How do Establishments Choose their Location? Taxes, Monopsony, and Productivity

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The New York Times

After 30 Years, East and West Germans Wonder: How United Are We?

By Melissa Eddy Oct. 3, 2020

Many question whether the expenditure of 1.6 trillion euros, almost $1.9 trillion, to try to raise living standards in the East to those of the West has been worthwhile. Economic growth in the East still lags that of the West

To attract more people to the region, the federal government [...] is offering incentives to lure entrepreneurs and start-ups [...] "Because of the lower cost of living, we could hire equally qualified employees at lower salaries there than in Berlin or Munich,"

1. Understanding how establishments make their market entry decision is key to effective regional development policy
2. What incentives might different types of establishments face when choosing a location? Consider a tech startup versus an auto manufacturer.

Context: Establishments and Local Labor Markets

- Benchmark literature studying establishment location choice typically assumes **perfectly competitive labor markets** Suárez Serrato and Zidar 2018, Gaubert 2018, Fajelbaum and Gaubert 2020, Bilal 2022

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  - Note: Spillovers are benefits that establishments receive from being located near other establishments in geographic space

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- Contradictory evidence on the efficacy of **place-based policies** Kline and Moretti 2004, Greenstone et. al 2010, Neumark and Simpson 2015, Bartik 2019 ▸ More

This Paper

- **Question:** How is the location decision of establishments impacted by **taxes, spillovers**, and **monopsony power**. How do these location decisions affect **local wages**?

- **Contributions**
  1. New **modeling framework** of establishment entry leading to an **estimating equation**
  2. Provide **estimates** of the relative contribution of taxes, spillovers, and local wage levels to the location decision
  3. **Evaluate** the impact of government tax policy using model **counterfactuals**

Model Environment

1. **Geography:** Commuting zone c=$\{1, 2, ..., C\}$
2. **Agents:** Workers i=$\{1, 2, ..., I\}$, Establishments j=$\{1, 2, ..., J\}$
3. **Establishments Solve by Backwards Induction:**
   - Workers with heterogeneous valuations of different employers choose an establishment, leading to the **monopsonistic labor supply equation**
   - New and incumbent establishments solve for their **optimal within-location wage**
   - New establishments **choose a location** to maximize profit as in IO-style differentiated products models ▸ Mobility Statistics

Establishment's Problem

- **Within Location:** Profit maximization problem for an establishment of sector sec in location c

$$\max_{w_{cjt}} \quad Y_{jct} = \underbrace{(1-\tau_{ct})}_{\text{Taxes}}\Big(\underbrace{\beta_{ct,sec}}_{\text{Productivity}} L_{cjt}(w_{cjt}) - L_{cjt}(w_{cjt})w_{cjt}\Big)$$

$$\text{s.t.} \quad L_{cjt}(w_{cjt}) = \underbrace{\mathcal{L}_{ct}}_{\text{Lab. Force}} \lambda_{ct} exp(\mu_c ln(w_{cjt} - \underbrace{b_{ct}}_{\text{Outside Option}}) + \underbrace{a_{sec}}_{\text{Amenities}})$$

▸ Worker Problem

(1)

- **Between Locations:** Share of entrants in a sector choosing c approximates the logit probability

$$s_{ct,sec} \approx p_{ct,sec} = \frac{exp(y_{ct,sec})}{\sum_{k=1}^{C} exp(y_{kt,sec})}$$

▸ Within Location Details ▸ Between Location Details

(2)

The Share Ratio and Estimating Equation

- Taking the log of the ratio of shares of establishments choosing c compared to a base location 0

$$ln(\frac{s_{ct,sec}}{s_{0t,sec}}) - \mu_c ln(\mu_c) = ln(1-\tau_{ct}) + ln(\mathcal{L}_{ct}\lambda_{ct}) + (1+\mu_c) ln[\frac{1}{1+\mu_c}(\beta_{ct,sec} - b_{ct})]$$
$$-ln(1-\tau_{0t}) - ln(\mathcal{L}_{0t}\lambda_{0t}) - (1+\mu_0) ln[\frac{1}{1+\mu_0}(\beta_{0t,sec} - b_{0t})] - \mu_0 ln(\mu_0) \quad (3)$$

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- May be estimated using the following empirical specification:

$$ln(\frac{s_{ct,sec}}{s_{0t,sec}}) = \beta_{0,sec} + \beta_{1,sec} ln(1-\tau_{ct}) \quad (4)$$

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Data Sources

1. The Establishment History Panel (BHP) from the German Federal Employment Agency (IAB) ▸ Details
   - 50% sample of all establishments
   - $s_{ct,sec}$, b_{ct}, additional regression controls $X_{ct,sec}$
2. Sample of Integrated Labour Market Biographies (SIAB) of the IAB ▸ Details
   - Pre-estimation of labor supply elasticities μ_c
   - In combination with the BHP, used to pre-estimate market size $\mathcal{L}_{ct}\lambda_{ct}$
3. Local corporate tax rates τ_{ct}: German Federal Statistical Office ▸ Details
4. Spillovers
   - Following the empirical proxies developed by Ellison, Glaeser, and Kerr (2010)

Proxies for Spillovers

- **Classical Marshallian Theories of Agglomeration:**
  1. Efficient moving of goods
  2. Labor Pooling
  3. Knowledge spillovers
- **Ellison, Glaeser, and Kerr (2010) develop empirical proxies for these forces and find:**
  1. Spillovers predict industrial coagglomeration patterns
  2. Hanlon and Miscio (2017) provide evidence that the importance of these spillovers varies between industries

Input-Output Measure Construction

- $Input_{sec \leftarrow m}$ is the share of sector sec's inputs which come from sector m, and $Output_{sec \rightarrow m}$ is the share of sector sec's output which goes to sector m
- For an establishment in sector sec in location c their total IO agglomeration benefits are:

$$\text{IO Agglom}_{ct,sec} = \sum_{m=1}^{M} \frac{N_{mct}}{\mathcal{N}_{ct}} max(Input_{sec \leftarrow m}, Output_{sec \rightarrow m}) \tag{5}$$

- Where N_{mct} is the number of establishments in the sector-CZ-year cell

▸ Construction of Other Proxies

Specification

$$\ln\left(\frac{s_{ct,sec}}{s_{0t,sec}}\right) = \beta_{0,sec} + \beta_{1,sec} ln(1-\tau_{ct}) + \beta_{2,sec} ln(\mathcal{L}_{ct}\lambda_{ct}) + \beta_{3,sec} Spillovers_{ct,sec} + \beta_{4,sec} b_{ct} + \beta_{5,sec} X_{ct,sec} + \gamma_{c,sec} + \zeta_{t,sec} + u_{ct,sec} \quad (4)$$

- Potential bias due to:

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- Potential bias due to:
  1. Correlations of tax rates and local economic conditions: thoroughly examined by Fuest et al. (2018)

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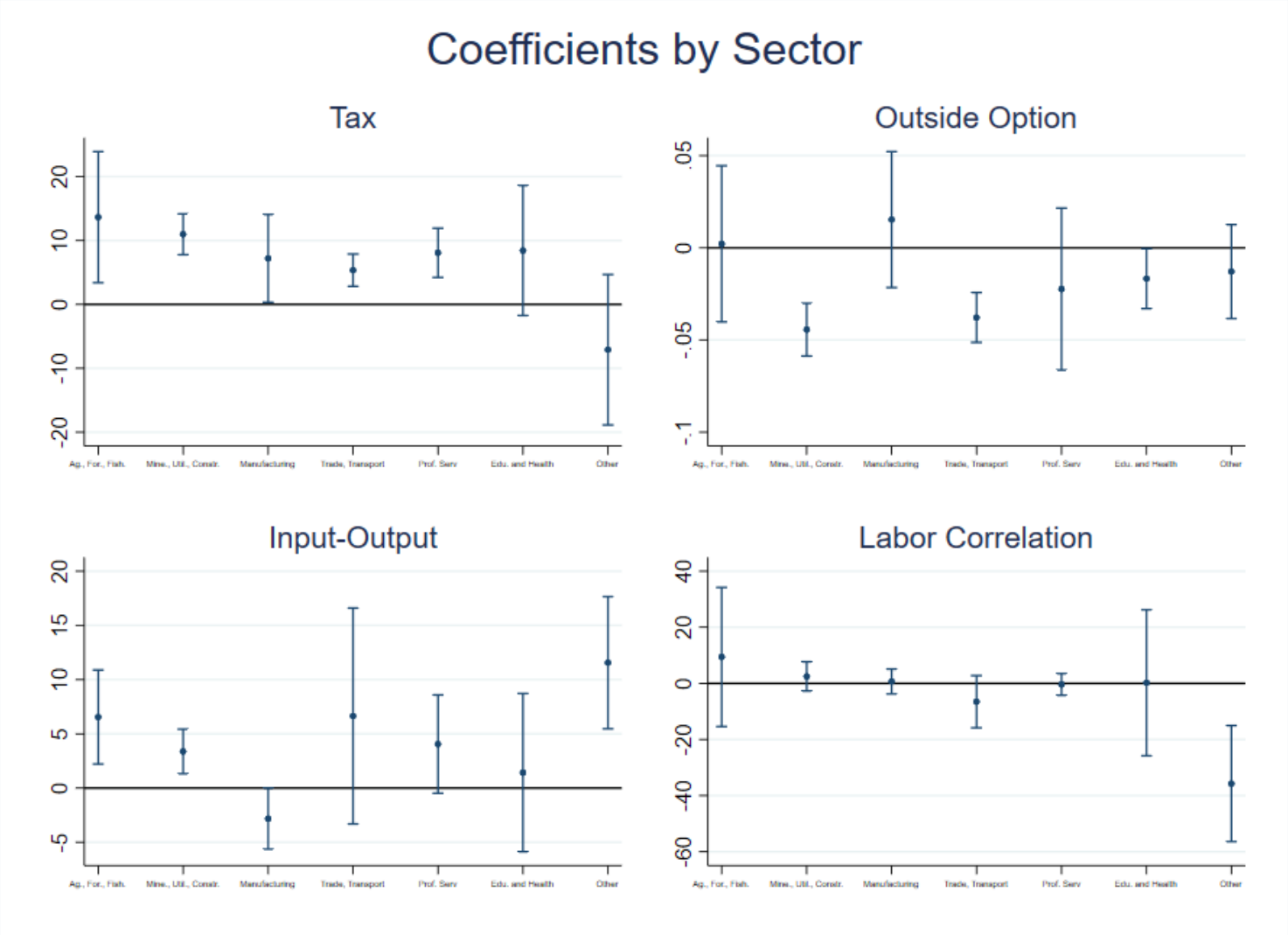
- Potential bias due to:
  1. Correlations of tax rates and local economic conditions: thoroughly examined by Fuest et al. (2018)
  2. Local productivity and demand shocks which affect both the share ratio and the spillovers: shift-share instrument ▸ Details

Substantial Between-Sector Heterogeneity



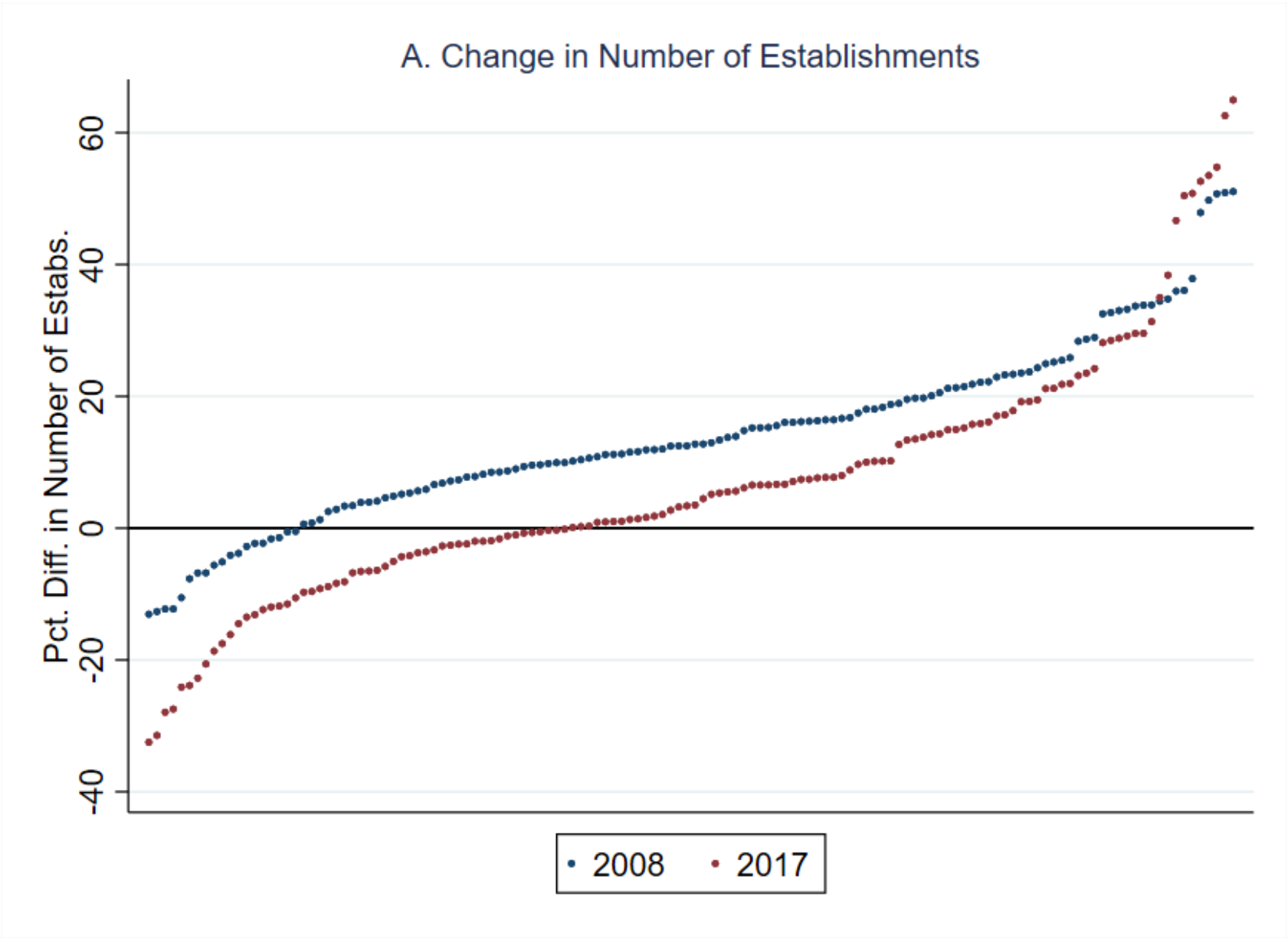
▶ Table ▶ OLS ▶ Extensions

Simulating the Effects of Tax Incentives

- I simulate the effects of a change in taxes designed to attract economic activity to a region beginning in the first year of my panel (1999) and continuing until the last year of my panel (2017)
- Set corporate tax rates to 7% (lowest permitted rate) in each of my 141 commuting zones (separately)
- Two Effects of Tax Policy:
  1. Immediate: Direct effects of lower taxes
  2. Secondary: New establishments means different spillovers, overall effect is a combination of both

▸ Intuition

Locations Experience Varying Policy-Induced Changes



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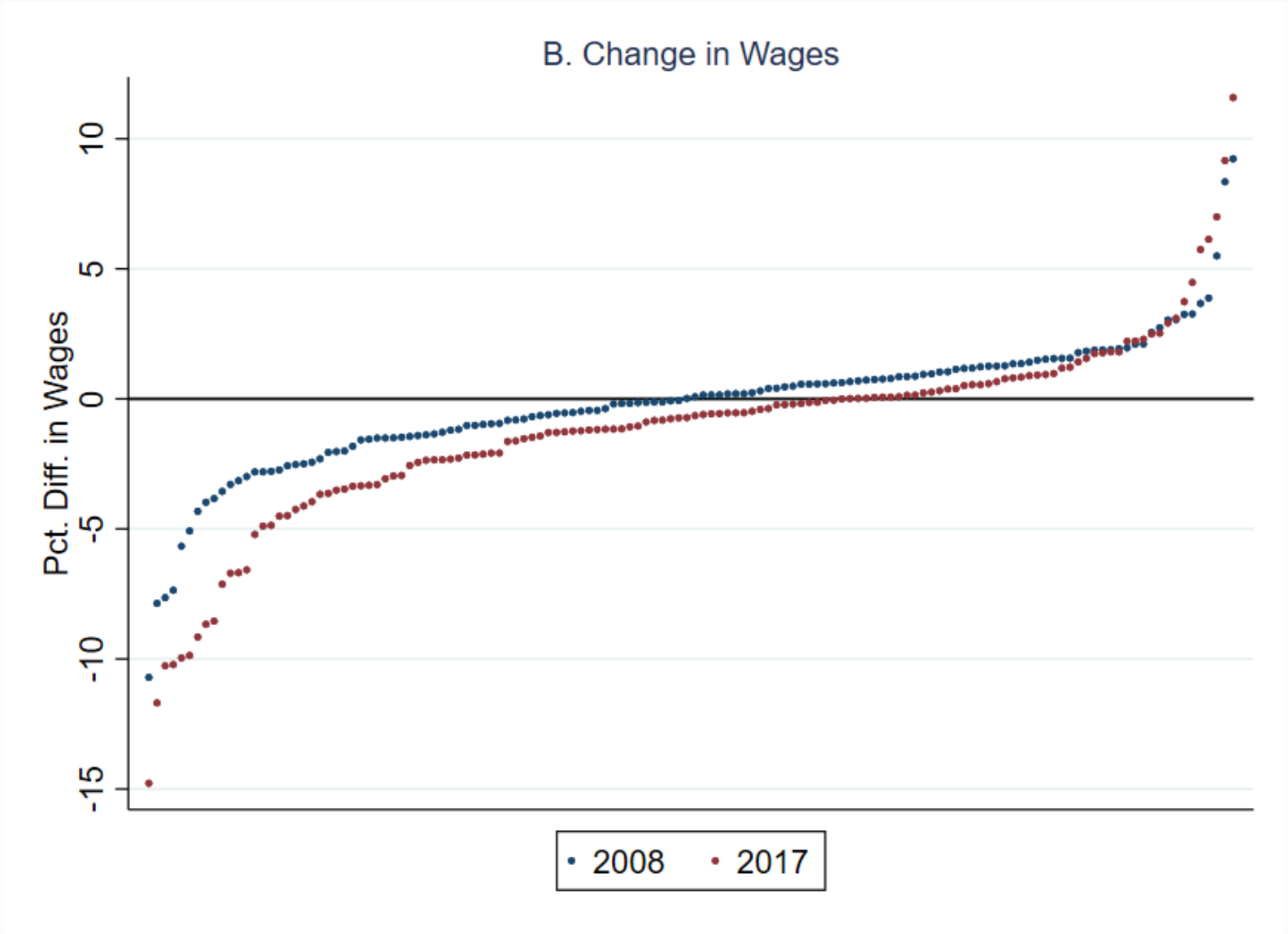

▸ Additional Counterfactuals ▸ Greenstone Figure

Conclusions

1. Industrial sectors demonstrate substantial **heterogeneity in valuation** of location characteristics
2. Response to tax-incentives varies greatly between locations due to **spillovers and specific local conditions**
3. Taken together: efficacy of place-based policy in achieving policy goals is highly **context dependent**
4. Long-term effects of policies **largely driven by spillovers**

Thank you!

Model - Workers

- Immobile workers i make the decision of which establishment j in their location c to work

$$u_{icj} = \mu_c ln(\underbrace{w_{cj}}_{Wage} - \underbrace{b_c}_{\text{Outside Option}}) + \underbrace{a_{sec}}_{\text{Non-Pecuniary Benefits}} + \underbrace{v_{icj}}_{\text{Type I E.V. Error}} \quad (6)$$

- This leads to the logit equation for workers
- Logit probability may be approximated by the exponential probability, which leads to the labor supply equation of the establishment:

$$L_{cj}(w_{cj}) = \underbrace{\mathcal{L}_c}_{\text{Lab. Force}} \lambda_c exp(\mu_c ln(w_{cj} - b_c) + a_{sec}) \quad (7)$$

Back

Establishment's Problem - Within Location

- Profit maximization problem for an establishment j in location c

$$\max_{w_{cj}} Y_{jc} = \underbrace{(1-\tau_c)}_{\text{Taxes}}(\underbrace{\beta_{c,sec}}_{\text{Productivity}} L_{c,sec}(w_{cj}) - L_{c,sec}(w_{cj})w_{cj}) \tag{8}$$

- Location-sector productivity $\beta_{c,sec}$ may be a function of:
  1. Agglomeration
  2. Worker characteristics
  3. Spillovers (efficient moving of goods, labor pooling, knowledge)
  4. Natural advantage

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Optimal Wage

- The optimal wage $w_{c,sec}$ is

$$w_{c,sec} = \frac{\mu_c}{1+\mu_c}\beta_{c,sec} + \frac{1}{1+\mu_c}b_c \tag{9}$$

- Key takeaways:
  1. Markets become perfectly competitive as $\mu_c \to \infty$
  2. Wages increase with both location-level productivity and outside option, with their relative importance determined by μ_c
  3. Wages are homogeneous within-sector-location due to homogeneous productivity within sector-location

▸ Back

Establishment Problem - Between Locations

- Substituting functional forms into the profit equation and log-linearizing

$$y_{jct} = ln(f(\mu_c)exp(a_{sec})) + ln(1-\tau_{ct}) + ln(\mathcal{L}_{ct}\lambda_{ct}) + (1+\mu_c)ln(\beta_{ct,sec} - b_{ct}) + \underbrace{u_{cjt}}_{\text{Type I E.V. Error}} \quad (10)$$

- Establishments choose the location which offers them the highest level of profit
- Log-profits made up of three key components:
  1. Taxes $(1-\tau_c)$
  2. A "market size" term $\mathcal{L}_c\lambda_c$
  3. Relative productivity of workers compared to the outside option $\beta_{c,sec} - b_c$

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Summary Statistics - Establishment Panel Entrants

Summary Statistics: New Establishments

Sector	1999	2008	2017
Agriculture, Forestry, and Fishing	1.83	1.85	1.8
Mining, Utilities, and Construction	14.44	11.25	14.22
Manufacturing	5.64	5.13	4.15
Trade and Transport	38.03	36.26	34.44
Professional Services	19.46	19.91	19.23
Education and Health	6.56	7.68	8.17
Other	14.05	17.92	17.98
Number of Employees			
1-4	82.15	76.86	69.96
5-9	10.72	13.73	16.84
10-19	4.44	5.75	7.98
20-49	1.96	2.63	3.94
50-99	0.51	0.72	0.94
100-199	0.16	0.22	0.23
200+	0.06	0.09	0.11
Total Entrants	94,537	61,888	37,972

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Outside Option Construction

- Germany did not have a minimum wage until 2015
- Germany has traditionally had an extensive system of sectoral union contracts
- I back out union minimum wage rates using the information about wages of low-skill workers available in the BHP
- I use this union minimum wage to construct a commuting-zone-level measure of the outside option similar to Card, Deviciente, and Maida (2013)

$$b_{ct} = \sum_{sec} \frac{N_{sec,ct}}{\mathcal{N}_{ct}} unionmin_{sec,ct} \tag{11}$$

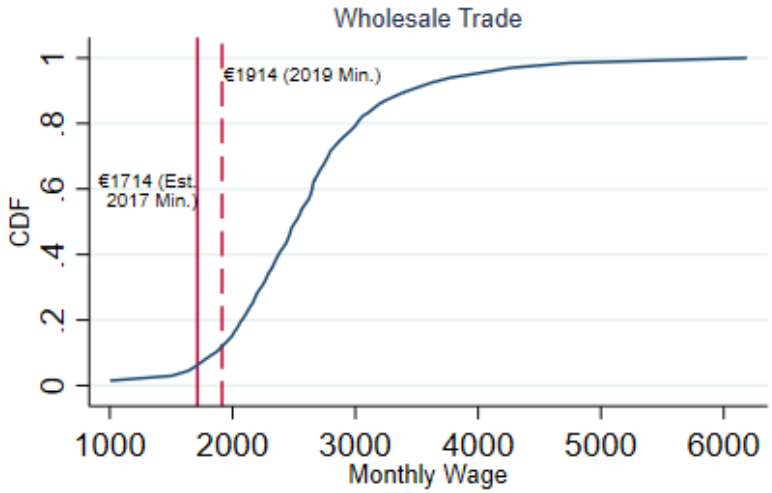
- Where $N_{sec,ct}$ is the number of establishments in the sector-CZ-year cell Back

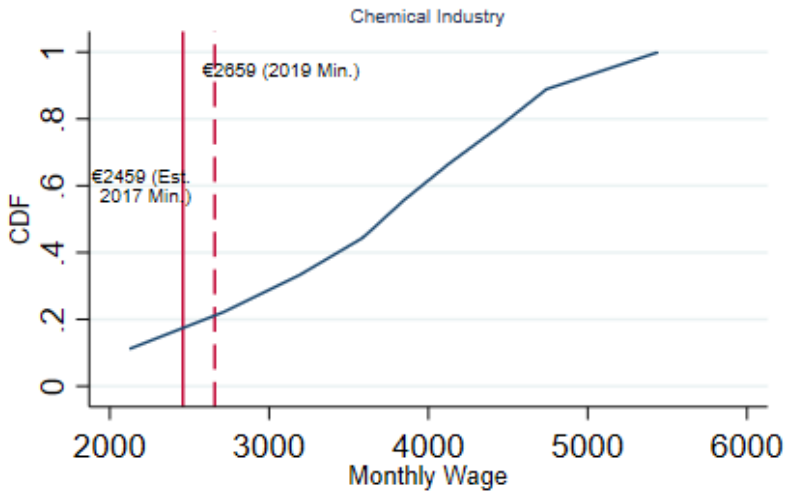
Outside Option Construction

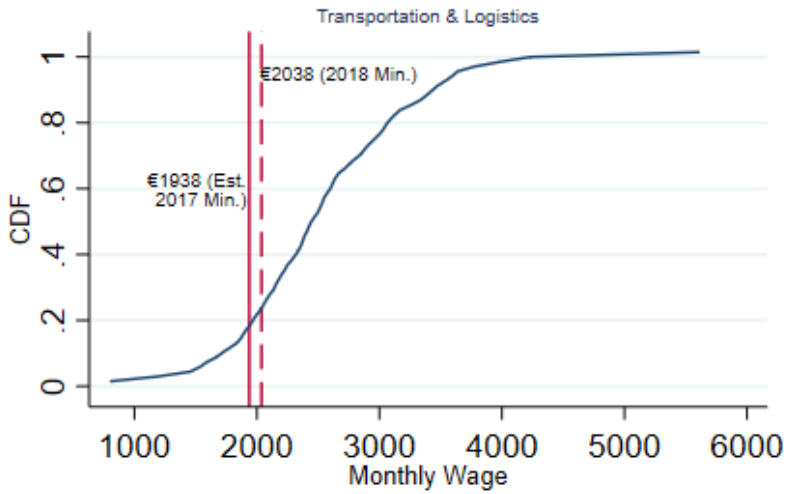
- There is no public repository of historical union contracts available for Germany
- I obtained union contracts for 2019 for the state of North-Rhine Westfalia
- Identify a subset of contracts that map to single two-digit industry code in the BHP data
- Use the 20th percentile of the establishment-level median wage of low-skill workers as the union minimum wage rate

Back

Wage Distribution of Low Skill Workers







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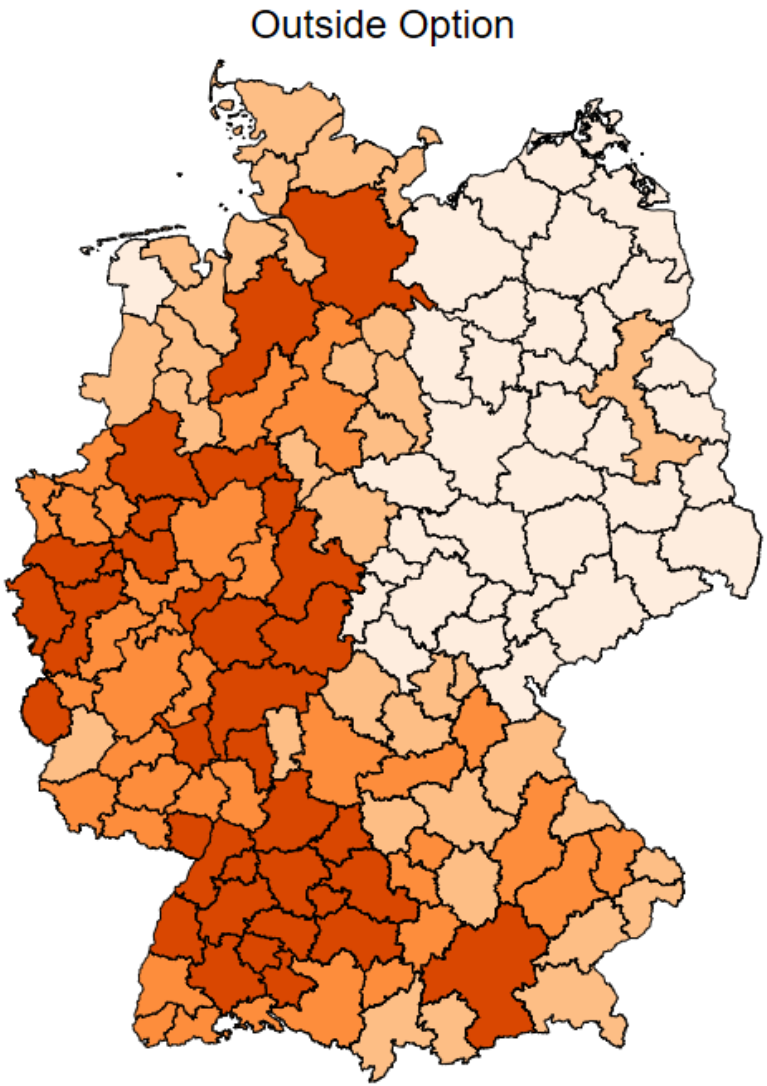
Outside Option Distribution



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Labor Supply Regression

- Revisiting the labor supply equation of the establishment

$$L_{ct,sec}(w_{ct,sec}) = \mathcal{L}_{ct}\lambda_{ct}exp(\mu_c ln(w_{ct,sec} - b_{ct}) + a_{sec}) \tag{7}$$

- In a log regression:

$$ln(L_{ct,sec}(w_{ct,sec})) = ln(\mathcal{L}_{ct}\lambda_{ct}) + \mu_c ln(w_{ct,sec} - b_{ct}) + a_{sec}$$

- Faces the standard problems of estimating labor supply elasticities, so I estimate μ using the method of Bassier, Dube, and Naidu (2020) then run the regression

$$ln(L_{ct,sec}(w_{ct,sec})) - \hat{\mu}_c ln(w_{ct,sec} - b_{ct}) = ln(\mathcal{L}_{ct}\lambda_{ct}) + a_{sec} + \epsilon_{cjt} \tag{12}$$

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Estimation of Elasticity

- Estimate the elasticity using the method of Bassier, Dube, and Naidu (2020)

$$s_{ijt} = \sum_j \eta \phi_j f_{jt}^i + X_{it} + v_{ijt}$$

s_{ijt}: Indicator for separation of individual i from firm j at time t

ϕ_j: AKM fixed effect of the firm

f_{jt}^i: Indicator variable for individual i working at firm j in time t

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Institutional Background

- Majority of municipal revenue comes from trade tax (gewerbesteuer)
- $\tau_{mun,t} = \tau_{federal} * p_{mun,t}$
  - $\tau_{federal}$ is the federal base rate, 3.5%
  - The municipal multiplier $p_{mun,t}$ must be at least 2, average local rate is 13.5%
- Fuest et al. (2018) find tax changes are negatively related to within-establishment wages using an event-study design
  - Distefano et al. (2022) find negative wage and employment effects at the local level in a similar event-study
- I aggregate municipal tax rates to a commuting-zone average using municipal population as the weights

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Within CZ Correlation of Municipal Tax Multipliers

- Taxes are highly correlated within commuting zone
- Commuting zone by year effects explain more than half the variation in municipal tax rates

Table: Correlation of Taxes Within Commuting Zone

	(1) CZ FE	(2) Year FE	(3) Interacted	(4) Leave-out average
R^2	0.417	0.116	0.550	0.541

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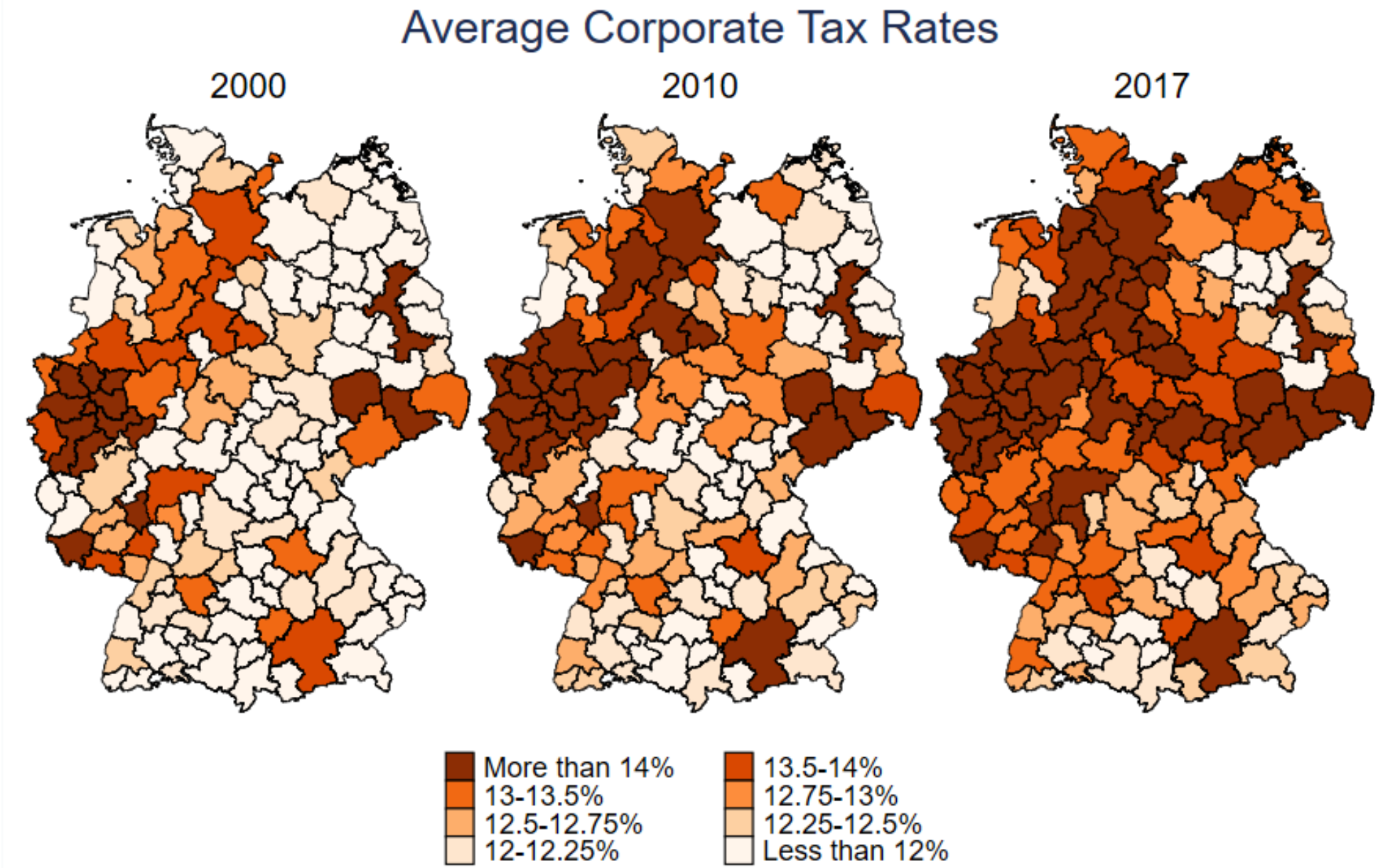
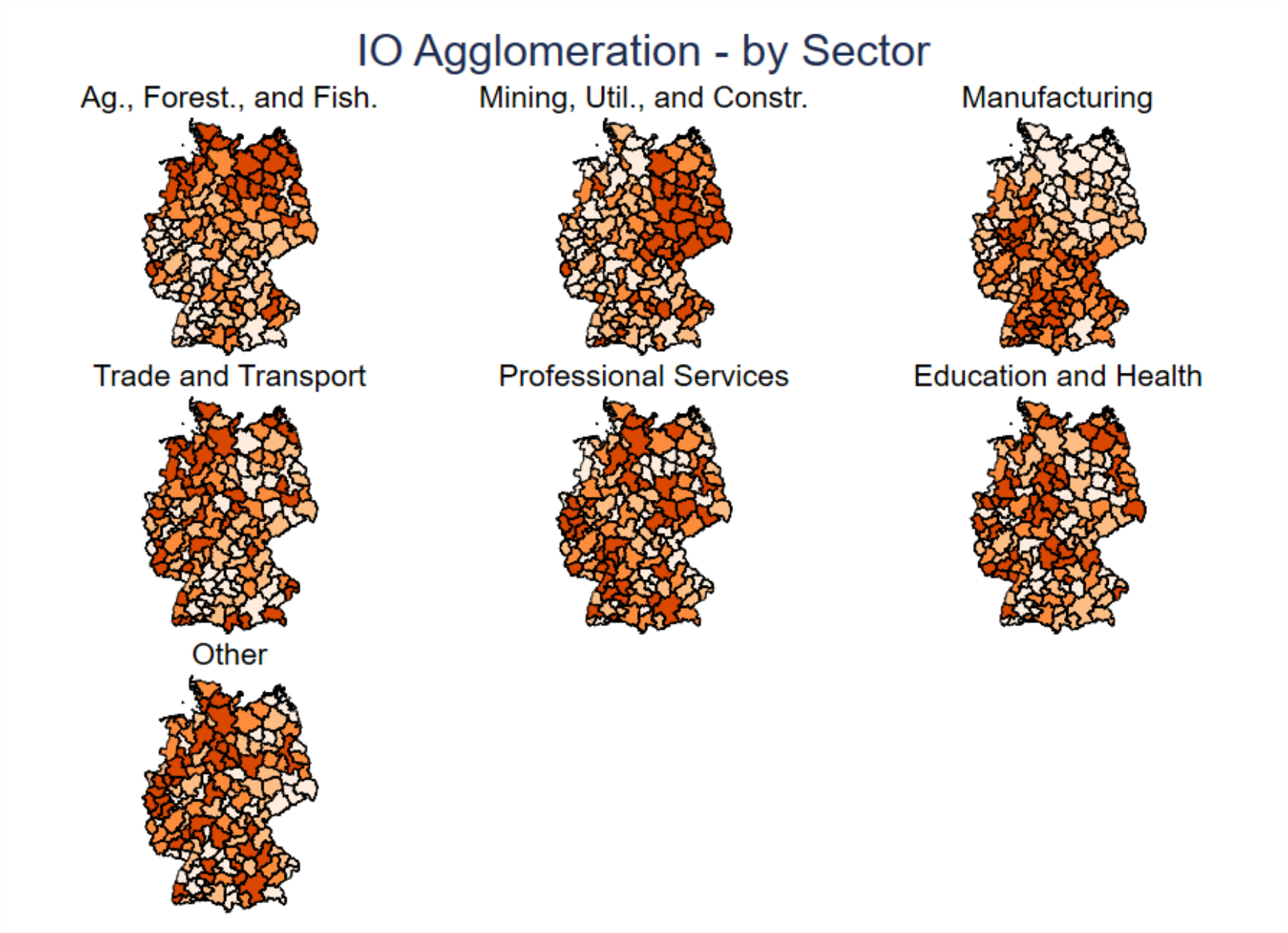
Local Taxes


Average Corporate Tax Rates
2000
2010
2017
More than 14%
13-13.5%
12.5-12.75%
12-12.25%
13.5-14%
12.75-13%
12.25-12.5%
Less than 12%

Summary Statistics - Input-Output Linkages



Labor Correlation Measure Construction

- For each sector:
  1. Construct a vector of the shares of sector employment of each occupation
  2. For each sector pair sec,m calculate the vector correlation of these occupation shares
- As for goods agglomeration, the location-level benefits are therefore

$$\text{LC Agglom}_{ct,sec} = \sum_{m=1}^{M} \frac{N_{mct}}{\mathcal{N}_{ct}} LC_{sec,mt} \tag{13}$$

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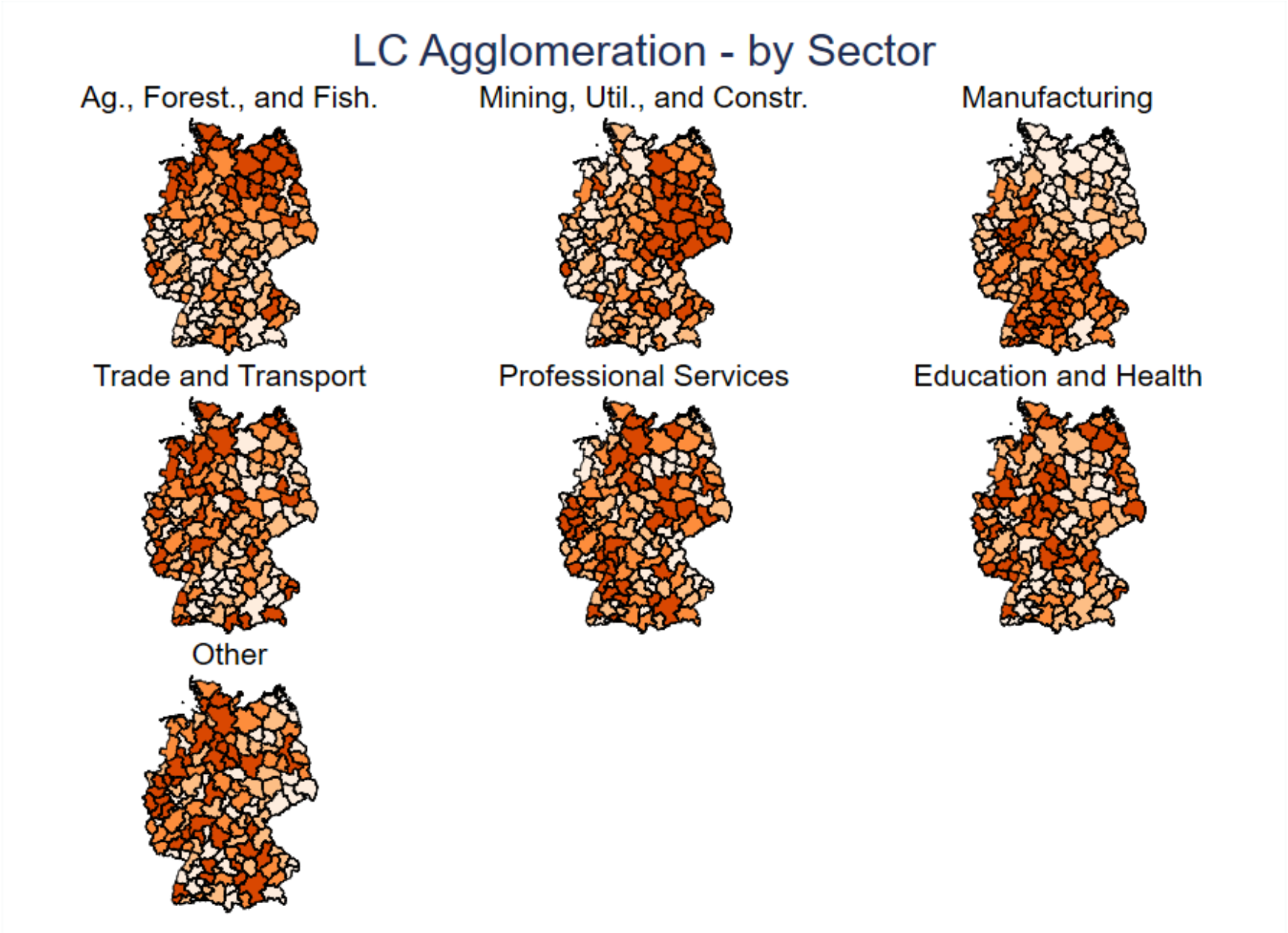
Summary Statistics - Labor Correlation



Knowledge Measure Construction

- Based on Jaffe et al. (1993)
- For each patent:
  1. I define a control patent as the patent with the closest publication date in the same 3-digit IPC patent class as the main patent
  2. Identify the commuting zone where the patent originates, as well as where each cited patent introduced by the applicant originates
  3. Define the knowledge agglomeration as the probability a cited patent comes from the same region (pr_{cite}) minus the probability that the control patent comes from the same region (pr_{cntrl})

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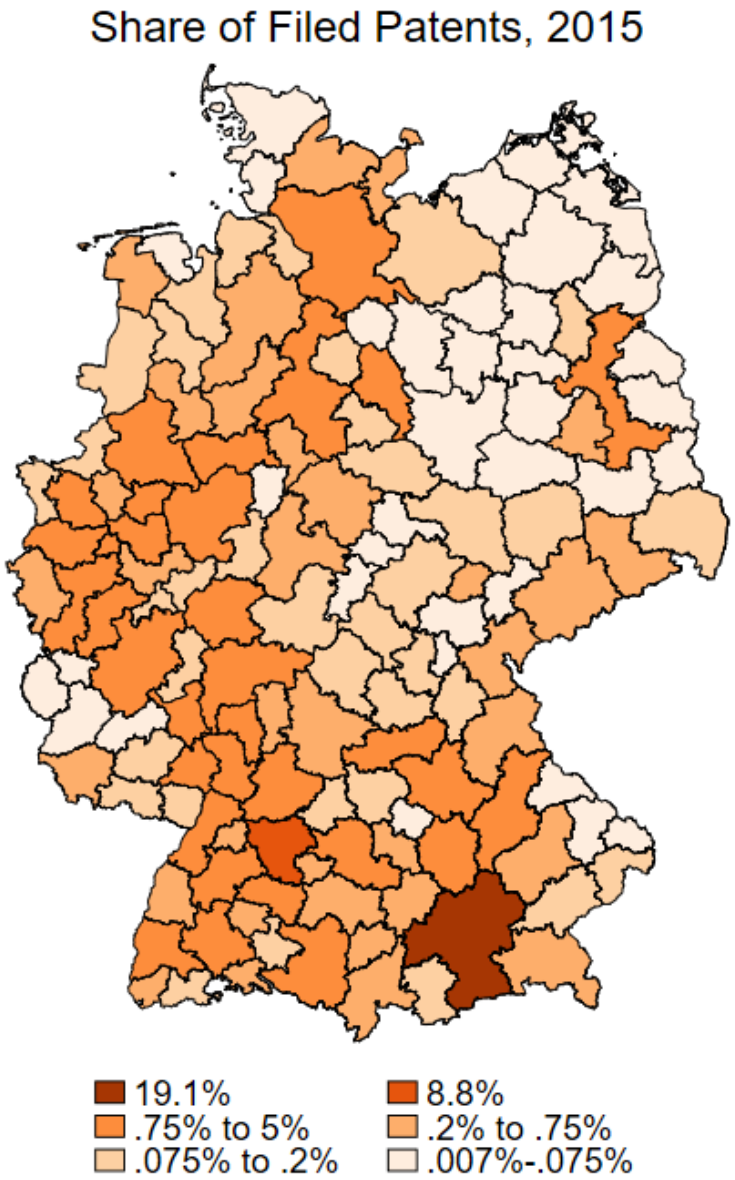
Summary Statistics - Patents



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Shift-Share Instrument

- Recall the construction of the spillovers

$$\text{IO Agglom}_{ct,sec} = \sum_{m=1}^{M} \frac{N_{mct}}{\mathcal{N}_{ct}} max(Input_{sec \leftarrow m}, Output_{sec \rightarrow m}) \tag{5}$$

- Instrument N_{mct} with:

$$\hat{N}_{mct} = N_{mc,1998} * growth_{m,-c} \tag{14}$$

Where $growth_{m,-c}$ is the leave-out growth rate of similarly sized (by labor force) commuting zones between 1998 and t

- Instrument labor correlation spillovers in a similar way

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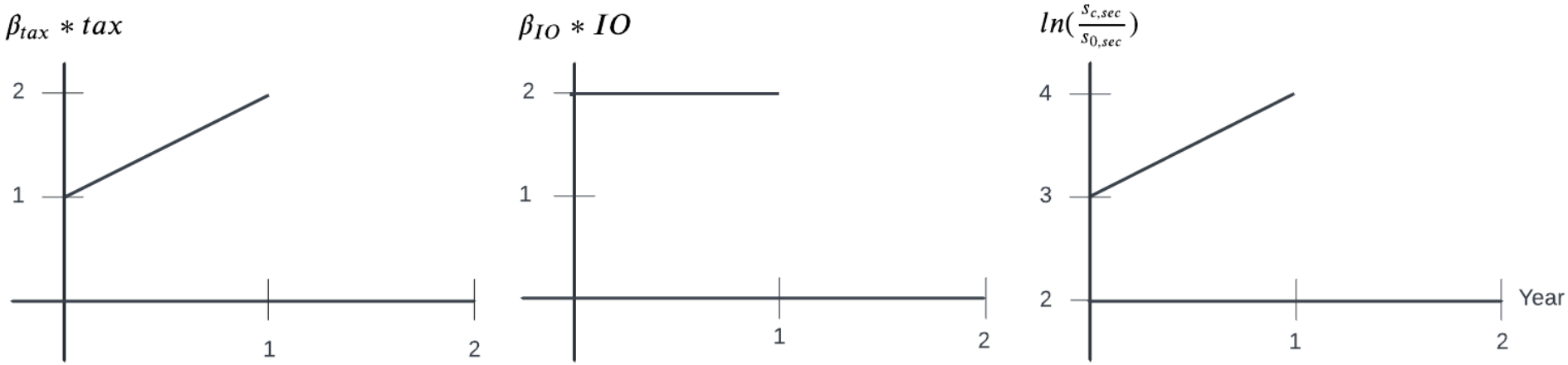
Long-Term Effects Also Depend on Spillovers



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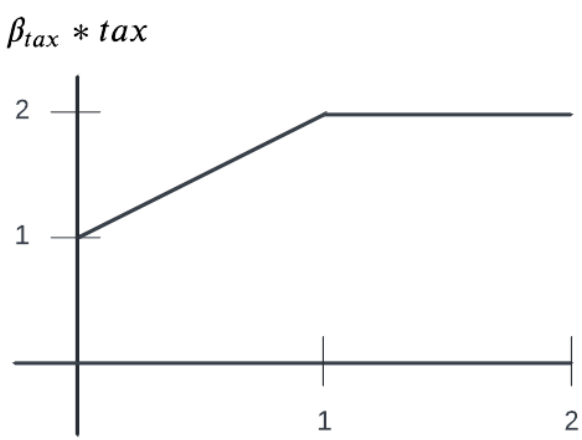
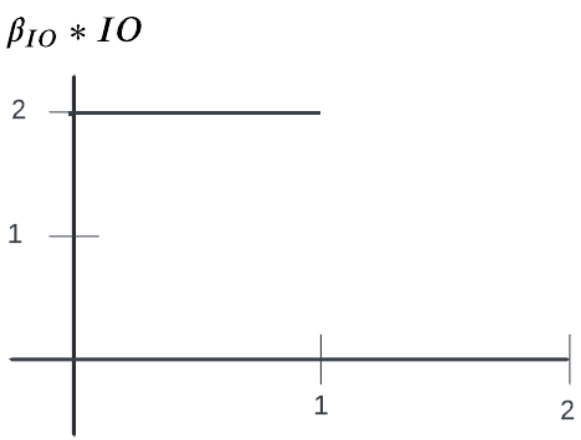
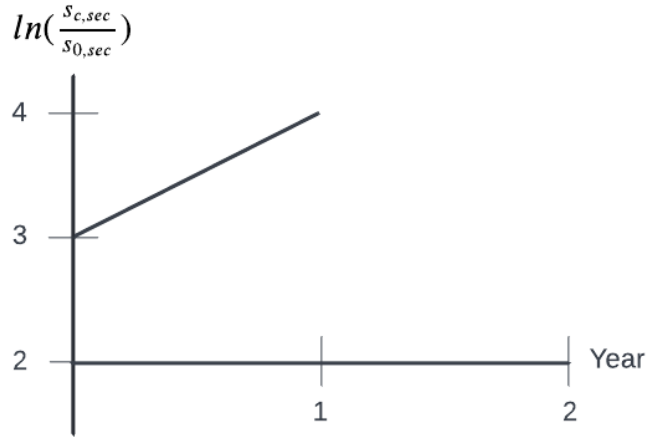
Long-Term Effects Also Depend on Spillovers







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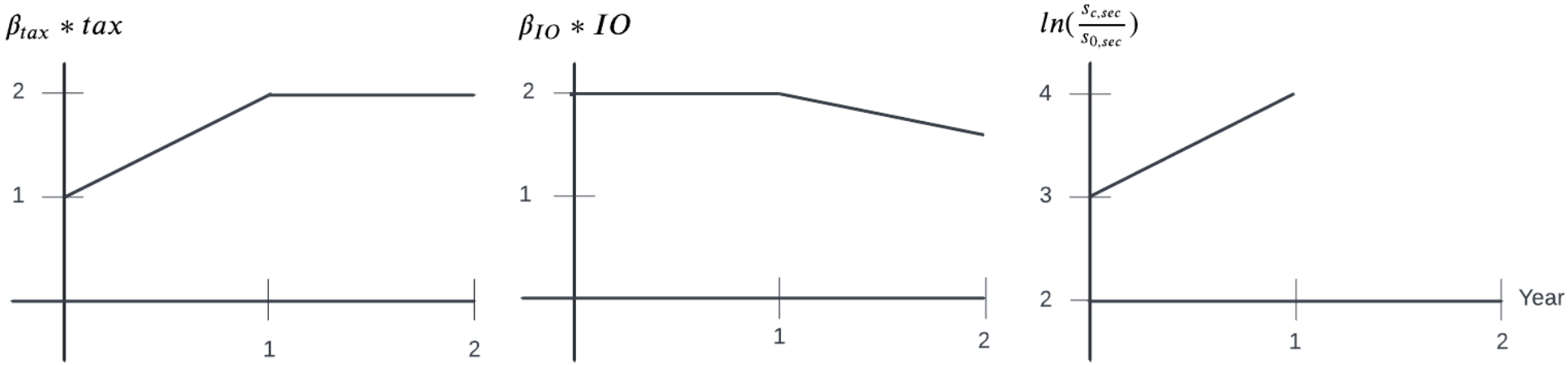
Long-Term Effects Also Depend on Spillovers



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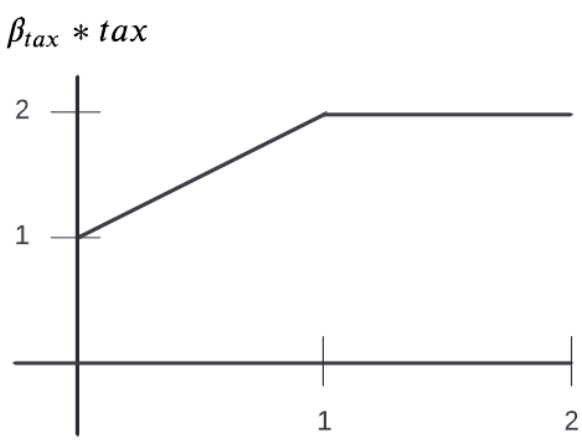
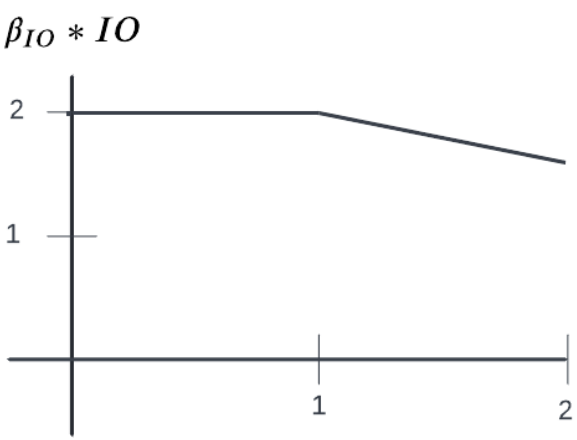
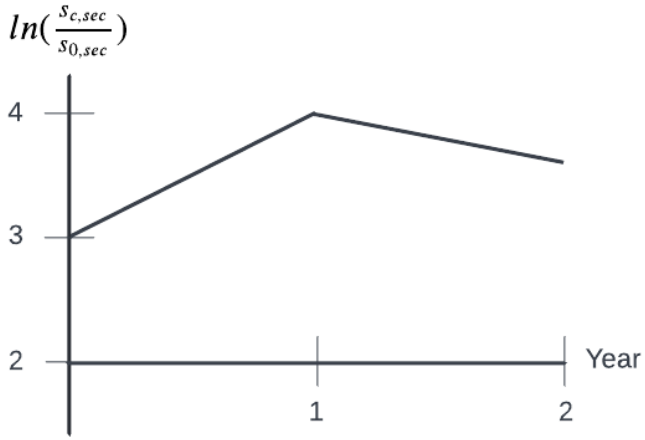
Long-Term Effects Also Depend on Spillovers







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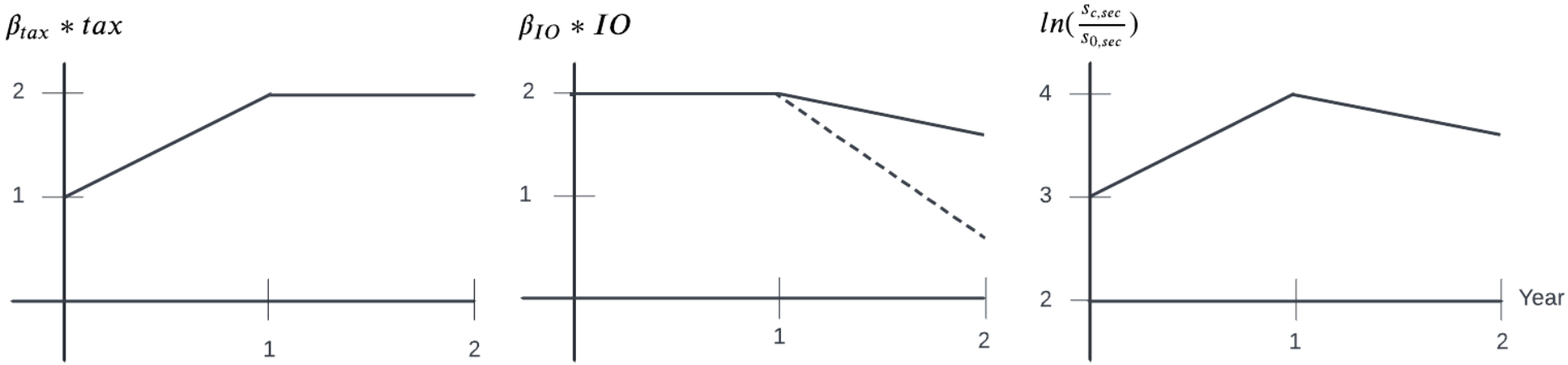
Long-Term Effects Also Depend on Spillovers



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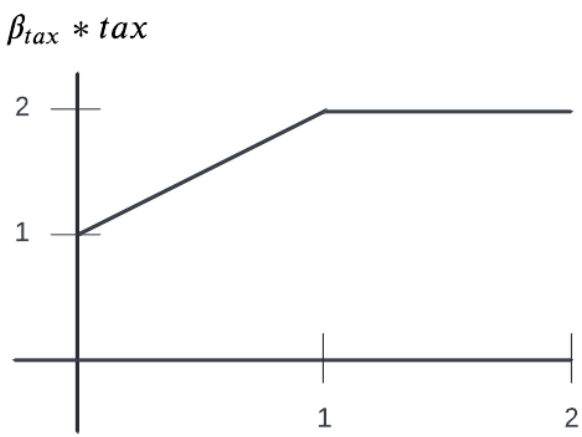
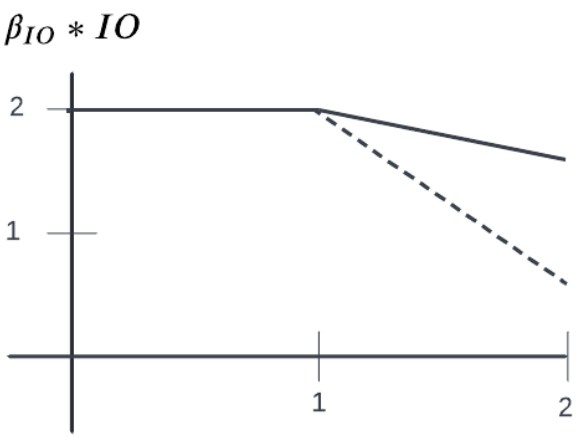
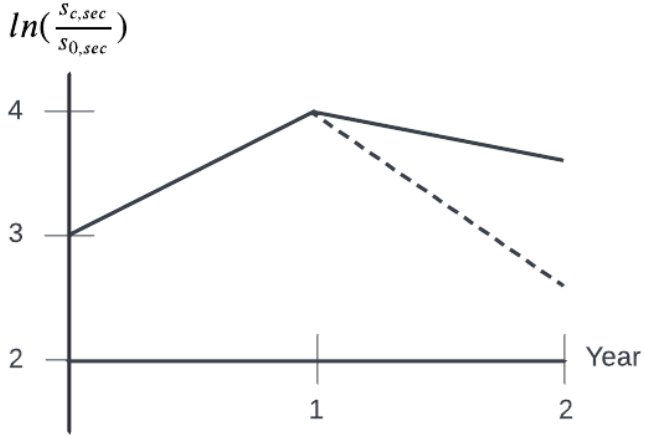
Long-Term Effects Also Depend on Spillovers







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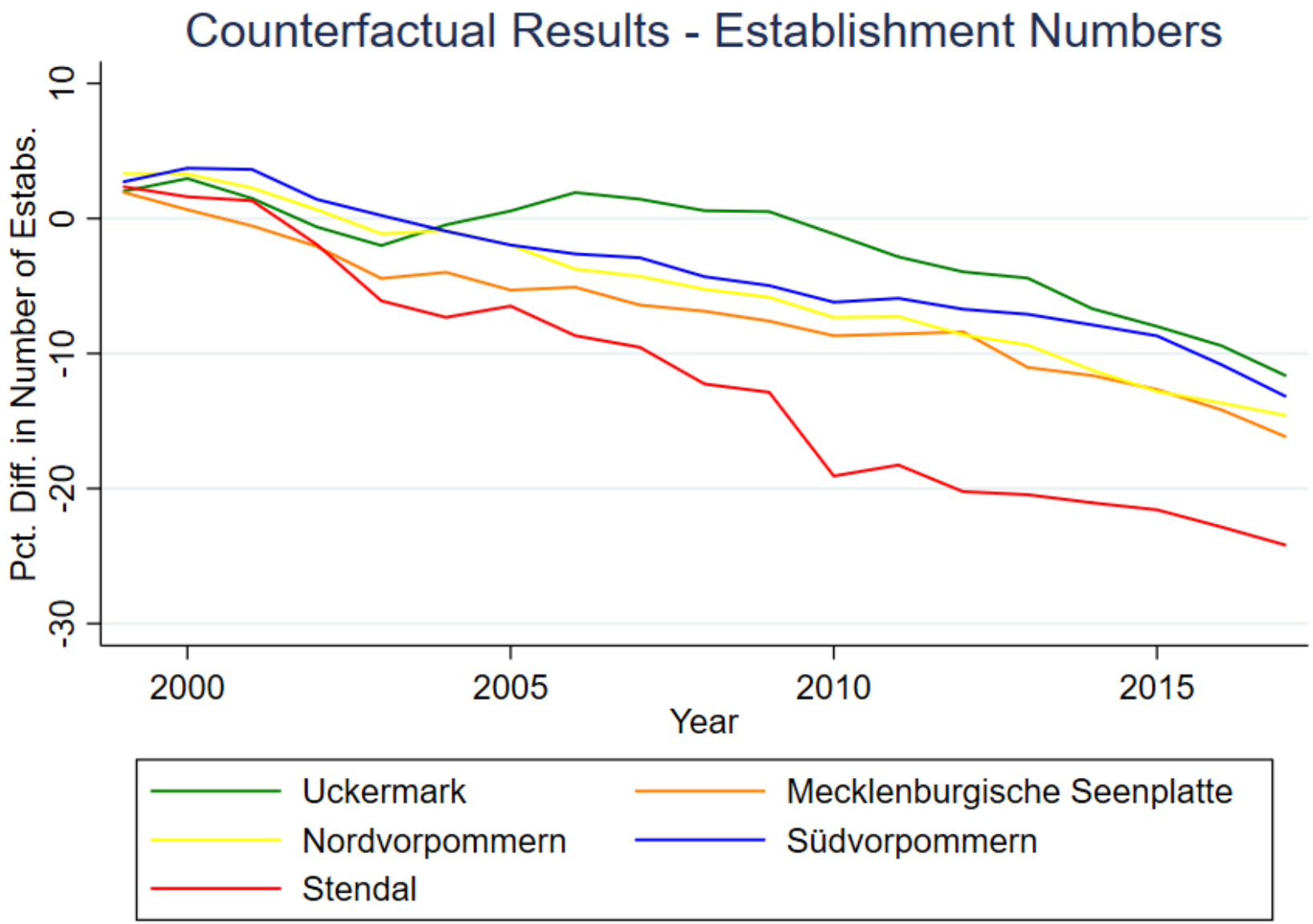
Additional Results

- Goodness of fit check: How well does the model predict average commuting-zone sector wages?
  - $\beta = 1.33$, intercept = -3.52, n = 18,622
- Extensions:
  1. Low-AKM-Effect establishments place higher importance on worker outside options ▸ Results
  2. Large and small (by n employees) establishments behave similarly ▸ Results
  3. Results for a finer industry disaggregation ▸ Results
  4. Controlling for rents does not change results ▸ Results

▸ Back

Locations Experience Varying Policy-Induced Decline



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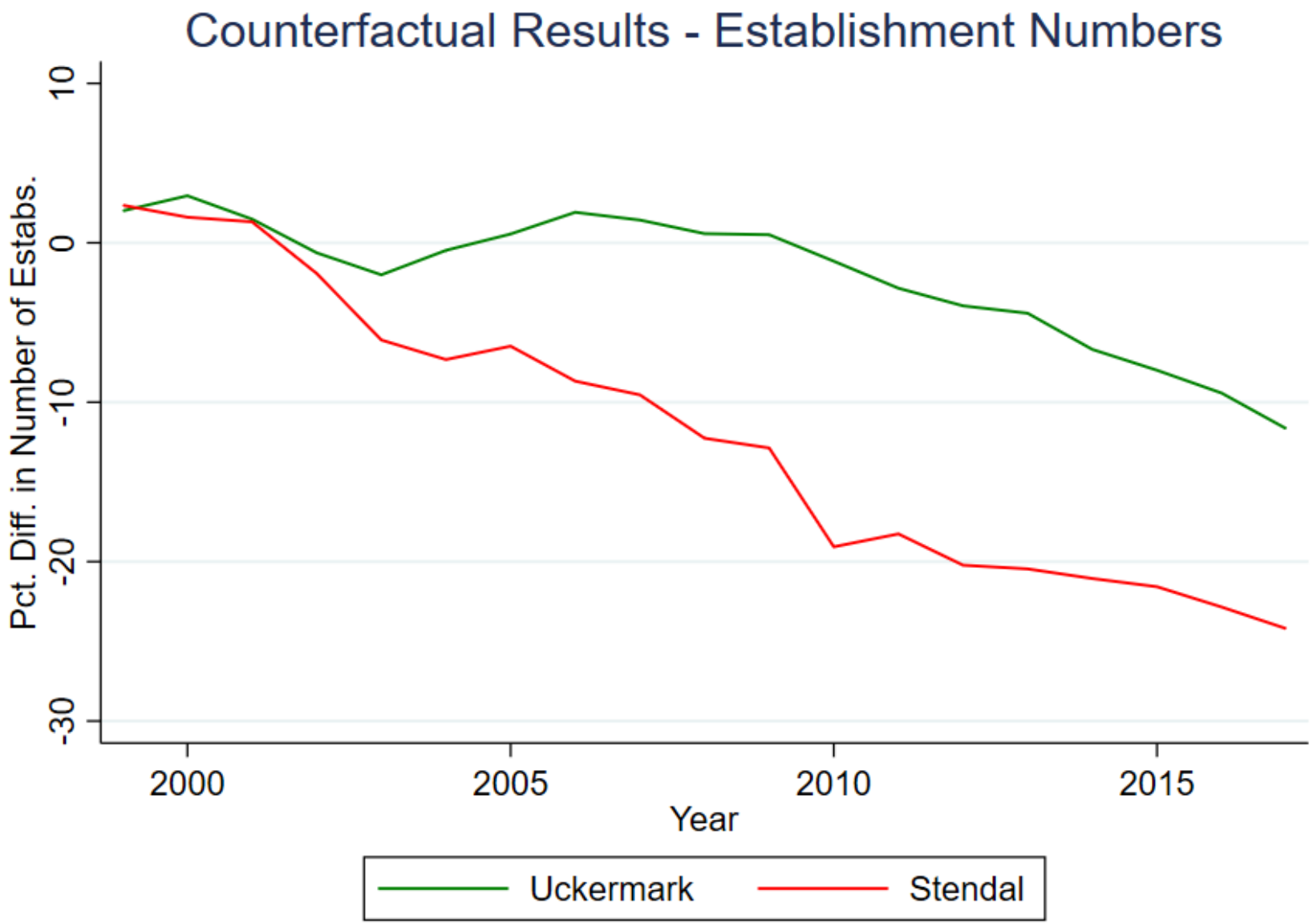
Zooming in



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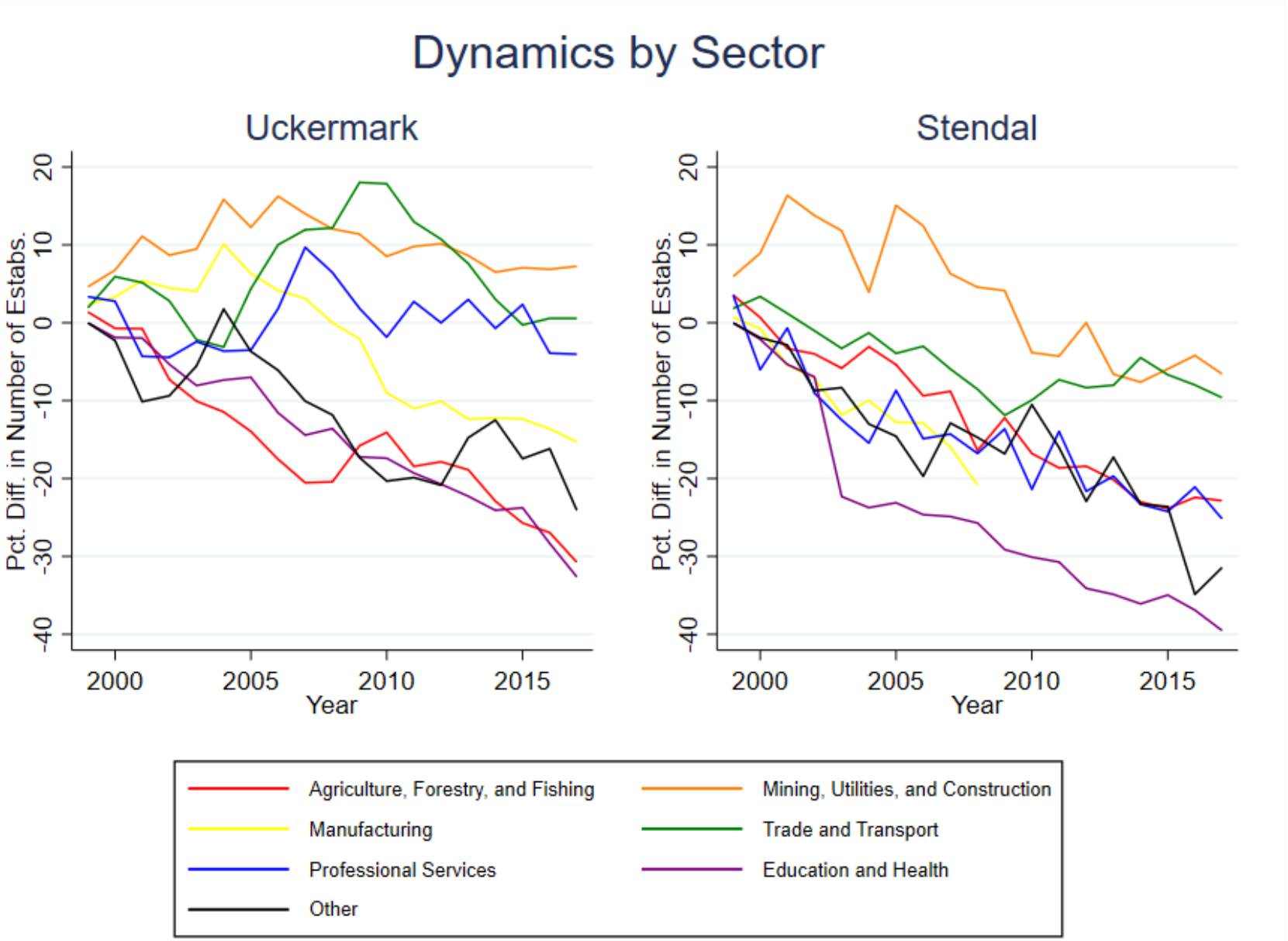
Sectoral Differences Driving Heterogeneity



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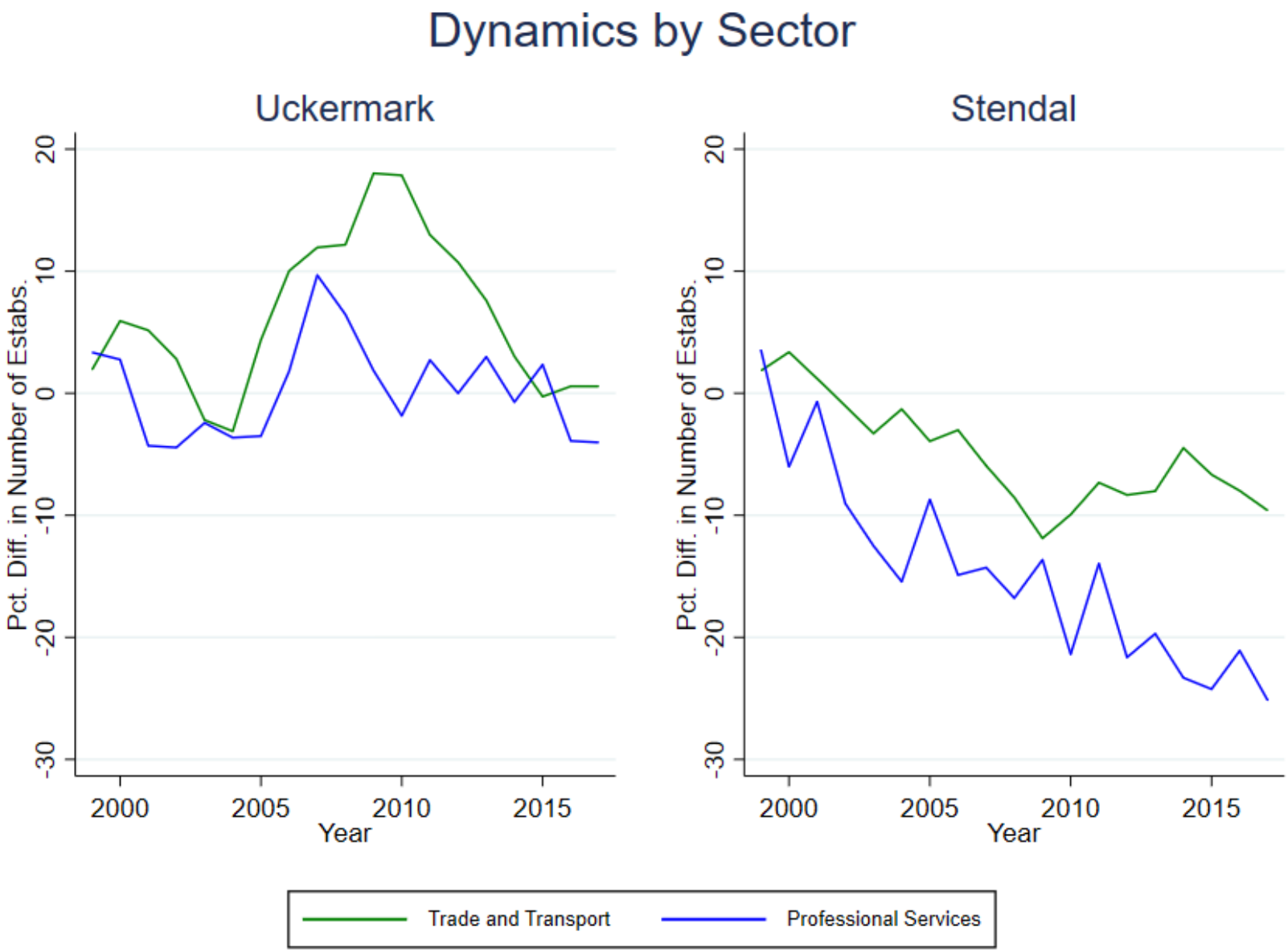
Sectoral Differences Driving Heterogeneity



What's Behind This?

- Trade and Transportation: $\beta_{tax} = 5.35$, $\beta_{outop} = -.0378$
  1. Mechanism: Tax changes entice new establishments, which move the outside option
  2. In Stendal they increase the outside option
  3. In Uckermark, they either decrease the outside option or the increases don't dominate the tax change effects
- Professional Services: $\beta_{tax} = 8.07$, $\beta_{IO} = 4.05$
  1. Mechanism: Tax changes entice new establishments, which move the input-output spillovers
  2. In Stendal they decrease the IO spillovers for professional service establishments
  3. In Uckermark, they either increase the IO spillovers for professional service establishments, or decreases don't dominate the tax effects Back

Slight Differences in Initial Conditions Lead to Large Differences in Response

Table: Initial Industrial Sector Shares

	Uckermark mean	Stendal mean
Agriculture, Forestry, and Fishing	8.71	8.57
Mining, Utilities, and Construction	15.88	17.91
Manufacturing	7.17	8.83
Trade and Transport	32.76	32.69
Professional Services	10.01	8.32
Education and Health	12.67	11.45
Other	12.79	12.22

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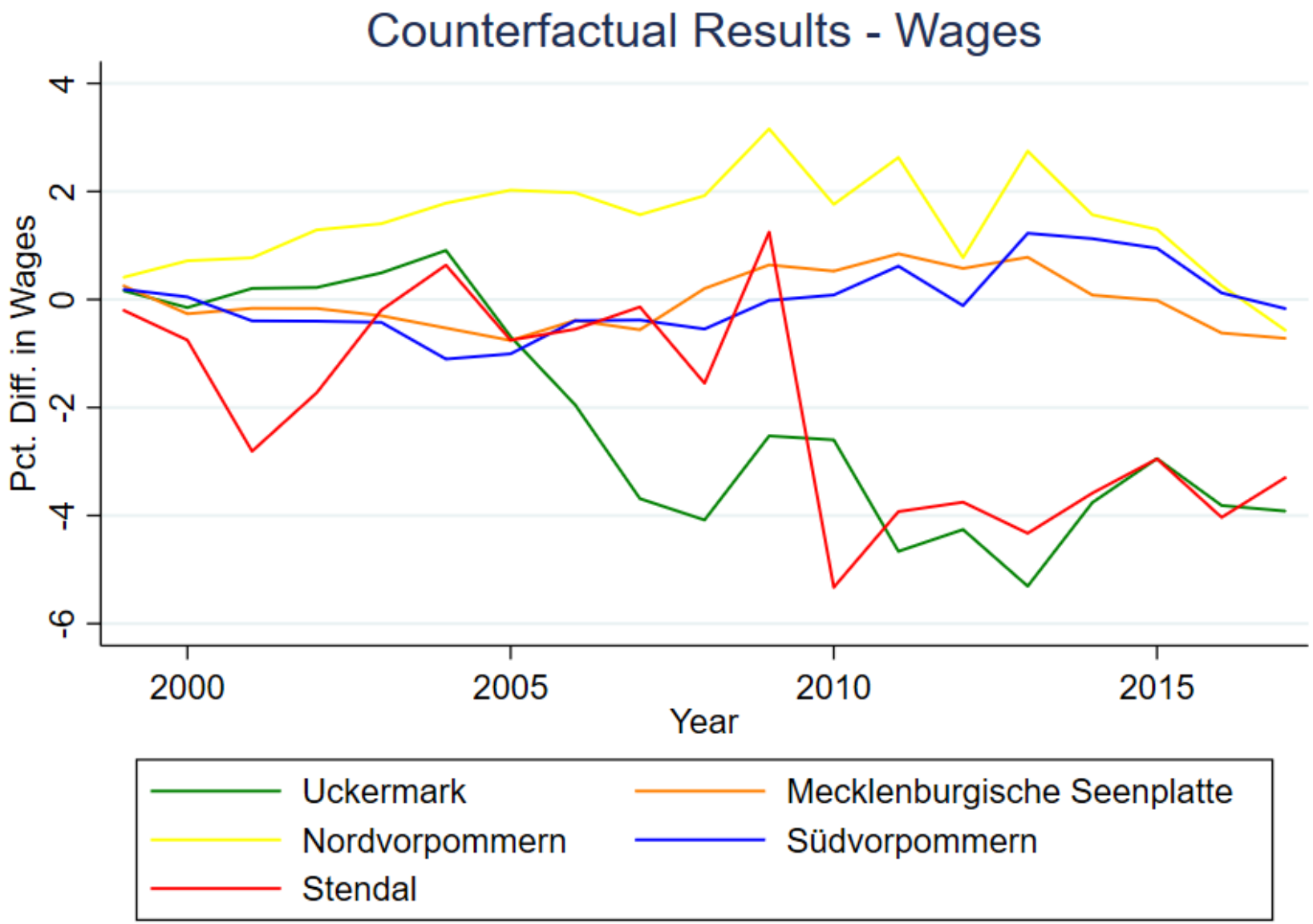
Wages Do Not Change or Decline



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Heterogenous Effects of Place-Based Policy on TFP

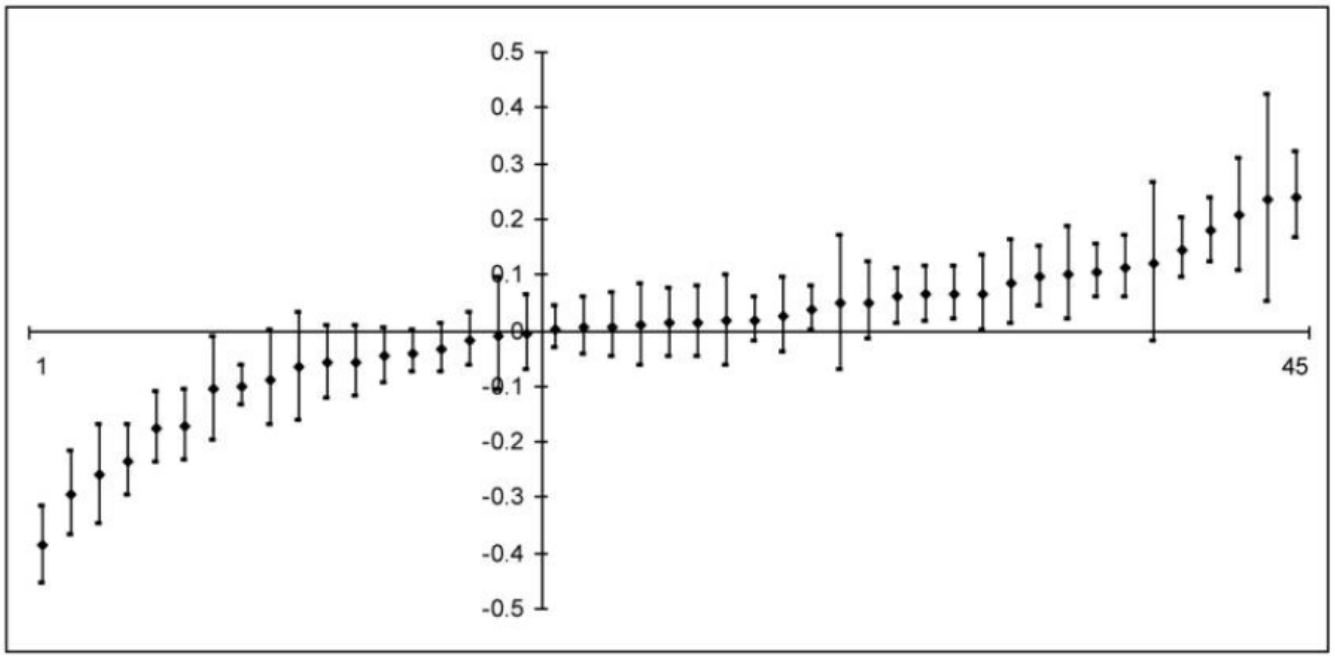


FIG. 2.—Distribution of case-specific mean shift estimates, following an MDP opening. The figure reports results from a version of model 1 that estimates the parameter θ_1 for each of the 47 MDP cases. The figure reports only 45 estimates because two cases were excluded for Census confidentiality reasons.

Source: Greenstone et. al 2010 ▸ Intro ▸ Counterfactuals

Overview of Studies of Place-Based Policies

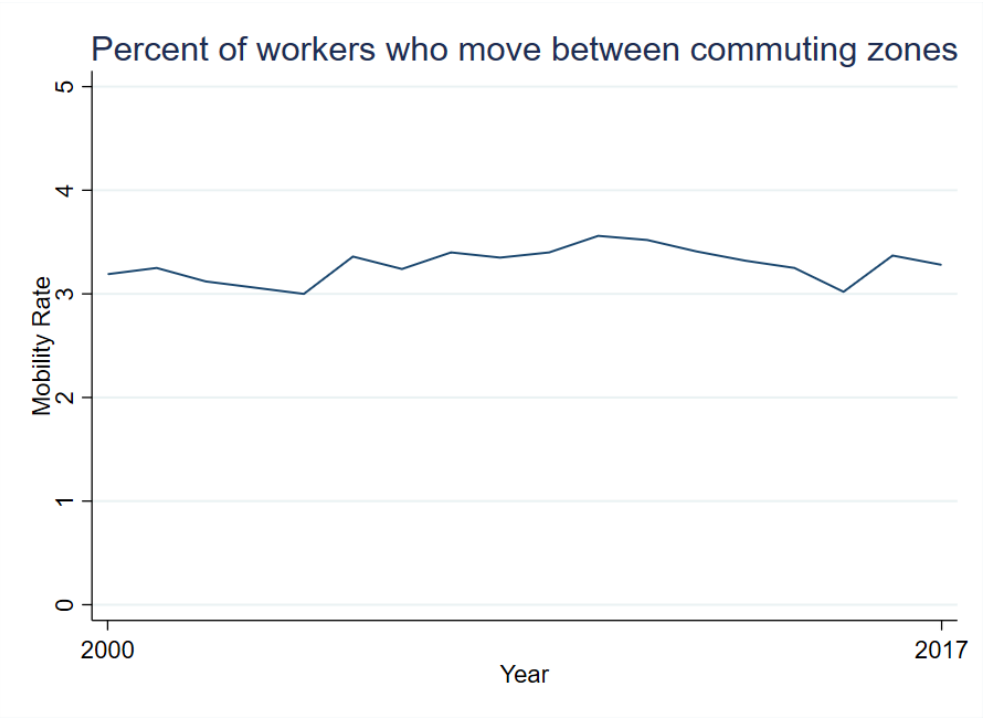
Table 18.3 Summary of evidence on discretionary grants

Study	Country	Program	Results
Crozet et al. (2004)	France	Prime d'Aménagement du Territoire	Small, nonrobust effects of PAT subsidies on foreign multinational firm location decisions
Devereux et al. (2007)	United Kingdom	Regional Selective Assistance	Small effects on location decisions of foreign multinational firms and domestic multiplant firms Heterogeneity in the effectiveness of grants in influencing location choice; grants having a greater effect in areas with higher existing employment in the firm's industry
Criscuolo et al. (2012)	United Kingdom	Regional Selective Assistance	Positive effects on plant employment (43% increase in employment for participant plants) and firm investment, but restricted to plants that are part of smaller firms (<150 firm employees); no evidence of effects on firm TFP or wages Positive effects on employment and number of plants at the area level (a 10% subsidy rate increases area employment by 2.9%) and negative effects on unemployment (a 10% subsidy rate reduces unemployment by 6.9%) No evidence, on average, of employment or plant displacement from noneligible to eligible areas, but some evidence of displacement for plants that are part of larger firms
Bernini and Pellegrini (2011)	Italy	Law 488	Output growth in subsidized firms around 8–10% higher over on average 3.6 years, employment growth 16–17% higher, and growth in physical capital around 40% higher; labor productivity growth and TFP growth 7% and 8% lower, respectively Effects on output and employment appear to be greater for small firms
Bronzini and de Blasio (2006)	Italy	Law 488	Increase in investment over the initial 2 years following receipt of the subsidy, but at 5 years, recipient firms show a decrease in investment relative to controls; program may act to bring forward investment that might otherwise have occurred at a later date, rather than subsidizing additional investment
Greenstone et al. (2010)	United States	Location subsidies for large plant entry	Substantial effects on incumbent plant productivity in successful locations; incumbent plant TFP 12% higher after 5 years Heterogeneity in magnitude of TFP effects across industries and across locations Positive effect on county-level wages (2.7%)

Source: Neumark and Simpson 2015 Back

Worker and Establishment Mobility

- 1.6% of establishments ever change location
- 82.36% of workers never move between commuting zones
  - 76% of those who move only move once



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Adjustment for Establishment Observation

- Unit of observation:
  1. Within municipality, all establishments owned by the same firm are linked
  2. Between municipalities, cannot observe parent firm
  3. Example: All McDonald's in Berlin are a single line of data, and I can't link McDonald's in Berlin to McDonald's in Munich
- What I'm actually observing is $s_{sec}(\text{pick C}|\text{observed in data})$
- Bayes' rule implies:

$$\text{pr}_{sec}(\text{pick C}|\text{observed in data}) = \frac{\text{pr}_{sec}(\text{pick C})\text{pr}_{sec}(\text{observed in data}|\text{pick C})}{\text{pr}_{sec}(\text{observed in data})} \tag{15}$$

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Adjustment for Establishment Observation

- After taking ratios and logs, the adjusted structural equation is:

$$ln(\frac{s_{ct,sec}}{s_{0t,sec}}) = y_{ct,sec} - y_{0t,sec} + ln(\text{pr}_{t,sec}(\text{observed in data}|\text{pick C})) - ln(\text{pr}_{t,sec}(\text{observed in data}|\text{pick 0})) \quad (16)$$

- $ln(\text{pr}_{t,sec}(\text{observed in data}|\text{pick 0}))$ is neatly captured by $\zeta_{t,sec}$ in my empirical specification
- At least some portion of $ln(\text{pr}_{t,sec}(\text{observed in data}|\text{pick C}))$ will be absorbed by the location fixed effect $\gamma_{c,sec}$
- To bias main coefficients: Conditional probability would need to be correlated with taxes or spillovers but not systematically within commuting zone or over time

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Adjustment for Establishment Observation

- Potential problem: some portion of $ln(\text{pr}_{t,sec}(\text{observed in data}|\text{pick C}))$ will be present in $\gamma_{c,sec}$, which I use to back out estimated location-sector productivity
- Solution: Rerun counterfactual specifications without $\gamma_{c,sec}$ as part of productivity

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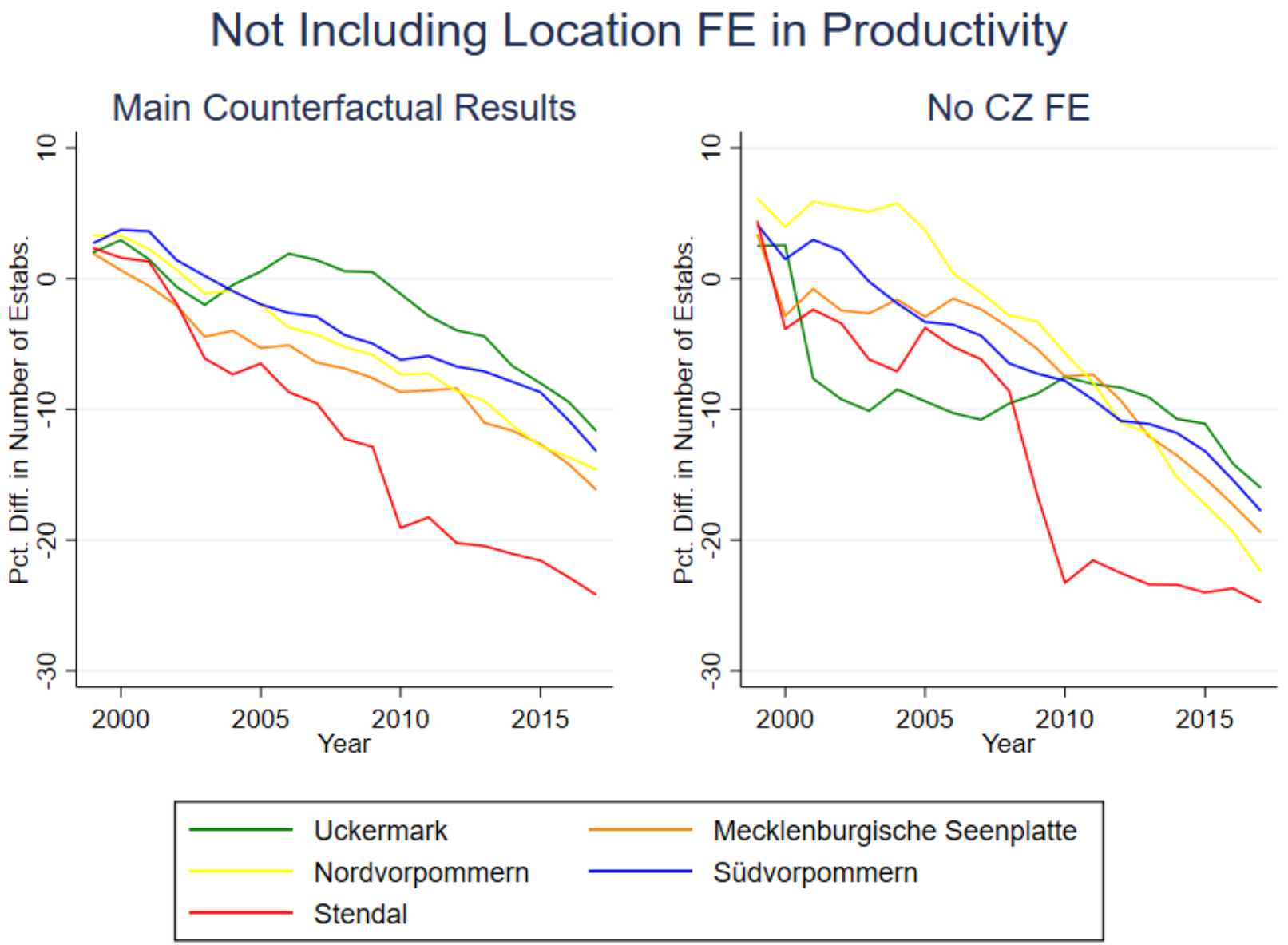
CF Comparison - Firm Adjustment



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Substantial Between-Sector Heterogeneity

Response of the Share-Ratio to Taxes, Spillovers, and Outside Option

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	13.65***	10.97***	7.197**	5.353***
Input-Output	6.550***	3.375***	-2.819**	6.646
Labor Correlation	9.400	2.479	0.673	-6.542
Outside Option	0.00214	-0.0444***	0.0153	-0.0378***
N	2561	2660	2637	2660
F	14.45	212.1	116.8	412.7

	Prof. Serv.	Edu., Health.	Other
Tax	8.069***	8.434	-7.097
Input-Output	4.052*	1.427	11.56***
Labor Correlation	-0.390	0.223	-35.72***
Outside Option	-0.0224	-0.0167**	-0.0129
N	2657	2654	2660
F	242.8	150.4	107.4

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Results of the reduced-form specification in equation (8)

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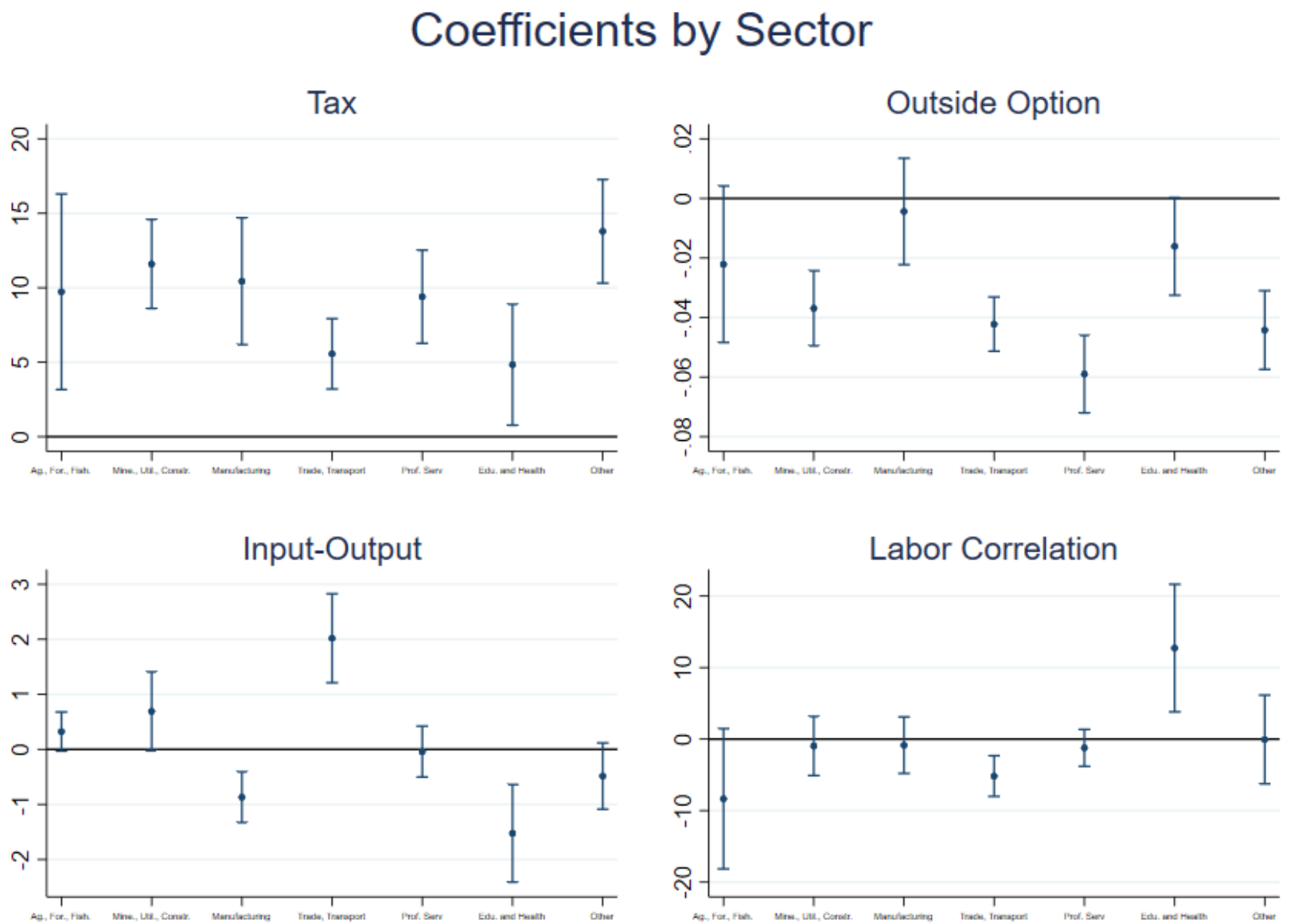
OLS Results



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OLS Results

Response of the Share-Ratio to Taxes, Spillovers, and Outside Option

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	9.730***	11.60***	10.44***	5.563***
Input-Output	0.324*	0.692*	-0.869***	2.018***
Labor Correlation	-8.352*	-0.971	-0.853	-5.174***
Outside Option	-0.0221*	-0.0369***	-0.00437	-0.0422***
N	2561	2660	2637	2660
R2	0.706	0.945	0.893	0.972

	Prof. Serv.	Edu., Health.	Other
Tax	9.397***	4.829**	13.79***
Input-Output	-0.0402	-1.525***	-0.485
Labor Correlation	-1.232	12.73***	-0.0555
Outside Option	-0.0590***	-0.0161*	-0.0442***
N	2657	2654	2660
R2	0.957	0.914	0.947

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Notes: Results of the reduced-form specification in equation (8)

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Results - AKM Effect

Panel A: Establishments with Above-Median AKM Effect

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	8.414	10.49***	4.248	7.234***
Input-Output	7.815***	3.472*	1.401	2.895
Labor Correlation	4.077	-0.248	5.722	-4.987
Outside Option	0.0152	-0.0108	0.0206	-0.0212*
N	1426	2590	2179	2641
F	5.037	66.76	40.92	164.0

Panel B: Establishments with Below-Median AKM Effect

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	2.062	7.383**	14.48***	3.072
Input-Output	1.594	7.708***	1.794	23.71*
Labor Correlation	7.416	-5.016	-2.951	-18.97
Outside Option	-0.0561***	-0.0802***	-0.0352	-0.0540***
N	1479	2547	2332	2656
F	14.61	62.28	36.04	64.51

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Results - AKM Effect

Panel A: Establishments with Above-Median AKM Effect

	Prof. Serv.	Edu., Health.	Other
Tax	5.067	-15.61**	2.603
Input-Output	-3.370	-7.895**	7.739**
Labor Correlation	-2.282	43.48***	-28.10**
Outside Option	-0.0332	0.00831	0.0419**
N	2456	2302	2551
F	92.55	50.56	72.63

Panel B: Establishments with Below-Median AKM Effect

	Prof. Serv.	Edu., Health.	Other
Tax	11.10***	12.16	-5.339
Input-Output	4.628	-0.0615	7.044*
Labor Correlation	5.443	15.45	-32.38***
Outside Option	-0.0410	0.0135	-0.0446***
N	2569	2424	2550
F	74.32	46.03	67.80

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Results - Establishment Size

Panel A: Establishments with Above-Median Size

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	7.759	13.14***	8.486**	2.822*
Input-Output	5.147***	4.137**	0.500	2.912
Labor Correlation	28.04**	10.77**	-0.223	-2.581
Outside Option	-0.00213	-0.0616***	-0.000687	-0.0313***
N	2143	2634	2535	2659
F	9.700	85.13	64.28	292.3

Panel B: Establishments with Below-Median Size

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	7.308	10.37***	4.629	6.679***
Input-Output	6.575***	2.845**	-3.427*	6.068
Labor Correlation	-4.739	-1.418	0.615	-7.371
Outside Option	0.0226	-0.0326***	0.0315	-0.0405***
N	2385	2659	2575	2658
F	11.23	164.1	65.26	303.9

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Results - Establishment Size

Panel A: Establishments with Above-Median Size

	Prof. Serv.	Edu., Health.	Other
Tax	5.826**	-7.549	-10.80
Input-Output	5.309*	-6.631	12.80***
Labor Correlation	3.871	25.44	-42.73***
Outside Option	-0.00883	-0.00721	0.00495
N	2619	2586	2634
F	126.4	78.84	76.99

Panel B: Establishments with Below-Median Size

	Prof. Serv.	Edu., Health.	Other
Tax	11.50***	14.62**	-2.196
Input-Output	2.342	3.128	10.49***
Labor Correlation	-1.174	-0.873	-31.88***
Outside Option	-0.0364	-0.00715	-0.0215
N	2653	2631	2653
F	179.9	91.80	96.79

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Results - Finer Industry

Results: Finer Industry Level

	Ag. For. Fish.	Mine., Util., Constr.	Goods Manu.	Chem., Pharm. Manu.
Tax	5.245	10.73***	11.34**	10.63
Input-Output	-14.55*	4.866***	4.475**	-3.977
Labor Correlation	-22.89	0.0672	-24.28	46.79
Outside Option	-0.0737	-0.0483***	-0.0724**	0.0126
N	2561	2660	2381	1978
F	4.326	187.5	30.96	20.50

Results: Finer Industry Level

	Metal. Manu.	Elec. Manu.	Mach. Manu.	Other Manu.
Tax	6.418*	-6.543	10.65**	-14.62
Input-Output	1.093	3.698***	1.108	-17.92
Labor Correlation	51.30***	-258.7***	-6.115	187.4
Outside Option	-0.0516**	0.0673**	0.0137	0.149
N	2390	1624	2001	2004
F	28.74	13.26	24.89	4.654

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Results - Finer Industry

Results: Finer Industry Level

	Trade	Trans., Logis.	Arts, Rec.	Media, Comm.
Tax	5.938**	6.085*	29.73**	1.134
Input-Output	22.57**	-15.42*	-3.838*	-1.057
Labor Correlation	-25.05**	199.1**	365.1**	23.71
Outside Option	-0.0236	-0.0445***	-0.194**	0.0353*
N	2660	2615	2423	2098
F	97.80	50.77	27.99	44.99

Results: Finer Industry Level

	Tech. Serv.	Bus. Serv.	Edu., Health	Other
Tax	5.480	-6.569	25.95*	-74.77
Input-Output	-6.102	11.21	8.209	51.29
Labor Correlation	-142.1	13.86	-68.32	-88.74
Outside Option	-0.171*	0.0812	-0.0188	0.0485
N	2636	2645	2654	2659
F	35.90	43.09	70.58	7.154

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Incorporating Rents

- Rents do not factor into worker establishment decision since they are immobile
- Assume:
  1. Establishments pay a fixed price r_c per square meter of space
  2. Each worker requires a fixed amount of space k that does not differ between locations
- Profits are:

$$Y_{jc} = (1 - \tau_c)[\beta_{c,sec} L_{cj}(w_{c,sec}) - L_{c,sec}(w_{c,sec}) w_{c,sec} - k r_c L_{c,sec}(w_{c,sec})] \tag{17}$$

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Incorporating Rents

- Wage Equation:

$$w_{cj} = \frac{\mu_c}{1+\mu_c}(\beta_{c,sec} - r_c k) + \frac{1}{1+\mu_c} b_c \tag{18}$$

- Log-linearized Profit Equation:

$$y_{ct,sec} = ln(f(\mu_c)exp(a_{sec})) + ln(\mathcal{L}_{ct}\lambda_{ct}) + (1+\mu_c)ln(\beta_{ct,sec} - r_c k - b_{ct}) + ln(1-\tau_{ct}) \tag{19}$$

- Controlling for rents (from RWI RWI-GEO-REDX dataset) does not change results of any of the main specifications

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Incorporating Rents

Panel A: Controlling for Rental Prices

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	-0.875	6.747**	7.715	2.691
Input-Output	5.038**	5.543*	-1.468	11.03
Labor Correlation	8.216	7.240*	-3.682	-3.972
Outside Option	0.0330	-0.0472***	0.00198	-0.0171
Rental Prices	0.00688	0.00718**	0.00180	0.00276
N	1345	1400	1380	1400
F	13.77	90.16	57.37	163.0

Panel B: No Rental Controls

	Ag. For. Fish.	Mine., Util., Constr.	Manu.	Trade, Transport
Tax	2.863	8.789***	8.919	3.144
Input-Output	4.396**	4.760*	-1.030	8.830
Labor Correlation	5.632	9.062**	-3.215	-3.272
Outside Option	0.0224	-0.0453***	-0.00255	-0.0209
N	1345	1400	1380	1400
F	15.09	94.48	57.47	195.3

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

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Incorporating Rents

Panel A: Controlling for Rental Prices

	Prof. Serv.	Edu., Health.	Other
Tax	5.505*	-3.551	-3.321
Input-Output	6.626	-7.609	8.027*
Labor Correlation	-0.918	4.876	-1.939
Outside Option	0.0305	-0.0121	-0.0268**
Rental Prices	-0.00107	-0.00825	-0.00316
N	1397	1396	1400
F	108.4	66.57	87.64

Panel B: No Rental Controls

	Prof. Serv.	Edu., Health.	Other
Tax	5.129	-7.867	-4.016
Input-Output	6.512	-8.699	7.698*
Labor Correlation	-0.777	8.829	-0.609
Outside Option	0.0302	-0.00797	-0.0256**
N	1397	1396	1400
F	110.3	63.99	90.37

* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Potential Market Size

- IO literature constructs potential market size in order to give agents option of choosing no product (Hortaçsu and Joo 2019), and construction is question dependent
- I construct potential market size as:
  1. For each sector-year-commuting zone calculate the establishments:residents ratio
  2. Potential market size is the number of establishments that would exist if every commuting zone had the maximum observed ratio
- More to come soon

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More Perfectly Competitive Markets Mean Less Establishments in Underdeveloped Regions

Table: Effects of Reducing Monopsony Power on Underdeveloped Regions

	Uckermark	Mecklenburgische Seenplatte	Nordvorpommern	Südvorpommern	Stendal
	mean	mean	mean	mean	mean
Number (Actual Elasticity)	1093	1049	2713	2518	2368
Number (Elasticity = Hamburg)	756	591	1656	1386	1445