



INSTITUTE FOR EMPLOYMENT
RESEARCH
The Research Institute of the Federal Employment Agency

REALLOCATION EFFECTS OF THE MINIMUM WAGE

EALE | SOLE | AASLE World Conference

June 25, 2020

Christian Dustmann (UCL)

Attila Lindner (UCL)

Uta Schönberg (UCL, IAB)

Matthias Umkehrer (IAB)

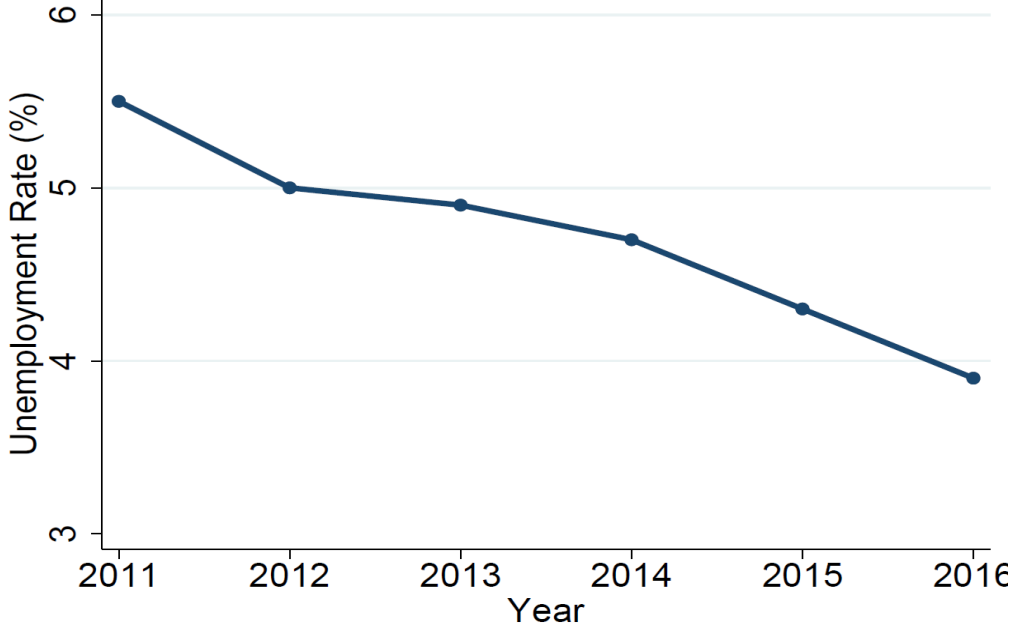
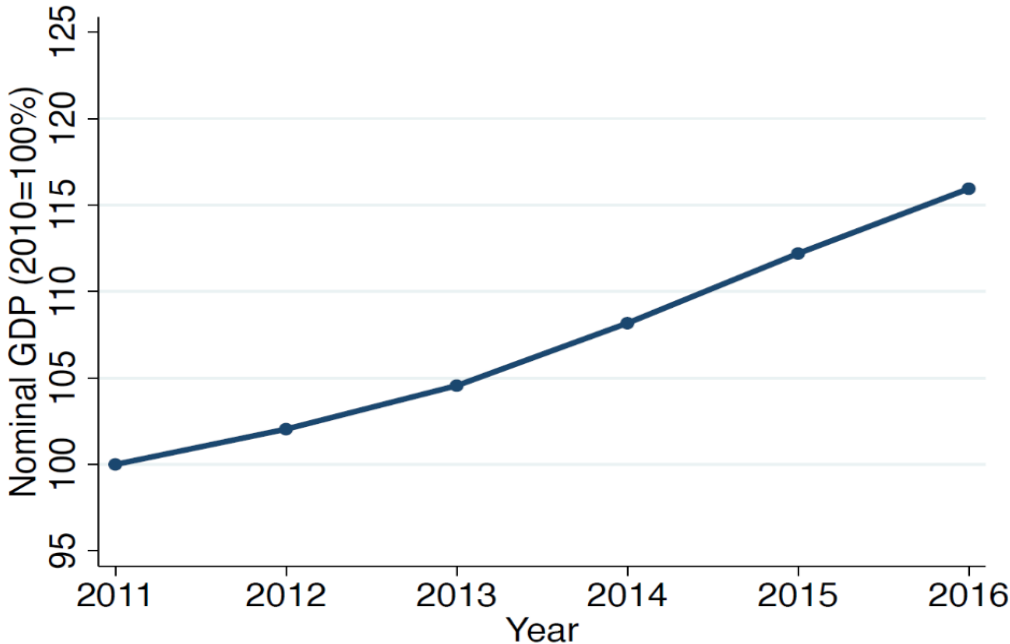
Philipp vom Berge (IAB)



MOTIVATION: INCREASING INEQUALITY

- Historically, strong safety net and high collective bargaining coverage in Germany (Dustmann et al., 2014)
- Collective bargaining agreements served as implicit wage floors
- Coverage declined from 82% in 1996 to about 55% in 2015
- Dramatic increase in wage inequality from the mid '90s (Dustmann et al., 2009; Antonczyk et al., 2010; Kügler et al., 2019)
 - the 90th percentile increased by nearly 20%
 - median wages rose by only 8%
 - the 10th percentile stagnated
- In response, Germany introduced hourly minimum wage (MW) of €8.50 in January 2015

MACROECONOMIC CONDITIONS



RESEARCH QUESTIONS

- Impact of the introduction of MW on **employment** and **wages**
- First analysis of **reallocation effects of MW**:
 - Do ‘bad’ firms exit the market?
 - Do workers reallocate to ‘better’ firms?

EMPIRICAL STRATEGY: VARIOUS DID ESTIMATIONS

Main strategy (**Individual level**)

- Similarly to Currie/Fallick (1996), we follow workers who earned wages below the MW prior to the introduction
- However, rather than using survey data we use employer-employee administrative data
- We carefully deal with differential labor market trajectories along the wage distribution by using pre-MW introduction years

Complementary strategy (**Local labor market level**)

- Similarly to e.g. Card (1992), we exploit the variation in the bite of MW across local labor markets

MAIN FINDINGS

- Positive and significant effect on wages, no indication for significant dis-employment effects
- MW leads to **reallocation of workers** to
 - firms paying higher wages and with higher AKM fixed firm effects
 - firms with higher full-time share/lower marginal employment share
 - larger firms
 - firms with higher share of skilled worker
 - firms with lower turnover
 - firms with more productive workforce
- At highly exposed locations, MW leads to
 - a decrease in the number of firms
 - an increase in average firm size
 - an increase in average AKM firm FEs and in average productivity of firms

MAIN FINDINGS

- Positive and significant effect on wages, no indication for significant dis-employment effects
- MW leads to **reallocation of workers** to
 - firms paying higher wages and with higher AKM fixed firm effects
 - firms with higher full-time share/lower marginal employment share
 - larger firms
 - firms with higher share of skilled worker
 - firms with lower turnover
 - firms with more productive workforce
- At highly exposed locations, MW leads to
 - a decrease in the number of firms
 - an increase in average firm size
 - an increase in average AKM firm FEs and in average productivity of firms

MAIN FINDINGS

- Positive and significant effect on wages, no indication for significant dis-employment effects
- MW leads to **reallocation of workers** to
 - firms paying higher wages and with higher AKM fixed firm effects
 - firms with higher full-time share/lower marginal employment share
 - larger firms
 - firms with higher share of skilled worker
 - firms with lower turnover
 - firms with more productive workforce
- At highly exposed locations, MW leads to
 - a decrease in the number of firms
 - an increase in average firm size
 - an increase in average AKM firm FEs and in average productivity of firms

DATA

- IAB employer-employee history administrative data
 - information on individual gross earnings and hours worked
 - **working hours** reported to German accident insurances separately for each single employment relationship (available between 2011-2014)
- Covers 2011-2016
- Sample restrictions, we exclude:
 - those younger than 18 and apprentices; not affected by the MW introduction
 - those older than 59; as their labor force participation is mainly driven by retirement incentives

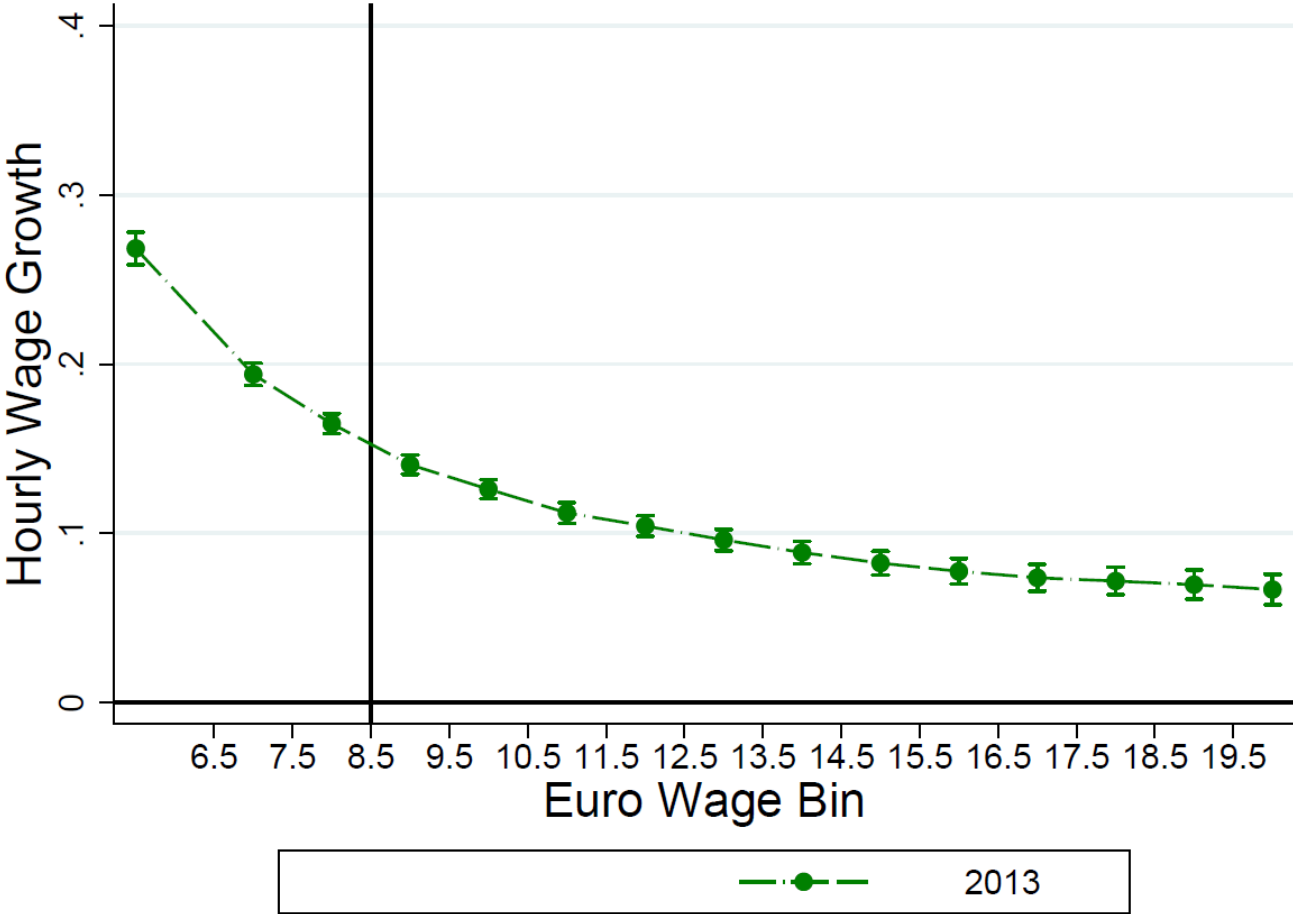
INDIVIDUAL APPROACH: IMPACT ACROSS THE WAGE DISTRIBUTION

- Effect of the minimum wage by previous wage (Abowd et al. 2000; Currie/Fallick 1996; Clemens/Wither 2019)
- We assign workers to a EUR wage bin w based on hourly wage in $t-2$

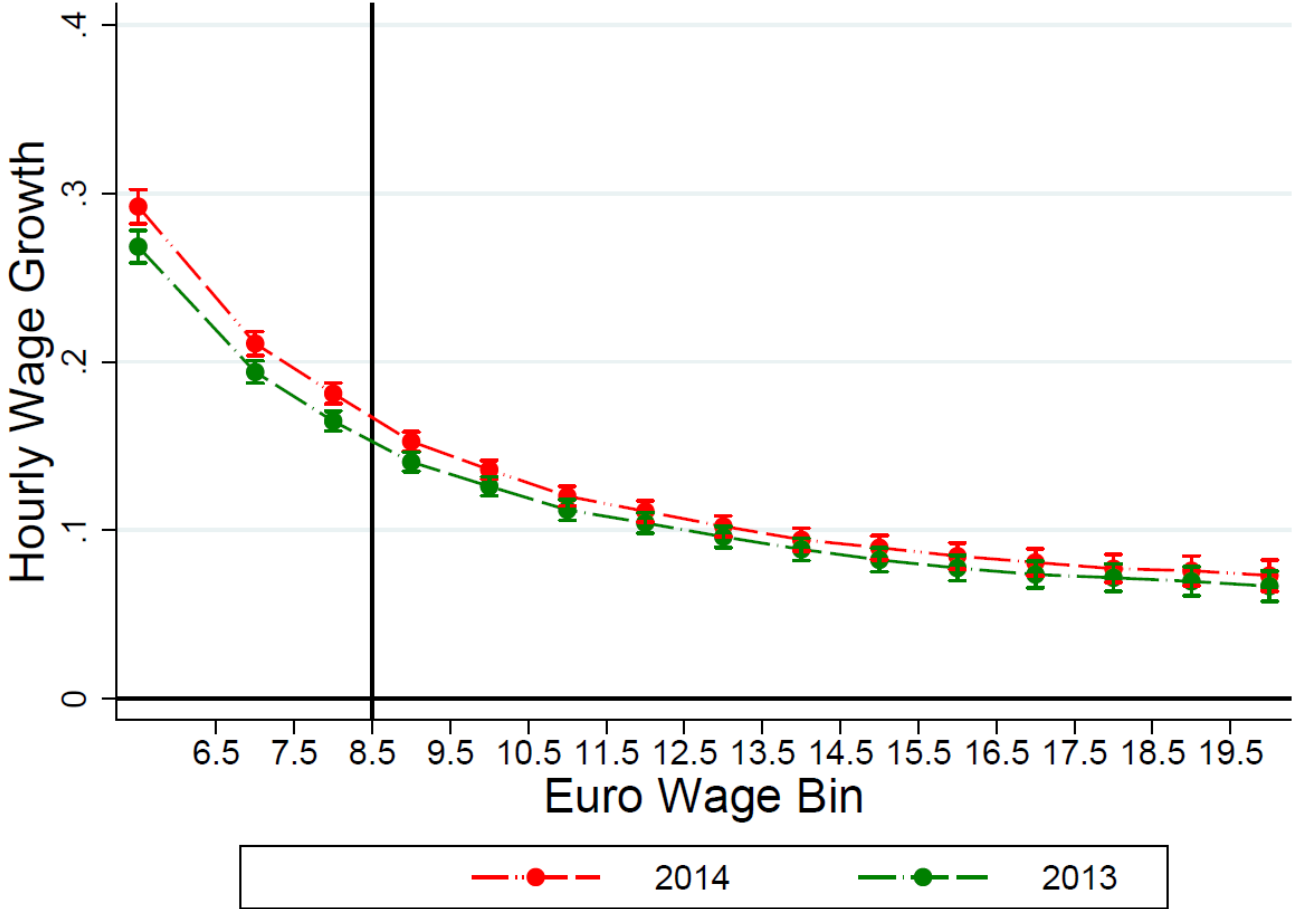
$$\Delta^2 y_{it} = \sum_w \gamma_{wt} D_{w_{i(t-2)}} + \beta X_{i,t-2} + e_{it}$$

- $D_{w_{i(t-2)}}$ equal to 1 if worker i falls into wage bin w
- $X_{i,t-2}$: age, gender, full-time status, industry, education, ...
- $\Delta^2 y_{it} = \log(\text{wage})_{it} - \log(\text{wage})_{it-2}$ or $\Delta^2 y_{it} = \text{Emp}_{it} - \text{Emp}_{it-2}$

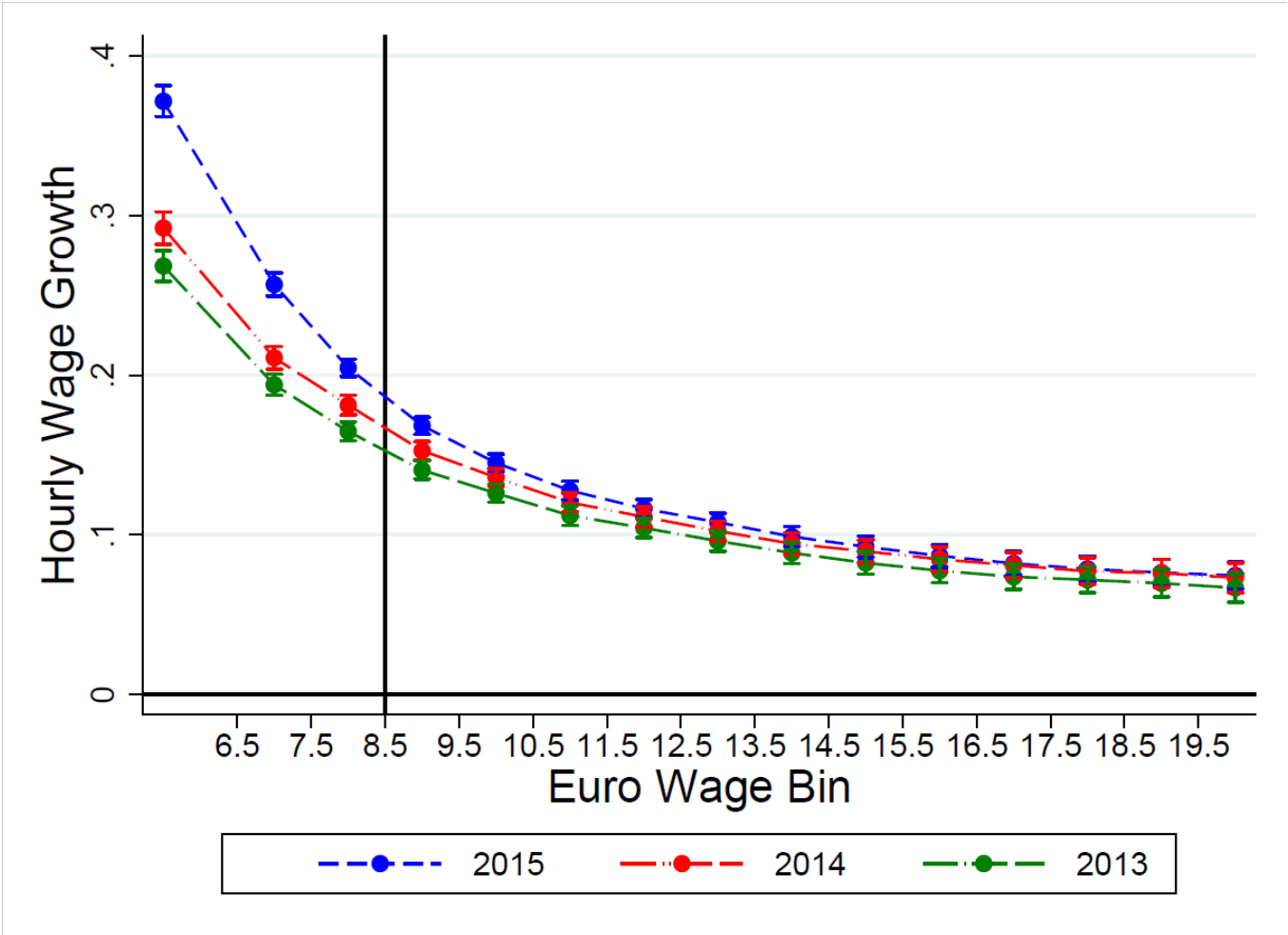
INDIVIDUAL APPROACH: (PROXIED) HOURLY WAGES



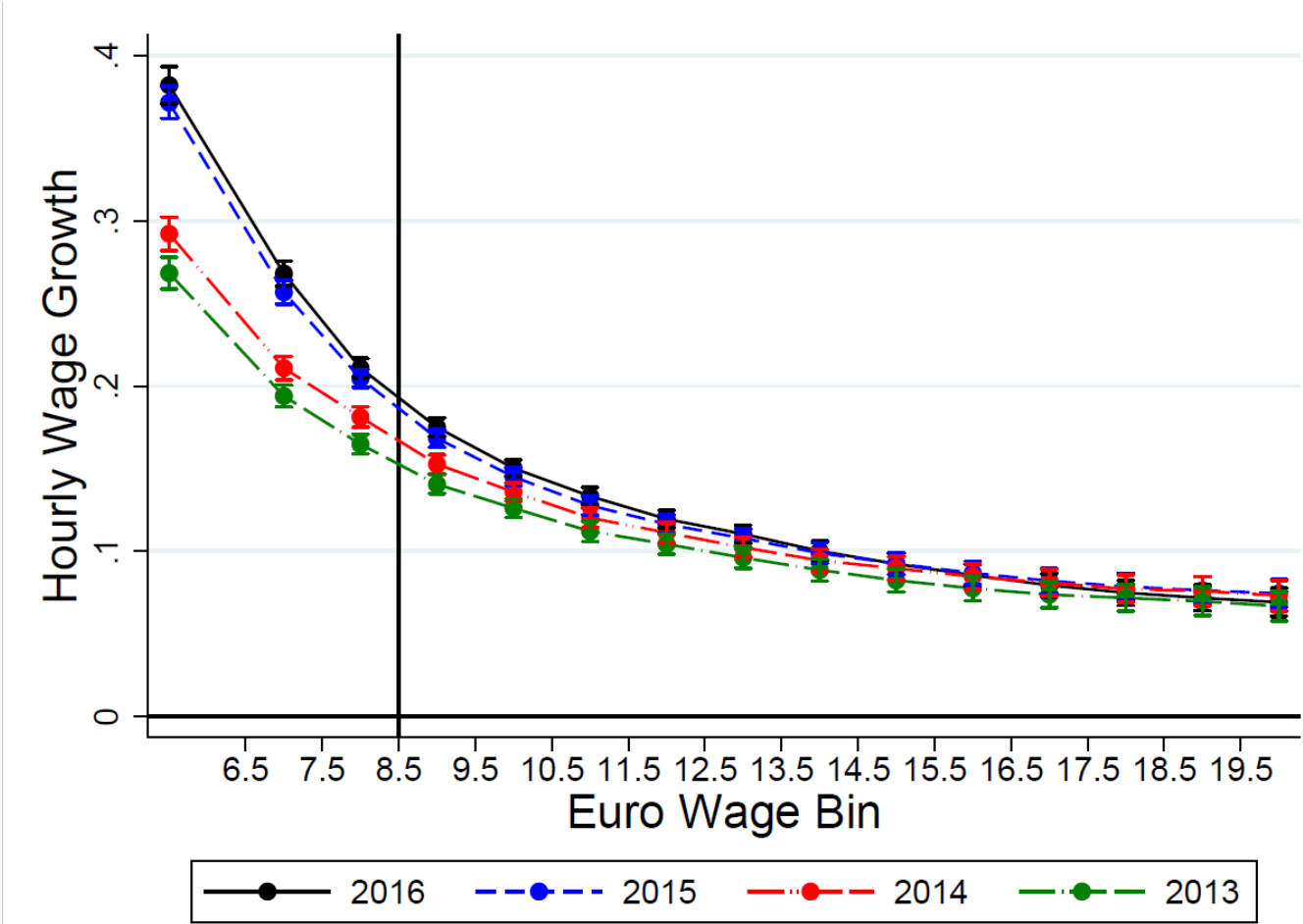
INDIVIDUAL APPROACH: (PROXIED) HOURLY WAGES



INDIVIDUAL APPROACH: (PROXIED) HOURLY WAGES



INDIVIDUAL APPROACH: (PROXIED) HOURLY WAGES



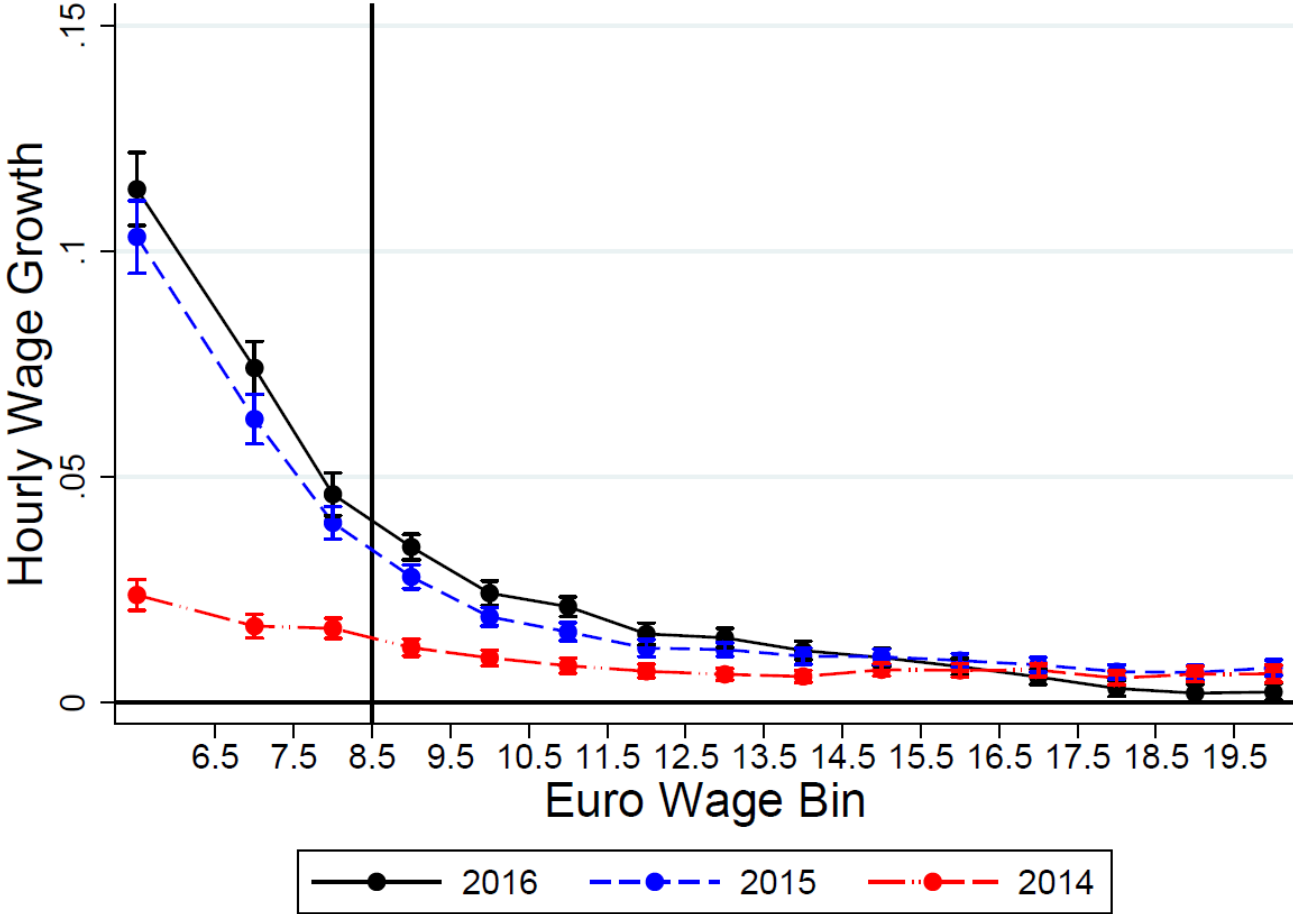
INDIVIDUAL APPROACH: EFFECTS RELATIVE TO 2013 VS 2011

- **Estimated Regression:**

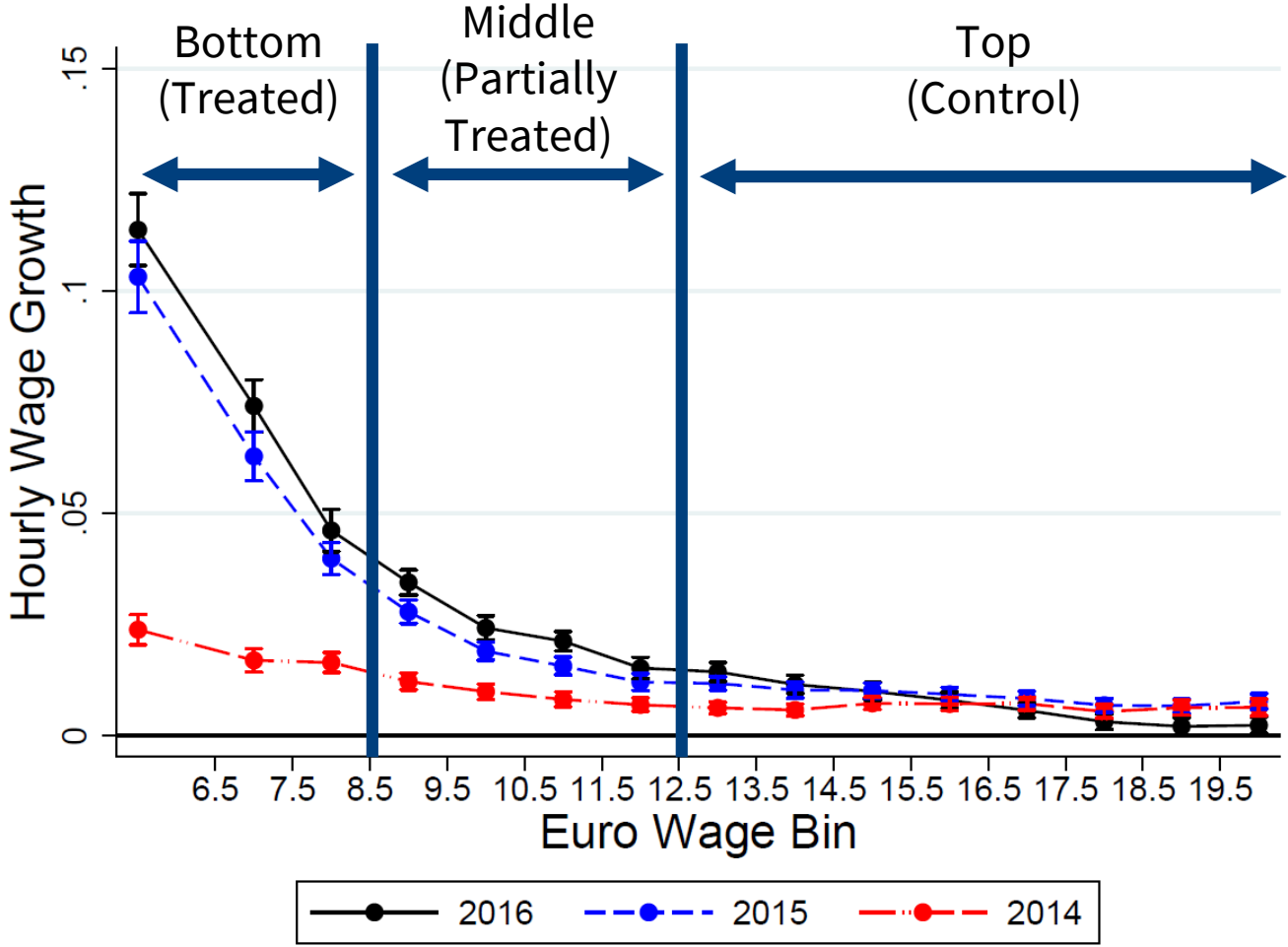
$$\Delta^2 y_{it} = \sum_w \delta_{wt} D_{wi(t-2)} \times YEAR_t + \sum_w \gamma_{w2013} D_{wi(2011)} + \beta X_{i,t-2} + e_{it}$$

- δ_{wt} corresponds to: $\gamma_{wt} - \gamma_{w2013}$
- For $t = 2015, 2016$: effects of the minimum wage policy
- For $t = 2014$: placebo period \rightarrow coefficients should be close to zero

INDIVIDUAL APPROACH: WAGE EFFECTS RELATIVE TO 2013 VS 2011



INDIVIDUAL APPROACH: WAGE EFFECTS RELATIVE TO 2013 VS 2011

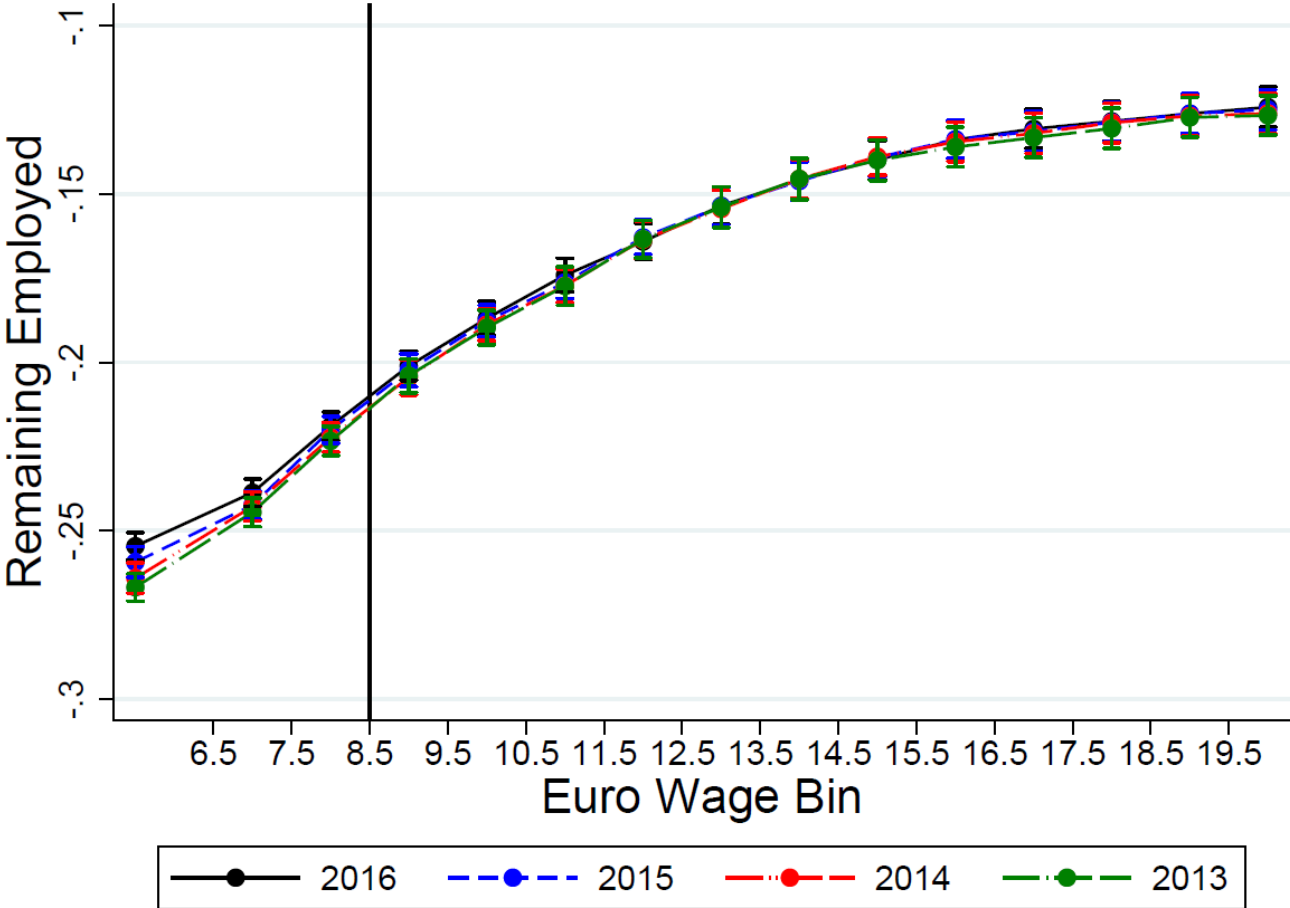


GENERALIZED DIFFERENCE-IN-DIFFERENCES

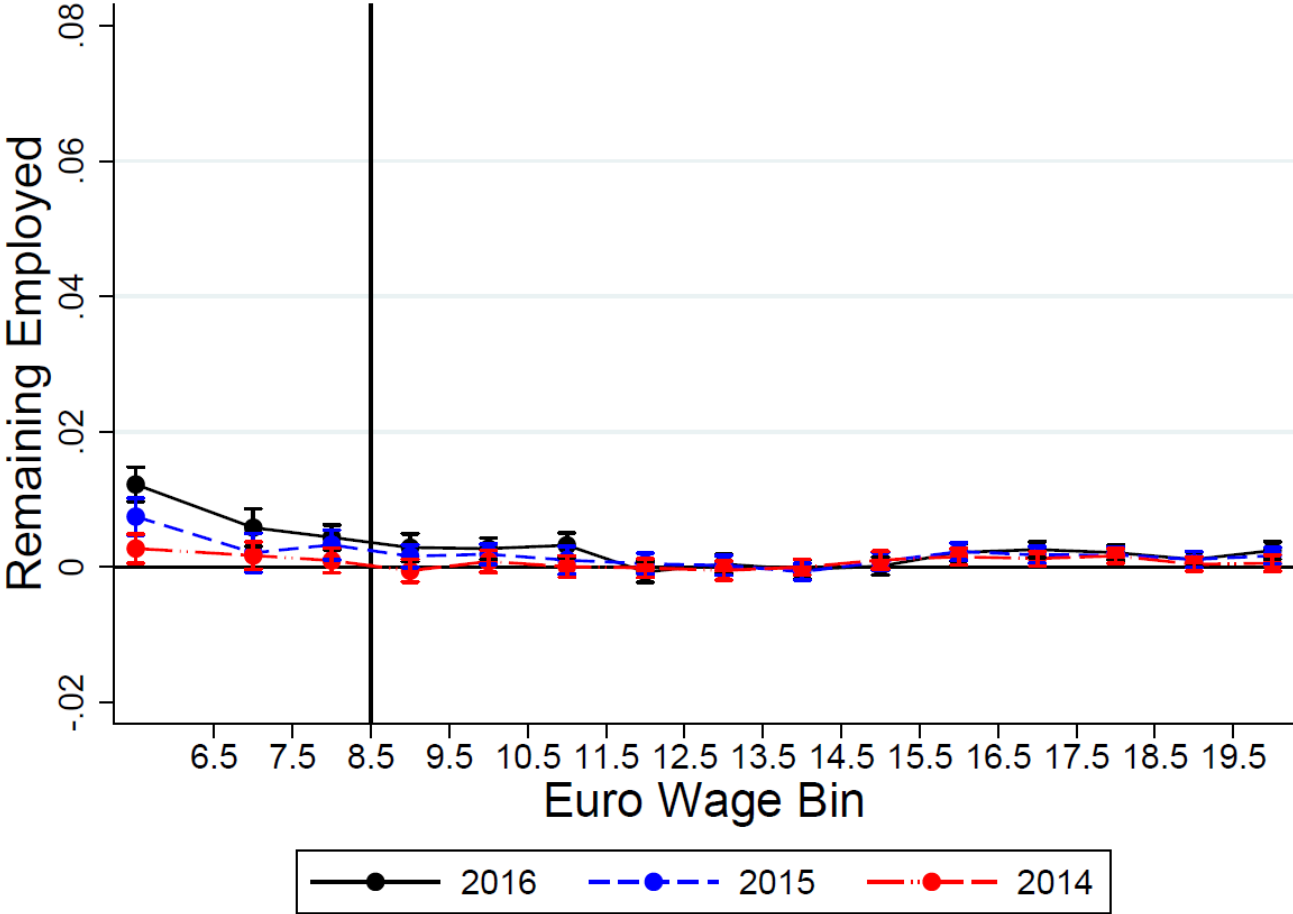
Wage bin in t-2	(1) Bottom vs Top	(2) Middle vs Top
Panel (a): (Proxied) Hourly Wages		
2016 vs 2014	0.061 (0.0019)	0.016 (0.0005)
2014 vs 2012 (Placebo)	0.010 (0.0007)	0.003 (0.0004)
Panel (b): Employment (1 if employed)		
2016 vs 2014	0.007 (0.0005)	0.001 (0.0003)
2014 vs 2012 (Placebo)	0.002 (0.0004)	-0.001 (0.0003)

- Changes relative to
 - 2013 vs 2011
 - Top
- **Bottom:** less than 8.50 Euro per hour (treatment group)
- **Middle:** between 8.50 Euro and 12.50 Euro per hour (partially treated group)
- **Top:** more than 12.50 Euro per hour (control group)

INDIVIDUAL APPROACH: EMPLOYMENT



INDIVIDUAL APPROACH: EMPLOYMENT EFFECTS RELATIVE TO 2013 VS 2011



GENERALIZED DIFFERENCE-IN-DIFFERENCES

Wage bin in t-2	(1) Bottom vs Top	(2) Middle vs Top
Panel (a): (Proxied) Hourly Wages		
2016 vs 2014	0.061 (0.0019)	0.016 (0.0005)
2014 vs 2012 (Placebo)	0.010 (0.0007)	0.003 (0.0004)
Panel (b): Employment (1 if employed)		
2016 vs 2014	0.007 (0.0005)	0.001 (0.0003)
2014 vs 2012 (Placebo)	0.002 (0.0004)	-0.001 (0.0003)

- Changes relative to
 - 2013 vs 2011
 - Top
- **Bottom:** less than 8.50 Euro per hour (treatment group)
- **Middle:** between 8.50 Euro and 12.50 Euro per hour (partially treated group)
- **Top:** more than 12.50 Euro per hour (control group)

WORKER REALLOCATION

- We measure change in firm quality:

$$\Delta^2 y_{it} = q_{j(i,t),i}^{t-2} - q_{j(i,t-2),i}^{t-2}$$

- where $q_{j(i,t),i}^{t-2}$ is the time $t-2$ characteristics of firm j where worker i is employed in year t

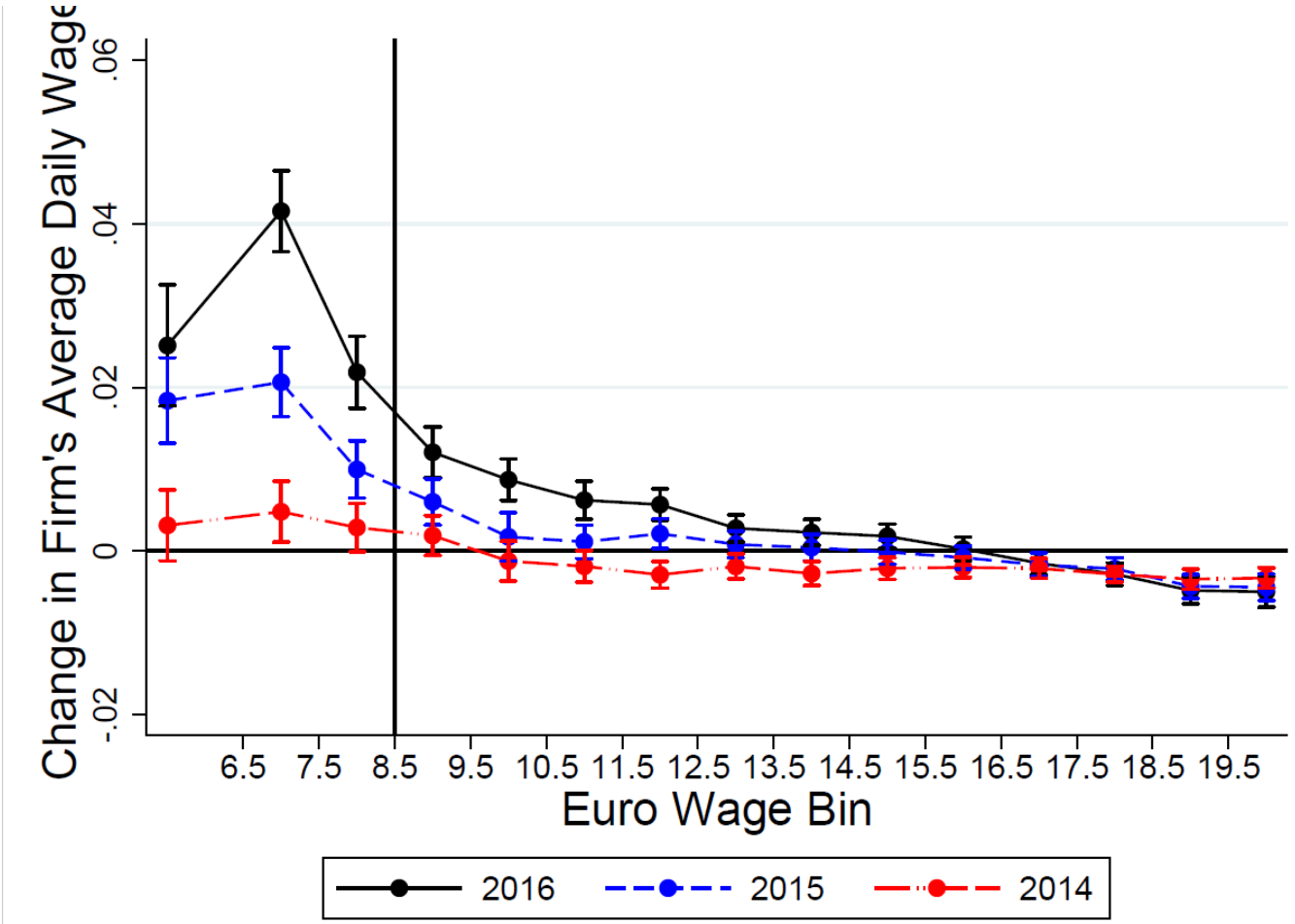
→ **Any changes in firm quality induced by the minimum wage reflect compositional changes only**

- For firm stayers: $q_{j(i,t),i}^{t-2} - q_{j(i,t-2),i}^{t-2} = 0$

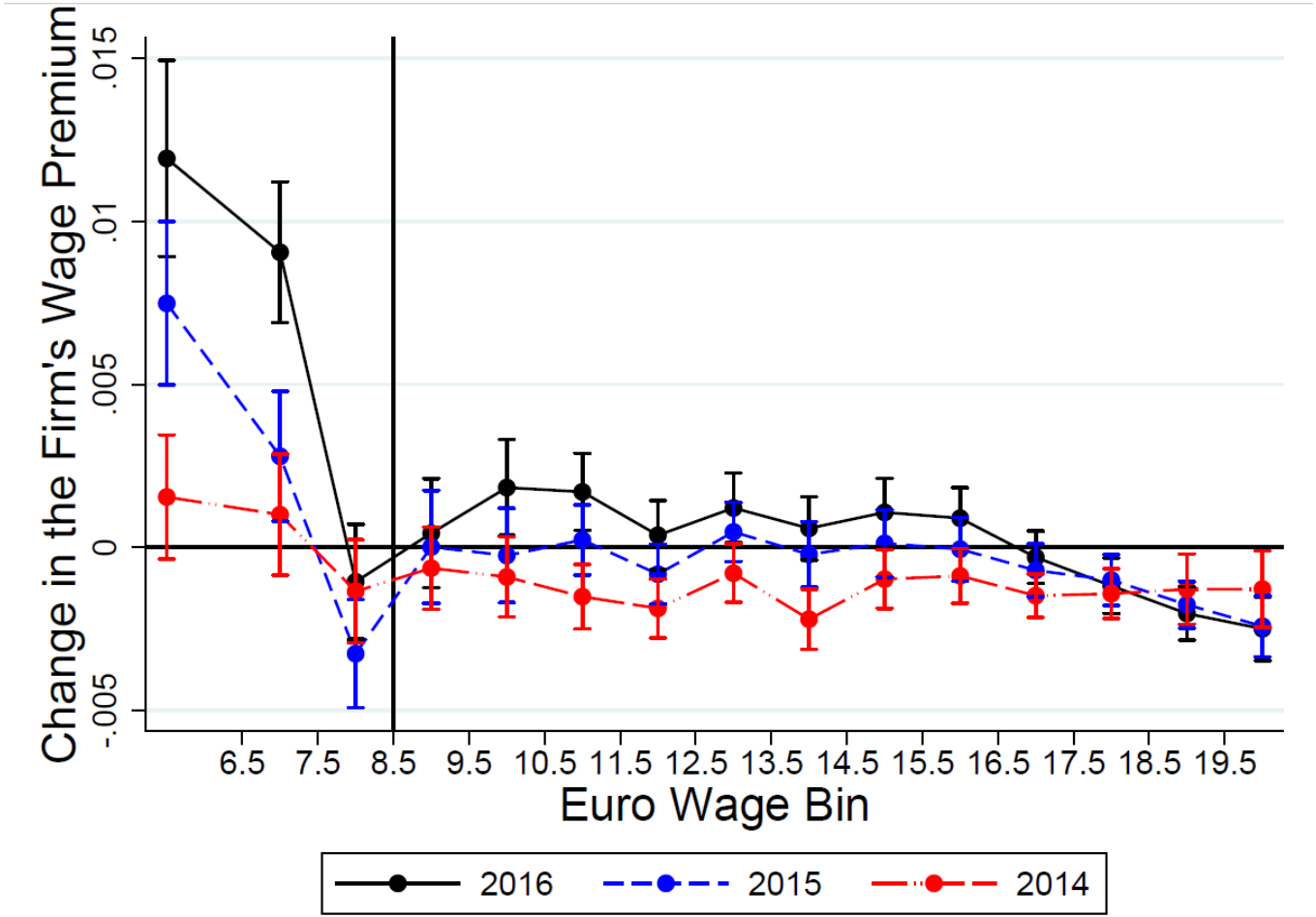
- **Estimated Regression:**

$$q_{j(i,t),i}^{t-2} - q_{j(i,t-2),i}^{t-2} = \sum_w \delta_{wt} D_{wi(t-2)} \times YEAR_t + \sum_w \gamma_{w2013} D_{wi(2011)} + \beta X_{i,t-2} + e_{it}$$

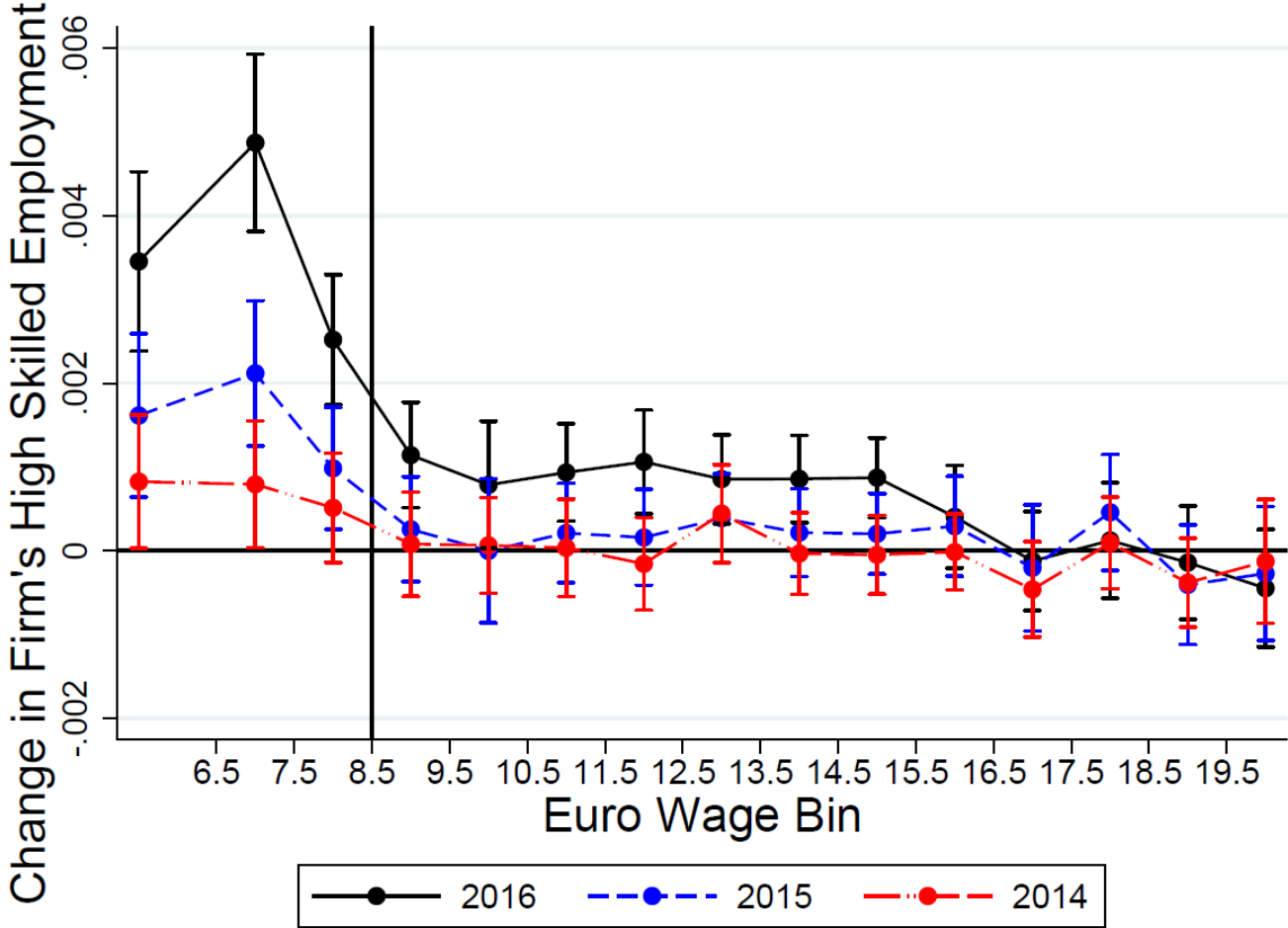
MOVEMENT TO FIRMS WITH HIGHER DAILY WAGE



MOVEMENT TO FIRMS PAYING A HIGHER WAGE PREMIUM



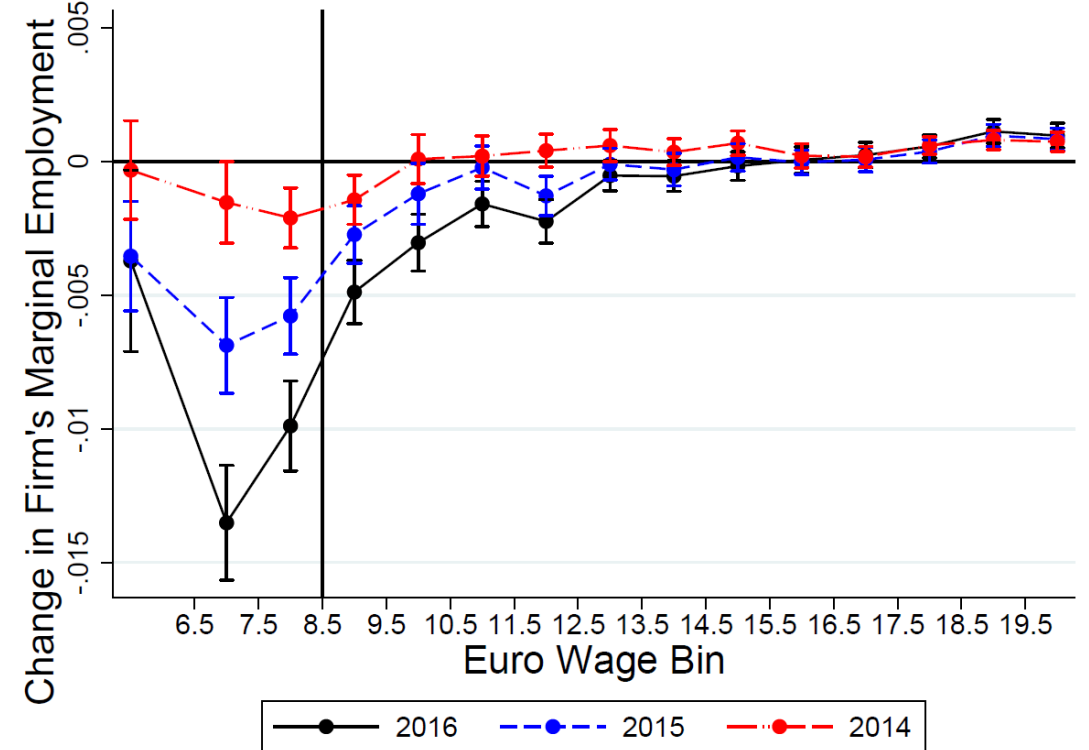
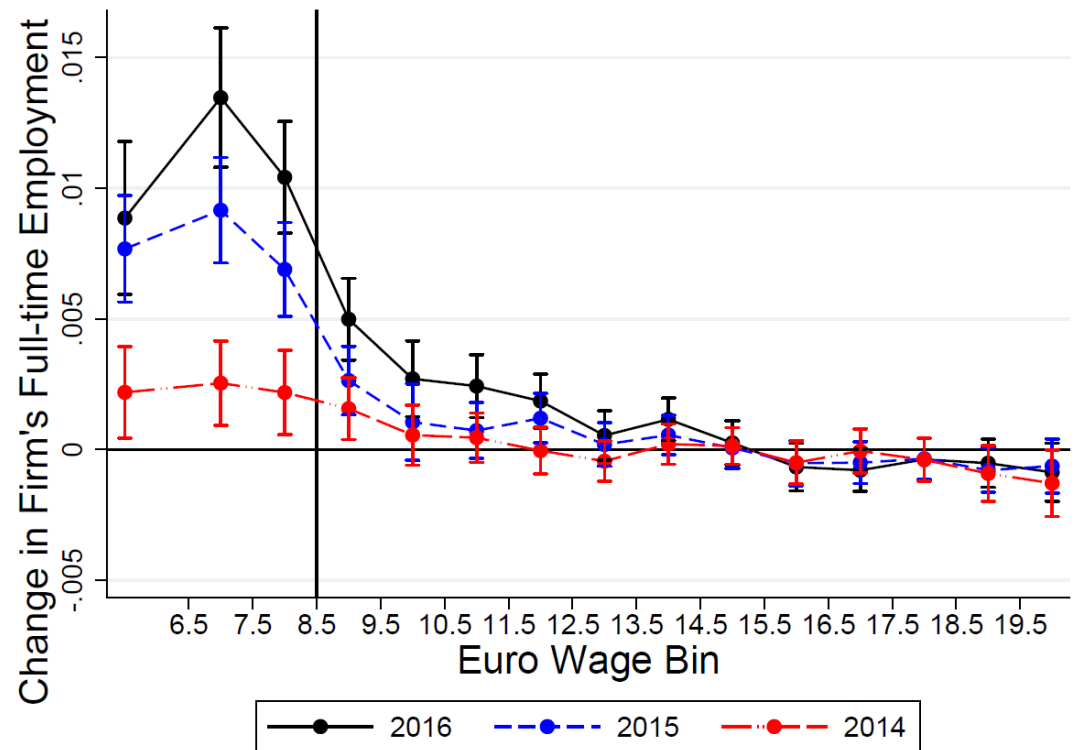
MOVEMENT TO FIRMS WITH A MORE SKILLED WORKFORCE



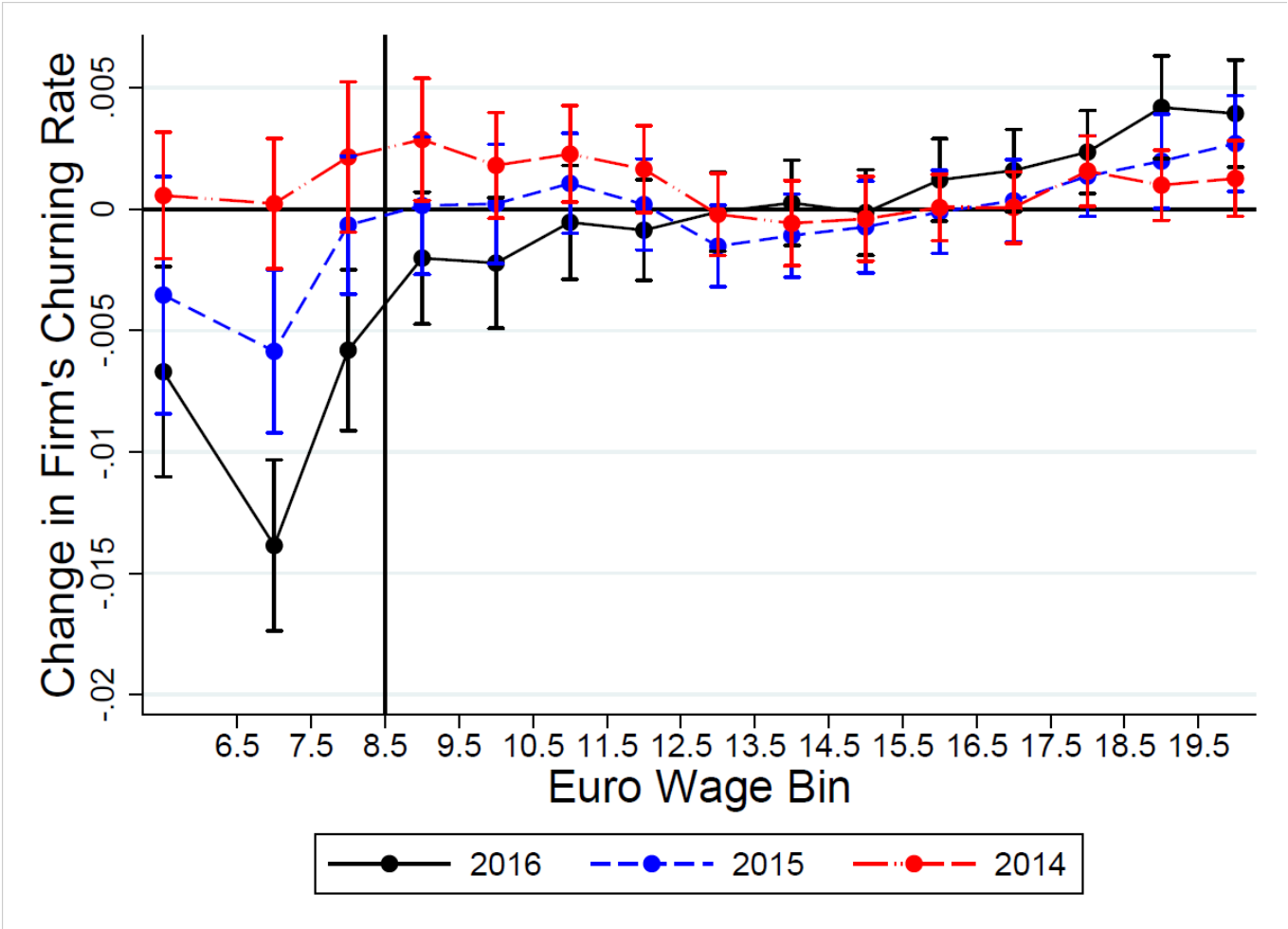
MOVEMENT TO FIRMS WITH MORE FULL-TIME

AND

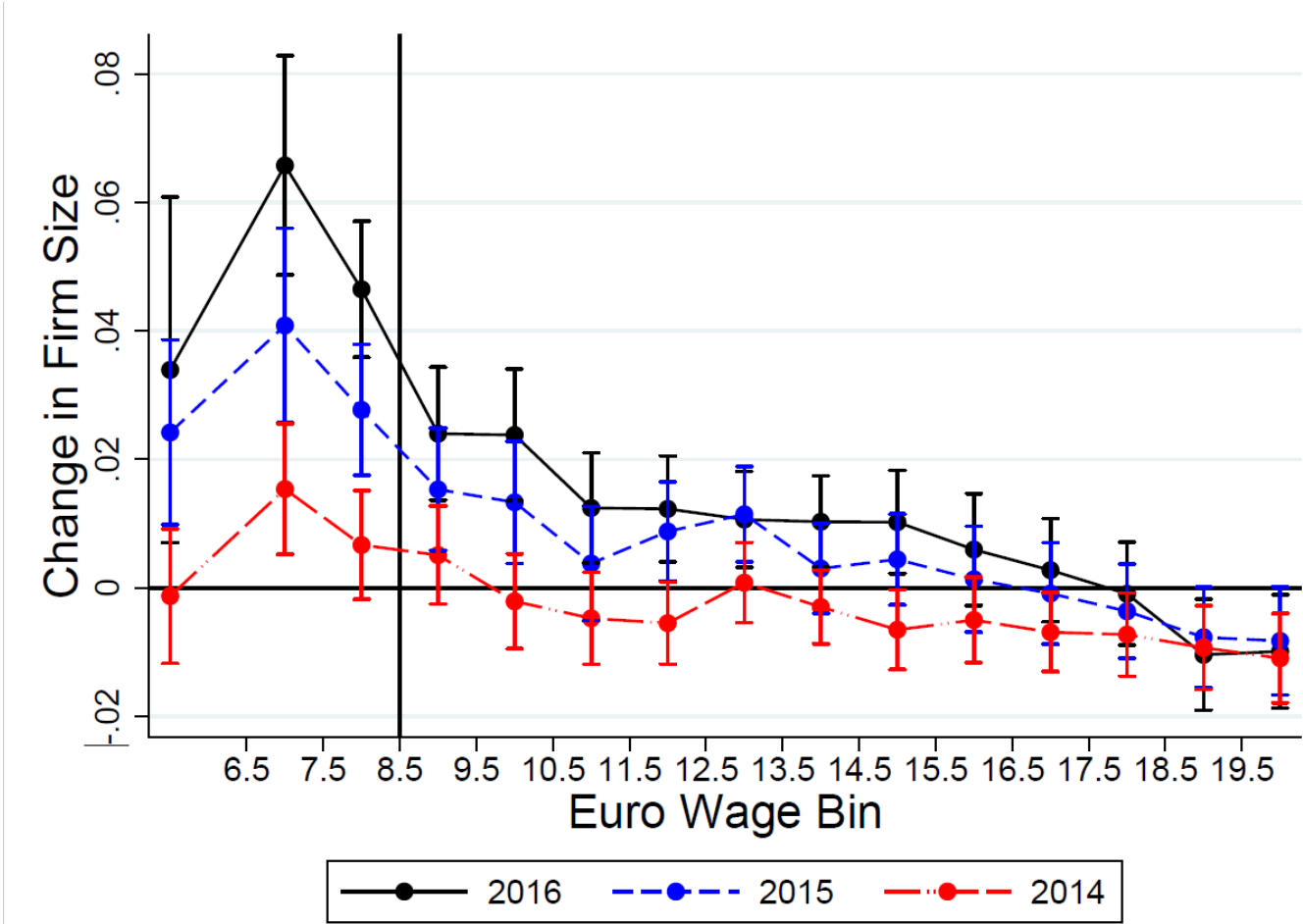
LESS MARGINAL WORKERS



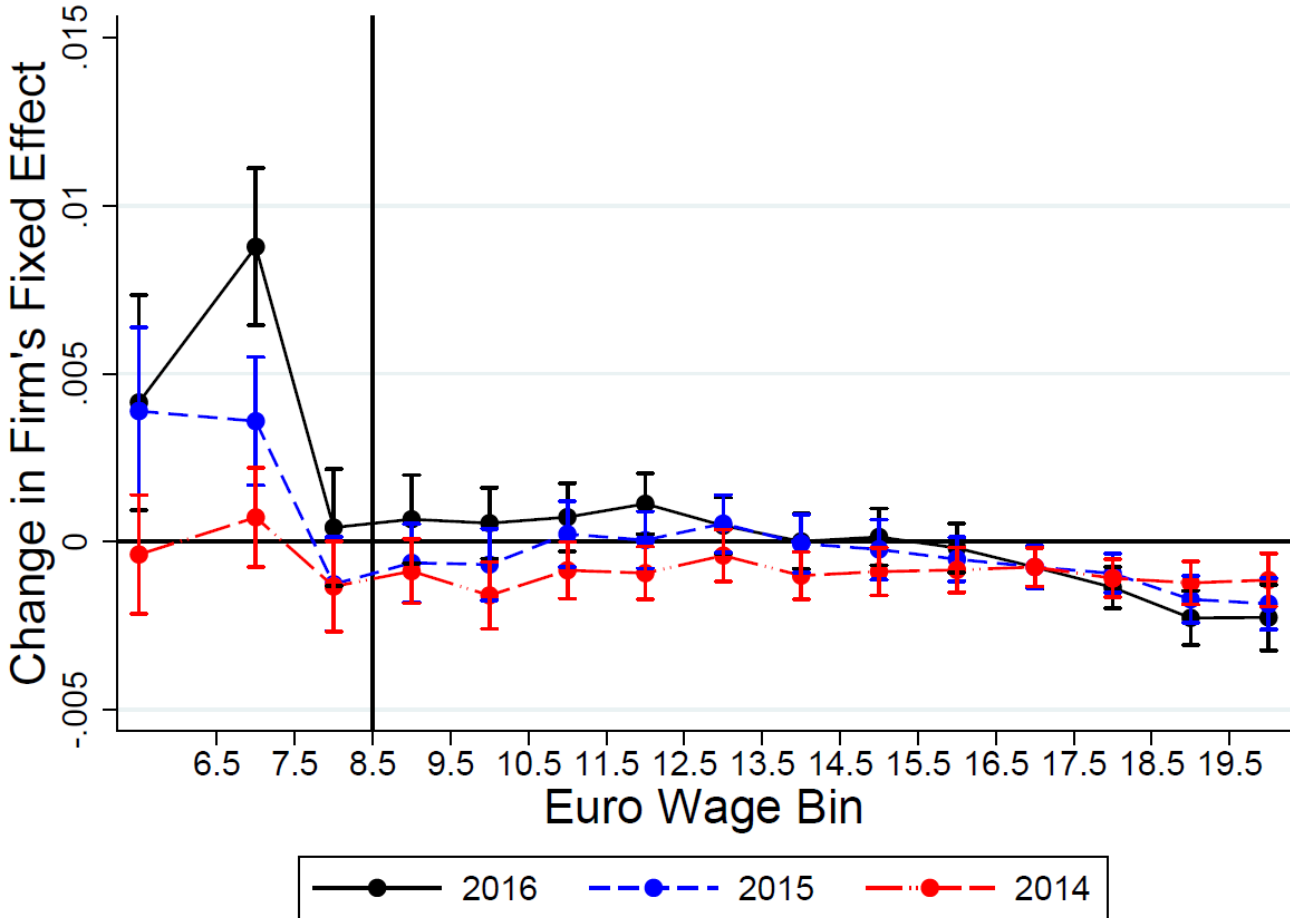
MOVEMENT TO FIRMS WITH LOWER WORKER TURNOVER



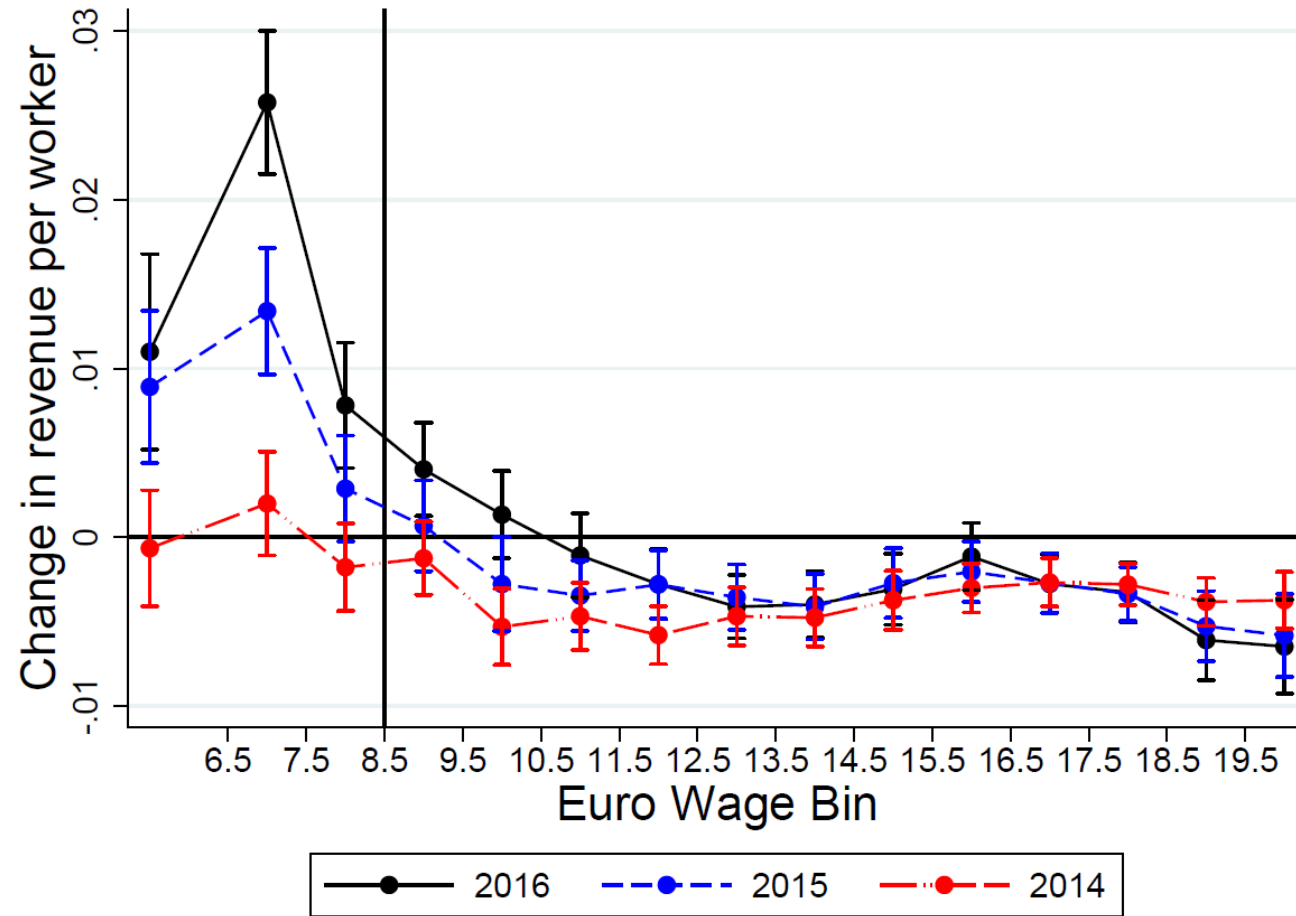
MOVEMENT TO LARGER FIRMS



MOVEMENT TO FIRMS WITH HIGHER AKM FIXED FIRM EFFECTS



MOVEMENT TO FIRMS WITH MORE PRODUCTIVE WORKERS



COMPLEMENTARY EVIDENCE ON REALLOCATION AT **REGIONAL LEVEL**

REGIONAL APPROACH

- Exposure to the minimum wage at time t at location g :

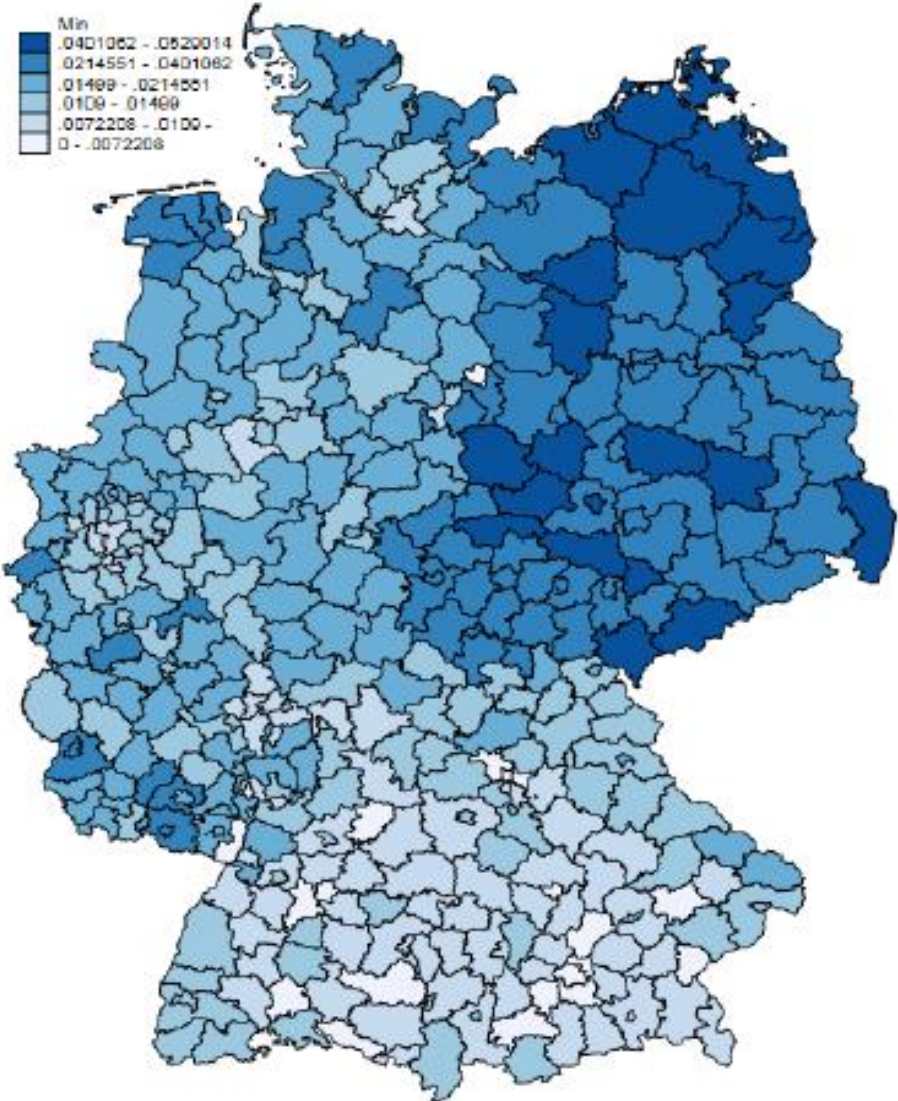
$$GAP_{gt} = \frac{\sum_{i \in g} h_{it} \min\{0, MW - w_{it}\}}{\sum_{i \in g} h_{it} w_{it}}$$

→ calculates the percentage increase in wages that is needed to comply with the minimum wage law for an average worker

- Average over 3 pre-introduction years:

$$\overline{GAP}_g = \frac{1}{3} \sum_{t=2011}^{2013} GAP_{gt}$$

REGIONAL VARIATION IN EXPOSURE TO MW

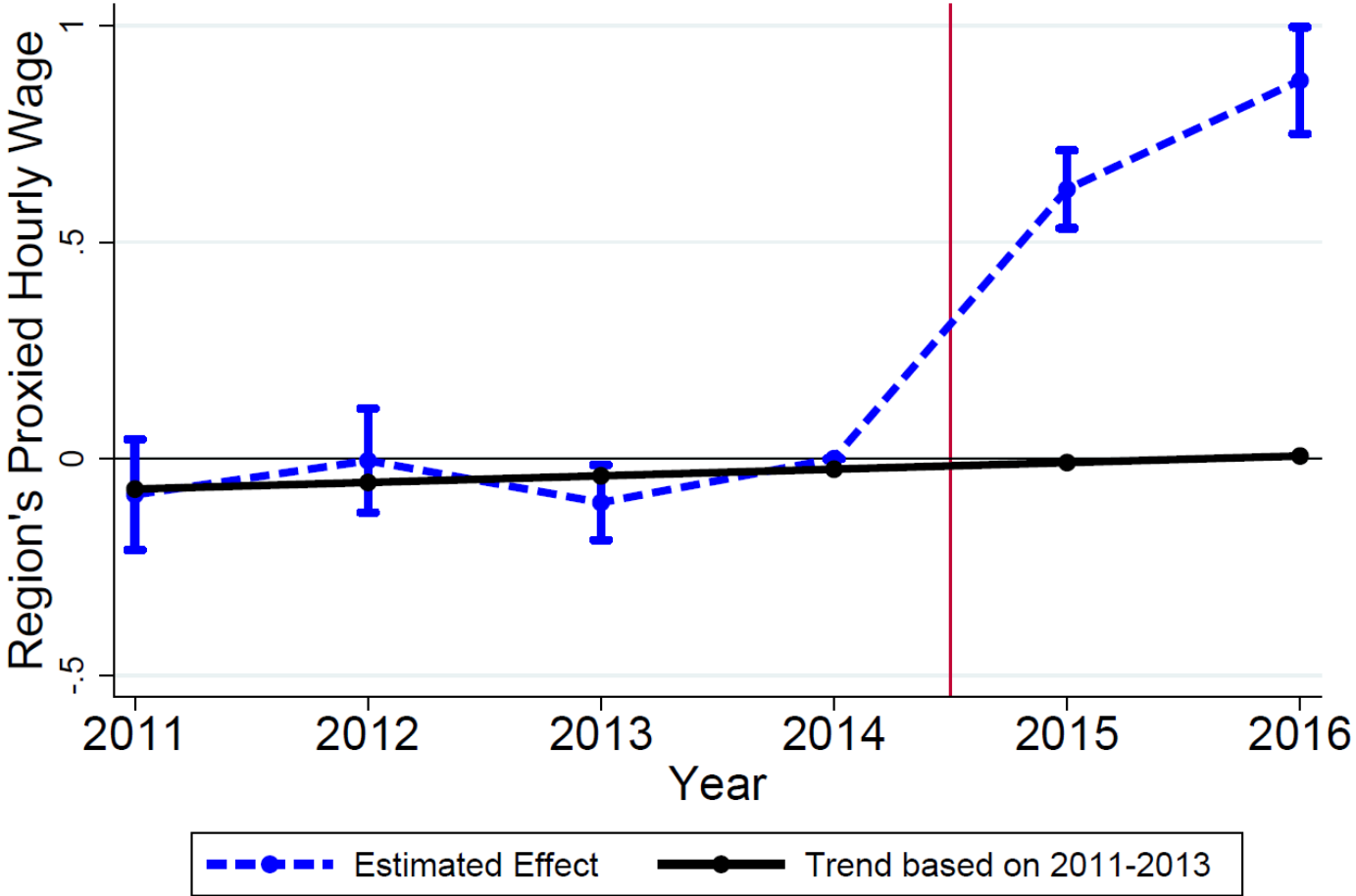


REGIONAL APPROACH: DIFFERENCE-IN-DIFFERENCES EVENT STUDY

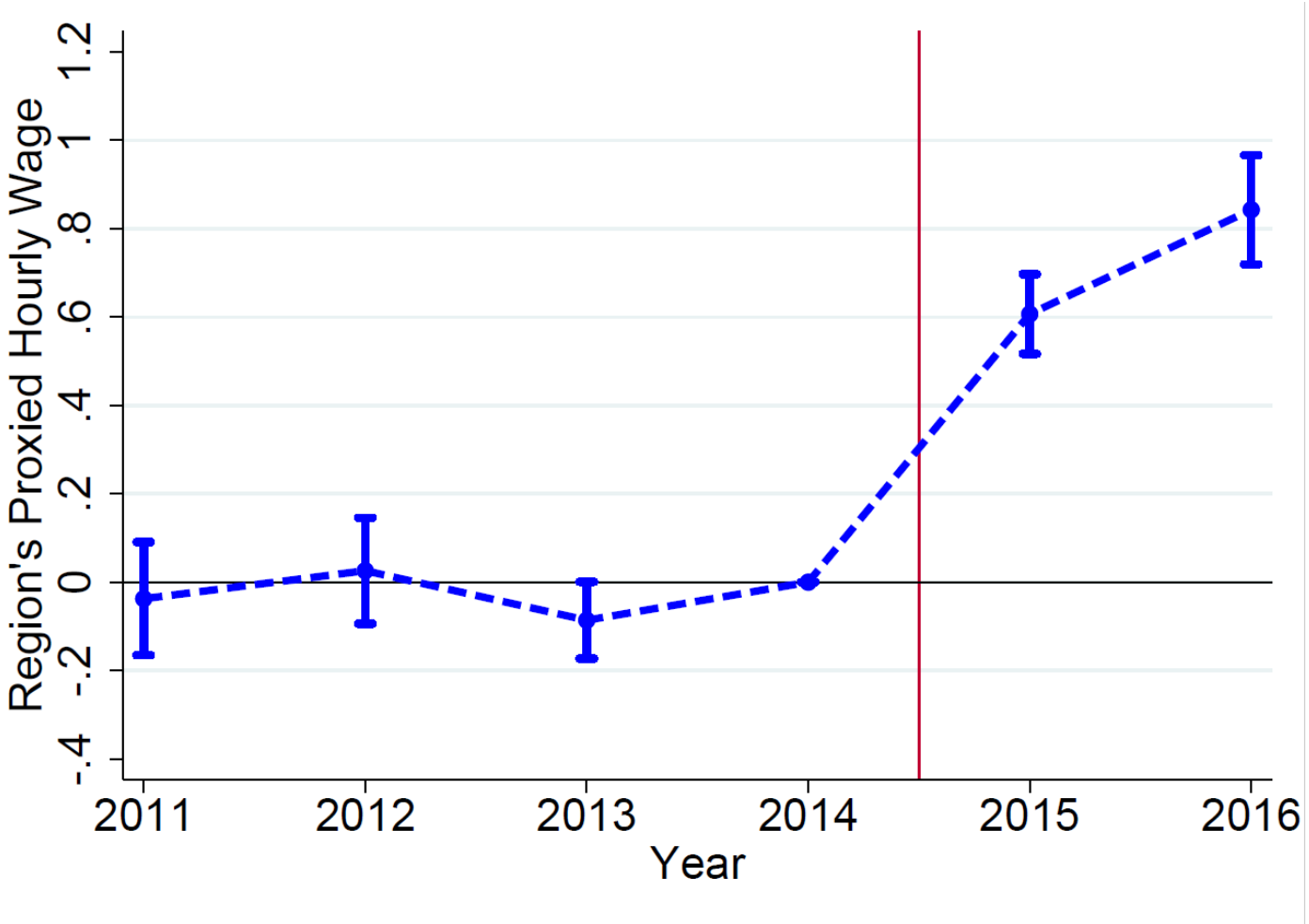
- We estimate the following equation:

$$Y_{rt} = \alpha_r + \zeta_t + \sum_{\tau=2011, \tau \neq 2014}^{2016} \gamma_{\tau} \overline{GAP}_r \times YEAR_{\tau} + \epsilon_{rt}$$

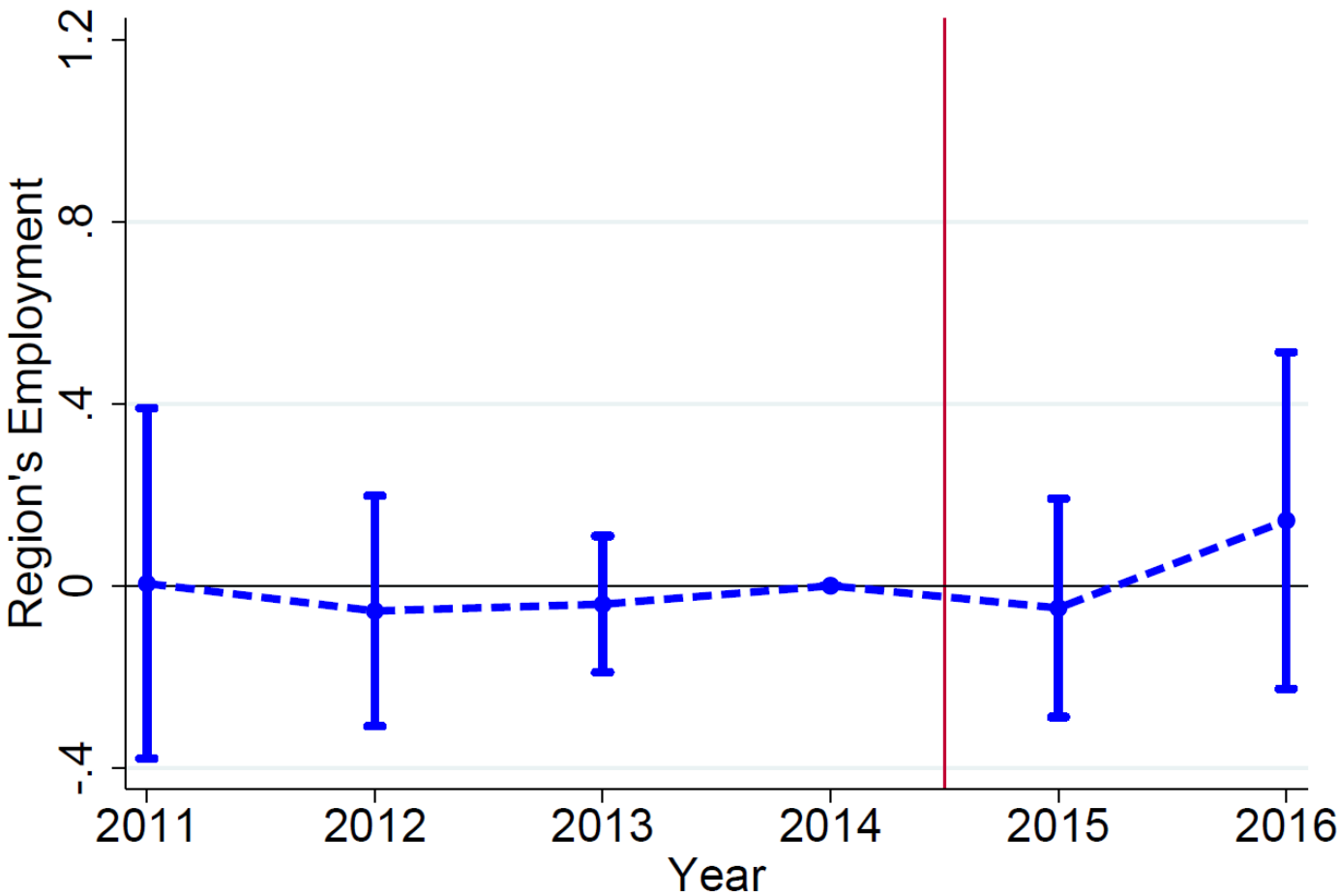
REGIONAL APPROACH: DISTRICTS' AVERAGES WAGES



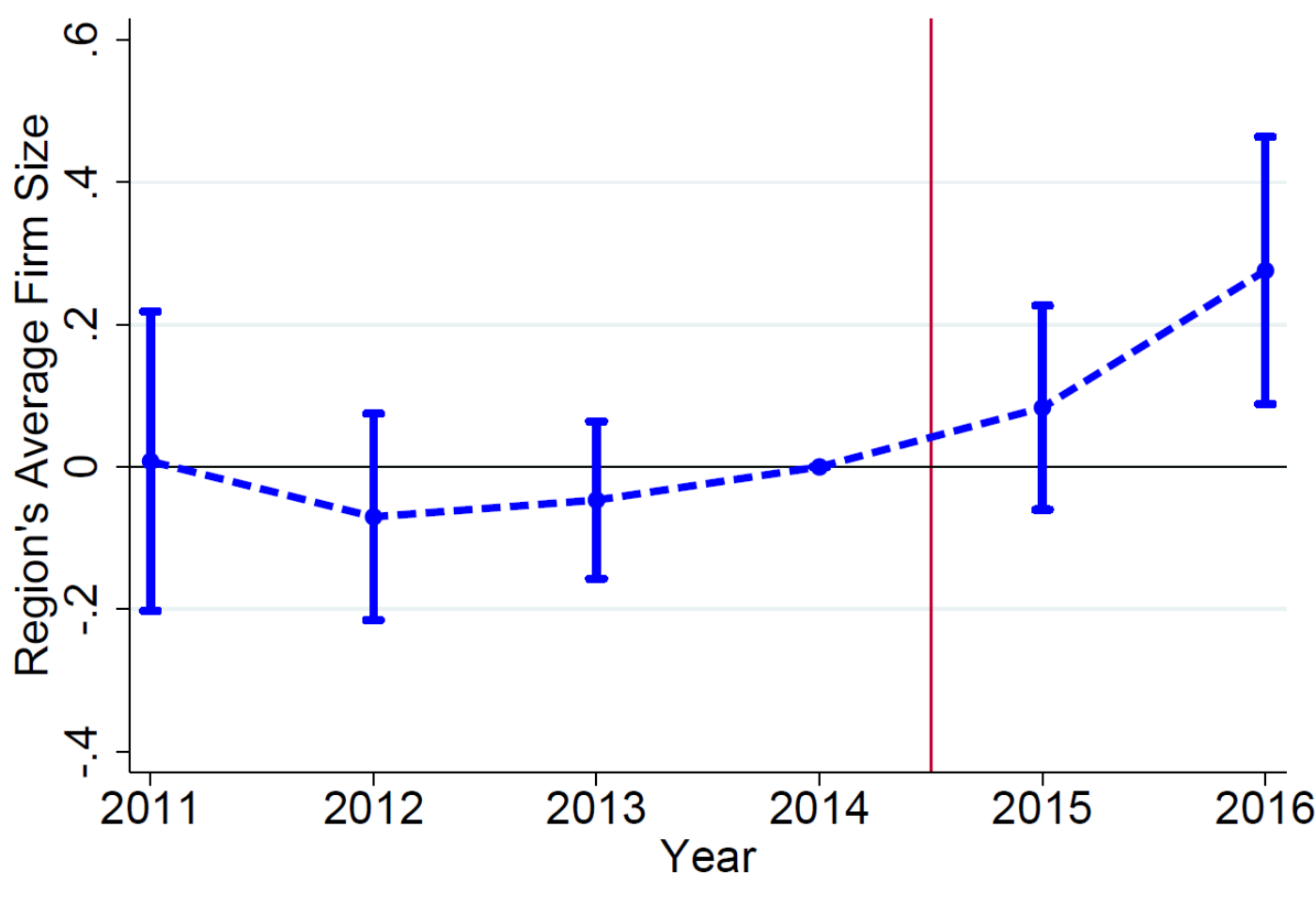
REGIONAL APPROACH: DISTRICTS' AVERAGES WAGES – DETRENDED



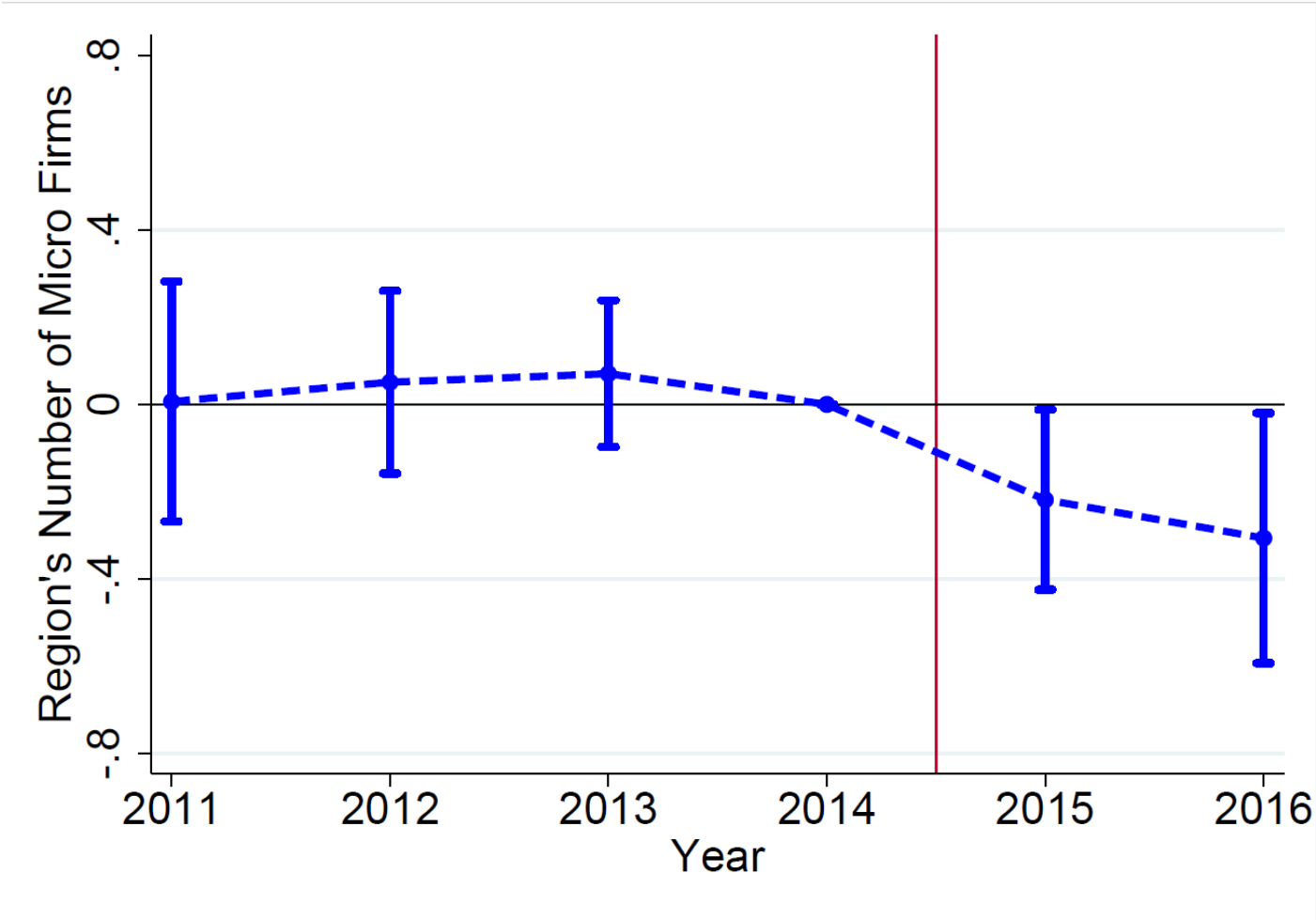
REGIONAL APPROACH: DISTRICTS' EMPLOYMENT – DETRENDED



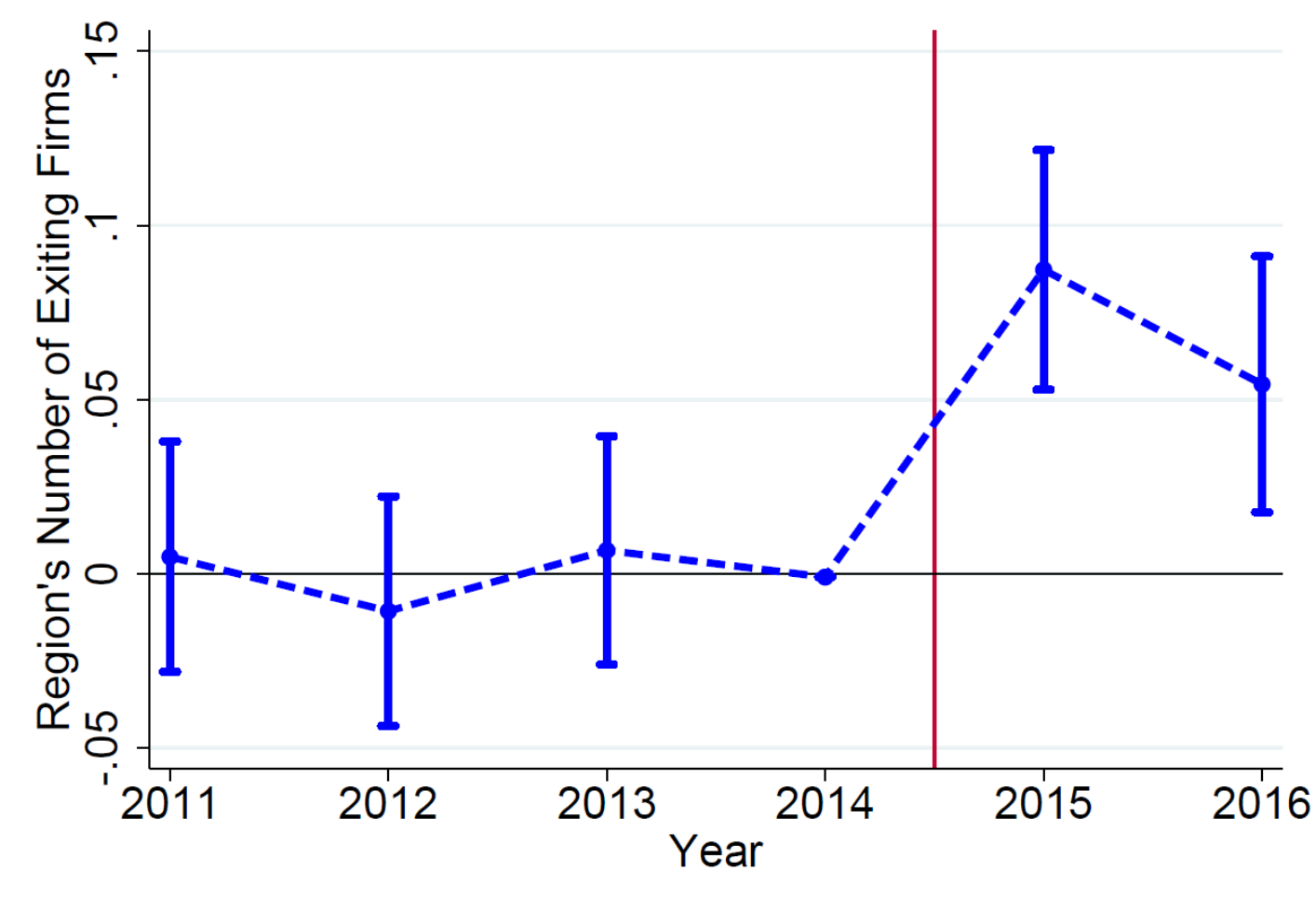
REGIONAL APPROACH: FIRM SIZE – DETRENDED



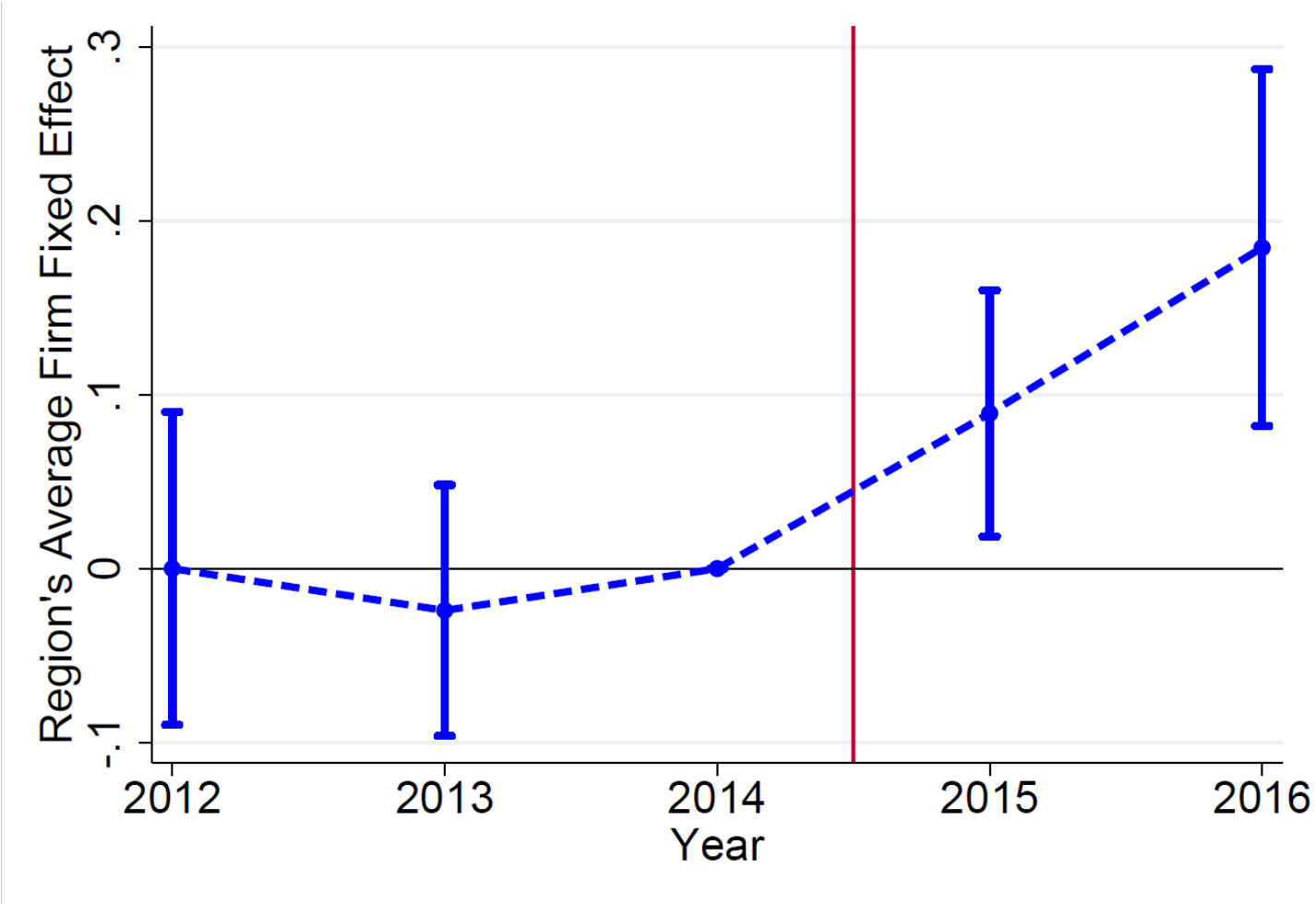
REGIONAL APPROACH: NUMBER OF SMALL FIRMS – DETRENDED



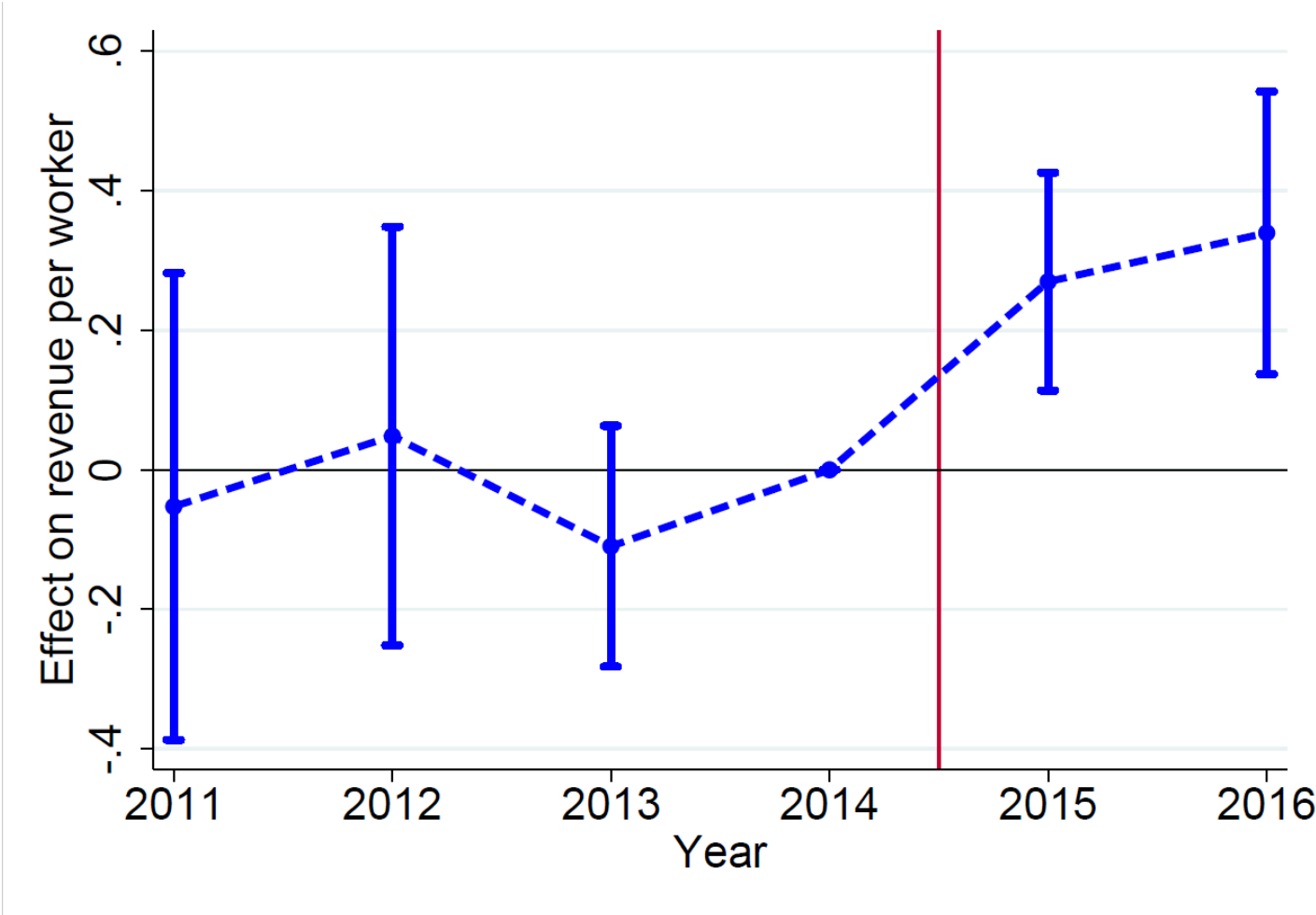
REGIONAL APPROACH: NUMBER OF SMALL FIRMS EXITING – DETRENDED



REGIONAL APPROACH: AKM FIXED FIRM EFFECT – DETRENDED



REGIONAL APPROACH: PRODUCTIVITY OF FIRMS – DETRENDED



CONCLUSION

Introduction of minimum wage:

- increased wages (at the bottom)
- did not lead to dis-employment effects
- lead to a reallocation of workers to better firms
- improved firm composition

THANK YOU

matthias.umkehrer@iab.de

APPENDIX

BITE OF THE MINIMUM WAGE

- Germany:

Fraction earning less than 8.50 EUR/hour

	Project	VSE	SOEP
All	12.2	11.3	13.4
West	10.6	9.3	11.7
East	19.3	20.7	17.8

- International Comparison of the Ratio of MW to Median Wage (OECD)

	German	Spain	France	UK	USA
2015	0.48	0.37	0.61	0.49	0.36

MAGNITUDE OF THE REALLOCATION EFFECTS

- Effect of the MW on daily wages is 10.7%
- Average daily wage increased by 2.5%



25% of the daily wage increase can be attributed to reallocation

- The firm's daily wage can increase:
 - Moving to firms which offer better jobs (full-time instead of marginal)
 - Moving to firms that increase hourly wages

- Effect of the MW on hourly wages is 6.1%
- Wage premium increases by 0.5%



8.2% of the hourly wage increase can be attributed to reallocation

MAGNITUDE OF THE REALLOCATION EFFECTS

- Effect of the MW on daily wages is 10.7%
- Average daily wage increased by 2.5%



25% of the daily wage increase can be attributed to reallocation

- The firm's daily wage can increase:
 - Moving to firms which offer better jobs (full-time instead of marginal)
 - Moving to firms which pay higher wage per hour

- Effect of the MW on hourly wages is 6.1%
- Wage premium increases by 0.5%



8.2% of the hourly wage increase can be attributed to reallocation

WHY MAY REALLOCATION EFFECTS ARISE?

→ common feature of models that deviate from competitive benchmark

- 1) Search frictions: e.g. Acemoglu (2001)
- 2) Monopsony power: Manning (2003); Bhaskar et al. (2002); more recently: Berger et al. (2019)
- 3) Product market frictions: consumers switch like in Luca/Luca (2018) and in Mayneris et al. (2014)
- 4) Friction to access technology: Williamson's (1968) 'Wage Rates as Barriers to Entry Model'

DISCUSSION – WHAT DRIVES REALLOCATION?

Search frictions

- Acemoglu (2001): low paying ('bad' jobs) and high paying ('good' jobs) can coexist **in DMP search model**
- MW will destroy 'bad' jobs and create 'good' (capital intensive) ones
- Test this by proxying **capital intensity** with:
 - AKM FEs
 - the share of high-skilled workers
- MW leads to reallocation in terms of both measures

DISCUSSION – WHAT DRIVES REALLOCATION?

Monopsony power

- Monopsonistic/Oligopsonistic competition models also predict reallocation
- Card et al. (2018) argue that monopsony power emerges if workers have **idiosyncratic, non-pecuniary preferences** to work at a particular firm
 - Leading candidate: commuting time from home
- We find evidence for an increase in **commuting distance**

DISCUSSION – WHAT DRIVES REALLOCATION?

Product market frictions

- Friction on the output market can also lead to reallocation (Luca/Luca, 2018; Mayneris et al., 2014)

Labor cost \uparrow \rightarrow least efficient firms exit \rightarrow consumers reallocate \rightarrow
 \rightarrow labor demand also reallocates given increasing demand for goods at given firm

- Consumer driven reallocation is likely to be stronger in the non-tradable sector
- We find that **reallocation is larger in the non-tradable sector**

ADJUSTMENT OF WORKING HOURS

	2011		2014	
	unadjusted	adjusted	unadjusted	adjusted
All	26,7	30,3	26,5	30,1
Full-time	34,8	39,8	34,8	39,7
Part-time	22	24,9	21,8	24,6
Marginally employed	8,4	9,2	8,3	9,1

WORKING HOURS - COMPARISON WITH SES

		All	
		BEH, adjusted	SES
Full-time			
	All	38,8	39,1
	Men	38,9	39,1
	Women	38,5	39
Part-time			
	All	24,3	23,9
	Men	25,2	23,8
	Women	24	23,9
Marginally employed			
	All	8,7	8,2
	Men	8,6	8
	Women	8,7	8,2