Corporate Taxation

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Week 3

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Outline

1 Brief overview of firm decisions and tax policies

2 Policy: business tax before and after Tax cuts and Jobs Act
   - Business entity types, tax rates, and context for TCJA
   - Business tax base (before and after TCJA)
   - Fundamental reform and apportionment

3 Theory
   - Capital market: supply, demand, and taxes
   - Corporate tax incidence
   - Simple spatial model: one factor, two locations
   - Harberger model

4 Evidence
   - Hines (AER, 1996)
   - Suárez Serrato and Zidar (AER, 2016)
   - Giroud and Rauh (JPE, forthcoming)
   - Fuest, Peichl, Siegloch (AER, forthcoming)
Overview of Business Taxes

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U.S. Business Tax Structure

- Taxes on firms in the US consist of several elements
  1. Tax corporate profits (earnings - expenses) at approx flat rate of 21%
     - Expenses include wages+materials, depreciation, and interest payments
     - Acceleration of depreciation used to stimulate investment
  2. Individual-level taxes on payouts (capital gains, dividends, interest income)
  3. International tax provisions (transfer pricing, tax havens, FTC)
  4. Pass-throughs: most privately-owned firms (S corporations and partnerships) subject to individual income tax system

- What are the consequences of this tax system and what is the optimal design of business taxation?
Corporate Decisions and Tax Policies

Firm’s Decision
- Organizational Form
- Raise Capital
- Production
- Payouts

S corp or C corp
- Where to Locate

Debt or Equity
- Investment Decisions

Report Profits
- Pay Dividends
- Pay Interest

Policy Instruments
- Indiv. vs. Corp. tax, Intl. tax
- Deduction of interest
- Accelerated Depreciation
- Div. tax, Corp. profit tax
Overview of Business Taxes

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Business entity types, tax rates, and context for TCJA
Context for tax reform

1. Rise of pass-throughs
2. Declining corporate tax revenue
3. Declining corporate tax rates
4. Substantial Tax Avoidance and Evasion
Context #1: The Rise of Pass-throughs

Source: Cooper et al (TPE, 2016).
Business Entity Types and Average Tax Rates in 2011

TAX RATE BY ENTITY TYPE

Source: Cooper et al (TPE, 2016)
Tax rate depends on ownership, which is concentrated

Source: Cooper et al (TPE, 2016).
Private business income is very concentrated
Roughly 70% of pass-through income goes to top 1%

Source: Cooper et al (TPF, 2016)
Context #2: Declining Corporate Tax Revenues

Corporate tax revenues, percent of GDP and of federal revenues

![Graph showing corporate tax revenues as a percent of GDP and federal revenues over time.](image)
Context #3: US had highest corp tax rate in the world


Statutory Corporate Income Tax Rates, 2014

OECD Weighted Average (excluding U.S.): 29.7

Source: OECD.
Context #3: Declining Corporate Tax Rates

Figure 1. G-7 Corporate Tax Rates Since 1990

Source: Auerbach (2017 BPEA).
Context #3: Declining Corporate Tax Rates


Statutory Corporate Tax Rates in the U.S. and OECD

Context #4: Substantial Tax Avoidance and Evasion

The share of tax havens in U.S. corporate profits made abroad

Source: G. Zucman.

Notes: This figure charts the share of income on U.S. direct investment abroad made in the main tax havens. In 2013, total income on U.S. DI abroad was about $500bn. 17% came from the Netherlands, 8% from Luxembourg, etc. Source: author’s computations using balance of payments data, see Online Appendix.
Context #4: Substantial Tax Avoidance and Evasion

After a Tax Crackdown, Apple Found a New Shelter for Its Profits

The tech giant has found a tax haven in the island of Jersey, leaving billions of dollars untouched by the United States, leaked documents reveal.

By JESSE DRUCKER and SIMON BOWERS  NOV 8, 2017
### Context #4: Substantial Tax Avoidance and Evasion

<table>
<thead>
<tr>
<th>Country</th>
<th>U.S. Controlled Foreign Corporation Profits Relative to GDP (2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bahamas</td>
<td>104%</td>
</tr>
<tr>
<td>Bermuda</td>
<td>1,578%</td>
</tr>
<tr>
<td>British Virgin Islands</td>
<td>1,009%</td>
</tr>
<tr>
<td>Cayman Islands</td>
<td>1,430%</td>
</tr>
<tr>
<td>Cyprus</td>
<td>13%</td>
</tr>
<tr>
<td>Ireland</td>
<td>38%</td>
</tr>
<tr>
<td>Luxembourg</td>
<td>103%</td>
</tr>
<tr>
<td>Netherlands</td>
<td>15%</td>
</tr>
<tr>
<td>Netherlands Antilles</td>
<td>25%</td>
</tr>
</tbody>
</table>

Source: IRS and United Nations; CEA Calculations.

Who will benefit from corporate tax cuts?

Corporate Tax Reform and Wages: Theory and Evidence
Who will benefit from corporate tax cuts?


Figure 2. Estimated Increases in Average Household Income under the Corporate Tax Proposal of the Unified Framework ($2016)

Source: Census Current Population Survey; CEA calculations.
Who will benefit from corporate tax cuts?

THE WALL STREET JOURNAL.

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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
“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

Business tax base
(before and after TCJA)
1. Summary of TCJA changes to business tax
2. Key base provisions (expensing, interest, DPAD, R&E, losses, etc)
3. Pass-through provisions
4. International provisions

Note: The 2017 Tax Reform is Public Law 115-97, “An Act to provide for reconciliation pursuant to titles II and V of the concurrent resolution on the budget for fiscal year 2018,” which was originally named the “Tax Cuts and Jobs Act” before the title had to be changed b/c of procedural rules related to budget reconciliation.
Summary of the 2017 Tax Reform (TCJA)

Overall Revenue Score and Major Business Provisions

1. Static cost of **1.5T** in federal revenue over ten years (JCT 2017)

2. Corporate Tax Changes
   1. Lowered corporate rate from 35% to 21% (-150B/yr, -1.4T 2018-27)
   2. Full expensing for next 5 years (-30B/yr in 2018-20, -86B/yr 2018-27)
   3. To offset, repeal/limit DPAD, interest deductibility, R&E, losses

3. Pass-through provisions (sunset 12/31/2025)
   1. New 20% deduction for certain pass-through income (-45B/yr)
   2. Lowered top rate from 39% to 37%
   3. To offset, disallow active losses in excess of $500K (15B/yr)

4. International provisions
   1. Establish territorial system and reduce rate on foreign intangibles associated with income derived in US
   2. To offset, minimum tax on global intangibles (GILTI) of 10.5% through 2025 and 13.125% thereafter and (BEAT) which is like a minimum tax on inbound investment. Also one-time payment on existing overseas earnings and free repatriation thereafter
Key Corporate Tax Provisions before TCJA
Pre TCJA: US had more generous tax base provisions


Source: Institute for Fiscal Studies; OECD.
Effective US rates were thus closer to other G7 countries.

Pre TJCA: What are some key tax base provisions?

- **Accelerated depreciation** (House and Shapiro, AER 2008)
- Bonus depreciation and Section 179 (Zwick and Mahon, AER 2017)
- Business net interest deduction
- Loss carry forwards and carrybacks (Zwick and Mahon, AEJ: Policy)
- DPAD (Eric Ohrn, AEJ: Policy 2018 or Rebecca Lester’s work)
- R & E credit (Nirupama Rao, JPUBE 2016)
- Many others
Tax Incentives for investment: accelerated depreciation

- Most common policies to directly change level of investment: changes in depreciation rules and tax credits for investment

- Frequently used in recessions to attempt to stimulate investment by firms

- Begin with a simple example to understand why depreciation rules matter

  - Suppose a firm buys a machine for $1000, which wears down by $100 a year
Consider two tax treatments of the machine

1. Expensing: subtract the full $1000 from profits in the year you buy machine
2. Economic depreciation: subtract $100 per year from your profits

- Expensing reduces effective tax rate for firm given interest rate $r > 0$
- Current policy in U.S.: approximate economic depreciation using linear or exponential rules by asset class
## Recovery periods & depreciation methods by type of \( K \)

Table 2—Recovery Periods and Depreciation Methods by Type of Capital

<table>
<thead>
<tr>
<th>Type of capital</th>
<th>Recovery period, ( R ) (years)</th>
<th>Tax depreciation rate, ( \delta ) (percent)</th>
<th>Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tractor units for over-the-road use, horses over 12 years of age or racehorses with over 2 years in service</td>
<td>3</td>
<td>66.7</td>
<td>200 DB</td>
</tr>
<tr>
<td>Computers and office equipment; light vehicles, buses and trucks</td>
<td>5</td>
<td>40.0</td>
<td>200 DB</td>
</tr>
<tr>
<td>Miscellaneous equipment, office furniture, agricultural equipment</td>
<td>7</td>
<td>28.6 or 21.4</td>
<td>200 DB or 150 DB</td>
</tr>
<tr>
<td>Water transportation equipment (vessels and barges); single-purpose agricultural structures</td>
<td>10</td>
<td>20.0 or 15.0</td>
<td>200 DB or 150 DB</td>
</tr>
<tr>
<td>Radio towers, cable lines, pipelines, electricity generation and distribution systems, “land improvements,” e.g., sidewalks, roads, canals, drainage systems, sewers, docks, bridges, engines and turbines</td>
<td>15</td>
<td>10.0</td>
<td>150 DB</td>
</tr>
<tr>
<td>Farm buildings (other than single purpose structures), railroad structures, telephone communications, electric utilities, water utilities structures including dams, and canals</td>
<td>20</td>
<td>7.5</td>
<td>150 DB</td>
</tr>
<tr>
<td>Nonresidential real property (office buildings, storehouses, warehouses, etc.)</td>
<td>39</td>
<td>2.6</td>
<td>SL</td>
</tr>
</tbody>
</table>

*Note:* Tax depreciation methods are 200 percent declining balance (200 DB), 150 percent declining balance (150 DB), and straight line (SL).

*Source:* IRS Publication 946.

Source: House and Shapiro (AER, 2008).
Table 1—Regular and Bonus Depreciation Schedules for Five-Year Items

<table>
<thead>
<tr>
<th>Year:</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal depreciation</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deductions (000s)</td>
<td>200</td>
<td>320</td>
<td>192</td>
<td>115</td>
<td>115</td>
<td>58</td>
<td>1,000</td>
</tr>
<tr>
<td>Tax benefit ($τ = 35%$)</td>
<td>70</td>
<td>112</td>
<td>67.2</td>
<td>40.3</td>
<td>40.3</td>
<td>20.2</td>
<td>350</td>
</tr>
<tr>
<td>Bonus depreciation (50%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deductions (000s)</td>
<td>600</td>
<td>160</td>
<td>96</td>
<td>57.5</td>
<td>57.5</td>
<td>29</td>
<td>1,000</td>
</tr>
<tr>
<td>Tax benefit ($τ = 35%$)</td>
<td>210</td>
<td>56</td>
<td>33.6</td>
<td>20.2</td>
<td>20.2</td>
<td>10</td>
<td>350</td>
</tr>
</tbody>
</table>

Notes: This table displays year-by-year deductions and tax benefits for a $1 million investment in computers, a five-year item, depreciable according to the Modified Accelerated Cost Recovery System (MACRS). The top schedule applies during normal times. It reflects a half-year convention for the purchase year and a 200\% declining balance method (2 × straight line until straight line is greater). The bottom schedule applies when 50\% bonus depreciation is available.

Source: Authors’ calculations. See IRS publication 946 for the recovery periods and schedules applying to other class lives (https://www.irs.gov/uac/about-publication-946).
Bonus depreciation

- Allows additional first-year deductions for new equipment.
- Bonus I: 30% in 2001, 2002; 50% in 2003, 2004
- Bonus II: 50% in 2008-09, 12-13; 100% in 2010-11

\[
\begin{align*}
z_T^0 &\equiv \left( D_0 + \sum_{t=1}^{T} \frac{1}{(1+r)^t} D_t \right) \text{ with } \sum D_i = 1 \\
z_T(\theta) &\equiv \theta z_T^0 + (1-\theta)z_T^0 \text{ with } \theta \in (0,1]
\end{align*}
\]

Source: Zwick and Mahon (AER, 2017).
**Bonus depreciation**

\[ z_T(\theta) \equiv (1 - \theta) z_T^0 + \theta \begin{array}{c} \text{PV of } \$1 \text{ Bonus times} \end{array} \text{ with } \theta \in (0, 1] \]

### Normal times:

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
</tr>
</thead>
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<td>Deductions</td>
<td>200</td>
<td>320</td>
<td>192</td>
<td>115</td>
<td>115</td>
<td>58</td>
<td>1000</td>
</tr>
<tr>
<td>( z_5(0) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.890</td>
</tr>
</tbody>
</table>

### Bonus times (50%):

<table>
<thead>
<tr>
<th>Year</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>Total</th>
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</thead>
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<tr>
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<td>600</td>
<td>160</td>
<td>96</td>
<td>57.5</td>
<td>57.5</td>
<td>29</td>
<td>1000</td>
</tr>
<tr>
<td>( z_5(0.5) )</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.945</td>
</tr>
</tbody>
</table>

Source: Zwick and Mahon (AER, 2017).
Bonus depreciation

1. Bonus allowance is more valuable for longer lived items.

2. Industries differ in relative intensity of longer lived investment.

<table>
<thead>
<tr>
<th>Short Duration (NAICS)</th>
<th>Long Duration (NAICS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rental and Leasing (532)</td>
<td>Utilities (221)</td>
</tr>
<tr>
<td>Publishing (511)</td>
<td>Pipeline Transport (486)</td>
</tr>
<tr>
<td>Data Processing (518)</td>
<td>Railroads (482)</td>
</tr>
<tr>
<td>Ground Transit (485)</td>
<td>Accommodations (721)</td>
</tr>
<tr>
<td>Professional Services (541)</td>
<td>Food Manufacturing (311)</td>
</tr>
</tbody>
</table>

Source: Zwick and Mahon (AER, 2017).
1. Bonus allowance is more valuable for longer lived items.

2. Industries differ in relative intensity of longer lived investment.

3. Use tax data to compute weighted average present value of deductions, $z_N$, at four-digit NAICS level

4. Use cross-sectional variation in bonus generosity to identify the effect of bonus (diff-in-diffs)

$$\Delta I_{\text{Rental and Leasing}} \quad \text{vs.} \quad \Delta I_{\text{Utilities}}$$

$$\log(I_{it}) = \alpha_i + \delta_t + \beta z_{N,t} + \gamma X_{it} + \varepsilon_{it}$$


- Larger sample, one policy change

Source: Zwick and Mahon (AER, 2017).
Calendar Diff-in-Diffs: Bonus I

Intensive Margin

Source: Zwick and Mahon (AER, 2017).
Calendar Diff-in-Diffs: Bonus I

Extensive Margin

Source: Zwick and Mahon (AER, 2017)
Bonus depreciation

**Calendar Diff-in-Diffs: Bonus II**

*Intensive Margin*

Source: Zwick and Mahon (AER, 2017).
**Calendar Diff-in-Diffs: Bonus II**

**Extensive Margin**

![Graph showing log(odds ratio) over years before and during Bonus II for treatment and control groups.](image)
What are some key tax base provisions?

- Accelerated depreciation and bonus (House and Shaprio, AER 2008)
- **Section 179**
- Business net interest deduction
- Loss carry forwards and carrybacks (Zwick and Mahon, AEJ: Policy)
- DPAD (Eric Ohrn, AEJ: Policy 2018 or Rebecca Lester’s work)
- R & E credit (Nirupama Rao, JPUBE 2016)
- Many others
Section 179

- S179 is a component of the depreciation schedule which applies mainly to smaller firms.
- Under Section 179, taxpayers may elect to expense qualifying investment up to a specified limit.
- With the exception of used equipment, all investment eligible for Section 179 expensing is eligible for bonus depreciation.
- Each tax year, there is a maximum deduction and a threshold over which Section 179 expensing is phased out dollar for dollar.
- The kink and phase-out regions have increased incrementally since 1993.
- TCJA raises the top threshold to $2.5 M
Section 179 example

Source: Yagan Zidar Zwick.
Loss provisions

<table>
<thead>
<tr>
<th>Ending fiscal period</th>
<th>Carryback</th>
<th>Carryforward</th>
<th>Enacting legislation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1998-12 to 2000-12</td>
<td>2 years</td>
<td>20 years</td>
<td>TRA 1997 (permanent)</td>
</tr>
<tr>
<td>2001-01 to 2002-12</td>
<td>5 years</td>
<td>20 years</td>
<td>JCWAA 2002 (temporary)</td>
</tr>
<tr>
<td>2003-01 to 2007-12</td>
<td>2 years</td>
<td>20 years</td>
<td>TRA 1997 (permanent)</td>
</tr>
<tr>
<td>2008-01 to 2010-11</td>
<td>5 years</td>
<td>20 years</td>
<td>ARRA 2009 (temporary)</td>
</tr>
<tr>
<td>2010-12 to 2012-11</td>
<td>2 years</td>
<td>20 years</td>
<td>WHBAA 2009 (temporary)</td>
</tr>
</tbody>
</table>

Notes: This table summarizes the statutory window for eligible carrybacks and carryforwards between 1998 and 2011. The policy rules apply to corporate tax returns with ending fiscal periods that fall within the range detailed in the first column of the table. The last column lists the legislation that enacted the policy changes. In this period, the carryback window was twice expanded temporarily as part of fiscal stimulus legislation. The information for this table was pulled from bulletins and revenue procedures released by the Internal Revenue Service.

a. Corporations file income taxes for the fiscal year instead of the calendar year
b. ARRA 2009 and WHBAA 2009 limited deductions against the fifth fiscal year preceding a firm’s current tax loss to 50 percent of taxable income
c. TRA: Taxpayer Relief Act of 1997
d. JCWAA: Job Creation and Worker Assistance Act of 2002
e. ARRA: American Recovery and Reinvestment Act of 2009
f. WHBAA: Worker, Homeowner, and Business Assistance Act of 2009

Institutional detail on international tax

Follow the Money
Essays on International Taxation

Michael J. Graetz

Future of Fiscal Policy (Econ 593i)
Taxation and the Firm
Week 3 46 / 120
Important provisions and issues

- Worldwide versus territorial
- Check the box regulations (effective 1997)
- Foreign Tax Credit (passive versus general income, US expense allocation rules, loss rules, HIRE act changes)
- Transfer pricing
- Subpart F rules
- Deductibility of interest payments and “thin capitalization” rules
- Intellectual property (IP) and BEPS
- Tax havens
TCJA: Corporate Tax Reform
TCJA Bucket 1: Key “old school” Base Provisions

1. **Equipment investment deductions:**
   - Increase section 179 expensing max value to $1M (with $2.5M phase-out threshold)
   - Extends bonus depreciation and expands to expensing with phase-out

2. **R&D deductions:** shifts from expensing to amortization in 2022

3. **Interest deductions:**
   - Limit net interest to 30% of adjusted taxable income (EBITDA until 2022 and EBIT after);
     firms with receipts < $25M are exempt
   - Does not apply to investment interest/interest income from financials

4. **Net operating losses (NOLs):** Repeals carrybacks. Carryforwards are indefinite, but NOL deduction is capped at 80% of income

5. **Other:** Repeals Corporate AMT and Domestic Production Activities Deduction (DPAD)
The effective marginal tax rate on equipment investment falls somewhat, then rises sharply.

Effective Marginal Tax Rate on Investment in 7-Year Equipment under the Tax Cuts and Jobs Act

Note: Assumes 32 percent debt financing and 68 percent equity financing. After 2017, assumes that 15 percent of firms are constrained by the interest cap. Source: Author's calculations based on Mathur and Kallen (2017).
The effective marginal tax rate on structures investment falls

Effective Marginal Tax Rate on Investment in 39-Year Structures under the Tax Cuts and Jobs Act

<table>
<thead>
<tr>
<th>Year</th>
<th>35% rate + normal depreciation</th>
<th>21% rate + normal depreciation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2018</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2019</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2020</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2021</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2022</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2023</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2024</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2025</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2026</td>
<td>30%</td>
<td>15%</td>
</tr>
<tr>
<td>2027</td>
<td>30%</td>
<td>15%</td>
</tr>
</tbody>
</table>

Note: Assumes 32 percent debt financing and 68 percent equity financing. After 2017, assumes that 15 percent of firms are constrained by the interest cap. Source: Author’s calculations based on Mathur and Kallen (2017).
The effective marginal tax rate on R&D investment rises substantially.

Effective Marginal Tax Rate on Investment in R&D under the Tax Cuts and Jobs Act

Note: Assumes 32 percent debt financing and 68 percent equity financing. After 2017, assumes that 15 percent of firms are constrained by the interest cap. Source: Author’s calculations based on Mathur and Kallen (2017) and Bureau of Economic Analysis.

1. **Deductions**: Same as pertinent “old school” provisions

2. **Rate cut**:
   - Allows 20% deduction of qualified business income
   - Reduces top rate from 37% to 29.6%

3. **Phase-out of deduction**:
   - Specified service businesses – health, law, consulting, etc.
   - Businesses with low wages AND low capital. Cap on the deduction is greater of (a) 50% of W2 comp or (b) 25% of W2 comp and 2.5% of purchase of tangible assets
   - Phase-out begins at $157,500 for individuals, $315,000 for joint filers
$2.8T in Accumulated Deferred Foreign Income (2017)

Just a handful of the biggest companies are responsible for a disproportionate share of the accumulated foreign profits.

Source: WSJ.

1. **Territorial?** territorial with minimum tax on certain foreign income

2. **Toll tax:** One-time tax on past earnings
   - Deemed repatriation of deferred foreign income with 8% rate on illiquid and 15.5% rate on liquid assets, payable over 8 years
   - Deferral system is repealed going forward

3. **Profit shifting with intangibles:**
   - Immediate taxation of global intangible low-taxed income (at least 10.5%) – GILTI provision
   - Deduction for domestic intangible income earned from unrelated foreign parties (implies a rate of at least 13%) – FDII

4. **Inbound profit shifting and anti-inversion measures:**
   - Min tax of 10% on income when payments to foreign related parties occur – BEAT provision
   - Could hit cross-border or sub to branch bank payments, as no netting

5. **Modification to Subpart F:** Broader CFC rules. Foreign corporations may be subject to immediate inclusion of foreign-earned income
Deficits expected to rise to 5%+ of GDP—and much more if major provisions are extended

Federal Deficit as a Percent of GDP

Source: Committee for a Responsible Federal Budget; Congressional Budget Office; author’s calculations.
Fall in Corporate Tax → Rise in Value-Added Tax

Corporate Rates

Value-Added Tax Rates

Source: Brookings, OECD.
Fundamental reform and apportionment
Reforming how we tax corporate income

Corporate tax base

- Tax base - what do we want to tax?

- Location of the tax base - where do we want income to be taxed?
  - Source-based: where goods or services are produced
  - Residence-based: where shareholders/corporate headquarters are located
  - Destination-based: where final consumers are located
State business taxes: three types of firm taxes

1. Partnership and S-corps: $\tau^{INC}$ personal income tax rate
   - Synthetic changes as in Zidar (2013) using NBER’s TAXSIM

2. Single-state C-corps: $\tau^c$ corporate income tax rate
   - Digitized corporate tax rates from “Book of the States”

3. Multi-state C-corps: $\tau^A$ apportioned corporate income tax rate
   - Depends on corporate rate, apportionment, and activity weights
     \[ \tau^A_i = \sum_s \tau^c_s \omega_{is} \]
   - where \[ \omega_{is} = \left( \frac{\theta^w_s W_{is}}{W} \right) + \left( \frac{\theta^p_s R_{is}}{R} \right) + \left( \frac{\theta^x_s X_{is}}{X} \right) \]
     - payroll
     - property
     - sales
Nike apportionment example
Nike apportionment example

Source: Suárez Serrato and Zidar (AER, 2016).
Nike apportionment example

- Suppose Nike earns $2 M of profit in every state
- Their tax liability differs based on how profits are apportioned

<table>
<thead>
<tr>
<th>State</th>
<th>I. Using Payroll</th>
<th>II. Using Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Apportioned Profit ($M)</td>
<td></td>
</tr>
<tr>
<td>OR</td>
<td>(80% of 6) = 4.8</td>
<td>2</td>
</tr>
<tr>
<td>IL</td>
<td>(10% of 6) = .6</td>
<td>2</td>
</tr>
<tr>
<td>AL</td>
<td>(10% of 6) = .6</td>
<td>2</td>
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</table>

<table>
<thead>
<tr>
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<th>Corporate Tax Liability ($M)</th>
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<tr>
<td>OR with $\tau_{OR} = 50%$</td>
<td>2.4 1</td>
</tr>
<tr>
<td>IL with $\tau_{IL} = 10%$</td>
<td>.06 0.2</td>
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<tr>
<td>AL with $\tau_{AL} = 0%$</td>
<td>0 0</td>
</tr>
<tr>
<td><strong>Total Tax Liability ($M)</strong></td>
<td><strong>3 1.2</strong></td>
</tr>
</tbody>
</table>

Source: Suárez Serrato and Zidar (AER, 2016).
Evolution of apportionment weights

Panel A. 1980

Panel B. 1990

Panel C. 2000

Panel D. 2010
Three reforms

- Formula apportionment
- Corporate tax integration
- Borderer adjustment
Formula Apportionment

Formula apportionment

- Tax base in country $i$ based on shares of global sales, assets, and/or payroll made in $i$ (Gordon and Wilson Econometrica '86)
- Used by US states for their own corporate taxes (Clausing '14)
- Key attraction: eliminates the opportunity for companies to engage in profit shifting
- Sales only apportionment removes incentives to move K abroad
- Potential problem of sales through low-tax resellers

Source: Zucman.
Corporate tax integration

- Shareholders receive credits for previously paid corporate taxes
- Corporate tax becomes like a withholding pre-paid tax that is refunded when dividends are paid out to individuals
- Removes incentives to shift profits and move capital abroad
- Existed in Europe; still exists today in Canada, Mexico, Australia
- Can be combined with apportionment to ensure proper withholding at corporate level

Source: Zucman.
Border adjustment (Auerbach 2010)

- Include in corporate tax base value of all imports and deduct the value of all exports
- Similar to VAT border-adjustment (Auerbach & Holtz-Eakin '16)
- In theory, $ FX must adjust leaving trade balance unchanged
- Like sales apportionment and integration, border adjustment removes incentives to shift profits or move capital abroad
- If combined with full expensing and no interest deduction: DBCFT

Source: Zucman.
Economically DBCFT at $\tau = 20\%$ is equivalent to:

1. Abolish corporate income tax
2. Introduce a value-added-tax on consumption at 20% rate
3. Subsidize labor earnings at 20% rate (like a giant payroll tax cut)

1. is regressive and makes US a corporate tax haven
2. + 3. is equivalent to a tax on existing wealth (progressive)

Uncertainties: FX adjustment, foreign business to consumers sales (problem also for VAT), WTO compatibility, long-term revenue effects

Source: Zucman.
Overview of Business Taxes

1 Brief overview of firm decisions and tax policies

2 Policy: business tax before and after Tax cuts and Jobs Act
   - Business entity types, tax rates, and context for TCJA
   - Business tax base (before and after TCJA)
   - Fundamental reform and apportionment

3 Theory
   - Capital market: supply, demand, and taxes
   - Corporate tax incidence
   - Simple spatial model: one factor, two locations
   - Harberger model

4 Evidence
   - Hines (AER, 1996)
   - Suárez Serrato and Zidar (AER, 2016)
   - Giroud and Rauh (JPE, forthcoming)
   - Fuest, Peichl, Siegloch (AER, forthcoming)
Theory
Impact of a Capital Tax

\[ R_t \]

\[ S(R_t) \]

\[ D(R_t) \]

\[ R^* \]

\[ K^* \]
Impact of a Capital Tax

![Graph showing the impact of a capital tax on investment and returns.](image)
Impact of a Capital Tax (in Long Run)
Impact of a Capital Tax

Who bears the capital tax in the long run?

- Who gets the triangle above \( R \)-pre-tax (i.e., consumer surplus in the typical S and D graph)?
- If firms don’t earn profits, this all goes to workers in terms of higher wages or lower prices
- A key object is the **elasticity of capital supply**, is likely larger (and some think infinite) in the LR
- Note that the distortion in the capital market reduces surplus more than it increases tax revenues (as with most taxes)
- Finally, distortions due to capital taxation are often considered in a dynamic context in which the distortion compounds overtime (See Ivan Werning’s recent paper on the classic Chamley-Judd results)
Simple spatial model: One factor, two locations
Setup

1. One factor (capital)
2. Two locations: east and west
3. Capital market in each location
4. Total $K$ fixed in economy overall
Initial equilibrium

![Diagram showing initial equilibrium with variables r and K, indicating equilibrium at r₀ and K₀.](image-url)
Tax in west

Causes capital to flee to east

\[ r \]

\[ r_0 \]

\[ K_1 \]

\[ K_0 \]

\[ K \]
New allocation of capital

- $K$ flows to east, lowering net returns in both
- Flows continue until after tax return is equalized across markets
Welfare changes in each location

- Welfare in west falls by red amount
- Welfare in east increases
Net welfare changes in aggregate

- Net welfare loss in red
What determines size of welfare loss in this toy example?

1. Size of tax change
2. Size of market being taxed (depends on fundamentals)
3. Elasticity of demand in both regions (quantity response more generally, which depends on S and D elasticities)
4. Strength of complementarities across markets (e.g., labor market)
5. Assumptions about effects/value of government spending (assumed to be zero here)
6. Presence of existing distortions
Harberger model
Two Main Effects of Taxing $K_x$

1. **Substitution effects:** capital bears incidence

2. **Output effects:** capital may not bear all incidence
Substitution effects

- Tax on $K_x$ shifts production in $X$ away from $K$ so aggregate demand for $K$ goes down.

- Because total $K$ is fixed, $r$ falls $\rightarrow K$ bears some of the burden.

Another intuition for this is that capital is misallocated across sectors, which lowers $r$ and $rK$. 
Output effects

- Tax on $K_X$ makes $X$ more expensive
- Demand shifts to $Y$

**Case 1: $K_X/L_X > K_Y/L_Y$ (X: cars, Y: bikes)**
- $X$ more capital intensive $\rightarrow$ lower aggregate demand for $K$
- Output + subst. effect: $K$ bears the burden of the tax

**Case 2: $K_X/L_X < K_Y/L_Y$ (X: bikes, Y: cars)**
- $X$ less capital intensive $\rightarrow$ higher aggregate demand for $K$
- Subst. and output effects have opposite signs $\rightarrow$ labor may bear some the tax
Harberger showed that under a variety of reasonable assumptions, capital bears exactly 100 percent of the tax. Note that this is the burden on all capital – as capital flees the corporate sector, it depresses returns in the noncorporate sector as well. Both the realism of the model and the characterization of the corporate income tax as an extra tax on capital in the corporate sector are subject to question, as discussed in considerable detail by the subsequent literature on the effects of the corporate tax. – Alan Auerbach

See Auerbach TPE paper on who bears the corporate tax for more details
Overview of Business Taxes

1. Brief overview of firm decisions and tax policies
2. Policy: business tax before and after Tax cuts and Jobs Act
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Evidence

Question: How do international taxation on FDI and state taxation interact when affecting business location?

Motivation: Effect of taxes on investment and firm location are key determinants of the incidence and efficiency consequences of business taxation
Countries have different policies on taxation of domestic firm income earned abroad.

- **Foreign earnings of domestic firms effectively exempt from taxation**
  - Ex: Australia, Canada, France, Germany, Switzerland

- **Foreign Tax Credits (FTCs):** firms pay taxes on profits earned abroad, claim credits against liabilities in the home country
  - Only corporate income taxes can be creditable in countries with FTC policies
  - Ex: United States, the United Kingdom, Japan

- **Key idea:** countries that can use FTCs are less sensitive to tax differences since they can write them off
Investment data: BEA 1987 Census of Manufactures

- State-by-country FDI data
- Investing countries: Australia, Canada, France, Germany, Japan, Switzerland, and the United Kingdom → “Together, the seven [...] countries account for 78% of the manufacturing PPE controlled by foreign investors in the United States in 1987” (p. 1083)

- Dataset excludes the Netherlands, because of role of Dutch companies in international tax avoidance

- State corporate income tax rate: top statutory rate, correcting for depreciation rules and federal deductibility
Investors from Exemption Countries Less Likely to Invest in High-Tax States

Notes: Figure plots investment-to-population ratios in 25 high-tax states and 25 low-tax states. High-tax states have tax...
Disparity in Investment Even Higher Across Highest- and Zero-Tax States

Figure plots investment-to-population ratios in highest-tax states and zero-tax states. Highest-tax states have tax rate that is greater than 8.8%.

NOTES: Figure plots investment-to-population ratios in highest-tax states and zero-tax states. Highest-tax states have tax rate that is greater than 8.8%.
Main Findings:

- 1% higher state corp tax rate ↔ 9-11% higher investment shares of firms from FTC countries relative to non-FTC countries

- State tax rate differences of 1% are correlated with diff of 3% in the likelihood of investors to establish affiliates

**Key takeaway:** results suggest that even small variations in local tax rates may have affect capital flows and on the economy as a whole
Suárez Serrato and Zidar (AER, 2016)
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
Relax two crucial assumptions

1. Firms are **perfectly competitive**
   - If firm owners earn zero profits, they cannot bear incidence

2. Firms are **perfectly mobile**
   - Every firm is marginal in their location decisions
Relax two crucial assumptions

1. Firms are **perfectly competitive**
   - If firm owners earn zero profits, they cannot bear incidence

2. Firms are **perfectly mobile**
   - Every firm is marginal in their location decisions

Allow for *monopolistically competitive & heterogeneously productive* firms
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
Who Benefits from State Corporate Tax Cuts?

Our Estimate

- Workers
- Firm Owners
- Landowners
Who Benefits from State Corporate Tax Cuts?

Our Estimate

- Landowners
- Firm Owners
- Workers

Standard Model

- Workers
Paper Outline: 3 Steps

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
   - 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
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)
Equilibrium in the Local Labor Market

\[ S_0(w) \]

\[ D_0(w) \]

\[ D_1(w) \]

\[ L_0 \]

\[ L^* \]

\[ L_1 \]

\[ w^* \]

\[ w_0 \]

\[ \tau \text{ cut} \]
Equilibrium in the Local Labor Market

\[ w \]

1. τ cut

2. \( w^* \)

3. \( w_0 \)

\[ w = \frac{\partial \ln D}{\partial \ln(1 - \tau)} \]

\[ \frac{\varepsilon^{LS} - \varepsilon^{LD}}{\varepsilon^{LS}} \]
Welfare Effects of Corporate Tax Cut

<table>
<thead>
<tr>
<th>Stakeholder</th>
<th>Benefit</th>
<th>Statistic</th>
</tr>
</thead>
<tbody>
<tr>
<td>Workers</td>
<td>Disposable Income</td>
<td>$\dot{w}_c - \alpha \dot{r}_c$</td>
</tr>
<tr>
<td>Landowners</td>
<td>Housing Costs</td>
<td>$\dot{r}_c$</td>
</tr>
<tr>
<td>Firm Owners</td>
<td>After-tax Profit</td>
<td>$1 - \delta (\varepsilon^{PD} + 1) + \gamma (\varepsilon^{PD} + 1) \dot{w}_c$</td>
</tr>
</tbody>
</table>
# Welfare Effects of Corporate Tax Cut

## Stakeholder Benefit Statistic

<table>
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<tr>
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<td>Housing Costs</td>
<td>$\dot{r}_c$</td>
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<tr>
<td>Firm Owners</td>
<td>After-tax Profit</td>
<td>$1 - \delta (\epsilon^{PD} + 1) + \gamma (\epsilon^{PD} + 1) \dot{w}_c$</td>
</tr>
<tr>
<td></td>
<td></td>
<td>$= 1 + \gamma (\epsilon^{PD} + 1) \times (\dot{w}_c - \frac{\delta}{\gamma})$</td>
</tr>
</tbody>
</table>

*Labor cost factor*

*Net Markup*
## Identification of Local Incidence on Welfare

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

- Housing expenditure share $\alpha = .3$ from Consumer Expenditure Survey
- Output Elasticity of Capital $\delta = .9\gamma$ from BEA
4 Reduced-Form Equations of the Model

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

\[ \Delta \ln E_{c,t} = \left( \frac{1}{-\sigma F(\varepsilon^{PD} + 1)} - \frac{\gamma}{\sigma F} \dot{\bar{w}}(\theta) \right) \Delta \ln(1 - \tau_{c,t}^b) + \phi^1_t + u^1_{c,t} \]

\[ \Delta \ln N_{c,t} = \left( \varepsilon^{LS} \dot{\bar{w}}(\theta) \right) \Delta \ln(1 - \tau_{c,t}^b) + \phi^2_t + u^2_{c,t} \]

\[ \Delta \ln w_{c,t} = \left( \dot{\bar{w}}(\theta) \right) \Delta \ln(1 - \tau_{c,t}^b) + \phi^3_t + u^3_{c,t} \]

\[ \Delta \ln r_{c,t} = \left( \frac{1 + \varepsilon^{LS}}{1 + \eta_c} \dot{\bar{w}}(\theta) \right) \Delta \ln(1 - \tau_{c,t}^b) + \phi^4_t + u^4_{c,t} \]
## Economic Incidence Estimates Using RF Effects

### A. Incidence

<table>
<thead>
<tr>
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<tr>
<td>Landowners</td>
<td>1.17</td>
<td>1.17</td>
<td>1.17</td>
<td>0.32</td>
<td>1.86</td>
<td>0.62</td>
</tr>
<tr>
<td></td>
<td>(1.43)</td>
<td>(1.43)</td>
<td>(1.43)</td>
<td>(1.36)</td>
<td>(1.56)</td>
<td>(0.60)</td>
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<tr>
<td>Workers</td>
<td>1.1*</td>
<td>0.69</td>
<td>1.1*</td>
<td>0.68</td>
<td>0.98</td>
<td>0.58*</td>
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<tr>
<td></td>
<td>(0.59)</td>
<td>(0.44)</td>
<td>(0.59)</td>
<td>(0.52)</td>
<td>(0.84)</td>
<td>(0.33)</td>
</tr>
<tr>
<td>Firmowners</td>
<td>1.63*</td>
<td>1.63*</td>
<td>2.08**</td>
<td>0.81</td>
<td>1.54*</td>
<td>0.9***</td>
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<tr>
<td></td>
<td>(0.90)</td>
<td>(0.90)</td>
<td>(0.95)</td>
<td>(1.4)</td>
<td>(0.92)</td>
<td>(0.34)</td>
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### Specification

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<td>Net-of-Business Tax</td>
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<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
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<td>Net-of-Corporate Tax</td>
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<td>N</td>
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<td>Y</td>
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<tr>
<td>Housing share $\alpha$</td>
<td>0.3</td>
<td>0.65</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
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<td>Output elasticity ratio $\delta/\gamma$</td>
<td>0.9</td>
<td>0.9</td>
<td>0.5</td>
<td>0.9</td>
<td>0.9</td>
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<td>Bartik</td>
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<td>Net-of-Personal Tax</td>
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B. Share of Incidence

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<tr>
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<td>0.27</td>
<td>0.18</td>
<td>0.42**</td>
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<td>(0.48)</td>
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<td>(0.16)</td>
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<td>(0.09)</td>
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<td>0.35***</td>
<td>0.43***</td>
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<td>(0.13)</td>
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Conventional View Test

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<th>χ² of (S_W = 1, S_F = 0)</th>
<th>132.67</th>
<th>108.14</th>
<th>48.8</th>
<th>6.96</th>
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<td>N</td>
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<td>N</td>
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<tr>
<td>Housing share α</td>
<td>0.3</td>
<td>0.65</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
<td>0.3</td>
</tr>
<tr>
<td>Output elasticity ratio δ/γ</td>
<td>0.9</td>
<td>0.9</td>
<td>0.5</td>
<td>0.9</td>
<td>0.9</td>
<td>0.9</td>
</tr>
<tr>
<td>Bartik</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
<tr>
<td>Net-of-Personal Tax</td>
<td>N</td>
<td>N</td>
<td>N</td>
<td>Y</td>
<td>Y</td>
<td>N</td>
</tr>
</tbody>
</table>
Overview of Giroud and Rauh (JPE, forthcoming)

- Question: How does state-level business taxation impact business activity and location decisions?
Data

1. Firm data
   - U.S. Census Bureaus Longitudinal Business Database (LBD) → 27.6 million establishment-year observations, or 647,000 firm-year observations
   - Sample: All multi-unit U.S. establishments from 1977-2011 belonging to firms with at least 100 employees and having operations in at least two states

2. Tax data
   - Type of state corporate taxation and the corporate tax rates: the University of Michigan Tax Database (1977-2002), the Tax Foundation (2000-2011) and the Book of States
   - Apportionment factors and throwback rules: the Commerce Clearing Houses State Tax Handbooks
Findings:

- For C corporations, employment and the number of establishments have short-run corporate tax elasticities of -0.4 to -0.5, and do not vary with changes in personal tax rates.
- Pass-through entity activities show tax elasticities of -0.2 to -0.4 with respect to personal tax rates, and are invariant with respect to corporate tax rates.
- Capital shows similar patterns.
- Reallocation of productive resources to other states drives around half the effect.
- The responses are strongest for firms in tradable and footloose industries.

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:

\[ \ln w^p_{f,t} = \delta \ln(1 - \tau_{m,t}) + \mu_f + \mu_m + \psi_{s,t} + \varepsilon_{f,t}, \] (3)
### Table 1: Differences-in-differences estimates: baseline wage effects

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
<th>(5)</th>
<th>(6)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Log net-of-LBT rate</td>
<td>0.388</td>
<td>0.229</td>
<td>0.386</td>
<td>0.396</td>
<td>0.343</td>
<td>0.399</td>
</tr>
<tr>
<td></td>
<td>(0.127)</td>
<td>(0.110)</td>
<td>(0.127)</td>
<td>(0.128)</td>
<td>(0.164)</td>
<td>(0.118)</td>
</tr>
<tr>
<td>Incidence ($I^w$)</td>
<td>0.505</td>
<td>0.288</td>
<td>0.502</td>
<td>0.516</td>
<td>0.442</td>
<td>0.520</td>
</tr>
<tr>
<td></td>
<td>(0.170)</td>
<td>(0.140)</td>
<td>(0.170)</td>
<td>(0.172)</td>
<td>(0.217)</td>
<td>(0.159)</td>
</tr>
</tbody>
</table>

- **State × year FE**: √
- **Year FE**: √
- **CZ × year FE**: √
- **Municipal controls t − 2**: √
- **Firm controls t − 2**: √
- **Worker shares**: √
- **Observations**: 44,654

*Source: LIAB and Statistical Offices of the Länder. Notes:* This table presents the DiD estimates, $\delta$, 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).
Table 4: Differences-in-differences estimates: wage effects by worker type

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

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 \times year” and “worker type \times year” fixed effects. The estimation sample comprises all establishments liable