technische universität
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Lecture 3b:
Monopsony, Markdowns, and Minimum Wages

Michael J. Böhm

Empirical Economics

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Monopsony, Markdowns, and Minimum Wages

Overview:

1. Perfect Competition and Background
2. Monopsony Theory and Minimum Wages
3. Labour Market Concentration
4. Estimating Markdowns
5. Mergers and Wages
6. Difference-in-Differences (DID) Estimates
7. Minimum Wages and Reallocation

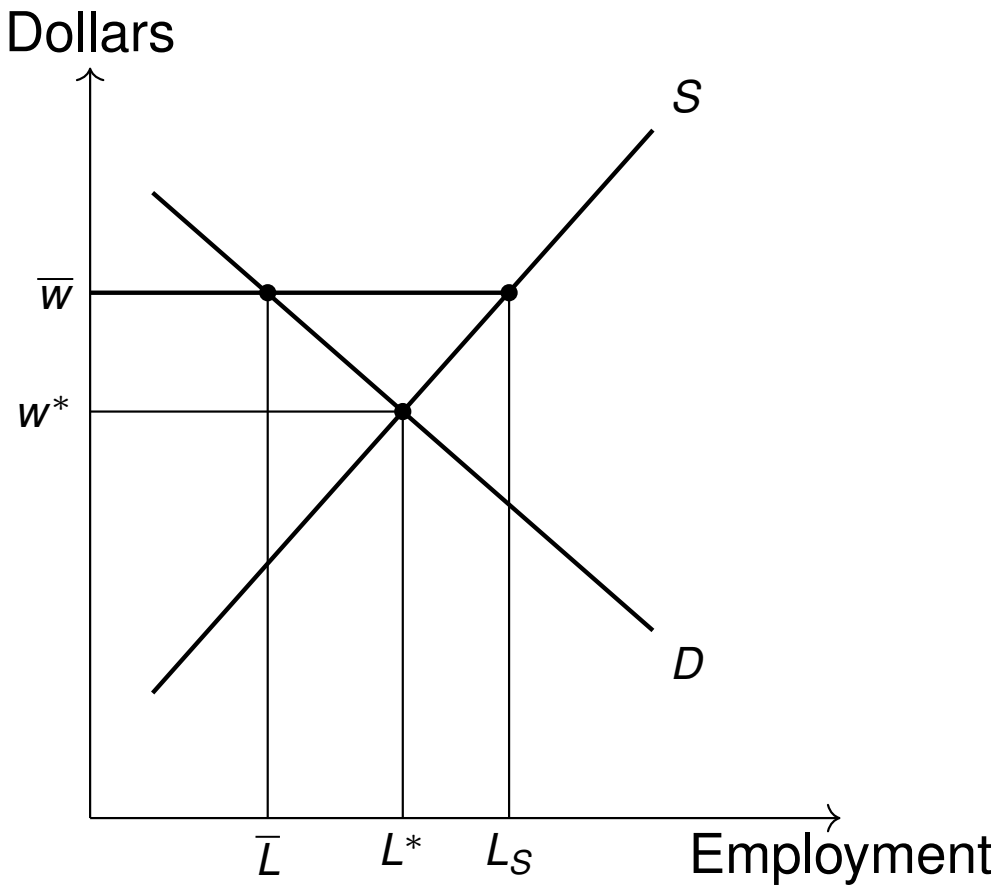
Perfect Competition

- The textbook model, due to Stigler (1946), of the impact of minimum wages applies to a market for homogeneous workers, which coincides with the entire labour market.
- Assume that this competitive labour market is initially at the equilibrium (w^*, L^*). When the minimum wage is set at $\bar{w} > w^*$ above the equilibrium wage, firms move up the demand curve and employment falls to $\bar{L}$.
- As a result of this wage floor, some workers $(L^* - \bar{L})$ are displaced from their current jobs and become unemployed.

Perfect Competition

The Impact of the Minimum Wage on the Employment

A minimum wage set at $\bar{w}$ forces employers to cut employment (from L^* *to* $\bar{L}$). The higher wage als encourages $L_S - L^*$ additional workers to enter the market. The minimum wage, therefore, creates unemployment.



Perfect Competition

- The assumption here is that in the short-run, it may be difficulty for firms to substitute away from the higher priced labour that receives the minimum wage.
- In the long run, the minimum wage increase should induce firms to substitute away from minimum wage workers into using more of other inputs including capital and even higher priced labour that does not receive the minimum wage increase.
- For example: self-service gasoline stations with credit card payment systems have substituted away from low-wage attendants who pump gas.
- Why then introduce a minimum wage in the first place if unemployment increases?

Perfect Competition

- It is possible that total worker earnings increase: $\bar{w}\bar{L} \lessgtr w^* L^*$. If proportional increase in wages is larger than (induced) proportional decline in employment, then the wage bill will increase, even if employment falls.
- In addition, the higher wage encourages additional persons to enter the labour market.
- If additional workers enter the labour market, but cannot find jobs at the minimum wage, this creates more unemployment than is caused by the workers' initial displacement.

Background

- More generally, the unemployment rate is larger the more elastic the demand $(L^* - \bar{L})$ and supply $(L_S - L^*)$ curves and the higher the minimum wage.
- Some of the main purposes of minimum wages, as espoused in the literature, are not concerned only with labour market consequences

1) Alleviate poverty
2) Reduce wage inequality
3) Put a floor below which transactions are not allowed to occur
4) Eliminate low-wage jobs and encourage movement up the value-added chain
5) Provide an incentive to leave income maintenance programs

Background

6) Prevent employers from exploiting earnings supplement programs (WITB, EITC)
7) Increase aggregate demand with associated multiplier effects
8) Help pay for rising tuition fees
9) Protect unprotected workers who have little individual or collective bargaining power
10) Protect protected workers by reducing low-wage competition
11) Reduce the need for unions
12) Provide a model for emulation by others.

Background

- In Germany there exists a general minimum wage since 2015.
- Before this there were only some de facto sectoral minimum wages, e.g., in the construction sector, because public procurement rules required firms to pay certain wage rates.
- Preceding the introduction were many years of heated debates (with very sceptical voices among conservative economists, business assocations and media).
- With the introduction, a “Minimum Wage Commission” (3 employers, 3 employees, 2 scientific members) was established that makes recommendations about raises.
- The minimum wage is federal and few exceptions: internships as formal requirement of study or schooling, certain longer-term unemploymed and participants in active labour market policies.

Background

Entwicklung des Mindestlohns

Gültig ab	Mindestlohn in € (brutto) je Zeitstunde	Prozentuale Änderung	Inflation im gleichen Zeitraum	Referenz / Bemerkung
1. Januar 2015	8,50			[12]
1. Januar 2017	8,84	+4,0 %	+1,0 %	[13][14]
1. Januar 2019	9,19	+4,0 %	+3,3 %	[15][14]
1. Januar 2020	9,35	+1,7 %	+1,4 %	[15][14]
1. Januar 2021	9,50	+1,6 %	+0,5 %	[16][14]
1. Juli 2021	9,60	+1,1 %	+3,1 %	
1. Januar 2022	9,82	+2,3 %		
1. Juli 2022	10,45	+6,4 %	+6,9 %	
1. Oktober 2022	12,00	+14,8 %		[17][14]
1. Januar 2024	**12,41**	+3,4 %	+5,9 %	[18][14]
1. Januar 2025	12,82	*+3,3 %*		[19]

Background

Other countries have had a minimum wage for much longer. European countries tend to have “national” minimum wages while in North America much variation at the sub-federal level:

- In Canada, the federal government sets the minimum wage in the federal jurisdiction, which represents approximately 6% of the Canadian workforce. For the remaining 94% of workers, the governments of the provinces and territories have jurisdiction over the minimum wage
- In the United States, the federal government sets a federal minimum wage but there are also State-level minimum wages.

Monopsony

- An important model that does not predict adverse employment effects of minimum wages is the case of a non-discriminating monopsonist.
  - an employer whose employment decisions affect the wage rate paid.
- The non-discriminating monopsonist pays the same wage to all its workers, regardless of the worker's reservation wage. This contrasts with the case of the discriminating monopsonist who can pay each worker her/his reservation wage.
  - the firm's own labor demand changes the market wage.

Monopsony

- The monopsonist maximizes

$$\pi(L) = pF(L) - W(L)L \qquad \text{where } F_L > 0, F_{LL} < 0, W_L > 0$$

  $W(L)$ is the wage necessary to "call forth" L workers.
- So that the FOC condition is

$$\begin{aligned} pF_L(L) &= W(L) + W_L(L)L \\ VMP_L(L) &= MC_L(L) \end{aligned} \tag{1}$$

- The labour supply curve for a monopolist is upward sloping $W_L > 0$, whereas in the competitive market $W_L = 0$. To get one more worker, the monopolist must raise the wage by a small amount.

Monopsony

- Assuming that all workers receive the same pay (i.e., the late-comers don't get paid more), then the marginal cost of the next worker is not simply her wage but the wage increase given to all of the other ('infra-marginal') workers.
- Hence, the marginal labor cost curve $MC_L(L)$ for this firm is even more upward sloping. The additional cost for each worker is given by the higher wage of that worker and by the increase in wage given to the entire pool of workers.

Monopsony

- Rearranging the FOC,

$$
\begin{aligned}
W(L) &= pF_L(L) - W_L(L)L \\
1 &= \frac{pF_L(L)}{W(L)} - \frac{\partial W}{\partial L}\frac{L}{W} \\
1 &= \frac{VMP_L}{W(L)} - \frac{1}{\varepsilon_s} \qquad (2) \\
\Rightarrow W^M &= \frac{VMP_L}{1+\frac{1}{\varepsilon_s}} = \frac{\varepsilon_s}{1+\varepsilon_s} VMP_L
\end{aligned}
$$

- Given that $0 < \varepsilon_s/(1+\varepsilon_s) < 1$, the wage chosen by the monopsonist is lower than the competitive wage the more inelastic labour supply is.
- Perfectly elastic labor supply $\Longrightarrow$ competitive case.

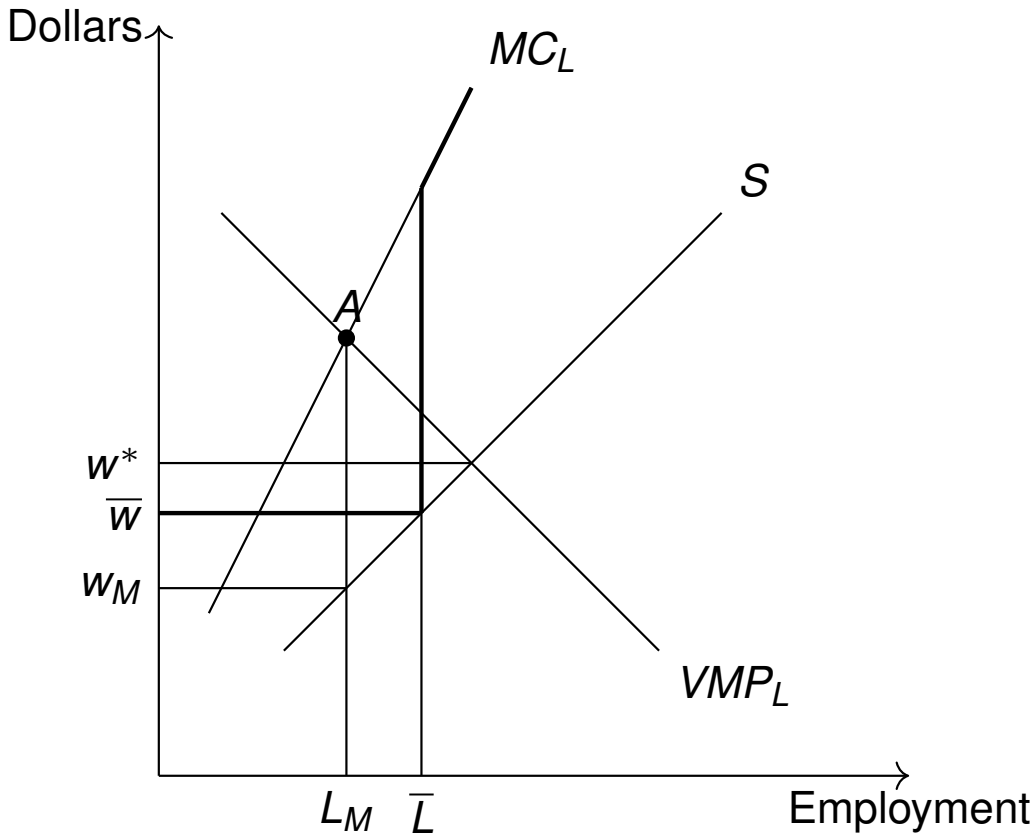
Monopsony

- Thus the number of workers L^M he employs is determined by the intersection of his marginal cost curve MC_L and his demand curve VPM_L, but the wage he pays W^M is determined by the supply curve.
- The non-discriminating monopsonist employs fewer workers than the competitive level ($L^M < L^*$) and pays them less ($W^M < W^*$).
- Thus the imposition of a minimum wage on a monopsonistic market can increase both wages and employment.
- Suppose that the non-discriminating monopsonist is in equilibrium at point A, hiring L^M at a wage of W^M and suppose that the government imposes a wage floor of $\bar{W}$.

Monopsony

The Impact of the Minimum Wage on a Nondiscriminating Monopsonist

The minimum wage may increase both wages and employment when imposed on a monopsonist. A minimum wage set at $\bar{w}$ increases employment to $\bar{L}$.



Monopsony

- Now the monopsonist can hire up to $\bar{L}$ workers at the minimum wage (these workers are actually willing to work for less than the minimum wage). But if the monopsonist wants to hire more workers (and pay all workers the same wage), then the marginal cost reverts back to its old level.
- This suggests that increasing the minimum wage up to W^* would do even better at increasing employment.
- However, setting the minimum wage above point A will raise wages but reduce employment.
- A well-designed minimum wage could therefore eliminate the market power of monopsonists and prevent the exploitation of workers.

Monopsony

- Where could we expect to find a monopsony?
  - Company towns
  - If skills are very specific, e.g. Boeing 737 repair technicians
  - 'Captive' labour markets, O.R. nurses in towns with single hospital, illegal immigrants in some small labour markets.
  - Fast food restaurants located in nearby towns in NJ and PA?
- For the case of fast food restaurants, see below...

Labour Market Concentration

Azar, Marinescu and Steinbaum (2022, JHR)

Recently renewed evidence of market concentration and possibly monopsony pricing:

- Azar et al. compute labor market concentration in the US, ie when a few firms dominate the hiring in the market.
- Use data from CareerBuilder.com, compute Herfindahl-Hirschman Index (HHI), which is based on the share of vacancies of all the firms that post vacancies in that market.
- Find that hiring in many labor markets (based on location and occupation) in US is “highly concentrated” and that posted wages substantially decline with concentration.

HHI by Commuting Zone

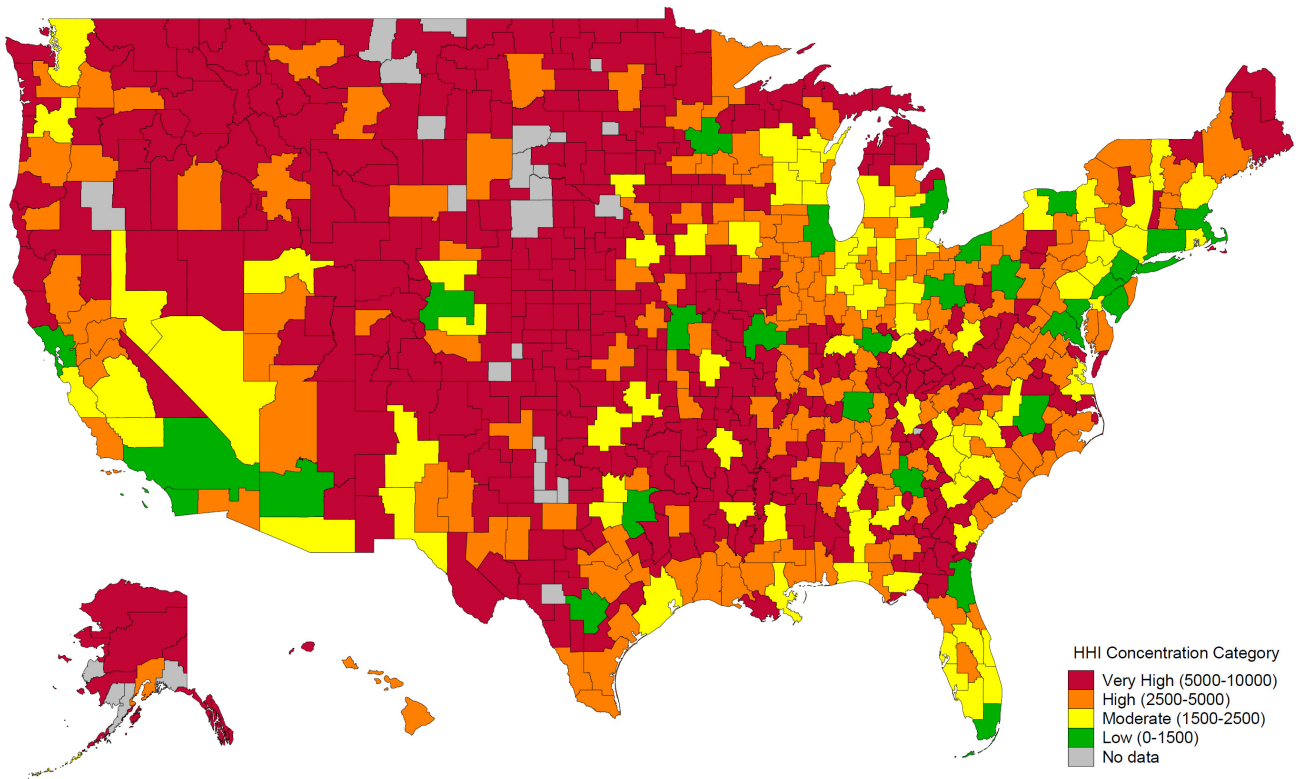


Figure 1. Average HHI by commuting zone, based on vacancy shares. This figure shows the average of the Herfindahl-Hirschman Index by 6-digit SOC occupation code for labor markets over the period 2010Q1–2013Q4. The categories we use for HHI concentration levels are: "Low": HHI between 0 and 1500; "Moderate": HHI between 1500 and 2500; "High": HHI between 2500 and 5000; "Very High": HHI between 5000 and 10000. These categories correspond to the DOJ/FTC guidelines, except that we add the additional distinction between high and very high concentration levels around the 5,000 HHI threshold. Market shares are defined as the sum of vacancies posted in CareerBuilder.com by a given firm in a given market and year-quarter divided by total vacancies posted in the website in that market and year-quarter.

Labour Market Concentration and Wages

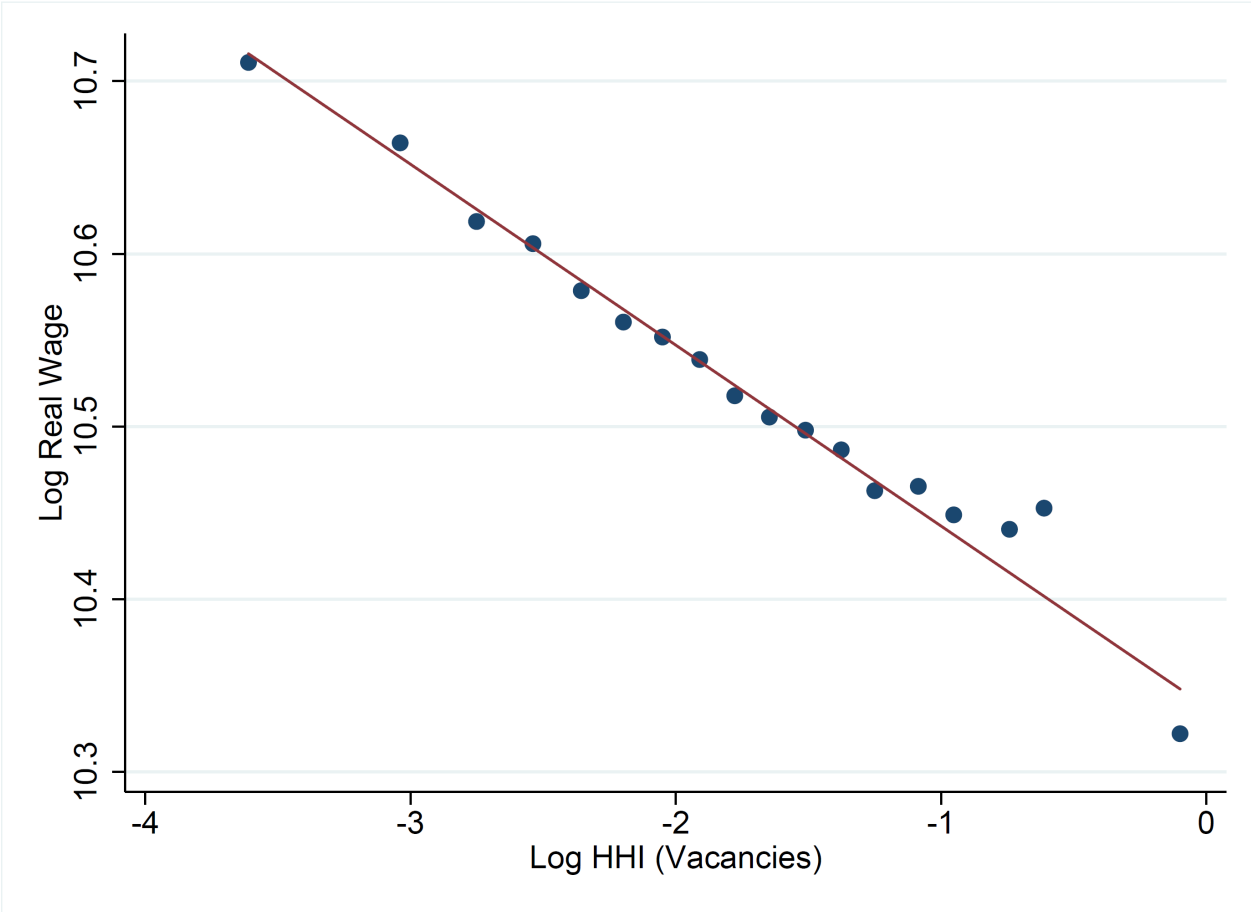


Figure 2. Binned scatter of log HHI based on vacancies and log real wage. This figure shows a binned scatter plot of log HHI based on vacancy shares and log real wage in the same market, using 18 quantiles.

OLS Panel Regression

$$\log(w_{m,t}) = \beta \cdot \log(\mathrm{HHI}_{m,t}) + \gamma \cdot X_{m,t} + \alpha_t + \nu_m + \varepsilon_{m,t}$$

- $\log(w_{m,t})$ and $\log(\mathrm{HHI}_{m,t})$ are the log real wage and log HHI in market m in year-quarter t.
- Aren't there massive identification problems? Yes.
- Market-specific changes in labor demand or labor supply could influence both posted wages and HHI.
  - Decrease in labor demand can lower wages and the number of firms hiring in the market, leading to higher concentration.
  - Decrease in labor supply can increase wages and lower the number of firms hiring, also leading to higher concentration.
- Control for labor market tightness (defined as vacancies/applications): time-varying measure of labor supply and demand at the market level.

IV using the inverse number of employers in other markets

- Instrument the HHI with the average of $\log(1/N)$ number of firms in other commuting zones for the same occupation and period.
- Commonly used IV in IO to address endogeneity of prices in a local product market (Nevo 2001) . . . but rarely used in labor!
- Identification?
  - Instrument protects against a spurious correlation between concentration and outcomes due to market-specific changes.
  - But not against national-level changes that influence both local concentration and other outcomes.

Market-level Regressions

	Dependent Variable: Log(Real Wage)							
	OLS					IV		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Log HHI (Vacancies)	-0.103***	-0.0347***	-0.0399***	-0.0378***	-0.0300***	-0.141***	-0.143***	-0.127***
	(0.00456)	(0.00377)	(0.00392)	(0.00406)	(0.00422)	(0.0191)	(0.0181)	(0.0176)
Log Tightness			0.0113***	0.0132***	0.00686*		0.0283***	0.0305***
			(0.00320)	(0.00357)	(0.00360)		(0.00427)	(0.00479)
Year-quarter FE	✓	✓	✓			✓	✓	
Market (CZ × 6-digit SOC) FE		✓	✓	✓	✓	✓	✓	✓
Year-quarter FE × CZ FE				✓	✓			✓
Year-quarter FE × 6-digit SOC FE					✓			
Observations	61,017	59,485	58,642	56,679	56,677	59,485	58,642	56,679
R-squared	0.042	0.674	0.672	0.715	0.738	-0.018	-0.015	-0.012
Kleibergen-Paap F-stat						854.3	1051	996.7

What does all of this mean?

- 10% increase in concentration is associated with a 0.38% (OLS) to a 1.3% (IV) decline in posted wages.
- Going from the 25th percentile to the 75th percentile in concentration is associated with a 17% decline in posted wages.
- Is that a large effect? Yes!
- How does it compare to other estimates?
  - Schuber, Stansbury & Taska (2019): moving from the median to the 95th percentile of employer concentration reduces wages by 3%.

Estimating Markdowns

Yeh, Macaluso, Hershbein (2022, AER)

Product Market (Monopoly) vs Labor Market (Monopsony) power:

- "the ability of a firm to set prices above marginal cost"
- "the ability of a firm to set wages below marginal revenue product of labor"

Markdown υ

- Wedge between Marginal Revenue Producity of Labor (MRPL) and wage.

Estimating Markdowns

A firm's ability to compensate workers below its Marginal Revenue Producity of Labor.

- Rearranging previous optimality condition gives:

$$\frac{VMP_L}{W(L)} = 1 + \frac{\varepsilon_s}{\varepsilon_s} = \varepsilon_s^{-1} + 1 = \upsilon$$

where $\varepsilon_s^{-1} = \frac{\partial W}{\partial L}\frac{L}{W}$ is a firm's inverse labor supply elasticity.

Production function approach to estimation

- Assume that there is another variable input: materials M with price p^M
- Cost minimization problem of the firm with production function $F(L, M)$:

$$\min_{L,M} C(L, M) = W(L) \cdot L + p^M \cdot M \text{ s.t. } F(L, M) = Q$$

- Optimality conditions can be rearranged to include only observable quantities:

$$\text{Markdown: } \upsilon = (\varepsilon_s^{-1} + 1) = \frac{\theta_L}{\alpha_L} \cdot \frac{\theta_M}{\alpha_M} \text{ where}$$

  - $\theta_L = \frac{F_L \cdot L}{F}$: output elasticity of labor
  - $\theta_M = \frac{F_M \cdot M}{F}$: output elasticity of materials
  - α_L, α_M: Revenue shares of wages, material costs

Estimation

Note that in Cobb-Douglas case $Q = L^{\theta_L} M^{1-\theta_L}$, output elasticities equal optimum cost shares. E.g. $\theta_L = \frac{W(L)L}{C}$

- Revenue and cost shares measureable from firm accounts.
- Authors use a translog production function (generalized Cobb-Douglas)
- Estimation procedure accounts for unobserved productivity.

Estimation and Data

Data:

- Annual Survey and Census of Manufactures (ASM/CM): representative sample of U.S. manufacturing plants 1976–2014
- Plant- and firm-level information on revenues, capital, labor, material inputs and energy
- Restricting attention to manufacturers has its limitations but:
  - More natural setting for production approach
  - Neoclassical production function is not well suited for services.
  - Rich information on plant- and firm-level observables
  - Capital (equipment and structures), labor (production and non-production), benefits, age, multi-unit status, location

Large dispersion across and within industries

- Average markdown is 1.53 (65 cents / $1). This is huge.
- *But: No correlation between markdowns and markups*

INDUSTRY GROUP	Median	Mean	IQR_{75-25}	SD
Petroleum Refining	2.391	2.547	1.828	1.267
Computer and Electronics	2.296	2.558	1.227	1.075
Plastics and Rubber	1.812	1.906	0.582	0.584
Food and Kindred Products	1.761	1.913	0.872	0.823
Paper and Allied Products	1.695	1.795	0.573	0.625
Chemicals	1.623	1.817	0.941	0.870
Lumber	1.540	1.623	0.467	0.522
Primary Metals	1.450	1.503	0.506	0.479
Motor Vehicles	1.368	1.422	0.376	0.432
Printing and Publishing	1.345	1.495	0.454	0.632
Electrical Machinery	1.317	1.416	0.519	0.513
Fabricated Metal Products	1.257	1.313	0.339	0.360
Non-electrical Machinery	1.246	1.317	0.532	0.454
Miscellaneous Manufacturing	1.208	1.254	0.348	0.358
Textile Mill Products	1.208	1.266	0.412	0.454
Furniture and Fixtures	1.150	1.167	0.320	0.358
Non-metallic Minerals	1.139	1.217	0.372	0.522
Apparel and Leather	1.035	1.146	0.413	0.539
Whole sample	**1.364**	**1.530**	**0.618**	**0.708**
Sample size	$1.393 \cdot 10^6$			

[a] Markdowns are estimated under the assumption of a translog specification for gross output. Each industry group in manufacturing corresponds to the manufacturing categorization of the U.S. Bureau of Economic Analysis, which approximately follows a 3-digit NAICS specification. The distributional statistics are calculated using sampling weights provided in the data. Source: Authors' calculations from ASM/CM data in 1976–2014.

Summary: Estimation of markdowns

Monopsony in U.S. manufacturing is substantial:

- Average markdown of 1.53 (65 cents/$1).
- No correlation between markups and markdowns.
- Size is key determinant of markdowns: rising in plant's employment share in local labor market.
- Aggregate markdown is decreasing until 2002 but increases sharply afterwards.
- Measures of concentration are weakly correlated with markdowns.

From Big Picture to Granular Events

- Claim that monopsonistic labor markets contribute to:
  - Declining labor share of income
  - Sluggish wage growth and wage stagnation (despite productivity growth in the US)
- Evidence:
  - Labor market concentration is rising and higher than we thought (Benmelech et al. 2022, Azar et al. 2022)
  - Negative **correlation (?)** between concentration and wages (Benmelech et al. 2022, Azar et al. 2022, Qiu & Sojourner 2022, Berger et al. 2022, Jarosch et al. 2024)

Hospital Mergers

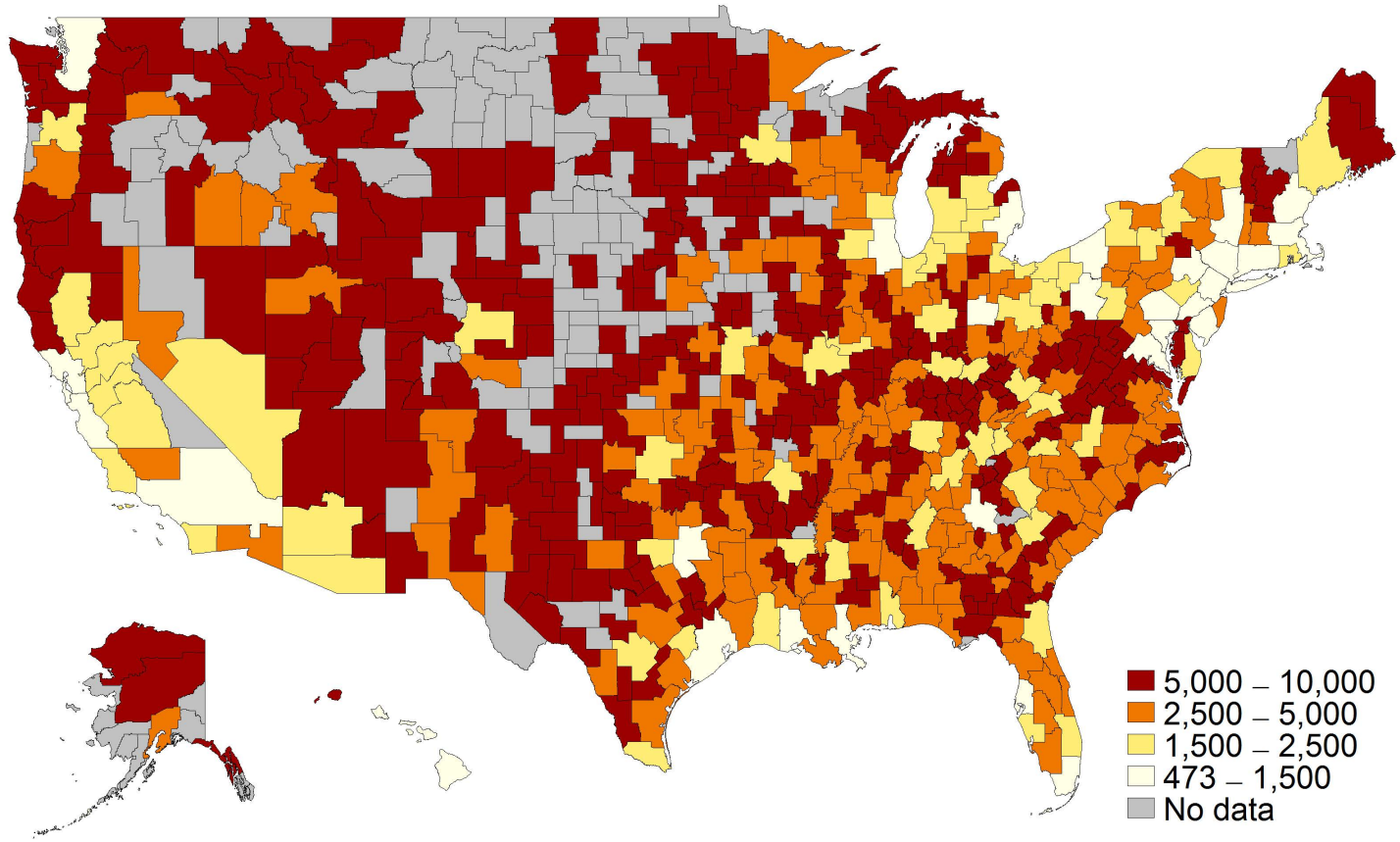
Prager and Schmitt (2021, AER)

- Recent literature requires strong assumptions for identifying causal effects
- Regresses wage on employment HHI
  - Must assume that all determinants of HHI changes are otherwise exogenous to wage changes
  - Example 1: economic decline $\rightarrow$ employer exit $\rightarrow$ HHI increases & wages fall
  - Example 2: diminishing MPL $\rightarrow$ firm size increases & wages fall
- Can we use smaller events like mergers instead? Ideally in an industry with lots of data, labor market power, mergers, ...
  - Airlines? Hospitals?

Why Hospital Mergers?

- With mergers, require only that determinants of mergers are otherwise exogenous to wage changes
  - Can check for other mechanisms: management changes, layoffs, labor composition, economic conditions, pre-trends
- Focus on single, well-suited industry
  - Account for institutional context (Berry et al 2019 JEP)
  - Hospital labor markets are relatively local
  - Hospital mergers driven largely by output market concerns
  - Large number of hospital mergers, within and across markets
- Practical reason: regulators cannot act on concentration per se, but can act on mergers

Hospital Employer HHI



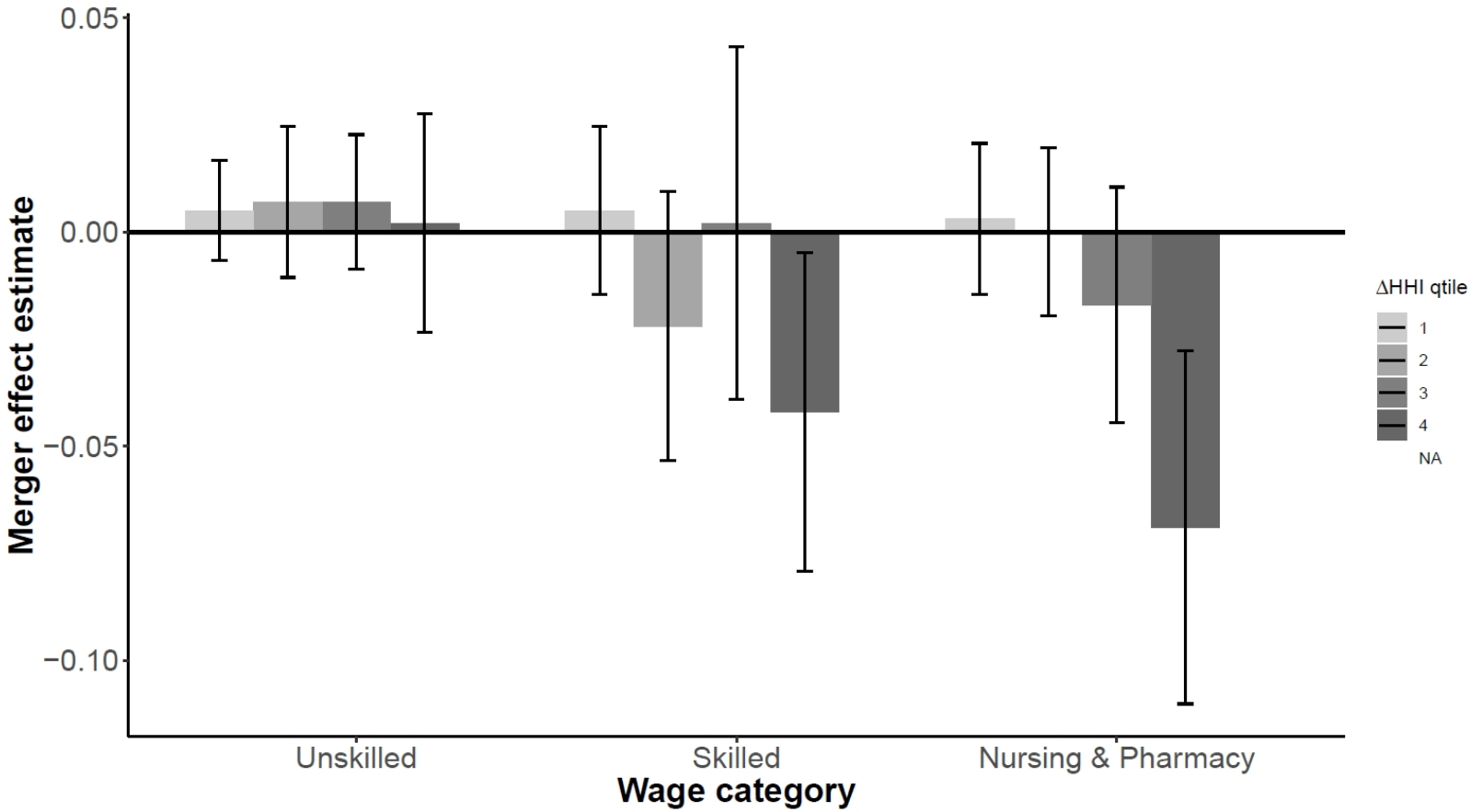
Difference-in-Differences for Wage Trajectories

Baseline estimation for hospital i in commuting zone m in year t

$$\log(w_{imtc}) = \alpha post_{mt} + \beta x_{imt} + \delta_i + \tau_t + \epsilon_{imtc}$$

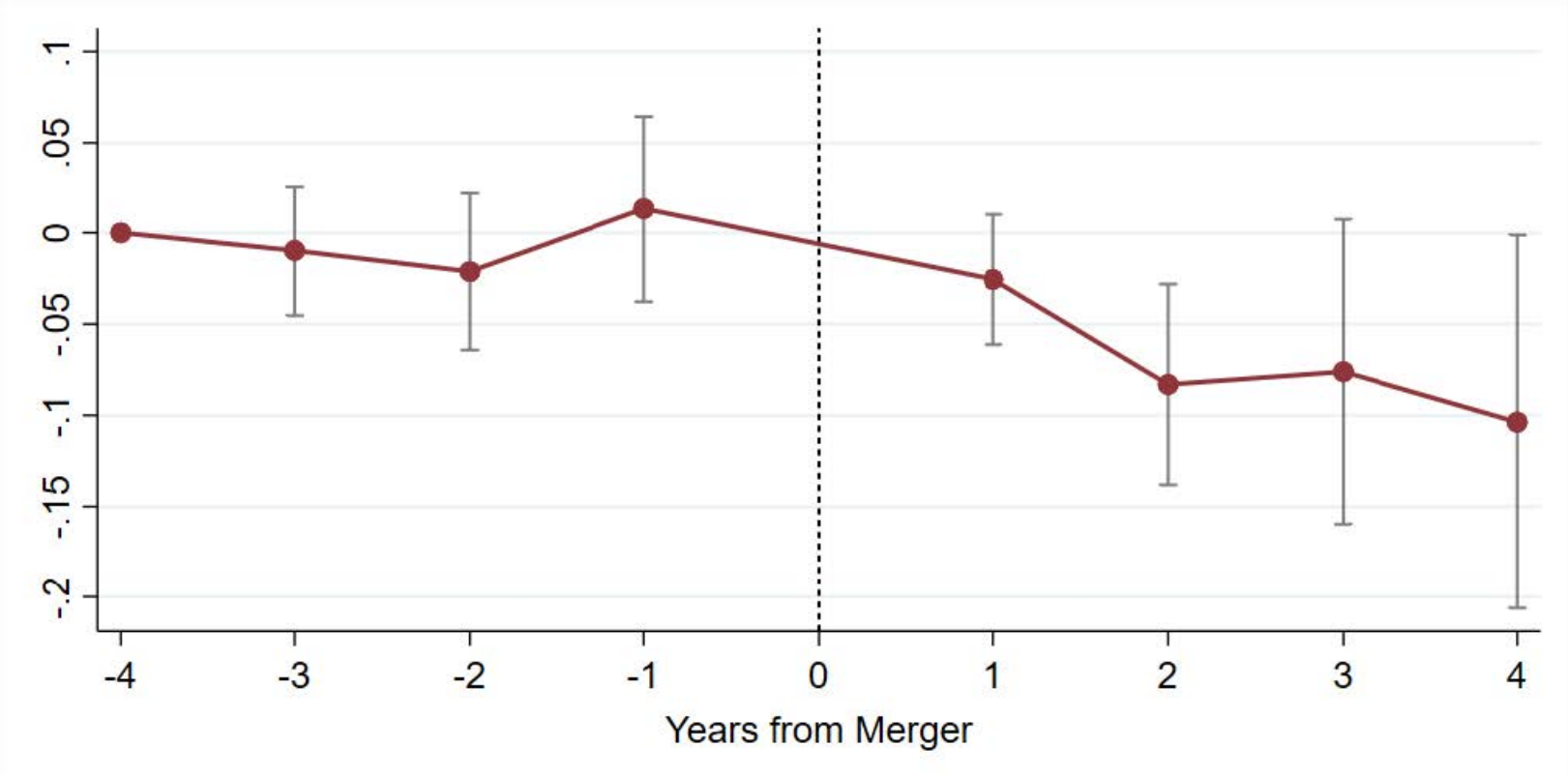
- w_{imtc} is wages for worker category c
- x_{imt} is hospital and market characteristics
- τ_t and δ_i are year and hospital fixed effects
- $post_{mt}$ is 1 if commuting zone m experienced a within-market hospital merger in year $t' \leq t$
- see also “Method: Difference-in-Differences” below.

Wages following mergers: diff-in-diff by ΔHHI



Checking Pre-trends

Top quartile of △HHI, nursing & pharmacy

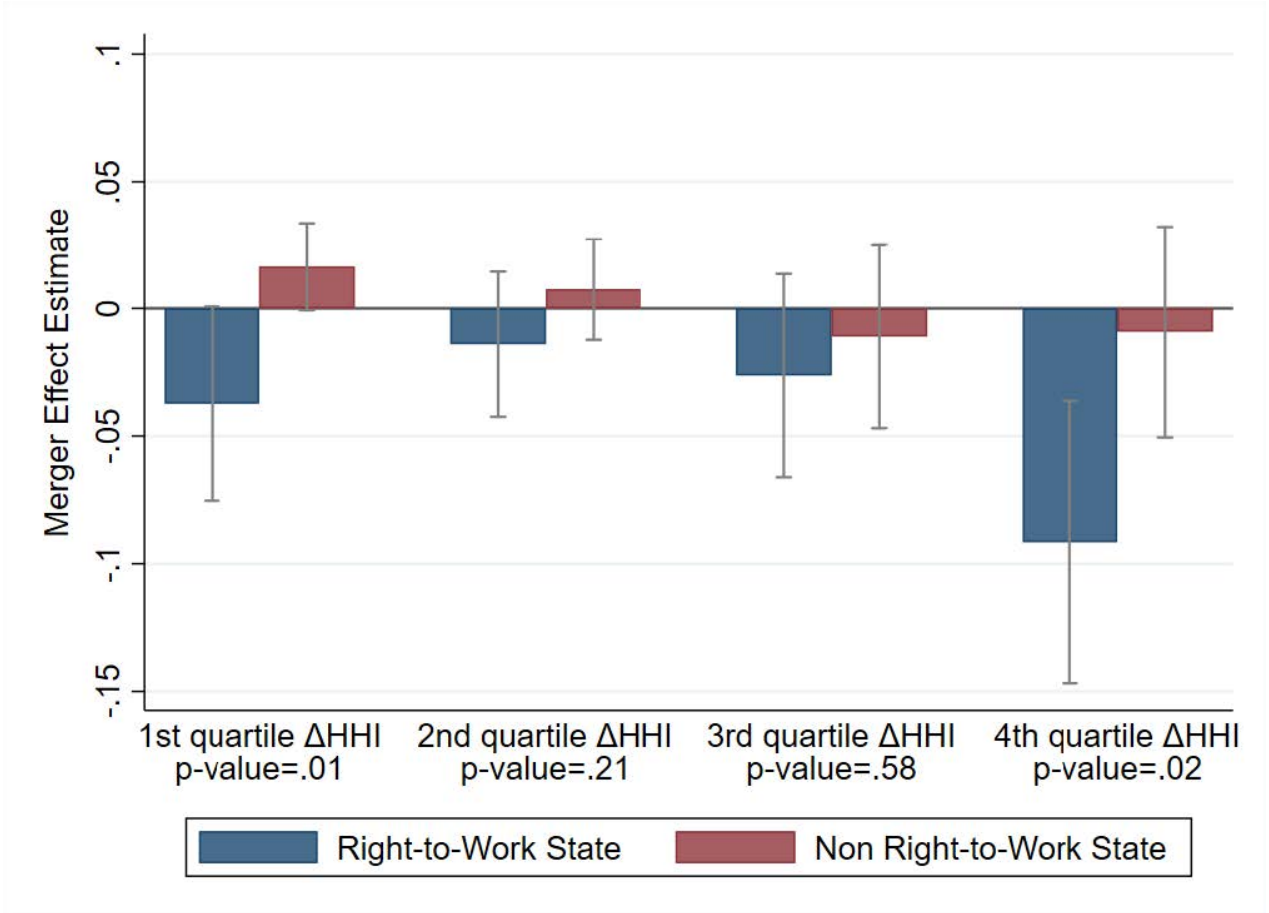


Is this labour market power?

- Results are also consistent with ΔHHI-dependent effects of
  - Changes in management
  - Changes in production technology $\rightarrow$ changes in marginal productivity of labor (MPL)
- Ideal test: examine mergers that do not change managerial practices or production technology
- Instead: examine mergers that do not change employer concentration
  - Effects only for large within-market mergers Effects only for large within-market mergers (high ΔHHI)
  - Effects larger for occupations with narrower labor markets

Employer versus union power

What about unions and right-to-work states (right to work = “less power for unions” states)?



Summary: Prager & Schmitt (2021)

- Evidence that some mergers raise employer market power and suppress wage growth
- Provides guidance for regulators
  - FTC public hearings: “Does available evidence suggest a **causal** relationship between employer concentration and labor market outcomes?” (October 2018)
  - DOJ public hearings: “reaffirmed that antitrust law seeks to preserve the free market opportunities of buyers and sellers of employment services” (Asst. AG Makan Delrahim, September 2019)

Difference-in-Differences (DID) Estimates

- For the minimum wage to have any adverse employment effects, it needs to be above the equilibrium wage. So the level of the minimum wage with respect the average wage (or median wage), it's "bite" crucial to predict any adverse impact.
- Since this is likely to be the case only for low skilled workers, empirical studies of the impact of the minimum wage have focused on teens and young workers, and more recently married women.
- Over the 1950s–80s, the consensus, based mainly on time series studies was that a 10% increase in the minimum wage led to a 1%–3% reduction in employment of teens.

DID Estimates

Card & Krueger 1994 AER

- But the landmark study of Card and Krueger found positive employment effects of increases in the minimum wage, focusing on minimum wage workers.
- The study created huge controversy among economists and arguably caused millions of workers to get a raise from the Clinton administration in 1995.
- The quasi-experiment:
  - April 1, 1992: in New Jersey the minimum wage rose from \$4.25 to \$5.05 per hour (this is a sizable increase)
  - Eastern Pennsylvania (bordering NJ) didn't raise the minimum wage. Kept the Federal minimum wage of \$4.25.

DID Estimates

- Card and Krueger collected data on employment, starting wages, prices, and other store characteristics for 410 fast-food restaurants in New Jersey and Pennsylvania by phoning managers and assistant managers a few months before and after the change in the minimum wage.
- The timing of the experiment is actually the following:
  - Before: Feb-Mar 1992
  - After: Nov-Dec 1992

DID Estimates

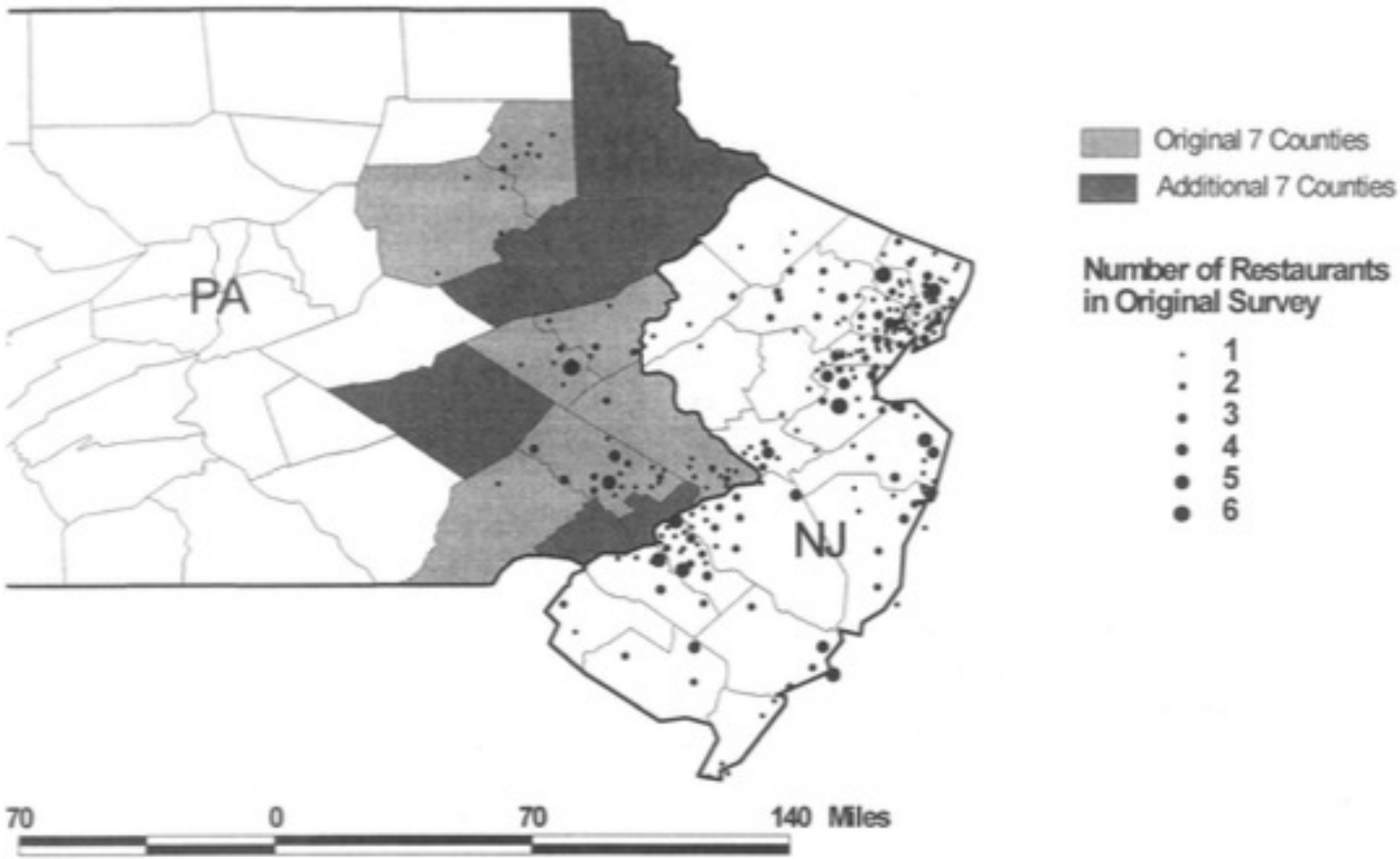


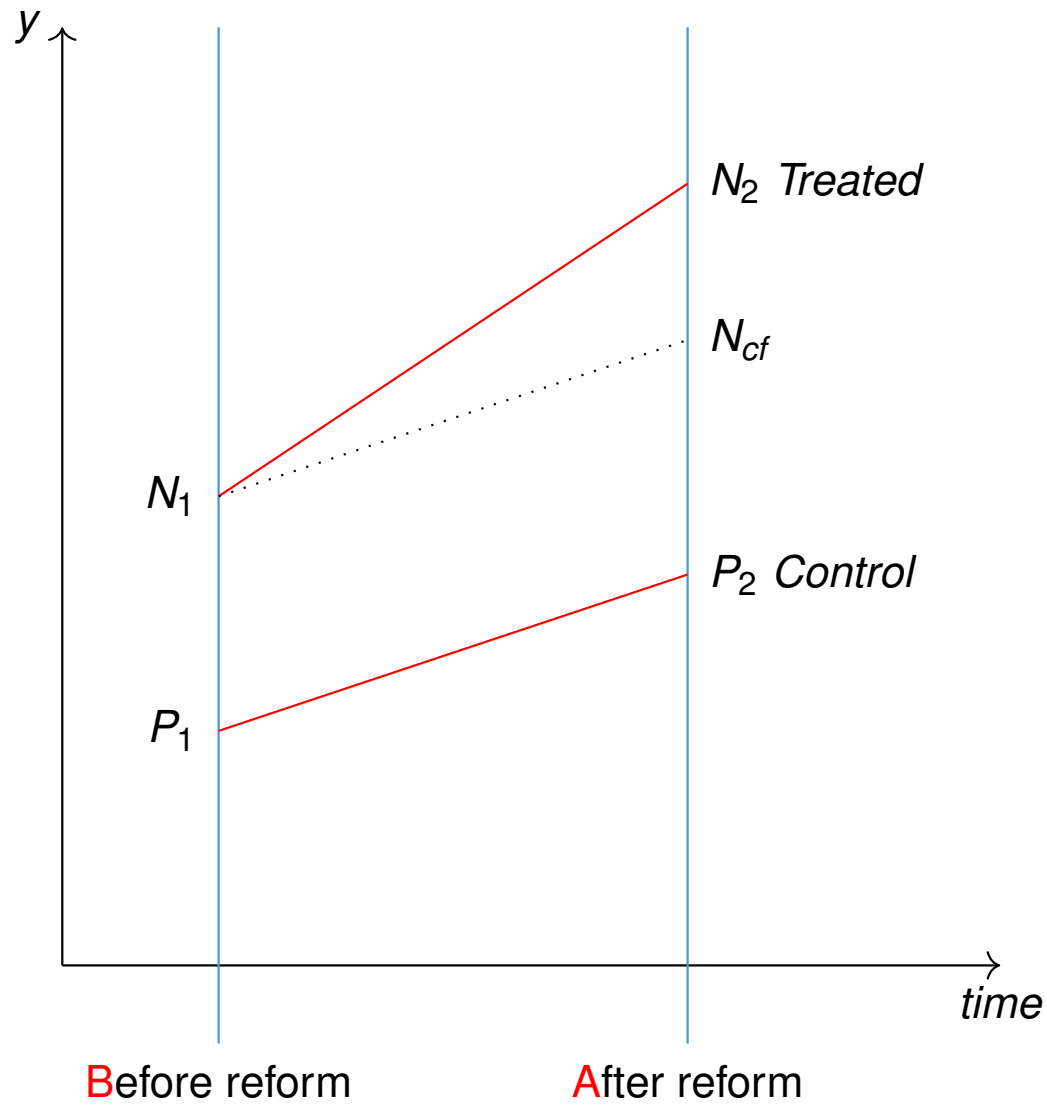
FIGURE 1. AREAS OF NEW JERSEY AND PENNSYLVANIA COVERED BY ORIGINAL SURVEY AND BLS DATA

Method: Difference-in-Differences

Step 1: Simple Difference

- Outcome: EMP (per store employment)
- Two groups: Treatment group T which faces a change [fast food restaurants in NJ] and control group C which does not [fast food restaurants in PA]
- Simple Difference estimate: $D = EMP^T - EMP^C$ captures treatment effect, if in the absence of treatment, EMP equal across 2 groups.
- This assumption always holds when T and C status is randomly assigned. To test for this assumption, we can compare EMP before the treatment: $D_B = EMP_B^T - EMP_B^C$.

Method: Difference-in-Differences



Method: Difference-in-Differences

Step 2: Difference-in-Difference (DD)

- If $D_B \neq 0$, we can estimate DD:

$$DD = D_A - D_B = [EMP_A^T - EMP_A^C] - [EMP_B^T - EMP_B^C]$$

  where $A =$ after reform, $B =$ before reform
- DD is unbiased if the parallel trend assumption holds: absent the treatment, the difference across T and C would have stayed the same before and after.
- No pre-period data limitation of Card & Krueger from today's perspective. Prager & Schmitt above and Dustman et al. below (can) check parallel trends...

Method: Difference-in-Differences

- *DD* can be estimated by OLS to control for additional covariates

$$EMP_{it} = \beta_0 + \beta_1 \text{After} + \beta_2 \text{Treat} + \gamma \text{After} * \text{Treat} + \beta_x X_{it} + \varepsilon_{it}$$

- It is easy to show that $\hat{\gamma} = \hat{DD}$
- *DD* most convincing when groups are very similar to start with [closer to randomized experiment]
- Should always test *DD* using data from more periods and plot the two time series to check parallel trend assumption
- Use alternative control groups [not as convincing as potential control groups are many]
- In principle, can create a *DDD* as the difference between actual *DD* and $DD^{Placebo}$ (*DD* between 2 control groups)

DID Estimates

- The setup:

	Before	After	Δ
1) NJ	$Y_{n0,b}$	$Y_{n1,a}$	ΔY_n
2) PA	$Y_{p0,b}$	$Y_{p0,a}$	ΔY_p

DD: $\hat{T} = \Delta Y_n - \Delta Y_p$

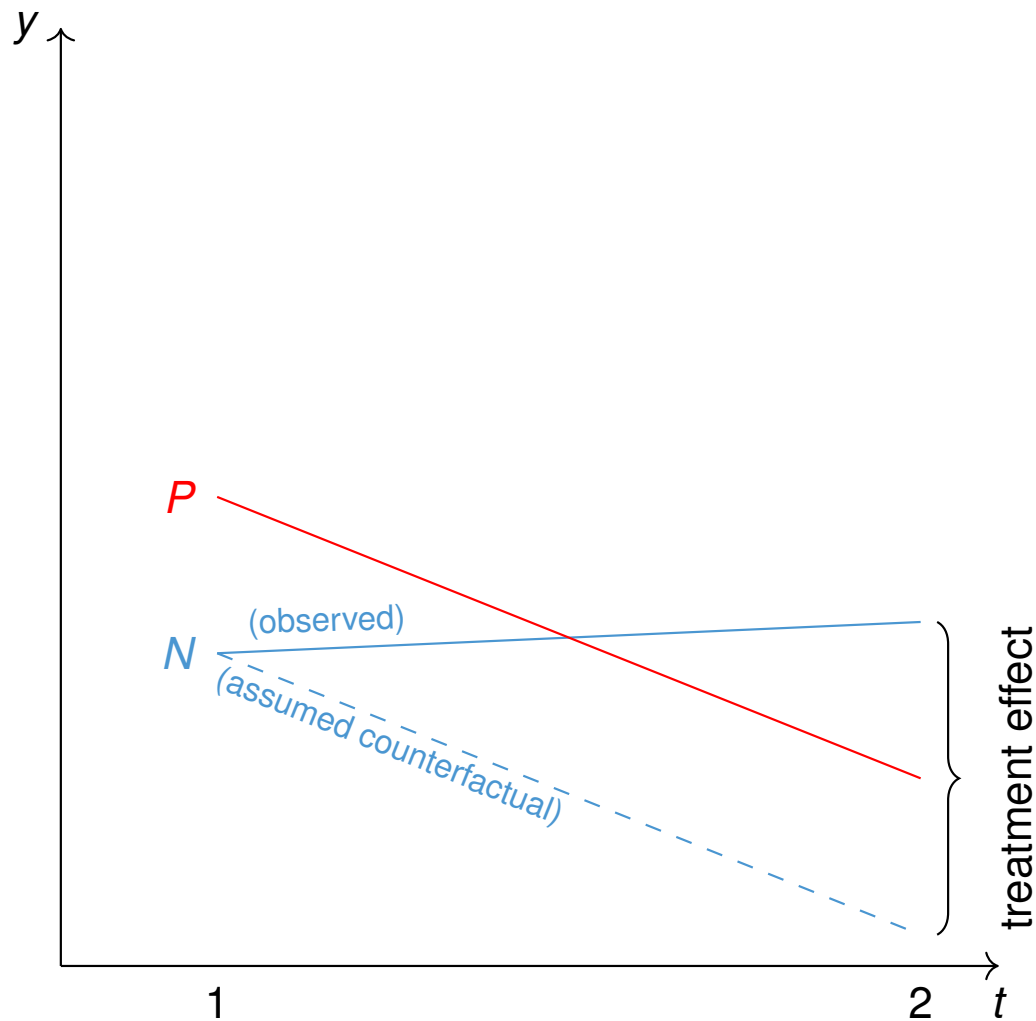
- Table 3 in the paper shows "Per store employment"

	Before	After	Δ
1) NJ	20.44	21.03	$\Delta Y_n = +0.59$
2) PA	23.33	21.37	$\Delta Y_p = -2.16$

DD: $\hat{T} = \Delta Y_n - \Delta Y_p = 0.59 - (-2.16) = 2.76$

- So, the basic result, with s.e.= 1.36 is statistically significant at the 5% level, corresponds to a whopping 13.5% increase in employment in NJ relative to PA.

DID Estimates Illustrated



DID Estimates

The paper contains many more tests and reduced-form estimation of the DD. It also started one of the great data “wars” in the labour literature.

- Neumark and Wascher (2000) argue that Card and Krueger’s results are an artifact of the survey data they used.
- They collect payroll data from fast-food restaurants in the same states for the same time-periods and found that the survey data exhibited much more employment variability than did the payroll data (causing them to question the accuracy of the survey data).
- They find that the payroll data imply that a 10% increase in the minimum wage would reduce employment by 1–2.5% which is almost exactly equal to the earlier consensus estimates of 1–3%, although their results are often statistically insignificant.

DID Estimates

- Card and Krueger (2000) reply by collecting another set of data which they think is more representative of the fast-food industry in the two states than the Neumark-Wascher-data.
- The new Card and Krueger (2000) estimates moved away from their earlier ones of often finding statistically significant positive employment effects, closer to ones that find no employment effect, and this seems their "preferred interpretation".
- Beyond data issues, there are alternative interpretations of the Card-Krueger results
  1. Monopsony
  2. Motivational effects
  3. Confounding variables (shocks to PA not accounted for)
  4. Wrong venue (why did they study fast food?)
  5. Longterm effects, anticipation effects

DID Estimates

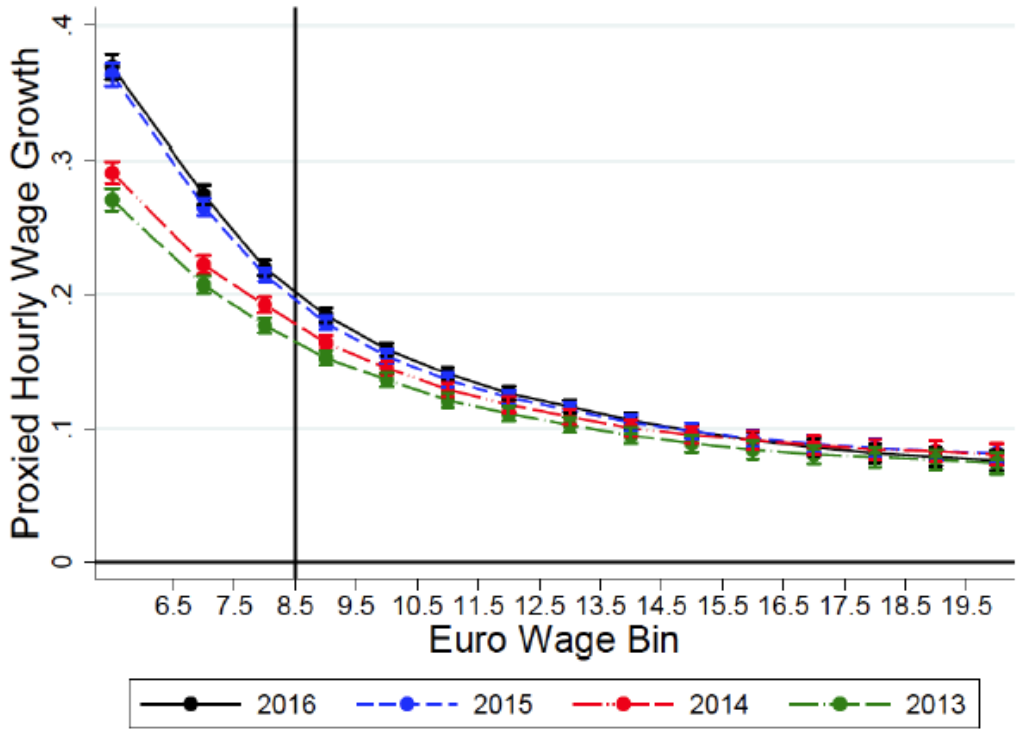
- Dube, Lester and Reich (2010) essentially replicated Card and Krueger's New Jersey-Pennsylvania experiment thousands of times, by comparing employment differences across contiguous U.S. counties with different levels of the minimum wage.
- They constructed a data set of restaurant employment in every quarter between 1990 and 2006 in the 1,381 counties in the United States for which data were available continuously over the full period.
- Also find no adverse employment effects.

Other channels of adjustments

1. Reduction in hours worked
2. Reductions in non-wage benefits
3. Reductions in training
4. Changes in employment composition
5. Higher prices
6. Improvements in efficiency
7. “Efficiency wage” responses from workers
8. Wage compression
9. Reduction in profits
10. Increases in demand (minimum wage as stimulus)
11. Reduced turnover
12. Reallocation to more productive firms (Dustmann et al. 2021)

Effect of German Minimum Wage (Dustmann et al. 2021)

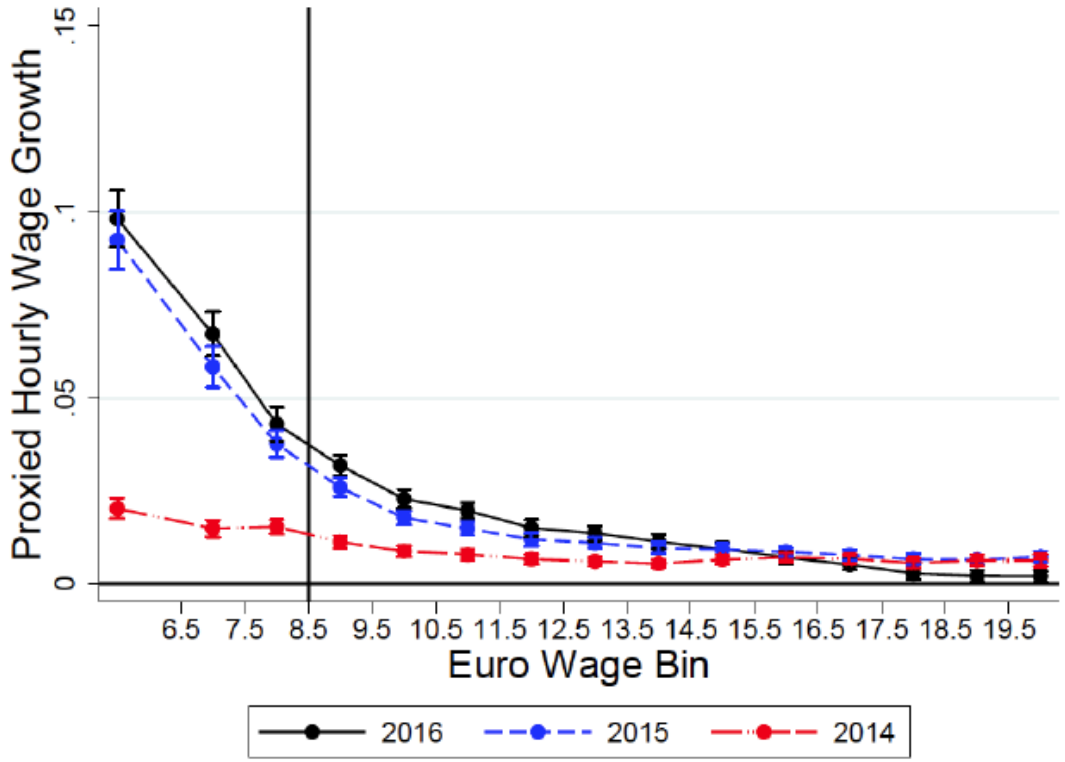
Higher wage growth of low- versus high-earners post introduction in 2015.



(A) Two-Year Hourly Wage Growth by Initial Wage Bin

Effect of German Minimum Wage

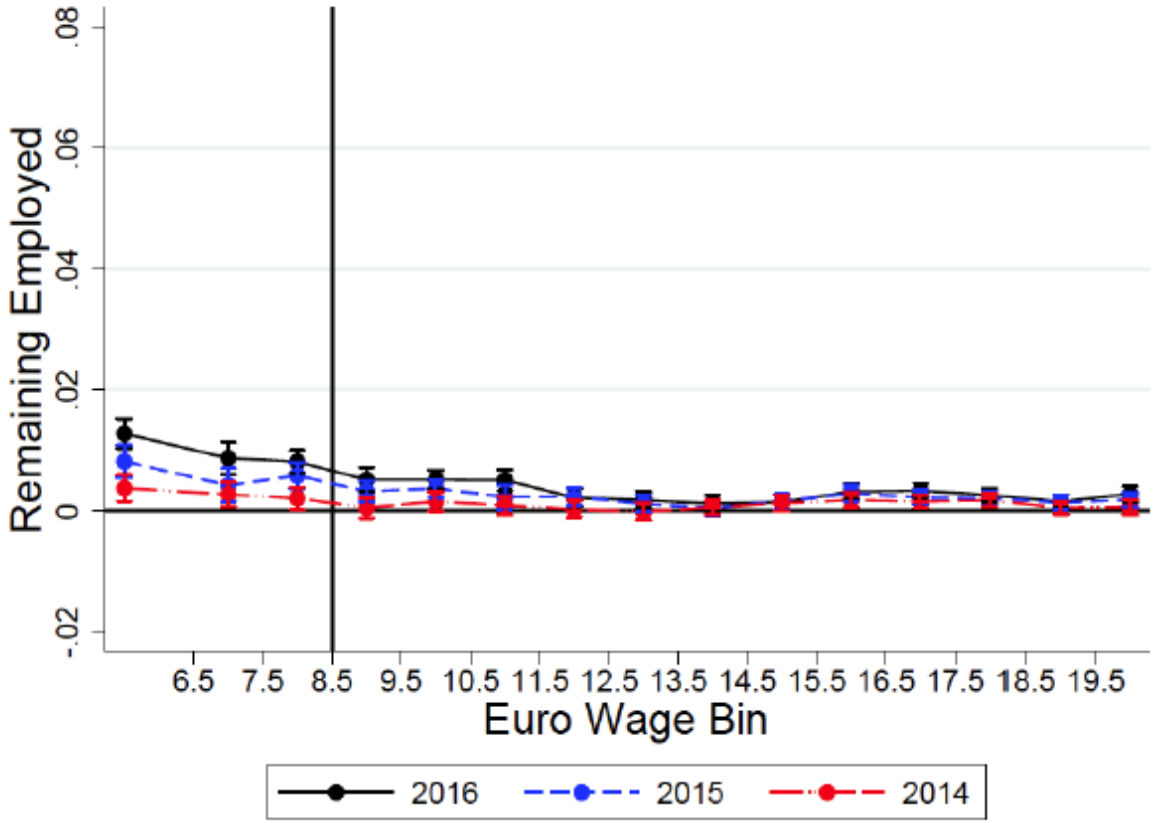
Diff-in-diff because, ceteris paribus, low-earners tend to have higher wage growh (“reversion”).



(B) Two-Year Hourly Wage Growth by Initial Wage Bin, relative to 2011 vs 2013

Effect of German Minimum Wage

Also non-negative effect on employment.



(B) Employment Probablity in Year t by Initial Wage Bin, relative to 2011 versus 2013

Regional approach, “bite” of minimum wage

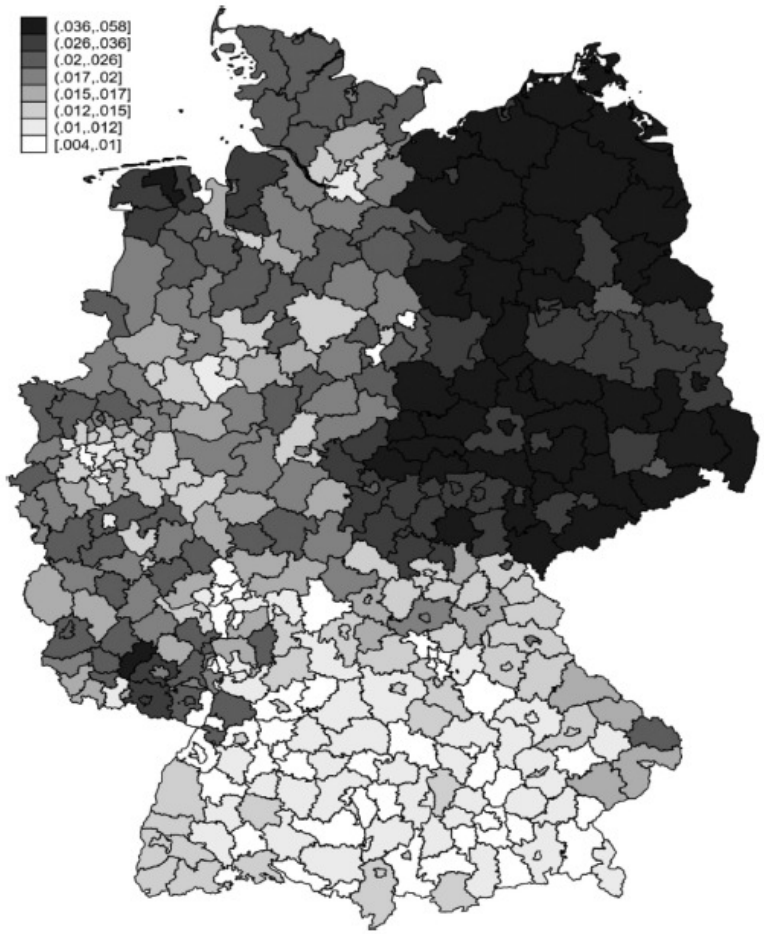
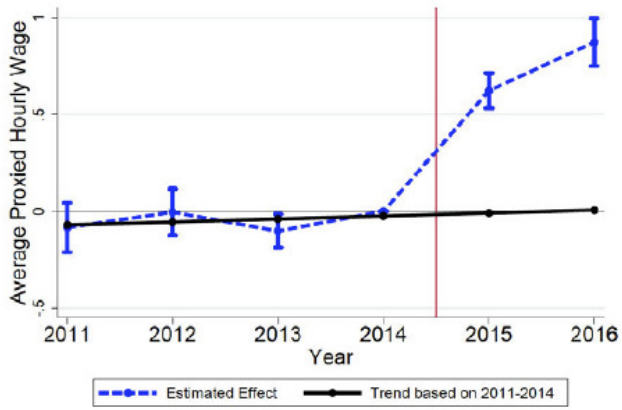


FIGURE VI

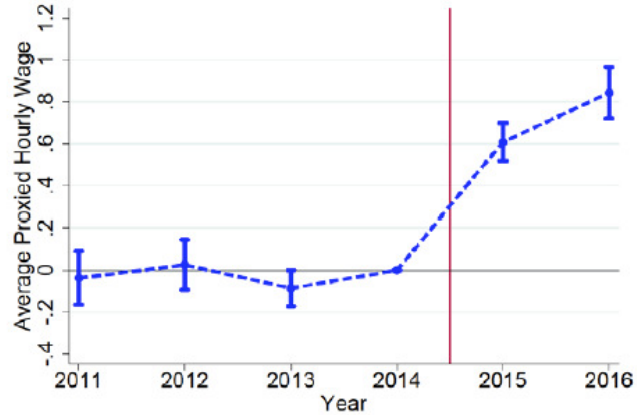
Exposure to the Minimum Wage across German Districts

The figure shows the exposure to the minimum wage across 401 German districts (*Kreise*). District-level exposure to the minimum wage is measured using the gap measure, as in equation (3). © GeoBasis-DE / BKG 2017.

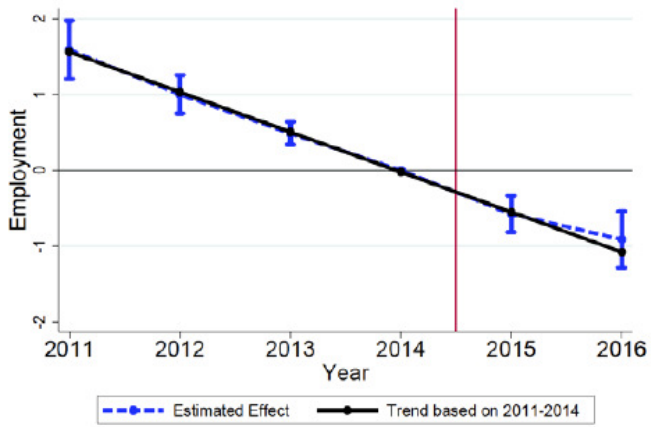
Regional approach, wage and employment effects



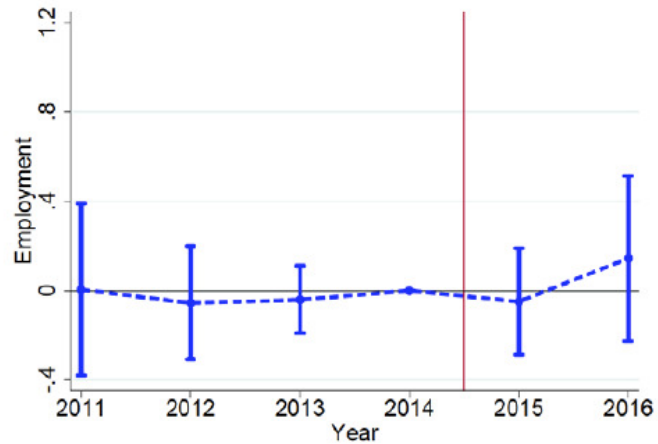
(A) Proxied Hourly Wages



(B) Detrended Proxied Hourly Wages



(C) Employment



(D) Detrended Employment

Why such benign effects?

Dustmann et al. argue along the lines of the monopsonistic model from Card et al. 2018 (for details, see session on firms' wages).

Baseline before the minimum wage:

- Firms are heterogeneous in their productivity and workers have preferences for firms (due to commuting time, get along with coworkers, work schedule, etc.)
- Wages and employment lower than in perfect competition, but more productive firms have higher pay and employment.

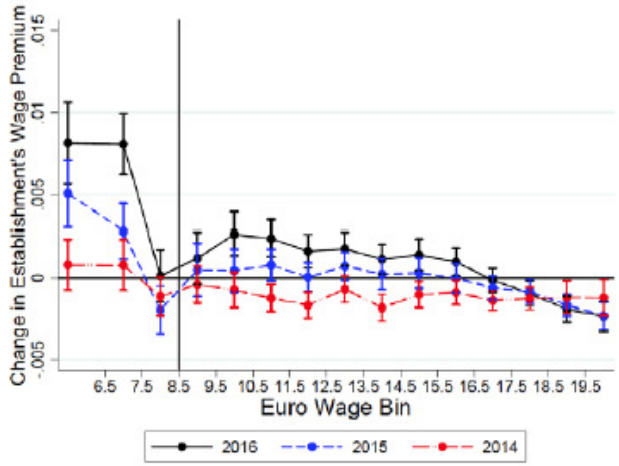
Why such benign effects? Reallocation

Minimum wage comes into effect:

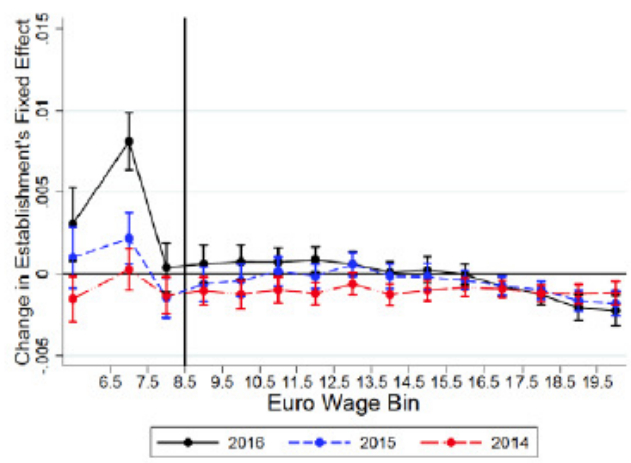
1. Least efficient firms no longer profitable and exit the market.
2. More productive firms that paid below minimum raise their wage and raise employment.
3. Most productive firms that paid above min-wage ambiguous: less competition from 1. and more from 2.

$\Rightarrow$Workers will reallocate to more productive firms and earn higher wages.

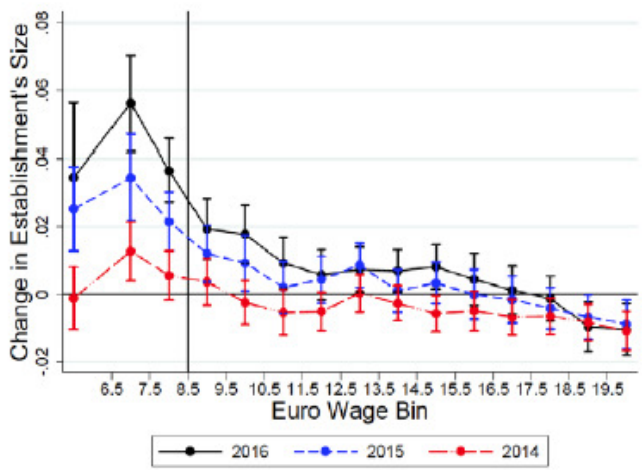
Reallocation to more productive firms



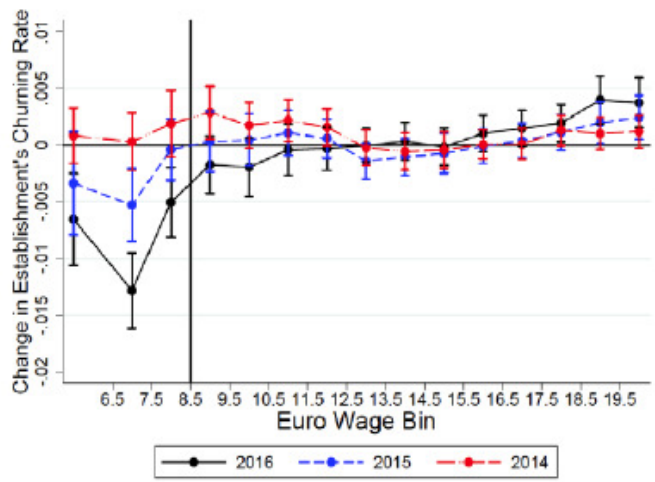
(A) Establishment's Wage Premium



(B) Establishment's AKM Effects

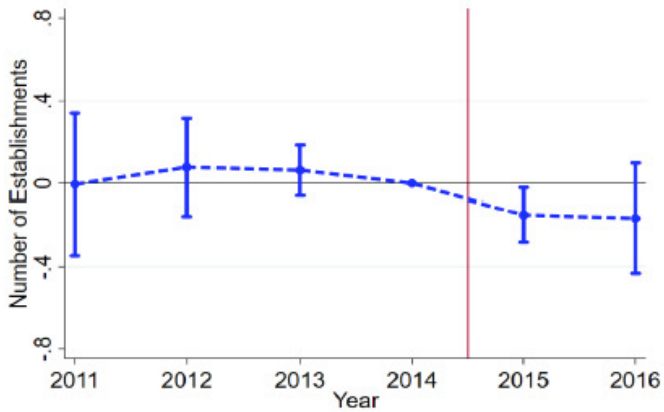


(C) Establishment Size

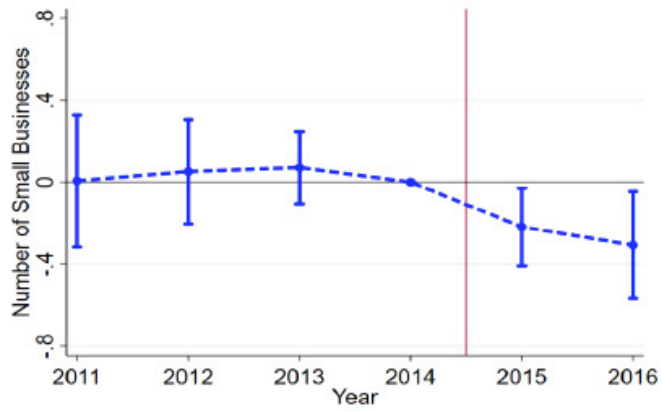


(D) Establishment's Churning Rate

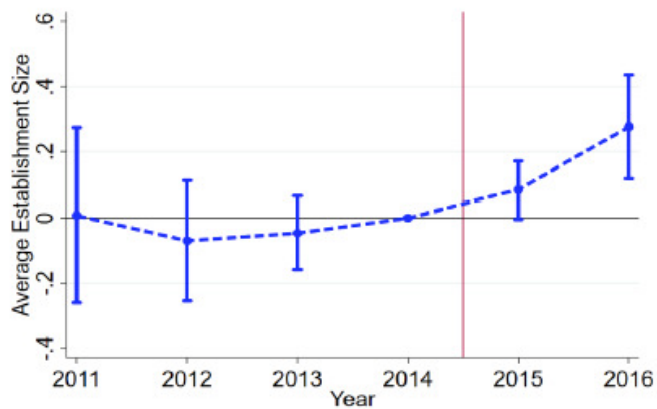
Regional approach, reallocation at the district level



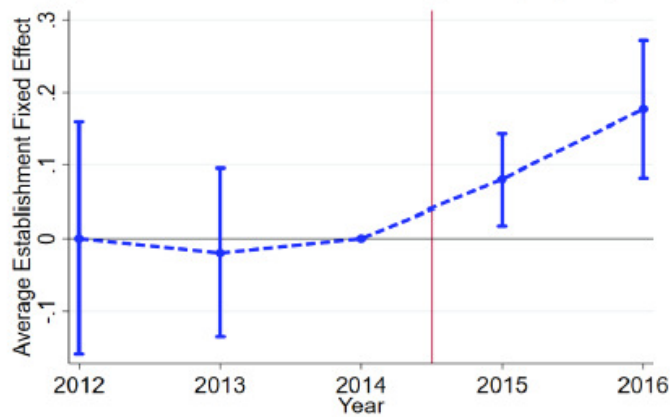
(A) Number of Establishments



(B) Number of Small Businesses (1-2 Employees)



(C) Average Establishment Size



(D) Average AKM Establishment Fixed Effects

Why such benign effects? Summary

Workers will reallocate to more productive firms and earn higher wages.

- Not all workers better off as some trade off utility for wages (Dustmann et al. find especially women have longer commutes now).
- But as long as overall employment not declines (empirically the case), model says workers are on average not worse off.
- Ignored here: search channels (instead of individual preferences), product market (e.g. consumers have less variety; pass-through of wages to prices; income effects of higher wages)

Readings

- Azar, J., Marinescu, I., & Steinbaum, M. (2022). Labor market concentration. Journal of Human Resources, 1218-9914R1.
- Card, David and A. B. Krueger, “Minimum Wages and Employment: A Case Study of the Fast-Food Industry in New Jersey and Pennsylvania,” American Economic Review, Vol. 84 (September 1994) 772-793.
- Dube, A., Lester, T. W., & Reich, M. (2010). Minimum wage effects across state borders: Estimates using contiguous counties. The review of economics and statistics, 92(4), 945-964.

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- Dustmann, C., Lindner, A., Schönberg, U., Umkehrer, M., & Vom Berge, P. (2021). Reallocation effects of the minimum wage. The Quarterly Journal of Economics.
- Prager, Elena, and Matt Schmitt. "Employer consolidation and wages: Evidence from hospitals." American Economic Review 111.2 (2021): 397-427.
- Yeh, Chen, Claudia Macaluso, and Brad Hershbein. "Monopsony in the US LaborMarket." American Economic Review (2022).