effects of linear regressions. Dependent variable is the mean-standardized google search for “internship position”. Standard deviations are in parentheses. Asterisks indicate significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Data: Google search data, 1 Jan 2011 – 12 March 2017, anticipation period excluded.

- Downward trend matches the trend in the IAB establishment panel



- Use other countries for Difference-in-Difference approach

- Baseline specification:

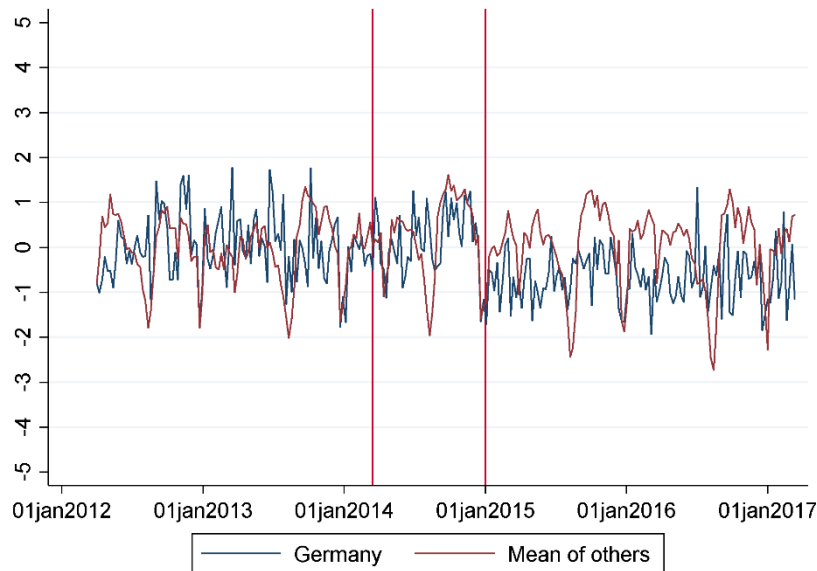
$$y_{it} = \text{minimum wage}_t * \text{Germany}_i * \delta + \tau_t + \theta_i + \varepsilon_{it}$$

- Controlling for country-specific trends:

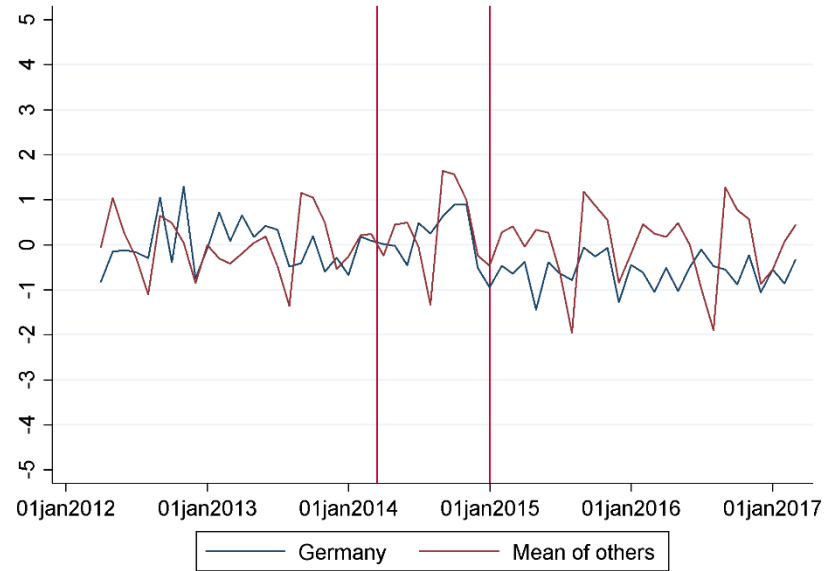
$$y_{it} = \text{minimum wage}_t * \text{Germany}_i * \delta + \tau_t + \theta_i + \varphi_{it} + \varepsilon_{it}$$

Where $\varphi_{it} = t_t * \text{country}_i$ or $\varphi_{it} = t_t * t_t * \text{country}_i$

Google search query analysis – Difference in Difference „Praktikantenstelle“



(a) Weekly data



(b) Monthly data

- Czech Republic (“praxe”), Denmark (“praktik”), Hungary (“gyakorlat”), Italy (“tirocinio”), Netherlands (“stage”), Spain (“practicas”), Sweden (“praktik”) and Turkey (“staj”) as control group

Regression results on internship position from a control group (weekly data)



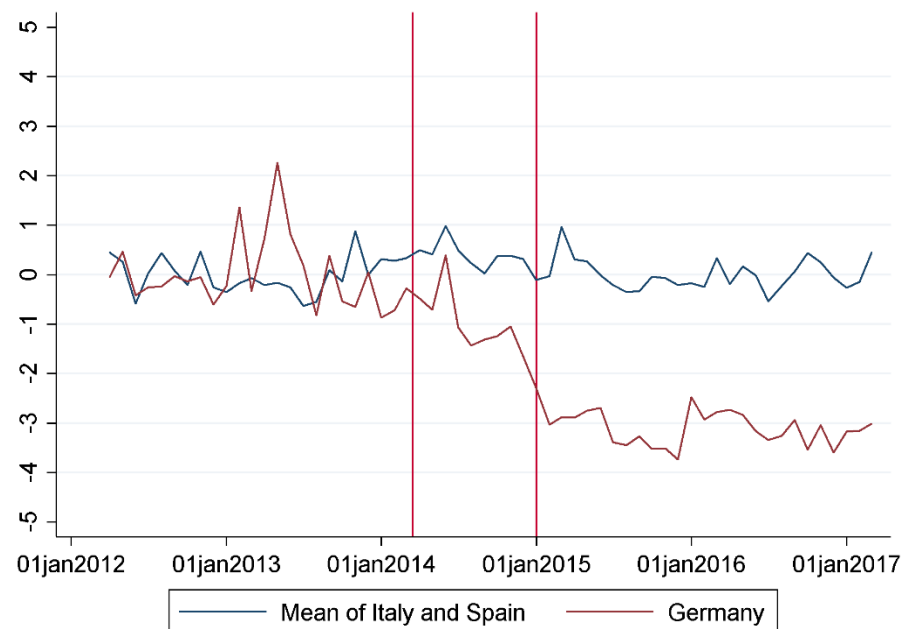
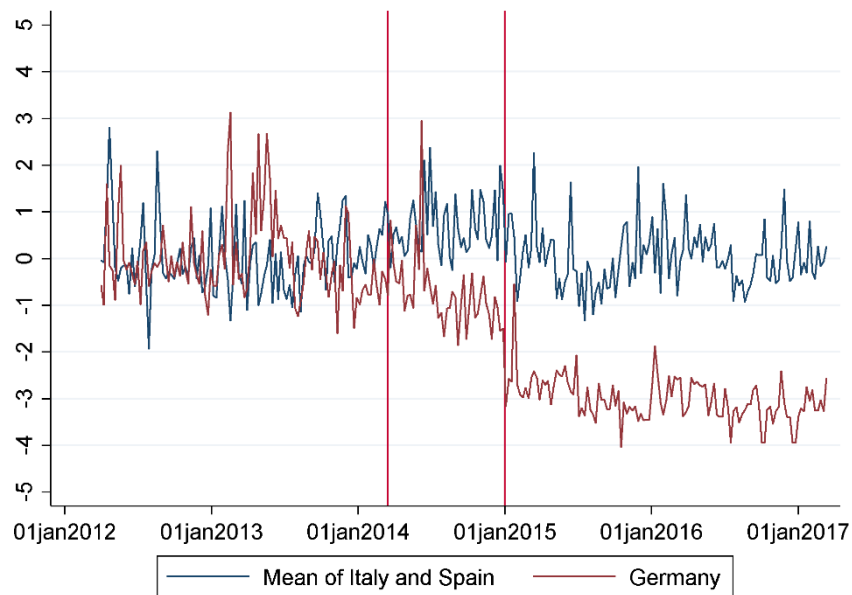
	Baseline (1)	Linear country trends (2)	Quadratic country trends (3)
<i>Trend specification:</i>			
Treatment effect	-1.920*** (0.250)	0.092 (0.358)	0.158 (0.363)
<i>DiD-Specification with controls for month and year:</i>			
Treatment effect	-2.200*** (0.202)	-0.713 (0.439)	-0.612 (0.440)
<i>DiD-Specification with controls for each month-year combination:</i>			
Treatment effect	-2.200*** (0.121)	-0.713 (0.468)	-0.612 (0.457)

Notes: Reported coefficients are marginal effects of linear regressions. Standard deviations are in parentheses.

Asterisks indicate significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Data: Google search data, Google search data, 1 April 2012 – 12 March 2017, anticipation period excluded.

Trend-adjusted time series for “generation internship”



- Italy (“generazione 1000”) and Spain (“mileurista”) as control group

DiD regression output for “generation internship”

	Baseline (1)	Linear country trends (2)	Quadratic country trends (3)
<i>Trend specification:</i>			
Treatment effect	-1.129 (0.138)	-0.663 (0.208)	-0.841 (0.277)
<i>DiD-Specification with controls for month and year:</i>			
Treatment effect	-1.332 (0.151)	-1.697 (0.359)	-1.502 (0.943)
<i>DiD-Specification with controls for each month-year combination:</i>			
Treatment effect	-1.333 (0.624)	-1.725 (0.401)	-1.682 (0.468)
Observations	579	579	579

Notes: Reported coefficients are marginal effects of linear regressions. Standard deviations are in parentheses. Asterisks indicate significance levels: * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Data: Google search data, 1 Jan 2013 – 12 March 2017, anticipation period excluded.