Outline

1 Brief overview of firm decisions and tax policies
2 Policy: business tax base (before and after Tax cuts and Jobs Act)
   - Business entity types, tax rates, and context for TCJA
   - Business tax base (before and after TCJA)
     - TCJA Business Tax Reform Summary
     - Key Corporate Deductions before TCJA
     - TCJA: Corporate Tax Base Reforms
   - Fundamental reform and apportionment
     - Tax base: source, residence, destination
     - Apportionment and State Corporate Taxation
3 Firm Location Decisions
   - Model of firm location
   - Empirical implementation: taxes and firm location
     - Hines (AER, 1996)
     - Giroud and Rauh (JPE, forthcoming)
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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

Goal: characterize the consequences of this tax system and optimal design of business taxation
Corporate Decisions and Tax Policies

- 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

Graduate Public Finance (Econ 524)
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

Indiv. vs.
Corp. tax,
Intl. tax

Deduction of
interest

Accelerated
Depreciation

Div. tax,
Corp. profit
tax

Policy Instruments
Outline

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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).
TAX RATE BY ENTITY TYPE

- Sole Proprietorships: 13.6%
- Partnerships: 15.9%
- S-corps: 25.0%
- C-corps: 31.6%

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 (TPE, 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 from 1962 to 2010. The graph displays a downward trend in revenues as a percent of GDP and federal revenues over time.](image-url)
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

Context #3: Declining Corporate Tax Rates

Source: Auerbach (2017 BPEA).

Figure 1. G-7 Corporate Tax Rates Since 1990

Source: OECD Tax Database

Year


Statutory Rate, Combined

Canada  France  Germany  Ireland  Italy  Japan  United Kingdom  United States
Context #3: Declining Corporate Tax Rates

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

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

Source: G. Zucman.
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. 6, 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.

The 2017 Tax Reform (a.k.a., “Tax Cuts and Jobs Act”)

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
Pre TCJA: US had more generous tax base provisions

Present Discounted Value of Depreciation Allowances

Percent


United States

G7 Weighted Average (excluding U.S.)

Effective US rates were thus closer to other G7 countries.

**Effective Marginal Tax Rates, 2011**

<table>
<thead>
<tr>
<th>Country</th>
<th>Tax Rate (Percent)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Germany</td>
<td>23</td>
</tr>
<tr>
<td>Italy</td>
<td>24</td>
</tr>
<tr>
<td>France</td>
<td>28</td>
</tr>
<tr>
<td>United States</td>
<td>29</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>32</td>
</tr>
<tr>
<td>Canada</td>
<td>33</td>
</tr>
<tr>
<td>Japan</td>
<td>43</td>
</tr>
</tbody>
</table>

G7 Weighted Average (excluding U.S.): 31.7

Source: U.S. Department of the Treasury; OECD.

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
Tax Incentives for investment: accelerated depreciation

- Consider two tax treatments of the machine
  1. Expensing: subtract the full $1000 from profits in the year you buy the 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
### 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, δ (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).
# Bonus Depreciation

## 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>
</tbody>
</table>

| Bonus depreciation (50\%) |    |    |    |    |    |    |       |
| Deductions (000s)    | 600 | 160 | 96  | 57.5 | 57.5 | 29  | 1,000 |
| Tax benefit ($τ = 35\%$) | 210 | 56  | 33.6 | 20.2 | 20.2 | 10  | 350   |

**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 ($2\times$ 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).

---

Source: Zwick and Mahon (AER, 2017).
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

\[
\begin{align*}
    z_T^0 & \equiv D_0 + \sum_{t=1}^{T} \frac{1}{(1 + r)^t} D_t \\
    z_T(\theta) & \equiv \theta + (1 - \theta) z_T^0
\end{align*}
\]

with \( \sum D_i = 1 \) and \( \theta \in (0, 1] \)

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

\[
z_T(\theta) = \theta + (1 - \theta) z_T^0 \quad \text{with} \quad \theta \in (0, 1]
\]

**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>
<tbody>
<tr>
<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>
</tr>
</thead>
<tbody>
<tr>
<td>Deductions</td>
<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).
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).
Calendar Diff-in-Diffs: Bonus II

Intensive Margin

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

Extensive Margin

Source: Zwick and Mahon (AER, 2017)
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
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
### Table 1: Section 179 and Bonus Depreciation Policy Changes

<table>
<thead>
<tr>
<th>Year</th>
<th>S179 Max Value</th>
<th>S179 Phase-out Region</th>
<th>Bonus</th>
</tr>
</thead>
<tbody>
<tr>
<td>1993-96</td>
<td>$17,500</td>
<td>$200,000-$217,500</td>
<td></td>
</tr>
<tr>
<td>1997</td>
<td>$18,000</td>
<td>$200,000-$218,000</td>
<td></td>
</tr>
<tr>
<td>1998</td>
<td>$18,500</td>
<td>$200,000-$218,500</td>
<td></td>
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<tr>
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<tr>
<td>2001-02</td>
<td>$24,000</td>
<td>$200,000-$224,000</td>
<td>30% Tax years ending after 9/10/01</td>
</tr>
<tr>
<td>2003</td>
<td>$100,000</td>
<td>$400,000-$500,000</td>
<td>50% Tax years ending after 5/3/03</td>
</tr>
<tr>
<td>2004</td>
<td>$102,000</td>
<td>$410,000-$512,000</td>
<td>50%</td>
</tr>
<tr>
<td>2005</td>
<td>$105,000</td>
<td>$420,000-$525,000</td>
<td></td>
</tr>
<tr>
<td>2006</td>
<td>$108,000</td>
<td>$430,000-$538,000</td>
<td></td>
</tr>
<tr>
<td>2007</td>
<td>$125,000</td>
<td>$500,000-$625,000</td>
<td></td>
</tr>
<tr>
<td>2008-09</td>
<td>$250,000</td>
<td>$800,000-$1,050,000</td>
<td>50% Tax years ending after 12/31/07</td>
</tr>
<tr>
<td>2010-11</td>
<td>$500,000</td>
<td>$2,000,000-$2,500,000</td>
<td>100% Tax years ending after 9/8/10</td>
</tr>
</tbody>
</table>

*Source: Yagan Zidar Zwick.*
Section 179 policy changes

Table 1: Section 179 and Bonus Depreciation Policy Changes

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<td>100% Tax years ending after 9/8/10</td>
</tr>
</tbody>
</table>

a. 2008 was retroactive.

Source: Yagan Zidar Zwick.
Loss provisions

Table 1: Legislative Background on Tax Loss Carrybacks and Carryforwards, 1998-2011

<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

TCJA: Corporate Tax Base Reforms
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

<table>
<thead>
<tr>
<th>Year</th>
<th>Baseline</th>
<th>35% rate + 50% bonus depreciation</th>
<th>21% rate + normal depreciation</th>
<th>21% rate + expensing</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2018</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2019</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2020</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2021</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2022</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2023</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2024</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2025</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2026</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</td>
</tr>
<tr>
<td>2027</td>
<td></td>
<td>6%</td>
<td>14%</td>
<td>21%</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 Kallian (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

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).

Source: Jason Furman.
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.

21% rate + 5 year amortization

Applies to ~$200b in annual investment

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)

Unremitted Foreign Profits

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

<table>
<thead>
<tr>
<th>Year</th>
<th>2018</th>
<th>2019</th>
<th>2020</th>
<th>2021</th>
<th>2022</th>
<th>2023</th>
<th>2024</th>
<th>2025</th>
<th>2026</th>
<th>2027</th>
</tr>
</thead>
<tbody>
<tr>
<td>GDP</td>
<td>4.3</td>
<td>5.5</td>
<td>5.8</td>
<td>6.0</td>
<td>6.4</td>
<td>6.3</td>
<td>6.2</td>
<td>6.6</td>
<td>7.0</td>
<td>7.5</td>
</tr>
</tbody>
</table>

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 $\omega_{is} = \left( \frac{\theta_s^w W_{is}}{W} \right) + \left( \frac{\theta_s^p R_{is}}{R} \right) + \left( \frac{\theta_s^x X_{is}}{X} \right)$

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>
</tr>
</tbody>
</table>

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

Total Tax Liability ($M)  

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>1.2</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

Source: Suárez Serrato and Zidar (AER, 2016).
State corporate tax rates

Source: Suárez Serrato and Zidar (JPUBE, 2018).
State corporate tax base

Source: Suárez Serrato and Zidar (JPUBE, 2018).

A. R&D

B. Sales Apportionment
State corporate tax base

A. Tax Credits

B. Loss Rules

C. Apportionment Weights


Source: Suárez Serrato and Zidar (JPUBE, 2018).
State corporate tax base

Source: Suárez Serrato and Zidar (JPUBE, 2018).
Variance Decomposition of Tax revenue

- Base rules change more than taxes, so we want to know if they matter for revenue
- Explore relationship through variance decomposition:

\[ \text{Var}(R_{st}) = \text{Var}(\alpha + \gamma \tau_{st}^{c} + X_{st}' \Psi_{st}^{\text{BASE}} + u_{st}) \]

- \(R_{st}\) = state corporate tax revenue as a share of GDP
- \(\tau_{st}^{c}\) = statutory corporate tax rate in state \(s\) and year \(t\)
- \(X_{st}\) = vectors of tax base determinants
- \(\alpha_s\) = state fixed effect
- \(\varepsilon_{it}\) clustered by state

- Decomposition is performed in 5 year intervals and data is weighted by mean GDP in sample
- Contribution to variation depends on coefficients \((\gamma, \Psi)\) and on variation in policies over time

Source: Suárez Serrato and Zidar (JPUBE, 2018).
Tax structure explains $\approx 60\%$ of variance

- $\approx 60\%$ of explained variance is due to tax base rules

ANOVA: base and credit rule provisions

- Contribution to the variance from base provision \( j \): \( \text{Var}(x^j_{st}, \psi^j_{st}) \)

B. Share of Explained Variance by Base Rule (i.e., \( \frac{\text{Var}(x^j_{st}, \psi^j_{st})}{\sum_j \text{Var}(x^j_{st}, \psi^j_{st})} \))

Source: Suárez Serrato and Zidar (JPUBE, 2018).
Outline

1 Brief overview of firm decisions and tax policies

2 Policy: business tax base (before and after Tax cuts and Jobs Act)
   • Business entity types, tax rates, and context for TCJA
   • Business tax base (before and after TCJA)
     • TCJA Business Tax Reform Summary
     • Key Corporate Deductions before TCJA
     • TCJA: Corporate Tax Base Reforms
     • TCJA: Pass-through Provisions
     • TCJA: International Provisions
   • Fundamental reform and apportionment
     • Tax base: source, residence, destination
     • Apportionment and State Corporate Taxation

3 Firm Location Decisions
   • Model of firm location
   • Empirical implementation: taxes and firm location
     • Hines (AER, 1996)
     • Giroud and Rauh (JPE, forthcoming)
How do taxes affect firm location?

Amazon narrows HQ2 cities list to 19 American cities, 1 Canadian
Overview

**Question** What is the effect of business taxes and location subsidies on firm location and the supply of corporate capital?

**Motivation:**
- Capital stock is key for growth
- At all levels of government, substantial resources deployed with goal of attracting firms

**Roadmap:**
- Simple model of firm location Suárez Serrato and Zidar (AER, 2016)
- Empirical evidence from recent papers

My take on this question

- **Location decisions are multidimensional**
  - Depend on more things than just taxes (e.g., factor prices, productivity, market access, amenities, existing plants and infrastructure)
  - Responsiveness of supply of corporate capital and thus overall economic growth depend on these other factors and how they relate to tax changes

- **Existing empirical estimates:**
  - Can inform some of these things at the state and local level
  - But there is a lot of uncertainty at the federal level or for really big subsides that are beyond what we have seen in the data (in which case we need to rely on models to make predictions)

- **Bottom line:**
  - Thus, in many cases, assessments of the effectiveness of corporate tax cuts depends on our assumptions about the economic environment.

Model of Firm Location

Assumptions and economic environment:

- **Assume** firms make location decision to maximize after-tax profits

- **Geography:** Small open economy $c \in C$

- **Agents:** $E_c$ establishments

- **Market Structure:**
  - Monopolistically competitive traded goods market for each variety $j$
  - Global capital market
  - Local labor market
  - Local housing market (only used by workers, not firms)

Source: Suárez Serrato and Zidar (AER, 2016)
Establishment Production

Source: Suárez Serrato and Zidar (AER, 2016)
Local Labor Demand: Establishment Production

- Demand for variety $j$ is $y_{jc} = I\left(\frac{p_{jc}}{P}\right)^{\varepsilon PD}$
Local Labor Demand: Establishment Production

- Demand for variety $j$ is $y_{jc} = I \left( \frac{p_{jc}}{P} \right) e^{PD}$

- Establishment $j$ produces its variety with the following technology

$$y_{jc} = B_{jc} \int_{jc} \gamma_{jc} k_{jc} \rho_{jc} M_{jc}^{1-\gamma-\delta}$$

$$\equiv \bar{B}_c + \zeta_{jc}$$
Local Labor Demand: Establishment Production

- Demand for variety \( j \) is \( y_{jc} = I \left( \frac{p_{jc}}{P} \right)^{\epsilon_{PD}} \)

- Establishment \( j \) produces its variety with the following technology

\[
y_{jc} = B_{jc} \left( \sum_{j_c} \kappa_{jc} M_{jc}^{1-\gamma-\delta} \right) \equiv \bar{B}_c + \zeta_{jc}
\]

- Firm Value Function

\[
V_{jc}^F = \left( \frac{\ln(1 - \tau_s^b)}{-\epsilon_{PD} + 1} - \gamma \ln w_c - \delta \ln \rho + \bar{B}_c + \zeta_{jc} \right) \equiv v_c
\]

Source: Suárez Serrato and Zidar (AER, 2016)
Fraction of Establishments:

\[ E_c = P \left( V_{jc}^F = \max_{c'} \{ V_{jc'}^F \} \right) = \frac{\exp \frac{v_c}{\sigma^F}}{\sum_{c'} \exp \frac{v_{c'}}{\sigma^F}} \]
Location Choice & Local Establishment Shares

Fraction of Establishments:

\[ E_c = P \left( V_{jc}^F = \max_c \{ V_{jc'}^F \} \right) = \frac{\exp \frac{v_c}{\sigma^F}}{\sum_{c'} \exp \frac{v_{c'}}{\sigma^F}} \]

Establishment Growth:

\[ \Delta \ln E_{c,t} = \frac{\Delta \ln (1 - \tau^b_{c,t})}{-\sigma^F (\varepsilon^{PD} + 1)} - \frac{\gamma}{\sigma^F} \Delta \ln w_{c,t} + \phi_t + \frac{1}{\sigma^F} \Delta \bar{B}_{c,t} \]

Key Parameter:

- Dispersion of idiosyncratic productivity \( \sigma^F \)
- Larger \( \sigma^F \) means lower responsiveness to tax changes

Source: Suárez Serrato and Zidar (AER, 2016)
Empirical Implementation

**Estimating Equation:**

\[
\Delta \ln E_{c,t} = \frac{\Delta \ln(1 - \tau_{c,t}^b)}{-\sigma_F(\varepsilon^{PD} + 1)} - \frac{\gamma}{\sigma_F} \Delta \ln w_{c,t} + \phi_t + \frac{1}{\sigma_F} \Delta \bar{B}_{c,t}
\]

**Regression**

- **LHS:** Log change in the number of establishments \(\Delta \ln E_{c,t}\)
- **RHS # 1:** Log change in the keep rate \(\Delta \ln(1 - \tau_{c,t}^b)\)
- **RHS # 2:** Log change in factor prices \(\Delta \ln w_{c,t} + \phi_t\)
- **Error term:** TFP shocks \(\Delta \bar{B}_{c,t}\) and other factors outside the model

Source: Suárez Serrato and Zidar (AER, 2016)
Empirical Implementation

Reduced Form:

$$\Delta \ln E_{c,t} = \left( \frac{1}{-\sigma F(\varepsilon PD + 1)} - \frac{\gamma}{\sigma F} \hat{w}(\theta) \right) \Delta \ln(1 - \tau_{c,t}^b) + \phi_t + u_{c,t}$$

Regression

- **LHS:** Log change in the number of establishments $\Delta \ln E_{c,t}$
- **RHS:** Log change in the keep rate $\Delta \ln(1 - \tau_{c,t}^b)$
- **Estimate:** $\beta^E$ will depend on direct effects plus indirect effects on factor prices (in this case, the incidence on wages)!

Source: Suárez Serrato and Zidar (AER, 2016)
Empirical Implementation

Alternative Estimating Equation (from FMSZ, 2018):

$$\ln E_{nt} = b_0 \ln ((1 - \bar{t}_n) MP_{nt}) + b_1 \ln c_{nt} + b_2 \ln \tilde{R}_{nt} + \psi^M_t + \xi^M_n + \nu^M_{nt}$$

where

- $c_{nt} = (w_{nt}^{1-\beta} r_{nt}^\beta) \gamma P_{nt}^{1-\gamma}$ are unit costs
- $\ln \tilde{R}_{nt}$ is government spending
- $\psi^M_t$ is a time effect
- $\xi^M_n + \nu^M_{nt}$ accounts for state effects and deviations from state and year effects in log productivity, $\ln z_{nt}$
- $MP_{nt}$ is the market potential of state $n$ in year $t$,

$$MP_{nt} = \sum_{n'} E_{n't} \left( \frac{\tau_{n'nt}}{P_{n't}} \frac{\sigma}{\sigma - \bar{t}_{n'nt}} \frac{\sigma}{\sigma - 1} \right)^{1-\sigma}$$

where $E_{n't} \equiv P_{n't} Q_{n't}$ denotes aggregate expenditures in state $n'$.

Source: Fajgelbaum, Morales, Suárez Serrato, and Zidar (Restud, 2018)
Empirical evidence on taxation and firm location

Three papers:
- Event study from Suárez Serrato and Zidar (AER, 2016), which uses apportioned tax rate which is approx $\tau^c/3$
- Hines (AER, 1996)
- Giroud and Rauh (JPE, forthcoming)
How do business tax cuts affect firm location?

Panel B. Cumulative annual effects with leads

F-test all lags are 0 has p-value = 0.92    F-test all lags are 0 has p-value = 0.036

Figure 4. Cumulative Effects of Business Tax Cuts on Establishment Growth

Source: Suárez-Serrato and Zidar (AER, 2016)

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
Institutional Background

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
Data and Estimation

- 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 rate that is 7% or higher.
Disparity in Investment Even Higher Across Highest- and Zero-Tax States

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 $\leftrightarrow$ 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
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) \(\rightarrow\) 27.6 million establishment-year observations, or 647,000 firm-year observations 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.