Graduate Public Finance

Business Taxation Part II: Corporate Tax Incidence

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Princeton
Fall 2018

Lecture 9

Outline

1. Motivation
2. Local Labor Market Approach of Suárez Serrato and Zidar (AER, 2016)
   - Model overview
     - Worker Location, Housing, and Local Labor Supply
     - Firm Location and Local Labor Demand
   - Incidence
   - Empirical Implementation and Identification
     - Structural and Reduced-Form of the Model
   - Estimation: Incidence and Parameter Estimates
     - Reduced-Form Estimation
     - Structural Estimation and Minimum Distance
   - Brief discussion of Local vs National/Global Effects
3. Fuest, Peichl, Siegloch (AER, 2018)

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The Opinion Pages | OP-ED CONTRIBUTOR The New York Times

Abolish the Corporate Income Tax

By LAURENCE J. KOTLIKOFF JAN. 5, 2014

I, like many economists, suspect that our corporate income tax is economically self-defeating – hurting workers, not capitalists

What can workers do to mitigate their plight? One useful step would be to lobby to eliminate the corporate income tax. That might sound like a giveaway to the rich. It's not. The rich, including Boeing's stockholders, can take their companies & run

Who will benefit from corporate tax cuts?

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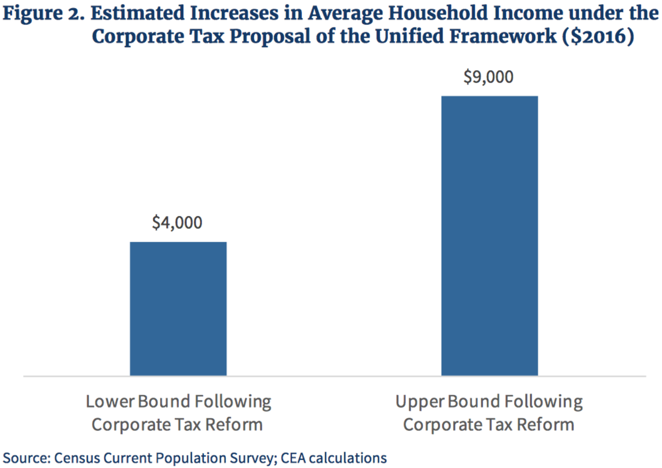

Source: CEA (2017).

Who will benefit from corporate tax cuts?

THE WALL STREET JOURNAL.

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https://www.wsj.com/articles/who-ultimately-pays-for-corporate-taxes-the-answer-may-color-the-republican-overhaul-1502184603

POLITICS

Who Ultimately Pays for Corporate Taxes? The Answer May Color the Republican Overhaul

Investors and workers bear tax burdens, but the politics of tax-code changes hinge on which group carries the heavier load

Lawmakers and Trump administration officials Washington are preparing to mount a business-tax-overhaul campaign this

Who will benefit from corporate tax cuts?

> *"This is about creating jobs" Treasury Secretary Steven Mnuchin said on CBS in April, because many surveys show that 70% or more of the tax burden is borne by the American worker. This is about putting money back in the American worker's pocket"*
> *Last month, Mr. Mnuchin offered an increased estimate, saying 80% of business taxes are paid by workers.*

"There's a pretty wide band of possible outcomes that are plausible," said Alan Auerbach

Source: WSJ (2017).

Agenda

1. **Local Labor Market Approach**
    - Framework from Suárez Serrato and Zidar (AER, 2016)
2. **Brief discussion of Local vs National Effects**
    - State vs federal impacts
    - Harberger-type general equilibrium models
3. **Recent Estimates**
    - Fuest, Peichl, Siegloch (AER, 2018)
    - Other considerations when measuring labor market impacts of corporate tax cuts (e.g., Auerbach, 2005 & forthcoming JEP paper)

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Who Benefits from State Corp Tax Cuts (AER, 2016)

- **Question:** What are the welfare effects of cutting **corporate taxes** in an open economy on **workers**, **firm owners**, and **landowners**?

- **Contributions**

  1. New **evidence** on business location
  2. New **framework** for evaluating welfare effects
  3. New **assessment** of corporate taxation in an open economy

Source: Suárez Serrato and Zidar (AER, 2016)

Relax two crucial assumptions

1. Firms are **perfectly competitive**
   - If firm owners earn zero profits, they can not bear incidence
2. Firms are **perfectly mobile**
   - Every firm is marginal in their location decisions

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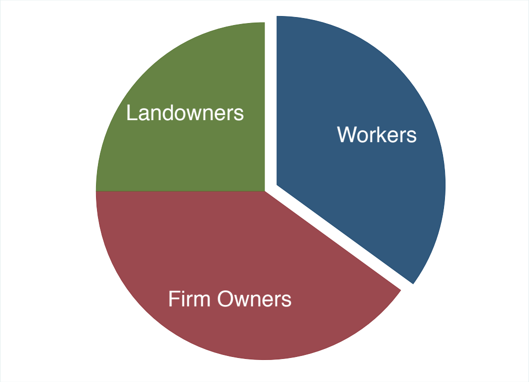
Allow for monopolistically competitive & heterogeneously productive firms

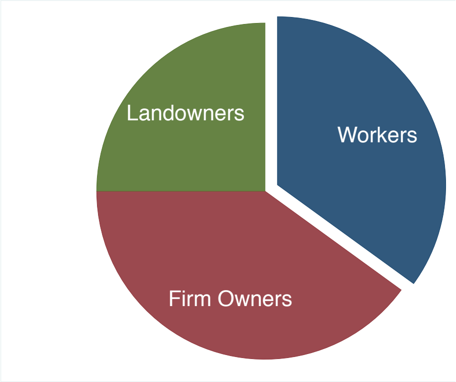
Who Benefits from State Corporate Tax Cuts?

Our Estimate

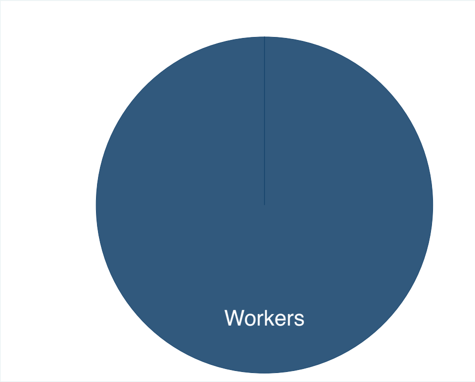


Who Benefits from State Corporate Tax Cuts?

Our Estimate



Standard Model



Context and Challenges

- **Empirical:** Desai et al. 2007, Gravelle 2011, Clausing 2013
  - Insufficient time series variation in US corporate rates
  - Cross-country variation compares countries with dissimilar institutions
- **Theoretical:**
  - Harberger-type general equilibrium with focus on open economy (Gravelle 2010)
  - Computable General Equilibrium Models (Kotlikoff & Summers 1987, Kotlikoff et al. 2013)

Suárez Serrato and Zidar (AER, 2016) Outline: 3 Parts

1. **Develop spatial equilibrium model with firms**
   - Allow workers, firm owners, landowners to bear incidence
   - Map reduced-form effects to parameters governing welfare
2. **Reduced-form effects of corporate tax cuts** (skip for time)
   - Implement state apportionment system using establishment data
   - Number of establishments increases by roughly 3.5% following a 1% corporate tax cut
3. **Estimate incidence and structural elasticities**
   - Implement reduced-form incidence expressions
   - Minimize distance between reduced-form expressions and estimates to estimate structural elasticities
   - Evaluate consequences for equity & efficiency of corporate tax policy

Local Labor Markets Approach

A Spatial Equilibrium Model with Firms

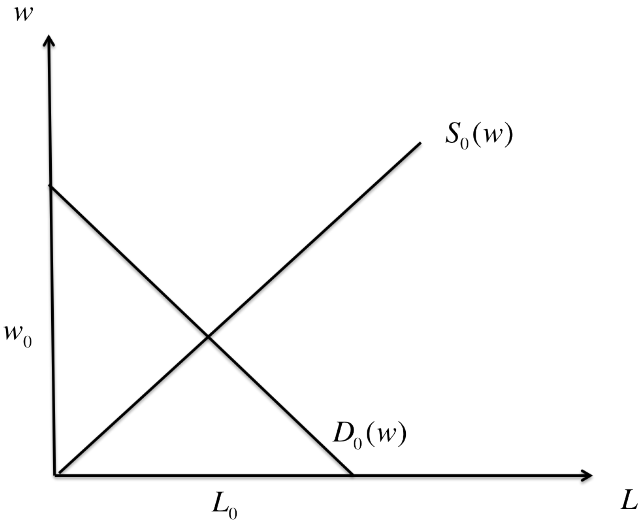
You have to start this conversation with the philosophy that businesses have more choices than they ever have before. And if you don't believe that, you say taxes don't matter. But if you do believe that, which I do, it's one of those things, along with quality of life, quality of education, quality of infrastructure, cost of labor, it's one of those things that matter.

—DELAWARE GOVERNOR JACK MARKELL (11/3/2013) [1]

A Spatial Equilibrium Model with Firms: Outline

1. **Setup**
2. **Worker Location, Labor Supply**
   Moretti (2011), Busso et al (2013)
3. **Housing Market**
   Kline (2010), Notowidigdo (2012)
4. **Firm Location and Labor Demand**
   Dixit-Stiglitz (1977), Krugman (1979), Melitz (2003)
5. **Results**: Incidence $\dot{w}(\theta)$, $\dot{\pi}(\theta)$, $\dot{r}(\theta)$
   - $\varepsilon^{LS}(\theta)$ and $\varepsilon^{LD}(\theta)$, and $\mathbf{b}(\theta)$

Equilibrium in the Local Labor Market



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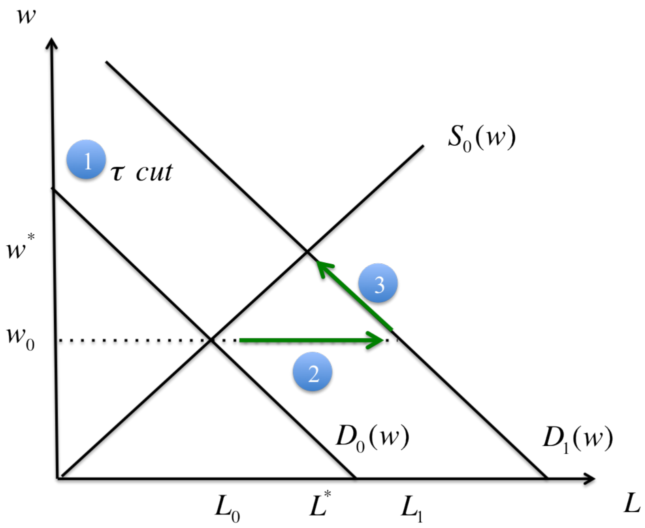

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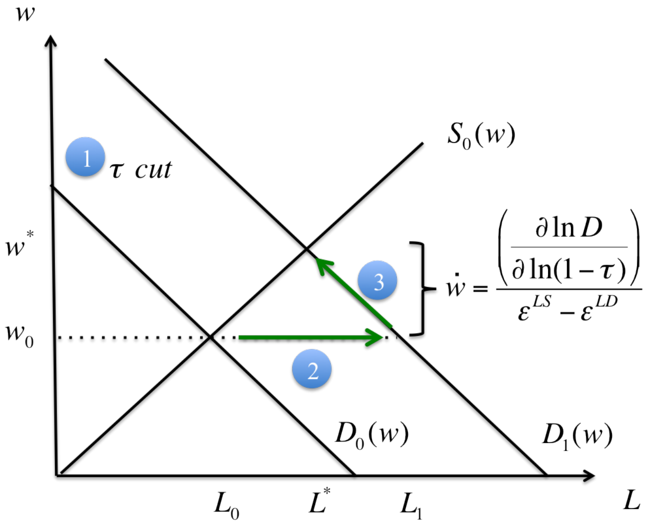

Model Setup

1. **Geography:** Small open economy $c \in C$
2. **Agents:** N_c households, E_c establishments, representative landowner in each location c
3. **Market Structure:**
   - Monopolistically competitive traded goods market for each variety j
   - Global capital market
   - Local labor market
   - Local housing market
4. **Timing:** Steady state, exogenous tax shock, new steady state

Household Problem

$$\max_{h,X} \quad \underbrace{\ln A}_{amenitites} + \underbrace{\alpha \ln h}_{housing} + \underbrace{(1-\alpha)\ln X}_{composite\ good} \quad s.t. \;\; rh + \int_{j\in J} p_j x_j dj = w$$

- where $X = \left(\int_{j\in J} x_j^{\frac{\varepsilon^{PD}+1}{\varepsilon^{PD}}} dj \right)^{\frac{\varepsilon^{PD}}{\varepsilon^{PD}+1}}$
- rh is housing expenditures
- $p_j x_j$ is expenditure on variety j

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Indirect Utility of a Worker:

$$V^W_{nc} = a_0 + \underbrace{\ln w_c - \alpha \ln r_c}_{\text{Disposable income}} + \underbrace{\ln A_{nc}}_{\text{Amenities } \equiv \bar{A}_c + \xi_{nc}}$$

Local Labor Supply

Location choice: Workers choose location with max utility:

$$\max_c \underbrace{a_0 + \ln w_c - \alpha \ln r_c + \bar{A}_c}_{\equiv u_c} + \xi_{nc}.$$

Local Labor Supply

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Local Population:

$$N_c = P\left(V_{nc}^W = \max_{c'}\{V_{nc'}^W\}\right) = \frac{\exp \frac{u_c}{\sigma^W}}{\sum_{c'} \exp \frac{u_{c'}}{\sigma^W}}$$

Local Labor Supply

Location choice: Workers choose location with max utility:

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(Log) Local Labor Supply:

$$\ln N_c(w_c, r_c; \bar{A}_c) = \frac{1}{\sigma^W}\left(\ln w_c - \alpha \ln r_c + \bar{A}_c\right) + C_0$$

Key Parameter: σ^W, dispersion of idiosyncratic preferences ξ_{nc}

Housing Market

Housing Market: Upward-sloping supply of housing:

$$H_c^S = (B_c^H r_c)^{\eta_c}$$

- B_c^H is housing productivity
- r_c is price of housing

With Cobb-Douglas H_c^D, HM equilibrium given by:

$$\ln r_c = \frac{1}{1+\eta_c} \underbrace{(\ln N_c + \ln w_c)}_{Housing\ Demand} + C_1$$

Key Parameter: η_c elasticity of housing supply

Local Labor Supply: Key points

- People move into a local area when wages increase
- How many people move in depends on:

1. **Dispersion of Idiosyncratic Preferences** σ^W
   Higher σ^W means smaller inflows of people following wage increases
2. **Housing Supply Elasticity** η_c
   Lower η_c means rents get bid up more when people move in

Higher σ^W and lower η_c make ε^{LS} smaller, so LS is more vertical

Local Labor Demand

Aggregate labor demand for firms in location c:

$$L_c^D = \underbrace{E_c}_{\text{Extensive margin}} \times \underbrace{\mathbb{E}_\zeta[l^*(\zeta_{jc})|c]}_{\text{Intensive margin}}$$

Elasticity of labor demand:

$$\frac{\partial \ln L_c^D}{\partial \ln w_c} = \underbrace{\gamma - 1}_{\text{Substitution}} + \underbrace{\gamma\varepsilon^{PD}}_{\text{Scale}} - \underbrace{\frac{\gamma}{\sigma^F}}_{\text{Firm}-\text{Location}} \equiv \varepsilon^{LD}$$

More elastic ε^{LD} when:

- Higher output elasticity of labor γ
- Higher product demand elasticity ε^{PD}
- Lower productivity dispersion σ^F (i.e. firms more mobile)

Result: Local Incidence of State Corporate Taxes (1/2)

- Let $\dot{w}_c(\theta) \equiv \frac{\partial \ln w_c}{\partial \ln(1-\tau^b)}$. Incidence on wages is:

$$\dot{w}_c(\theta) = \frac{-\frac{1}{(\varepsilon^{PD}+1)\sigma^F}}{\underbrace{\left(\frac{1+\eta_c-\alpha}{\sigma^W(1+\eta_c)+\alpha}\right)}_{\varepsilon^{\mathrm{LS}}} - \gamma \underbrace{\left(\epsilon^{PD}+1-\frac{1}{\sigma^F}\right)+1}_{\varepsilon^{\mathrm{LD}}}}$$

Smaller wage increase if:

1. Productivity Dispersion σ^F is large (i.e. immobile firms)
2. Preferences Dispersion σ^W is small (i.e. mobile people)
3. Any other reason why ε^{LS} and $|\varepsilon^{LD}|$ are large

Result: Local Incidence of State Corporate Taxes (2/2)

Rental Costs: $\dot{r}_c(\theta) = \left(\frac{1+\varepsilon^{LS}}{1+\eta_c}\right) \dot{w}_c$

- Smaller rent increases if housing supply is very elastic

Firm Profits:

$$\dot{\pi}_c(\theta) = 1 \quad \underbrace{-\delta(\varepsilon^{PD} + 1)}_{\text{Reducing Capital Wedge}} \quad + \underbrace{\gamma(\varepsilon^{PD} + 1)\dot{w}_c}_{\text{Higher Labor Costs}}$$

- Mechanical effects vs. higher production costs

Welfare Effects of Corporate Tax Cut

Stakeholder	Benefit	Statistic
Workers	Disposable Income	$\dot{w}_c - \alpha \dot{r}_c$
Landowners	Housing Costs	$\dot{r}_c$
Firm Owners	After-tax Profit	$1 - \delta(\varepsilon^{PD} + 1) + \gamma(\varepsilon^{PD} + 1)\dot{w}_c$

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Workers	Disposable Income	$\dot{w}_c - \alpha \dot{r}_c$
Landowners	Housing Costs	$\dot{r}_c$
Firm Owners	After-tax Profit	$1 - \delta(\varepsilon^{PD} + 1) + \gamma(\varepsilon^{PD} + 1)\dot{w}_c$ $= 1 + \underbrace{\gamma(\varepsilon^{PD} + 1)}_{-\frac{\text{Labor cost factor}}{\text{Net Markup}}} \times \left(\dot{w}_c - \frac{\delta}{\gamma}\right)$

Empirical Implementation and Identification

Structural Form of the Model

$$\mathbb{A}\mathbf{Y}_{c,t} = \mathbb{B}\mathbf{Z}_{c,t} + \mathbf{e}_{c,t}$$

where

- $\mathbb{A} = \begin{bmatrix} -\frac{1}{\sigma^W} & 1 & \frac{\alpha}{\sigma^W} & 0 \\ 1 & -\frac{1}{\varepsilon^{LD}} & 0 & 0 \\ -\frac{1}{1+\eta} & -\frac{1}{1+\eta} & 1 & 0 \\ \frac{\gamma}{\sigma^F} & 0 & 0 & 1 \end{bmatrix}$, $\mathbb{B} = \begin{bmatrix} 0 \\ \frac{1}{\varepsilon^{LD}\sigma^F(\varepsilon^{PD}+1)} \\ 0 \\ \frac{1}{-\sigma^F(\varepsilon^{PD}+1)} \end{bmatrix}$
- $\mathbf{Y}_{c,t} = \begin{bmatrix} \Delta \ln w_{c,t} & \Delta \ln N_{c,t} & \Delta \ln r_{c,t} & \Delta \ln E_{c,t} \end{bmatrix}'$
- $\mathbf{Z}_{c,t} = \begin{bmatrix} \Delta \ln(1 - \tau^b_{c,t}) \end{bmatrix}$
- $\mathbf{e}_{c,t}$ is a structural error term

Exact Reduced Form of the Model

$$\mathbf{Y}_{c,t} = \underbrace{\mathbb{A}^{-1}\mathbb{B}}_{\equiv \boldsymbol{\beta}^{\text{Business Tax}}} \mathbf{Z}_{c,t} + \mathbb{A}^{-1}\mathbf{e}_{c,t}$$

where $\boldsymbol{\beta}^{\text{Business Tax}}$ is a vector of reduced-form effects of business tax changes:

$$\boldsymbol{\beta}^{\text{Business Tax}} = \begin{bmatrix} \beta^W \\ \beta^N \\ \beta^R \\ \beta^E \end{bmatrix} = \begin{bmatrix} \dot{w} \\ \dot{w}\varepsilon^{LS} \\ \frac{1+\varepsilon^{LS}}{1+\eta}\dot{w} \\ \frac{\mu-1}{\sigma^F} - \frac{\gamma}{\sigma^F}\dot{w} \end{bmatrix}.$$

4 Reduced-Form Equations of the Model

Effects on establishments, pop., wages, & rental cost growth over 10 years

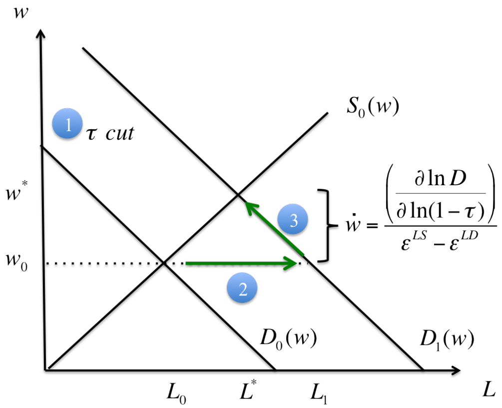
$$\Delta \ln w_{c,t} = \underbrace{(\dot{w}(\theta))}_{\beta^W} \Delta \ln(1 - \tau^b_{c,t}) + \phi^1_t + u^1_{c,t}$$

$$\Delta \ln N_{c,t} = \underbrace{\left(\varepsilon^{LS} \dot{w}(\theta)\right)}_{\beta^N} \Delta \ln(1 - \tau^b_{c,t}) + \phi^2_t + u^2_{c,t}$$

$$\Delta \ln r_{c,t} = \underbrace{\left(\frac{1 + \varepsilon^{LS}}{1 + \eta_c} \dot{w}(\theta)\right)}_{\beta^R} \Delta \ln(1 - \tau^b_{c,t}) + \phi^3_t + u^3_{c,t}$$

$$\Delta \ln E_{c,t} = \underbrace{\left(\frac{1}{-\sigma^F(\varepsilon^{PD} + 1)} - \frac{\gamma}{\sigma^F} \dot{w}(\theta)\right)}_{\beta^E} \Delta \ln(1 - \tau^b_{c,t}) + \phi^4_t + u^4_{c,t}$$

Identification of Local Welfare Effects



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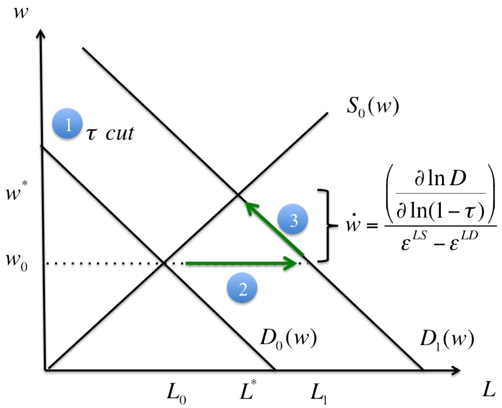

- Reduced forms:
  $\dot{w} = \beta^W$, $\dot{N} = \beta^N$

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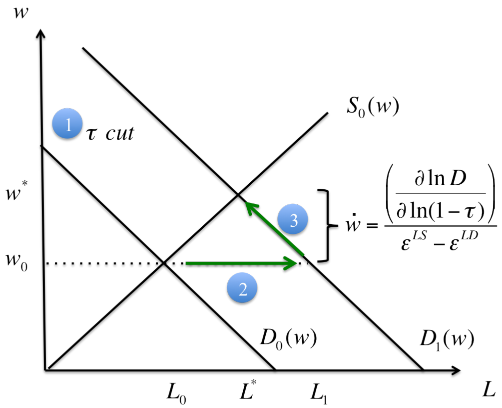
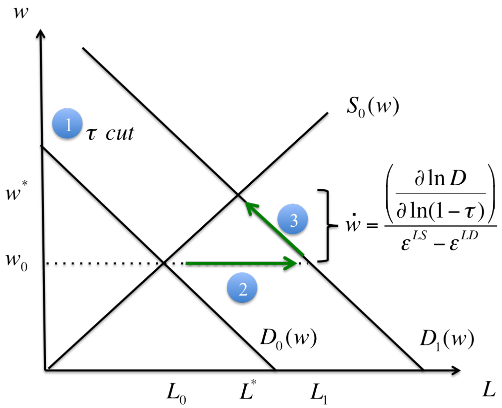


$$\dot{w} = \frac{\left(\frac{\partial \ln D}{\partial \ln(1-\tau)}\right)}{\varepsilon^{LS} - \varepsilon^{LD}}$$

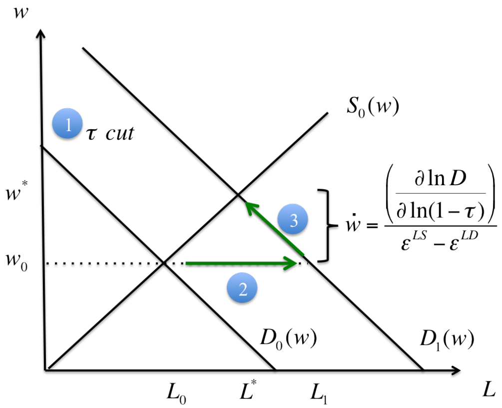
- Reduced forms:
  $\dot{w} = \beta^W$, $\dot{N} = \beta^N$
  $\Longrightarrow \varepsilon^{LS} = \frac{\beta^N}{\beta^W}$

Identification of Local Welfare Effects



- Reduced forms:
  $\dot{w} = \beta^W$, $\dot{N} = \beta^N$
  $\implies \varepsilon^{LS} = \frac{\beta^N}{\beta^W}$
- Labor Demand
  $\varepsilon^{LD} = \gamma(\varepsilon^{PD} + 1) - \frac{\gamma}{\sigma^F} - 1$

Identification of Local Welfare Effects



- Reduced forms:
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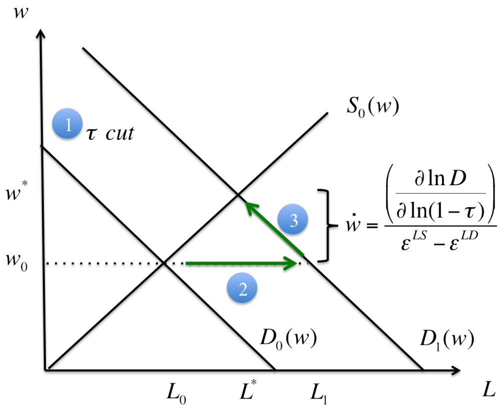
- Labor Demand
  $\varepsilon^{LD} = \gamma(\varepsilon^{PD} + 1) - \frac{\gamma}{\sigma^F} - 1$
- Establishment Location
  $\frac{\partial \ln D}{\partial \ln(1-t)} = \beta^E + \frac{\gamma}{\sigma^F}\beta^W$

Identification of Local Welfare Effects



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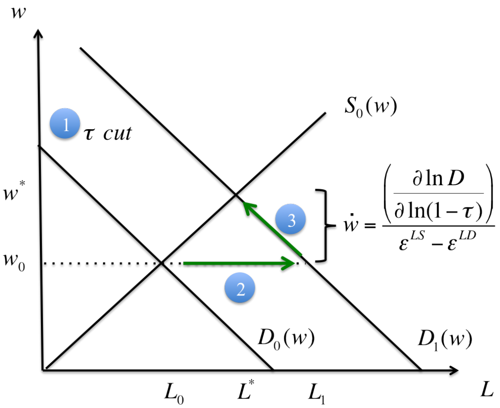
  $\varepsilon^{LD} = \gamma(\varepsilon^{PD} + 1) - \frac{\gamma}{\sigma^F} - 1$
- Establishment Location
  $\frac{\partial \ln D}{\partial \ln(1-t)} = \beta^E + \frac{\gamma}{\sigma^F}\beta^W$

$$\beta^W = \frac{\beta^E + \frac{\gamma}{\sigma^F}\beta^W}{\frac{\beta^N}{\beta^W} - \gamma(\epsilon^{PD} + 1) + \frac{\gamma}{\sigma^F} + 1}$$

Identification of Local Welfare Effects



$$\dot{w} = \frac{\left(\frac{\partial \ln D}{\partial \ln(1-\tau)}\right)}{\varepsilon^{LS} - \varepsilon^{LD}}$$

- Reduced forms:
  $\dot{w} = \beta^W$, $\dot{N} = \beta^N$
  $\Longrightarrow \varepsilon^{LS} = \frac{\beta^N}{\beta^W}$
- Labor Demand
  $\varepsilon^{LD} = \gamma(\varepsilon^{PD} + 1) - \frac{\gamma}{\sigma^F} - 1$
- Establishment Location
  $\frac{\partial \ln D}{\partial \ln(1-t)} = \beta^E + \frac{\gamma}{\sigma^F}\beta^W$

$$\beta^W = \frac{\beta^E + \frac{\gamma}{\sigma^F}\beta^W}{\frac{\beta^N}{\beta^W} - \gamma(\epsilon^{PD} + 1) + \frac{\gamma}{\sigma^F} + 1} \Longrightarrow \boxed{\gamma(\varepsilon^{PD} + 1) = \left(\frac{\beta^N - \beta^E}{\beta^W} + 1\right)}$$

Identification of Local Welfare Effects

Stakeholder	Benefit	Statistic
Workers	Disposable Income	$\hat{\beta}^W - \alpha\hat{\beta}^R$
Landowners	Housing Costs	$\hat{\beta}^R$
Firm Owners	After-tax Profit	$1 + \left(\frac{\hat{\beta}^N - \hat{\beta}^E}{\hat{\beta}^W} + 1\right)(\hat{\beta}^W - \frac{\delta}{\gamma})$

Benefits of the incidence formulae

This framework enables us to:

1. Accommodate the conventional view
2. Transparently evaluate the sensitivity of our incidence estimates
3. Use data to govern relative factor mobility
4. Conduct inference and compare results to existing estimates

Incidence and Parameter Estimates

4 Reduced-Form Equations of the Model

Effects on establishments, pop., wages, & rental cost growth over 10 years

$$\Delta \ln E_{c,t} = \underbrace{\left(\frac{1}{-\sigma^F(\varepsilon^{PD}+1)} - \frac{\gamma}{\sigma^F}\dot{w}(\theta) \right)}_{\beta^E} \Delta \ln(1-\tau^b_{c,t}) + \phi^1_t + u^1_{c,t}$$

$$\Delta \ln N_{c,t} = \underbrace{\left(\varepsilon^{LS}\dot{w}(\theta) \right)}_{\beta^N} \Delta \ln(1-\tau^b_{c,t}) + \phi^2_t + u^2_{c,t}$$

$$\Delta \ln w_{c,t} = \underbrace{\left(\dot{w}(\theta) \right)}_{\beta^W} \Delta \ln(1-\tau^b_{c,t}) + \phi^3_t + u^3_{c,t}$$

$$\Delta \ln r_{c,t} = \underbrace{\left(\frac{1+\varepsilon^{LS}}{1+\eta_c}\dot{w}(\theta) \right)}_{\beta^R} \Delta \ln(1-\tau^b_{c,t}) + \phi^4_t + u^4_{c,t}$$

Identification of Local Incidence on Welfare

Stakeholder	Benefit	Statistic
Workers	Disposable Income	$\hat{\beta}^W - \alpha\hat{\beta}^R$
Landowners	Housing Costs	$\hat{\beta}^R$
Firm Owners	After-tax Profit	$1 + \left(\frac{\hat{\beta}^N - \hat{\beta}^E}{\hat{\beta}^W} + 1\right)(\hat{\beta}^W - \frac{\delta}{\gamma})$

- Housing expenditure share $\alpha = .3$ from Consumer Expenditure Survey
- Output Elasticity of Capital $\delta = .9\gamma$ from BEA

Economic Incidence Estimates Using RF Effects

A. Incidence

	(1)	(2)	(3)	(4)	(5)	(6)
Landowners	1.17	1.17	1.17	0.32	1.86	0.62
	(1.43)	(1.43)	(1.43)	(1.36)	(1.56)	(0.60)
Workers	1.1*	0.69	1.1*	0.68	0.98	0.58*
	(0.59)	(0.44)	(0.59)	(0.52)	(0.84)	(0.33)
Firmowners	1.63*	1.63*	2.08**	0.81	1.54*	0.9***
	(0.90)	(0.90)	(0.95)	(1.4)	(0.92)	(0.34)
Specification						
Net-of-Business Tax	Y	Y	Y	Y	Y	N
Net-of-Corporate Tax	N	N	N	N	N	Y
Housing share α	0.3	0.65	0.3	0.3	0.3	0.3
Output elasticity ratio δ/γ	0.9	0.9	0.5	0.9	0.9	0.9
Bartik	N	N	N	Y	Y	N
Net-of-Personal Tax	N	N	N	N	Y	N

Economic Incidence Estimates Using RF Effects (cont.)

B. Share of Incidence

	(1)	(2)	(3)	(4)	(5)	(6)
Landowners	0.30	0.34	0.27	0.18	0.42**	0.29*
	(0.19)	(0.24)	(0.2)	(0.48)	(0.17)	(0.16)
Workers	0.28***	0.20	0.25***	0.37	0.22*	0.28***
	(0.09)	(0.16)	(0.07)	(0.43)	(0.12)	(0.08)
Firmowners	0.42***	0.47***	0.48***	0.45***	0.35***	0.43***
	(0.12)	(0.10)	(0.17)	(0.13)	(0.09)	(0.10)
Conventional View Test						
χ^2 of $(S^W = 1, S^F = 0)$	132.67	108.14	48.8	6.96	76.27	195.92
P-value	0.00	0.00	0.00	0.01	0.00	0.00
Specification						
Net-of-Business Tax	Y	Y	Y	Y	Y	N
Net-of-Corporate Tax	N	N	N	N	N	Y
Housing share α	0.3	0.65	0.3	0.3	0.3	0.3
Output elasticity ratio δ/γ	0.9	0.9	0.5	0.9	0.9	0.9
Bartik	N	N	N	Y	Y	N
Net-of-Personal Tax	N	N	N	N	Y	N

Structural Estimation

- **4 Parameters of interest**
- **4 Simultaneous equations with the following outcomes:**
  1. Establishment Growth
  2. Population Growth
  3. Wage Growth
  4. Rental Cost Growth
- RF effects of **Taxes** on **4 Outcomes** to estimate σ^F, σ^W, η
- Enhance precision with supplement labor demand (Bartik) Shocks
  1. RF effects of **Both Shocks** on **4 Outcomes** $\Rightarrow \sigma^F$, σ^W, η
  2. RF effects of **Both Shocks** on **4 Outcomes** $\Rightarrow \sigma^F$, σ^W, η, ε^{PD}

Parameters θ

1. Estimated Parameters

1. Productivity Dispersion σ^F
2. Preference Dispersion σ^W
3. Housing Supply Elasticity η
4. Product Demand Elasticity ε^{PD}

2. Calibrated Parameters

- Housing expenditure share $\alpha = .3$ from Consumer Expenditure Survey
- Output Elasticity of Labor $\gamma \in [.1, .3]$ from IRS, BEA
- Output Elasticity of Capital $\delta = .9\gamma$ from BEA residual of L, M

4 Reduced-Form Equations of the Model

Effects on establishments, pop., wages, & rental cost growth over 10 years

$$\Delta \ln E_{c,t} = \underbrace{\left(\frac{1}{-\sigma^F(\varepsilon^{PD}+1)} - \frac{\gamma}{\sigma^F}\dot{w}(\theta)\right)}_{\beta^E} \Delta \ln(1-\tau^b_{c,t}) + \phi^1_t + u^1_{c,t}$$

$$\Delta \ln N_{c,t} = \underbrace{\left(\varepsilon^{LS}\dot{w}(\theta)\right)}_{\beta^N} \Delta \ln(1-\tau^b_{c,t}) + \phi^2_t + u^2_{c,t}$$

$$\Delta \ln w_{c,t} = \underbrace{(\dot{w}(\theta))}_{\beta^W} \Delta \ln(1-\tau^b_{c,t}) + \phi^3_t + u^3_{c,t}$$

$$\Delta \ln r_{c,t} = \underbrace{\left(\frac{1+\varepsilon^{LS}}{1+\eta_c}\dot{w}(\theta)\right)}_{\beta^R} \Delta \ln(1-\tau^b_{c,t}) + \phi^4_t + u^4_{c,t}$$

Estimating Structural Parameters

1. **Reduced Form:** Estimate reduced form $\hat{\mathbf{b}}$ and covariance $\hat{\mathbf{V}}$

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2. **Recover Structural Parameters via Classical Minimum Distance:**

$$\hat{\theta} = \arg\min_{\theta \in \Theta} \; [\hat{\mathbf{b}} - \mathbf{m}(\theta)]' \hat{\mathbf{V}}^{-1} [\hat{\mathbf{b}} - \mathbf{m}(\theta)]$$

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Results:

	Panel (a) Business Tax Shock			
	Population	Wage	Rent	Establishments
Empirical Moments				
Business Tax	4.275***	1.451	1.172	4.074**
	(1.642)	(0.938)	(1.428)	(1.815)
Predicted Moments ($\gamma = .15, \varepsilon^{PD} = -2.5$)				
Business Tax	3.514	0.839	0.591	4.542

Over-id Test	
χ^2-Stat	2.453
χ^2-P-Value	0.117

Test: $\beta^E = \beta^N - (\gamma(\varepsilon^{PD} + 1) - 1)\beta^W$	
T-stat	-1.566
P-value	0.117

Enhancing precision with supplemental LD shocks

Effects on establishments, pop., wages, & rental cost growth over 10 years

$$\begin{aligned}
\Delta \ln E_{c,t} &= b_1 \Delta \ln(1-\tau^b_{c,t}) + b_5 Bartik_{c,t} + \tilde{\phi}^1_t + \tilde{u}^1_{c,t} \\
\Delta \ln N_{c,t} &= b_2 \Delta \ln(1-\tau^b_{c,t}) + b_6 Bartik_{c,t} + \tilde{\phi}^2_t + \tilde{u}^2_{c,t} \\
\Delta \ln w_{c,t} &= b_3 \Delta \ln(1-\tau^b_{c,t}) + b_7 Bartik_{c,t} + \tilde{\phi}^3_t + \tilde{u}^3_{c,t} \\
\Delta \ln r_{c,t} &= b_4 \Delta \ln(1-\tau^b_{c,t}) + b_8 Bartik_{c,t} + \tilde{\phi}^4_t + \tilde{u}^4_{c,t}
\end{aligned}$$

8 Moments from Tax and Bartik Shocks

Panel (b) All Shocks

	Population	Wage	Rent	Establishments
Empirical Moments				
Business Tax	1.516	1.534	1.857	1.749
	(1.915)	(1.117)	(1.562)	(1.540)
Bartik	0.446**	0.554***	0.697***	0.600***
	(0.183)	(0.079)	(0.257)	(0.189)
Personal Tax	1.731	-0.588	-1.192	1.247
	(1.247)	(0.728)	(1.173)	(1.420)
B. Predicted Moments ($\gamma = .15, \varepsilon^{PD} = -2.5$)				
Business Tax	0.736	0.944	1.111	1.893
Bartik	0.424	0.571	0.730	0.479
Personal Tax	1.052	-0.596	-1.559	0.322
Over-id Test			Test: $\beta^E = \beta^N - (\gamma(\varepsilon^{PD} + 1) - 1)\beta^W$	
χ^2-Stat	4.665		T-stat	-1.217
χ^2-P-Value	0.458		P-value	0.224

Structural Elasticities Using Estimated Parameters

	A. All Shocks						
Calibrated Parameters	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Output Elasticity γ	0.150	0.150	0.150	0.200	0.250	0.150	0.250
Housing Share α	0.300	0.500	0.650	0.300	0.300	0.300	0.500
Elasticity of Product Demand ε^{PD}	-2.500	-2.500	-2.500	-2.500	-2.500	-4.000	-4.000
Estimated Parameters							
Idiosyncratic Location Prod. Disp. σ^F	0.277**	0.271**	0.233**	0.321*	0.304	0.149	0.136
	(0.138)	(0.120)	(0.092)	(0.186)	(0.186)	(0.096)	(0.093)
Idiosyncratic Location Pref. Disp. σ^W	0.829***	0.686***	0.621***	0.845***	0.843***	0.839***	0.649**
	(0.282)	(0.260)	(0.230)	(0.294)	(0.295)	(0.294)	(0.253)
Elasticity of Housing Supply η	0.513	2.185	1.157	1.600	0.707	1.995	2.812
	(1.417)	(6.206)	(2.661)	(5.065)	(2.301)	(7.320)	(13.688
Overid Test (p-value)	0.458	0.390	0.393	0.385	0.444	0.390	0.507

Structural Elasticities Using Estimated Parameters (cont.)

	B. Business Tax Shock				C. All Shocks, Estimated ε^{PD}		
Calibrated Parameters	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Output Elasticity γ	0.150	0.150	0.250	0.150	0.150	0.150	0.250
Housing Share α	0.300	0.650	0.300	0.300	0.300	0.650	0.300
Elasticity of Product Demand ε^{PD}	-2.500	-2.500	-2.500	-4.000		Estimated Below	
Estimated Parameters							
Idiosyncratic Location Prod. Disp. σ^F	0.119*	0.117*	0.106	0.048	0.109	0.105	0.138
	(0.065)	(0.064)	(0.075)	(0.039)	(0.392)	(0.194)	(0.411)
Idiosyncratic Location Pref. Disp. σ^W	0.188	0.128	0.171	0.170	0.892***	0.571**	0.753***
	(0.184)	(0.147)	(0.176)	(0.175)	(0.337)	(0.234)	(0.245)
Elasticity of Housing Supply η	6.367	5.724	7.328	6.424	1.925	1.783	3.056
	(15.899)	(13.090)	(20.574)	(16.136)	(8.085)	(6.503)	(25.617)
Elasticity of Product Demand ε^{PD}					-4.704	-4.439	-4.986
					(11.945)	(6.471)	(12.190)
Overid Test (p-value)	0.117	0.117	0.098	0.088	0.251	0.334	0.290

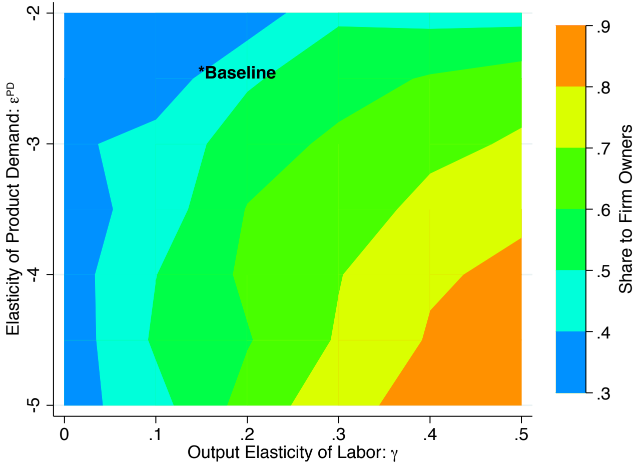
Economic Incidence Using Estimated Parameters

	A. Incidence				
	(1)	(2)	(3)	(4)	(5)
		All Shocks		Business	All Shocks
Calibrated Parameters				Tax	Est. ε^{PD}
Output Elasticity γ	0.150	0.150	0.150	0.150	0.150
Housing Share α	0.300	0.650	0.300	0.300	0.300
Elasticity of Product	-2.500	-2.500	-4.000	-2.500	-4.704
Demand ε^{PD}					(11.945)
Estimated Incidence					
Wages $\dot{w}$	0.944**	1.088**	0.655*	0.839	0.646
	(0.408)	(0.457)	(0.348)	(0.847)	(1.028)
Landowners $\dot{r}$	1.111	0.886	0.428	0.591	0.420
	(1.119)	(1.052)	(1.079)	(1.373)	(1.517)
Workers $\dot{w} - \alpha\dot{r}$	0.611**	0.512	0.527*	0.662	0.520
	(0.293)	(0.355)	(0.269)	(0.517)	(0.703)
Firm Owners $\dot{\pi}$	0.990***	0.958***	1.110***	1.014***	1.141
	(0.092)	(0.103)	(0.157)	(0.191)	(1.012)
Elasticity of Labor	0.780**	0.757	0.958	4.188	0.902
Supply ε^{LS}	(0.386)	(0.729)	(0.588)	(4.795)	(0.645)
Elasticity of Labor	-1.766***	-1.867***	-2.457***	-2.485***	-2.933

Economic Incidence Using Estimated Parameters (cont.)

	B. Shares of Incidence				
	(1)	(2)	(3)	(4)	(5)
		All Shocks		Business	All Shocks
Calibrated Parameters				Tax	Estimated ε^{PD}
Output Elasticity γ	0.150	0.150	0.150	0.150	0.150
Housing Share α	0.300	0.650	0.300	0.300	0.300
Elasticity of Product	-2.500	-2.500	-4.000	-2.500	-4.704
Demand ε^{PD}					(11.945)
Estimated Incidence					
Landowners $\dot{r}$	0.410	0.376	0.207	0.261	0.202
	(0.263)	(0.339)	(0.434)	(0.430)	(0.621)
Workers $\dot{w} - \alpha\dot{r}$	0.225*	0.217	0.255	0.292**	0.250
	(0.134)	(0.197)	(0.185)	(0.142)	(0.290)
Firm Owners $\dot{\pi}$	0.365**	0.407**	0.537*	0.447	0.548
	(0.168)	(0.164)	(0.297)	(0.392)	(0.734)
Test of Standard View (p-value)	0.000	0.000	0.000	0.000	0.026

Firm Owner's Share of Incidence for Calibrated Values of γ and ε^{PD}



Two Additional Considerations

1. **Regional Heterogeneity**
   - We document average effects, but regions can vary (e.g., housing market elasticities η_c) $\Rightarrow$ equity and efficiency impacts vary
   - Everything is bigger in Texas, including the efficiency costs of business location incentives
2. **Accounting for (small) Government Spending Changes**
   - Quantify 3 scenarios: cutting services, infrastructure, both
   - Expenditure shares on services exceed those on infrastructure, so worker amenities hit more
   - Shared impact even for infrastructure only case (lower productivity $\Rightarrow$ lower wages)
   - This reinforces conclusion that firm owners enjoy substantial portion of benefit

Conclusion

Conventional view: corporate taxation in an open economy hurts workers since "shareholders can take their companies and run"

1. New Measure of Local Business Taxes
2. New Reduced Form-Effects
3. New Tractable Spatial Equilibrium Framework with Firms

Conclusion

Conventional view: corporate taxation in an open economy hurts workers since "shareholders can take their companies and run"

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New Assessment: in terms of equity and efficiency, corporate taxation in an open economy may not be as bad as we thought

Brief discussion of Local vs National/Global Effects

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A few considerations:

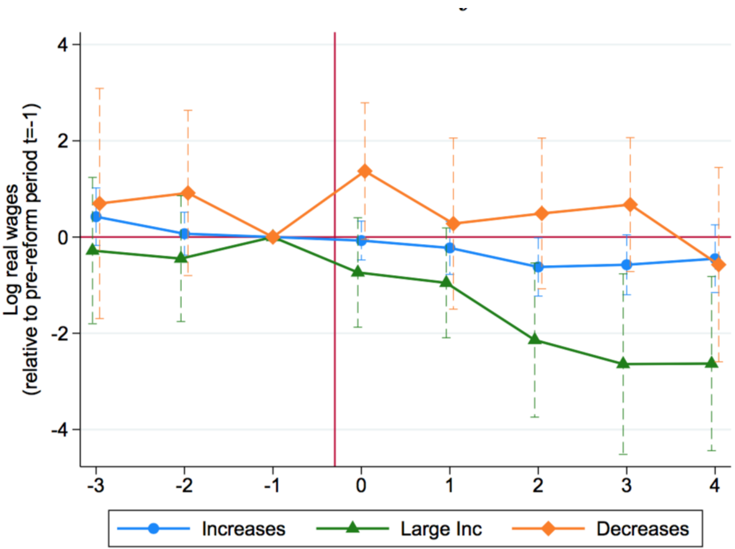
1. Local versus national labor supply and demand are different
2. Key question is how elastic supply of capital is, and how that impacts labor market (both in short and long run)
3. At national level, other issues, like deficit financing's impact on interest rates, and the effects of those higher interest rates on growth, capital accumulation, and labor demand matter more
4. We have more variation and empirical evidence from changes at state and local level. National effects more uncertain

Outline

Overview of Fuest, Peichl, Siegloch (AER, 2018)

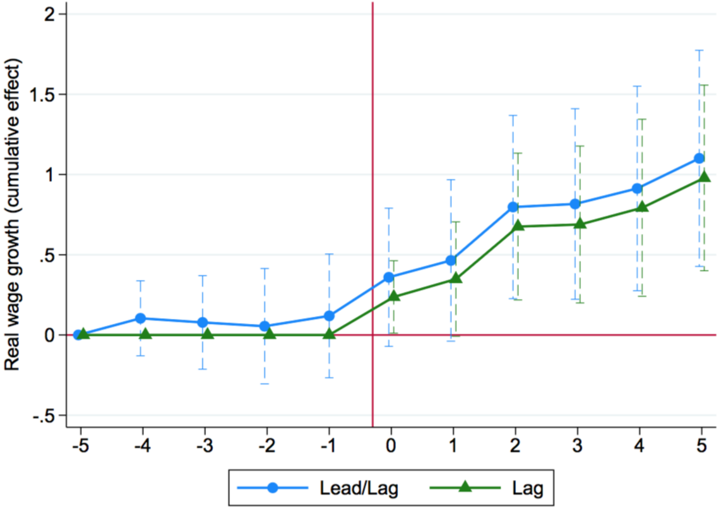
- Paper: C. Fuest, A. Peichl, S. Siegloch . "Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany?"
- Question: What is the effect of corporate taxes on wages?
- Data: 20-year panel of German municipalities. Administrative linked employer-employee data
- Findings:
  - Workers bear roughly half the burden of corporate taxes
  - Low-skilled, young and female employees bear a larger share of the tax burden

Event Study: Effects of corp tax change on log real wages



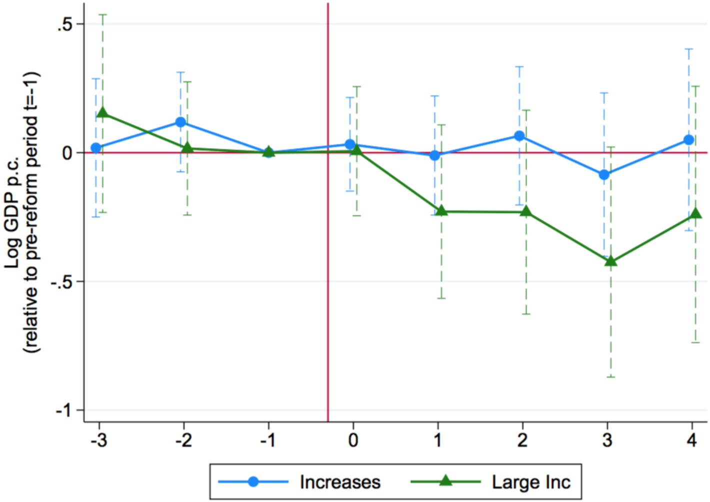
Source: Fuest, Peichl, Siegloch.

Distributed lag: Effects of corp tax change on log real wages



Source: Fuest, Peichl, Siegloch.

Event Study: Effects of corp tax change on log GDP



Source: Fuest, Peichl, Siegloch.

Estimating equation:

$$\ln w_{f,t}^{p50} = \delta \ln(1 - \tau_{m,t}) + \mu_f + \mu_m + \psi_{s,t} + \varepsilon_{f,t},$$

Effects of corp tax change on median wages

Table 1: Differences-in-differences estimates: baseline wage effects

	(1)	(2)	(3)	(4)	(5)	(6)
Log net-of-LBT rate	0.388	0.229	0.386	0.396	0.343	0.399
	(0.127)	(0.110)	(0.127)	(0.128)	(0.164)	(0.118)
Incidence (I^w)	0.505	0.288	0.502	0.516	0.442	0.520
	(0.170)	(0.140)	(0.170)	(0.172)	(0.217)	(0.159)
State × year FE	✓			✓	✓	✓
Year FE		✓				
CZ × year FE			✓			
Municipal controls $t-2$				✓		
Firm controls $t-2$					✓	
Worker shares						✓
Observations	44,654	44,654	44,654	44,654	25,241	44,654

Source: LIAB and Statistical Offices of the Laender. *Notes:* This table presents the DiD estimates, $\hat{\delta}$, of regression model (3) at the firm level. Coefficients measure the wage elasticity with respect to the net-of-local-business-tax rate. The incidence effect I^w is measured according to formula (4) as the share of the total tax burden borne by workers. All regression models include municipal and firm fixed effects. Additional control variables and fixed effects (year, "state × year" or "commuting zone (CZ) × year") vary depending on the specification (as indicated at the bottom of the table). The estimation sample is restricted to all establishments liable to the LBT in non-merged municipalities. Standard errors are clustered at the municipal level. Corresponding standard errors for the incidence measure are obtained using the Delta method. Our preferred (baseline) specification is shown in column (1).

Source: Fuest, Peichl, Siegloch.

Heterogeneous effects on median wages

Table 4: Differences-in-differences estimates: wage effects by worker type

Stratified by ...	Effect of log net-of-LBT rate by worker type			N
Skill	High	Medium	Low	9,295,488
	0.013	0.357	0.377	
	(0.120)	(0.115)	(0.168)	
Gender	Female	Male		9,295,488
	0.530	0.325		
	(0.129)	(0.119)		
Occupation	Blue-collar	White-collar		9,295,442
	0.363	0.250		
	(0.132)	(0.104)		
Age	Young	Medium	Old	9,295,488
	0.507	0.317	0.329	
	(0.127)	(0.111)	(0.106)	

Source: LIAB and Statistical Offices of the Laender. *Notes:* This table presents the DiD estimates $\hat{\delta}$ of regression model (3) with the log individual wage as dependent variables for different worker types as indicated in the table. The heterogeneous effects are estimated by interacting the LBT rate with dummy variables for different firms types. Coefficients measure the wage elasticity with respect to the net-of-local-business-tax rate. All specifications include worker, firm and municipal fixed effects, as well as "state × year" and "worker type × year" fixed effects. The estimation sample comprises all establishments liable to the LBT in non-merged municipalities. Standard errors are clustered at the municipal level.

Source: Fuest, Peichl, Siegloch.