The Future of Fiscal Policy: American Economic Policy Debates in the 21st Century

Corporate Taxation

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Woodrow Wilson School
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Week 3

Thanks to Alan Auerbach, Raj Chetty, Jason Furman/CEA, Jim Hines, Eric Zwick, and Gabriel Zucman for providing their notes, some of which are reproduced here. Stephanie Kestelman provided excellent assistance making these slides.

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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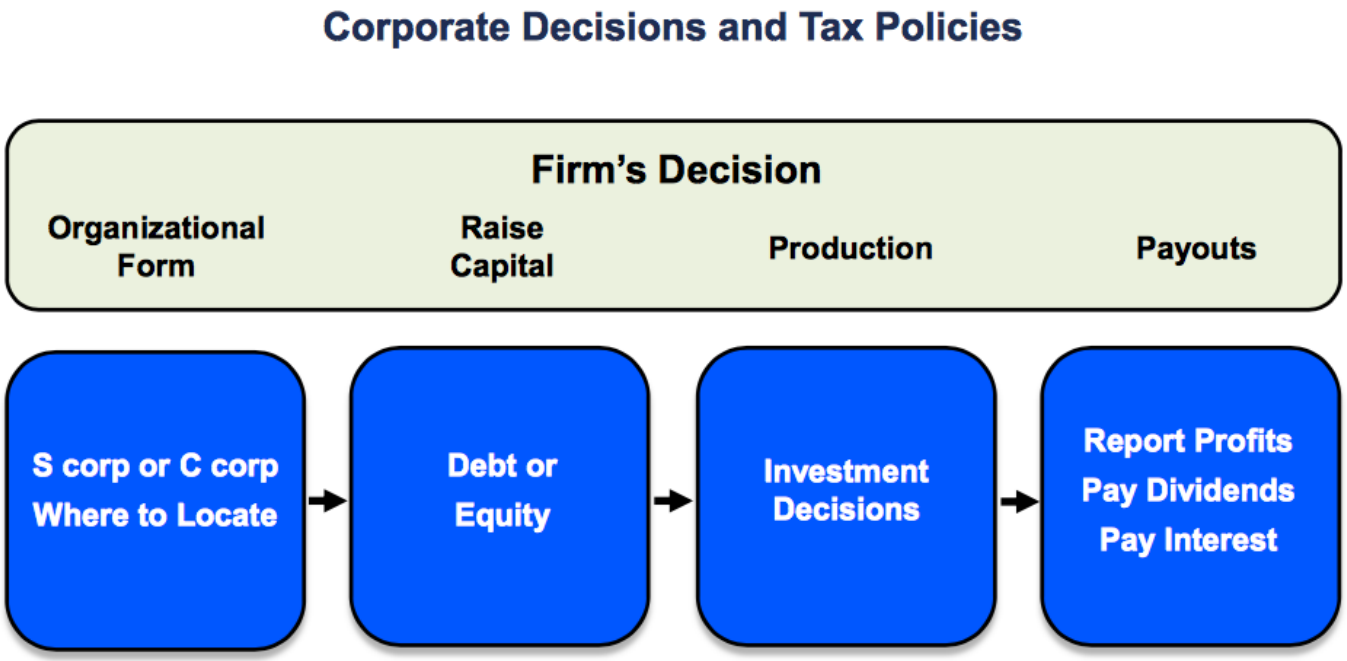
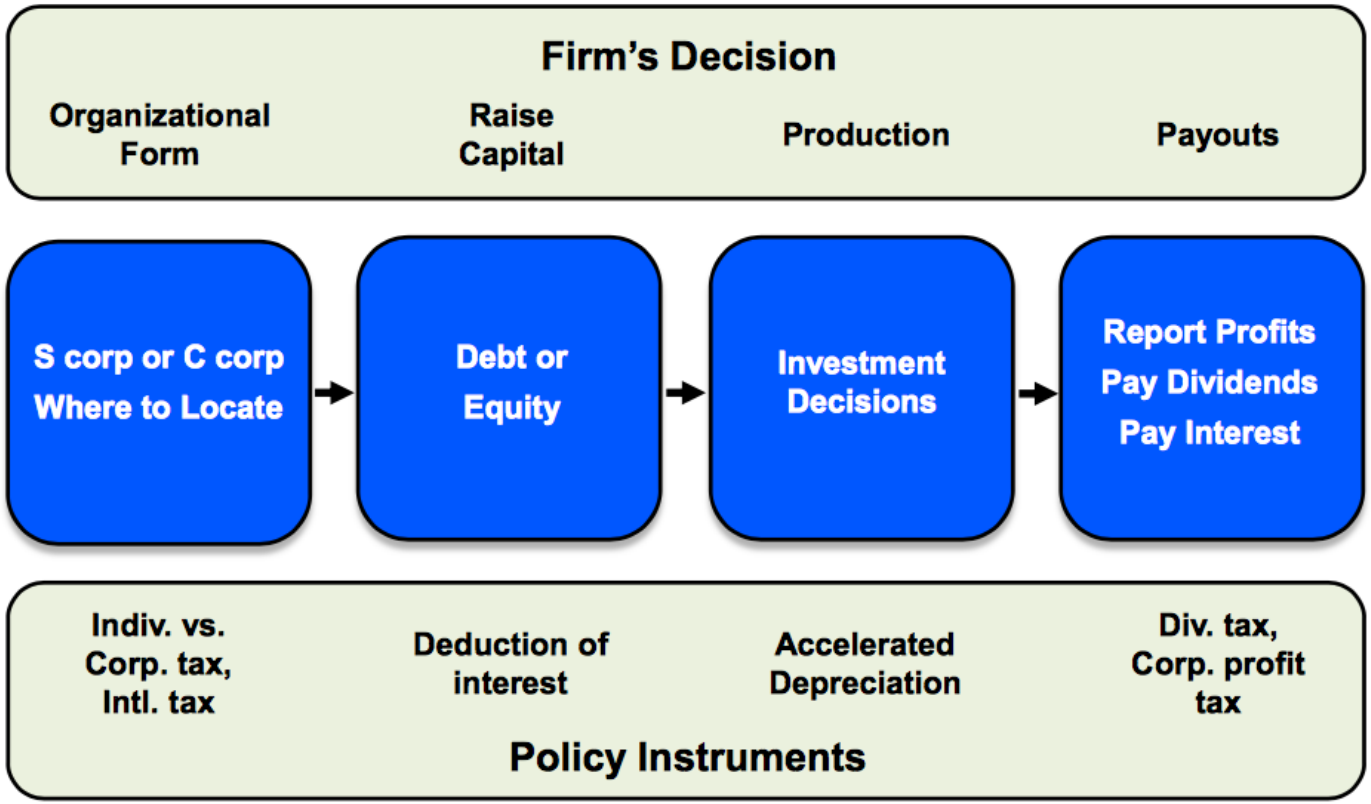
U.S. Business Tax Structure

- 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



Corporate Decisions and Tax Policies



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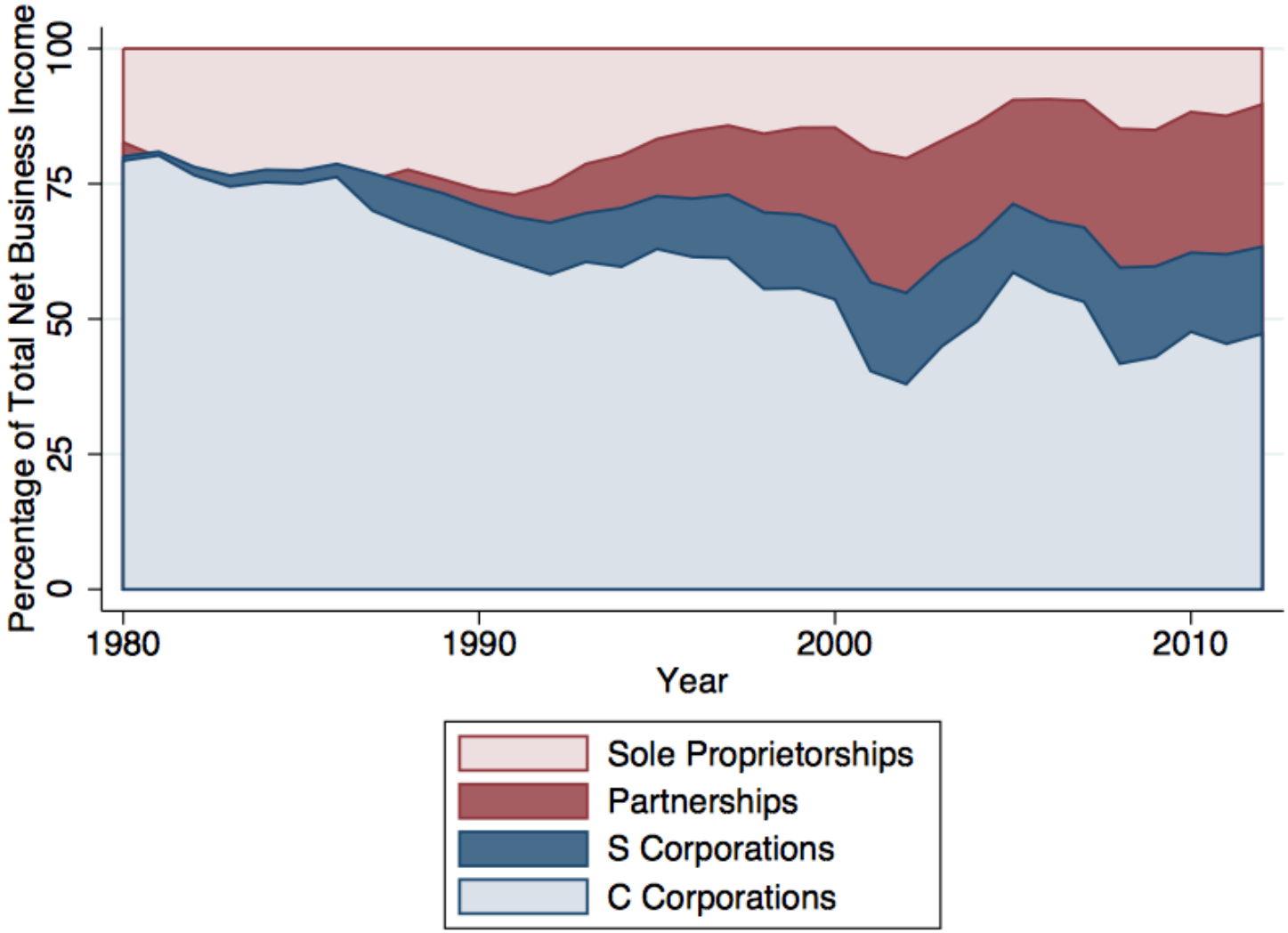
Business entity types, tax rates, and context for TCJA

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

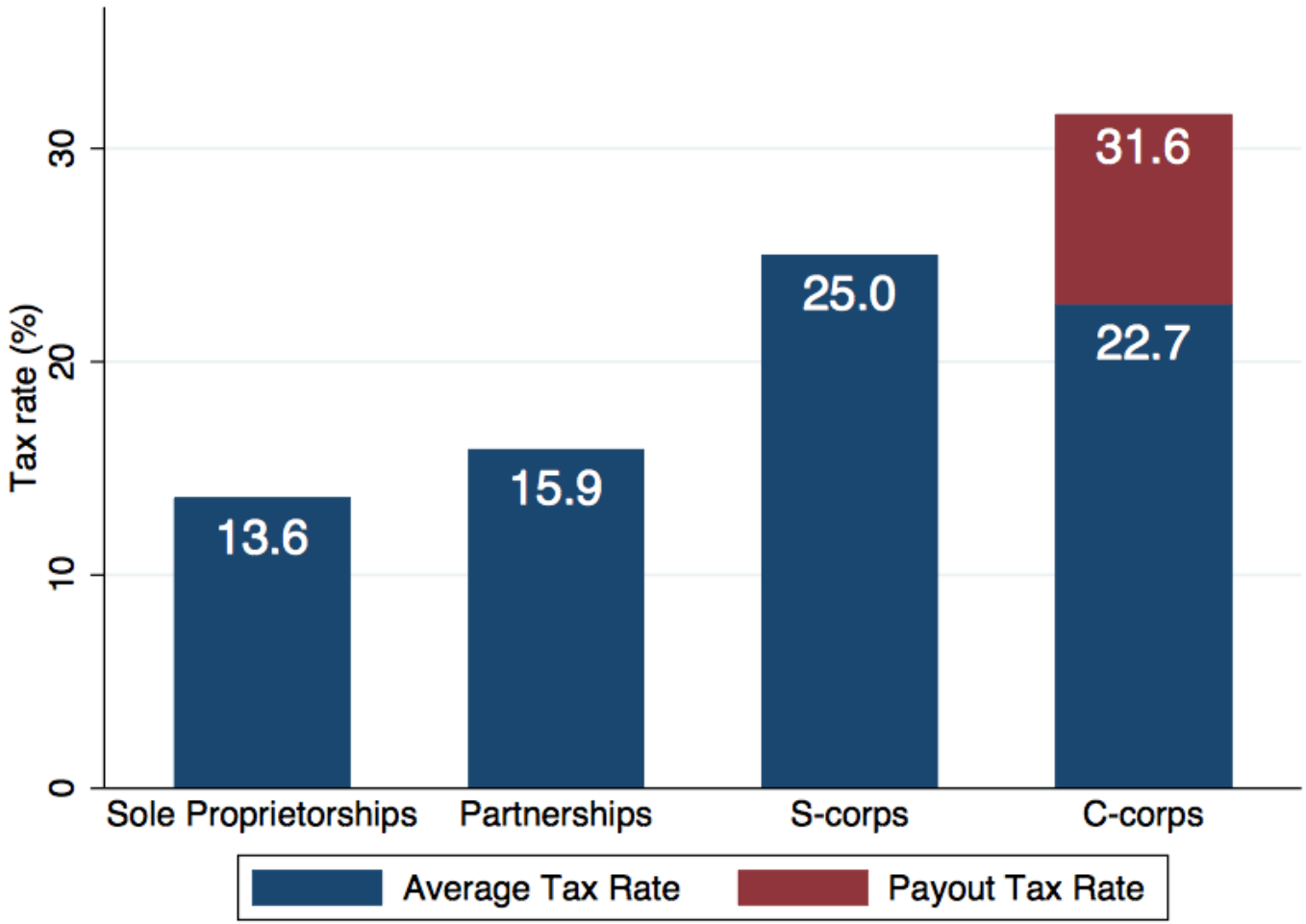
Context #1: The Rise of Pass-throughs



Source: Cooper et al (TPE, 2016).

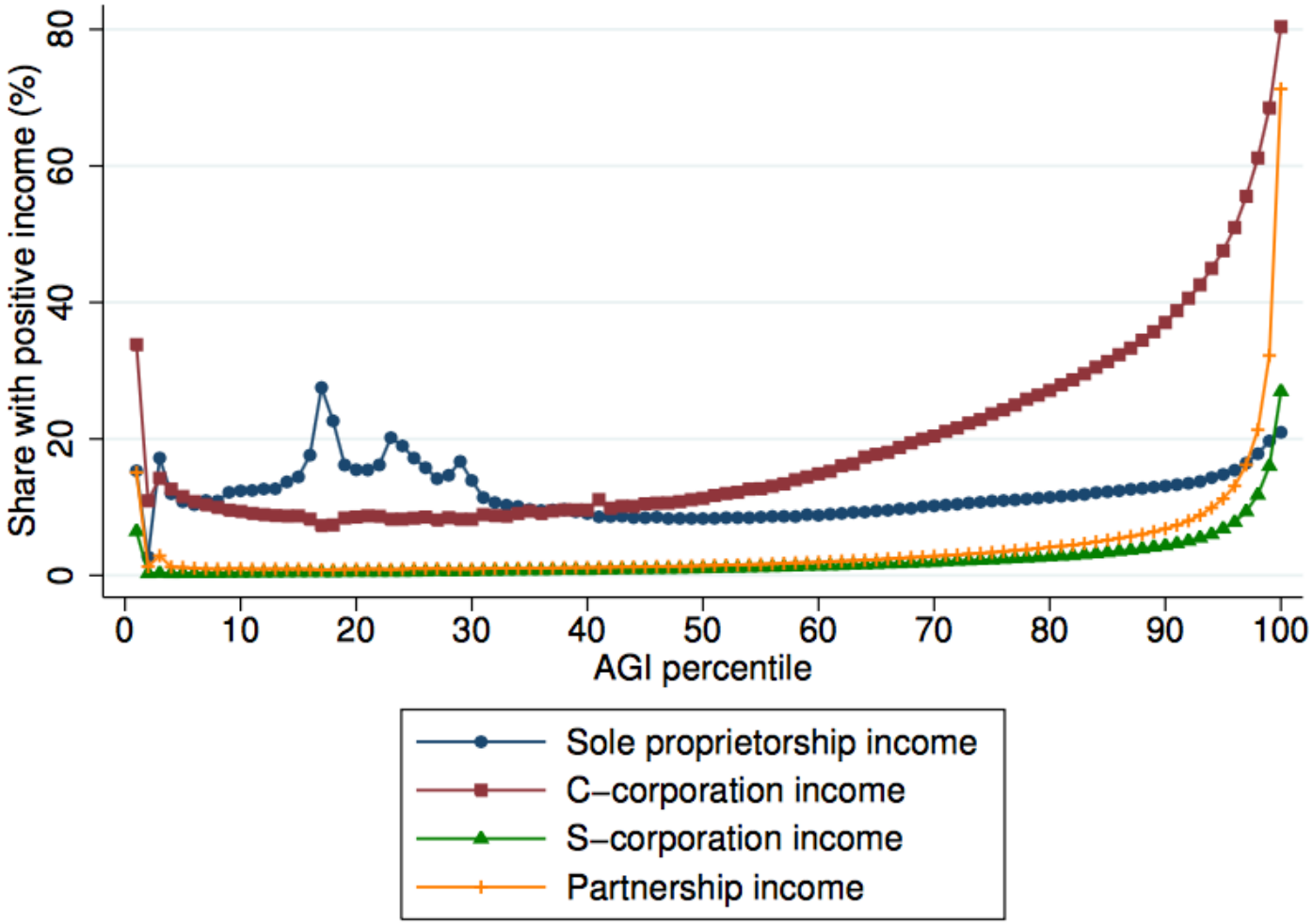
Business Entity Types and Average Tax Rates in 2011

Tax Rate by Entity Type



Source: Cooper et al (TPE, 2016).

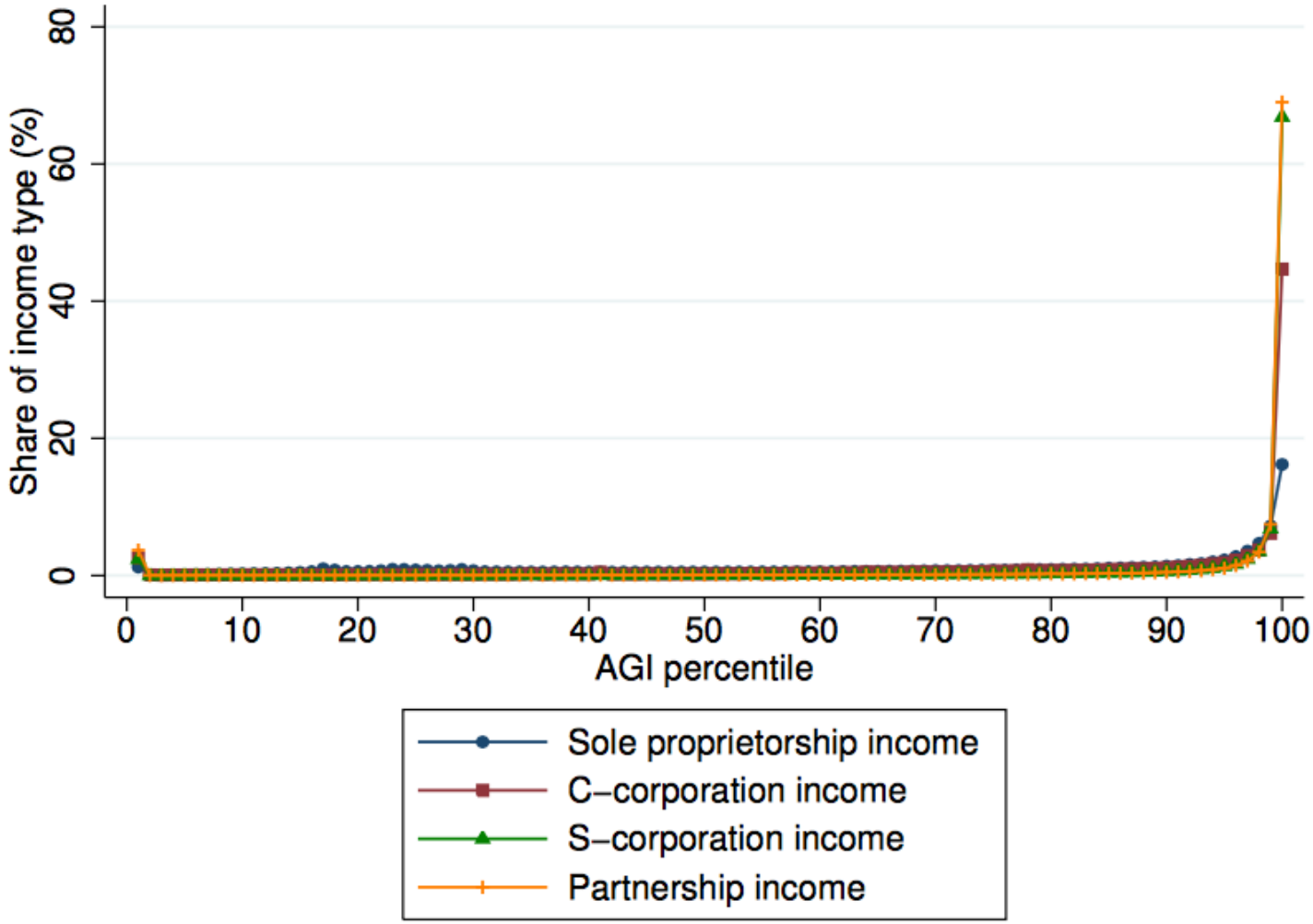
Tax rate depends on ownership, which is concentrated



Source: Cooper et al (TPE, 2016).

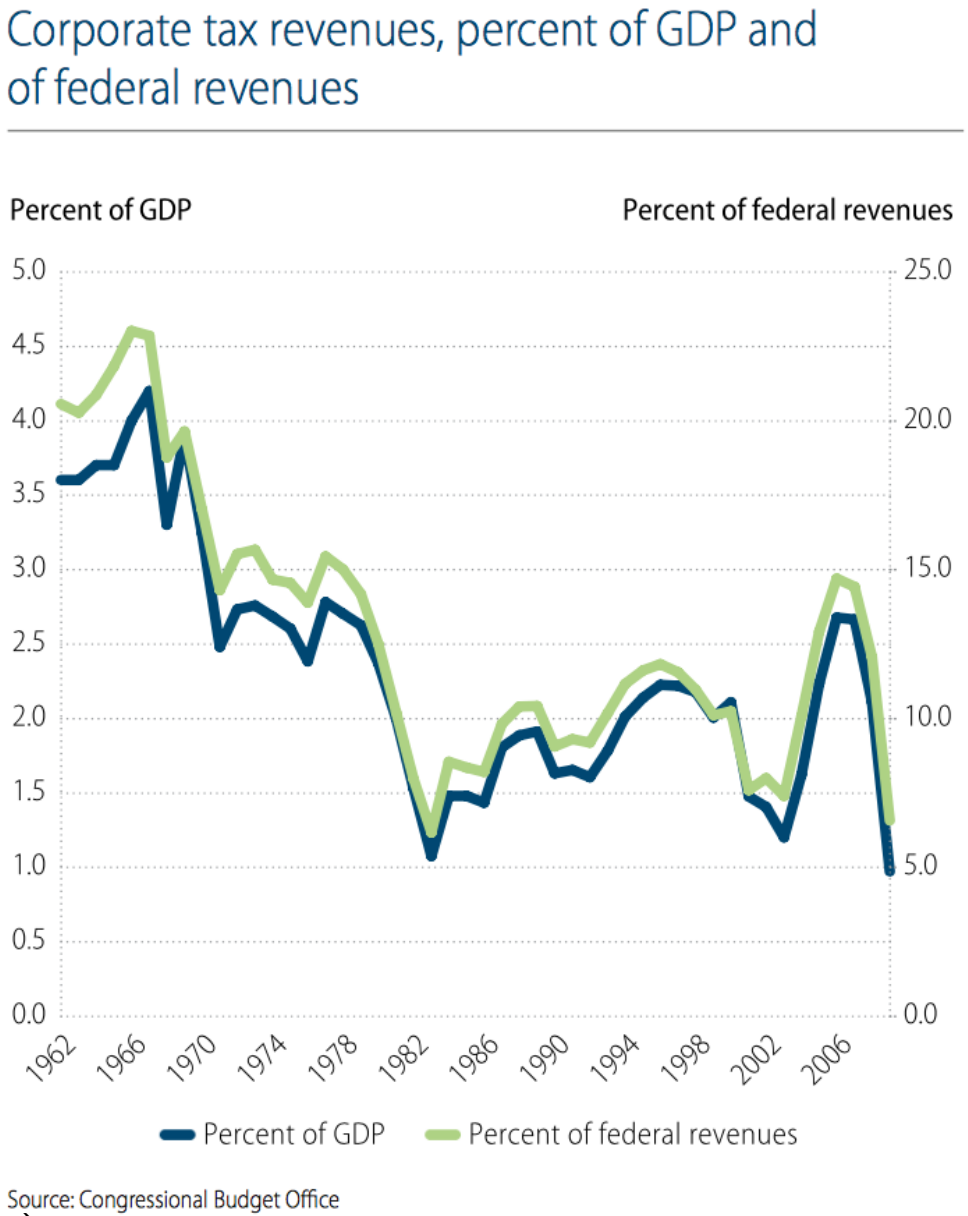
Private business income is very concentrated

Roughly 70% of pass-through income goes to top 1%



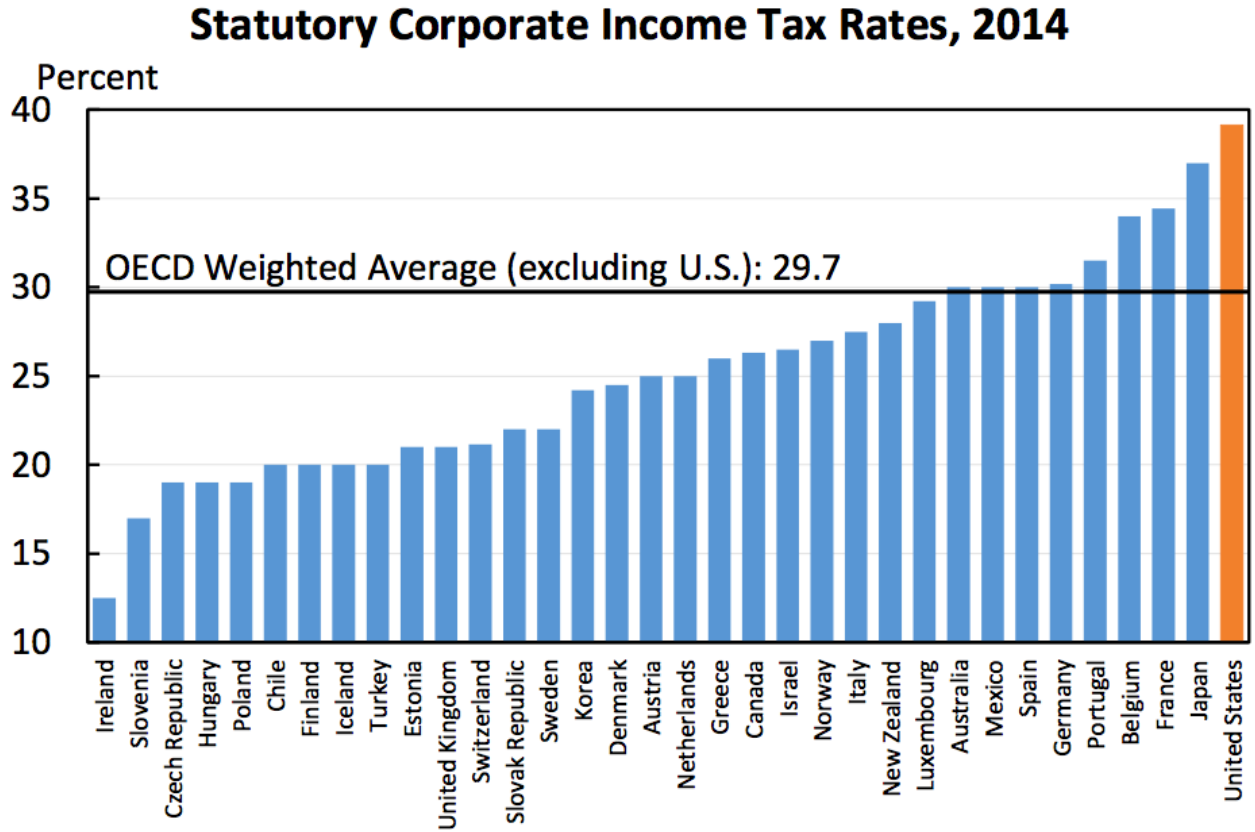
Source: Cooper et al (TPE, 2016).

Context #2: Declining Corporate Tax Revenues



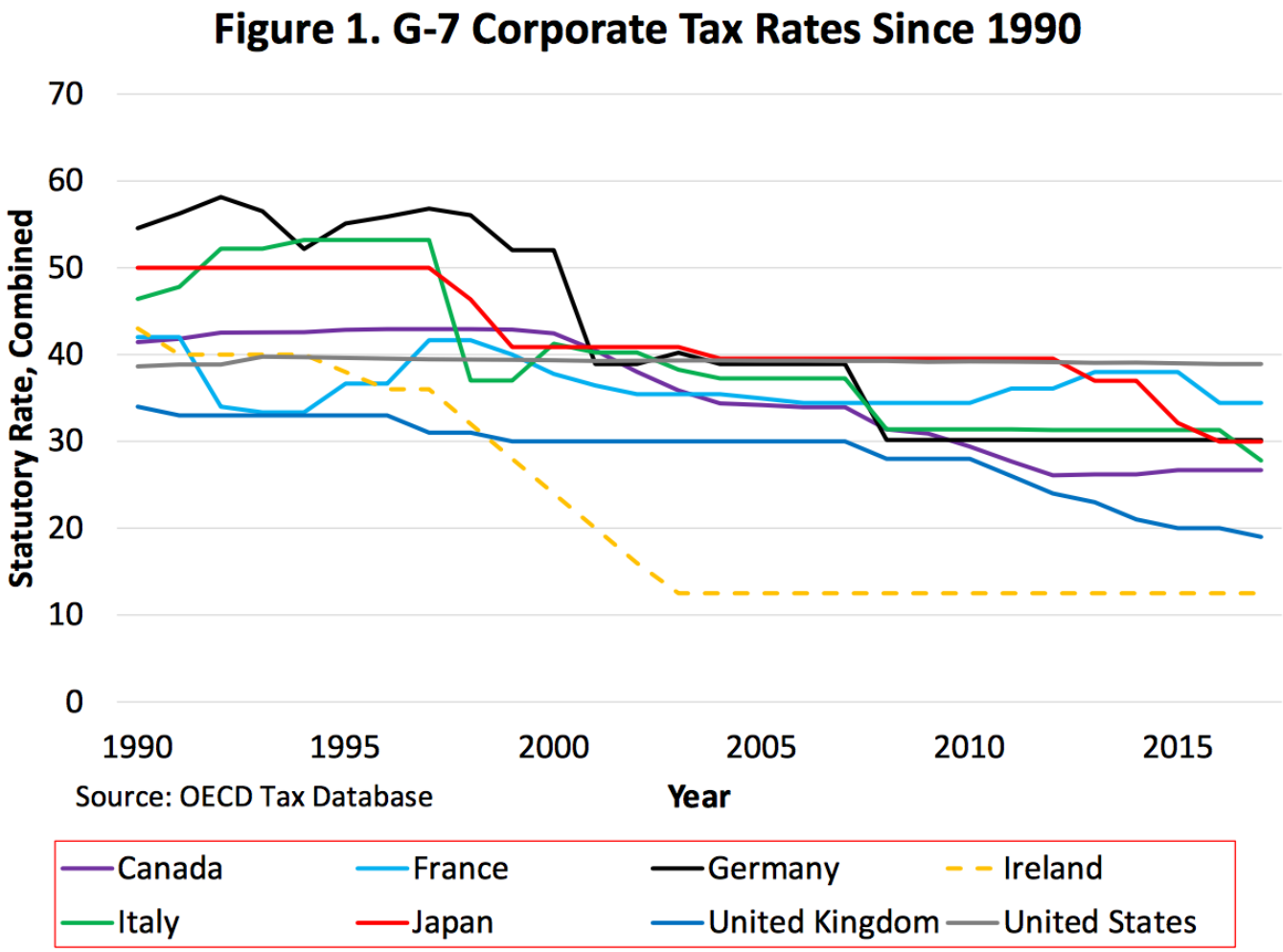
Source: Auerbach (2010).

Context #3: US had highest corp tax rate in the world



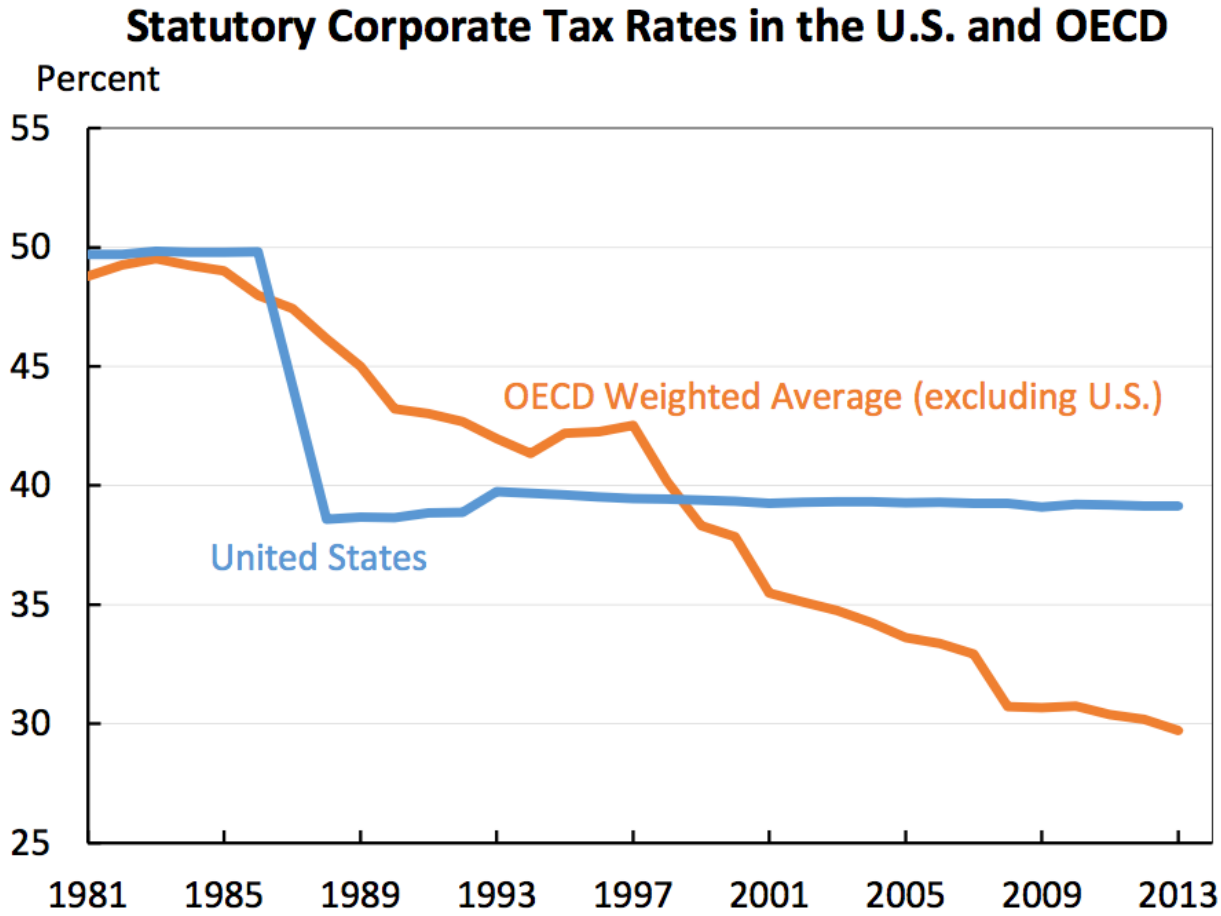
Source: Furman/CEA (2014).

Context #3: Declining Corporate Tax Rates



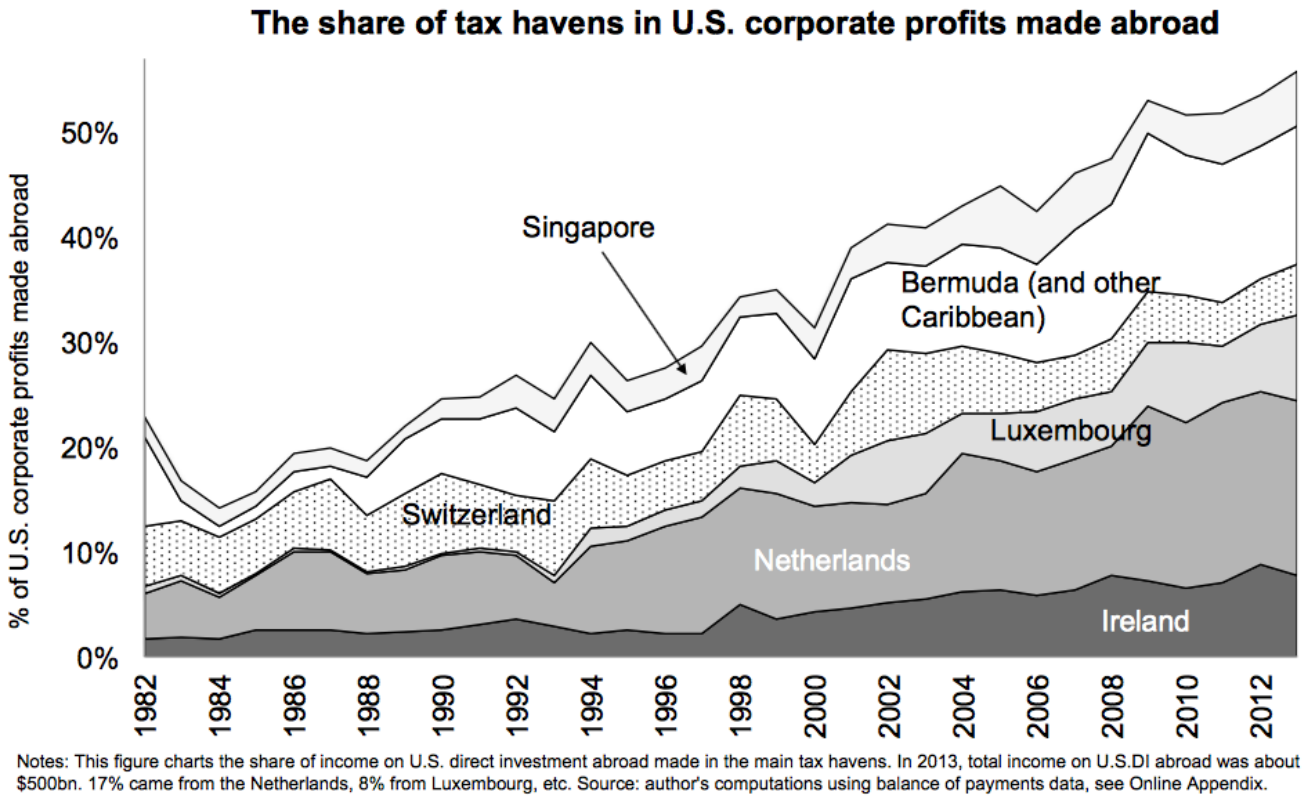
Source: Auerbach (2017 BPEA).

Context #3: Declining Corporate Tax Rates



Source: Furman/CEA (2014).

Context #4: Substantial Tax Avoidance and Evasion



Source: G. Zucman.

Context #4: Substantial Tax Avoidance and Evasion

Source: NYTIMES.

Context #4: Substantial Tax Avoidance and Evasion

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

Source: IRS and United Nations; CEA Calculations.

Source: Furman/CEA (2014).

Who will benefit from corporate tax cuts?

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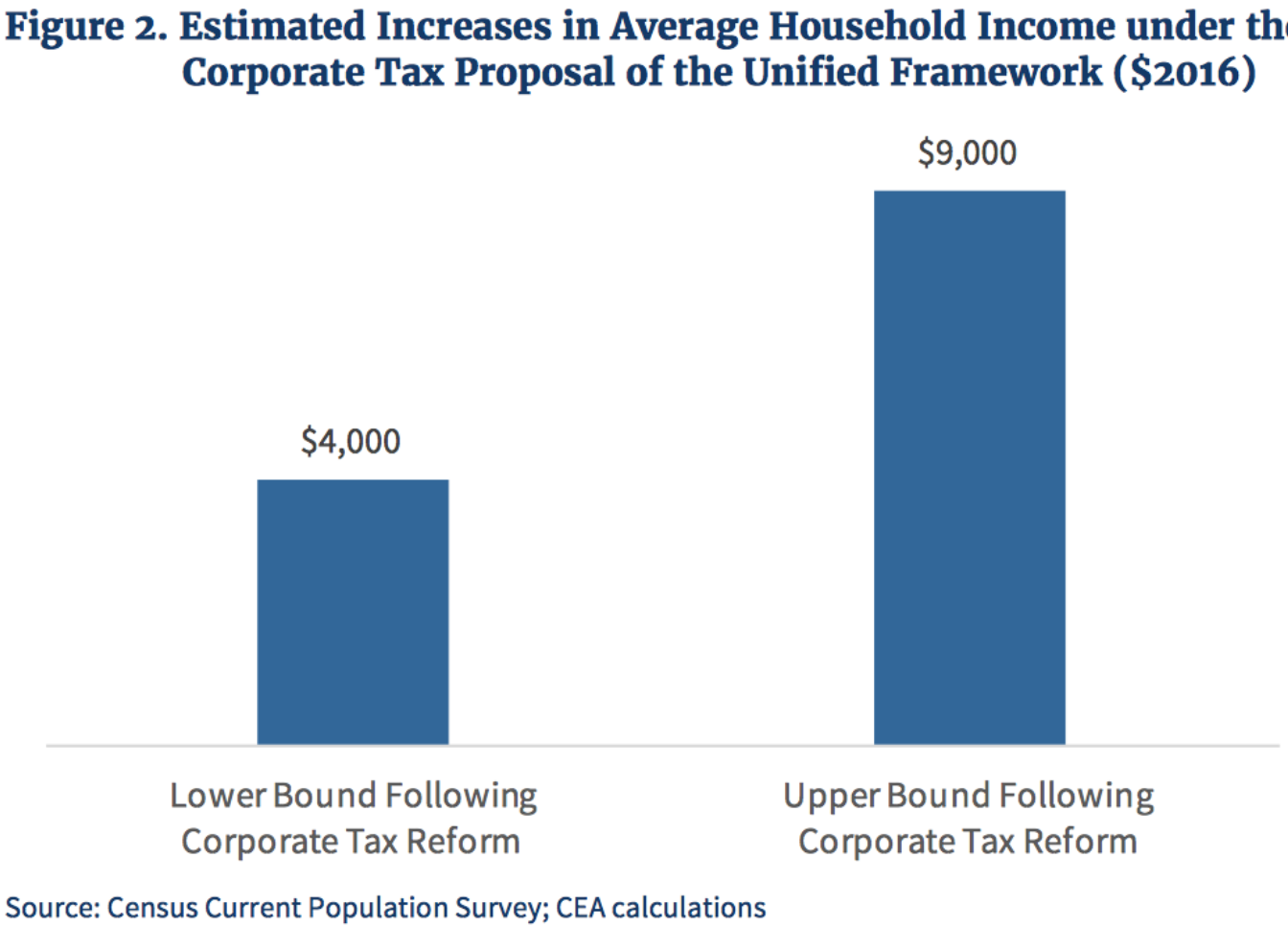


Source: CEA (2017).

Who will benefit from corporate tax cuts?

THE WALL STREET JOURNAL.

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 fall, but debate over whether workers or investors bear the brunt of the corporate tax burden may affect the nature of the

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).

Business tax base (before and after TCJA)

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.

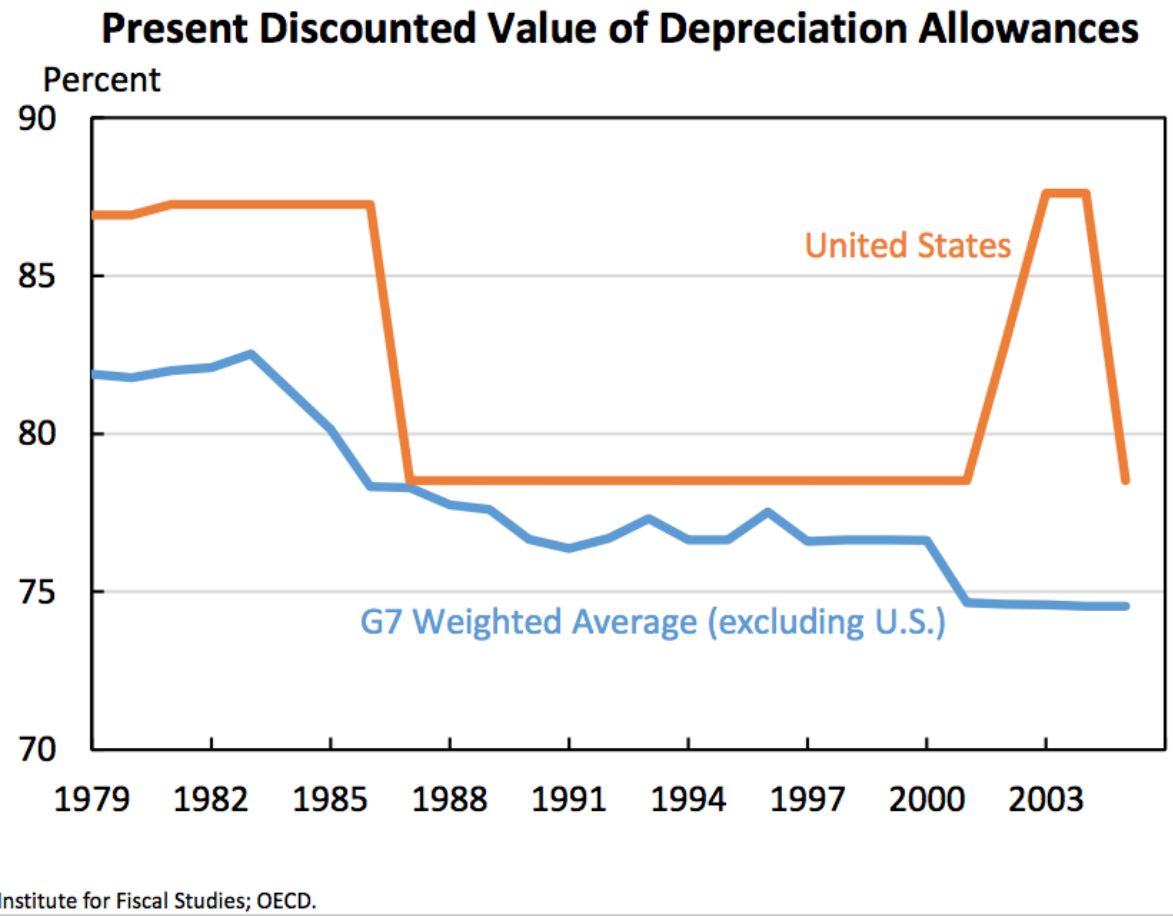
Summary of the 2017 Tax Reform (TCJA)

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

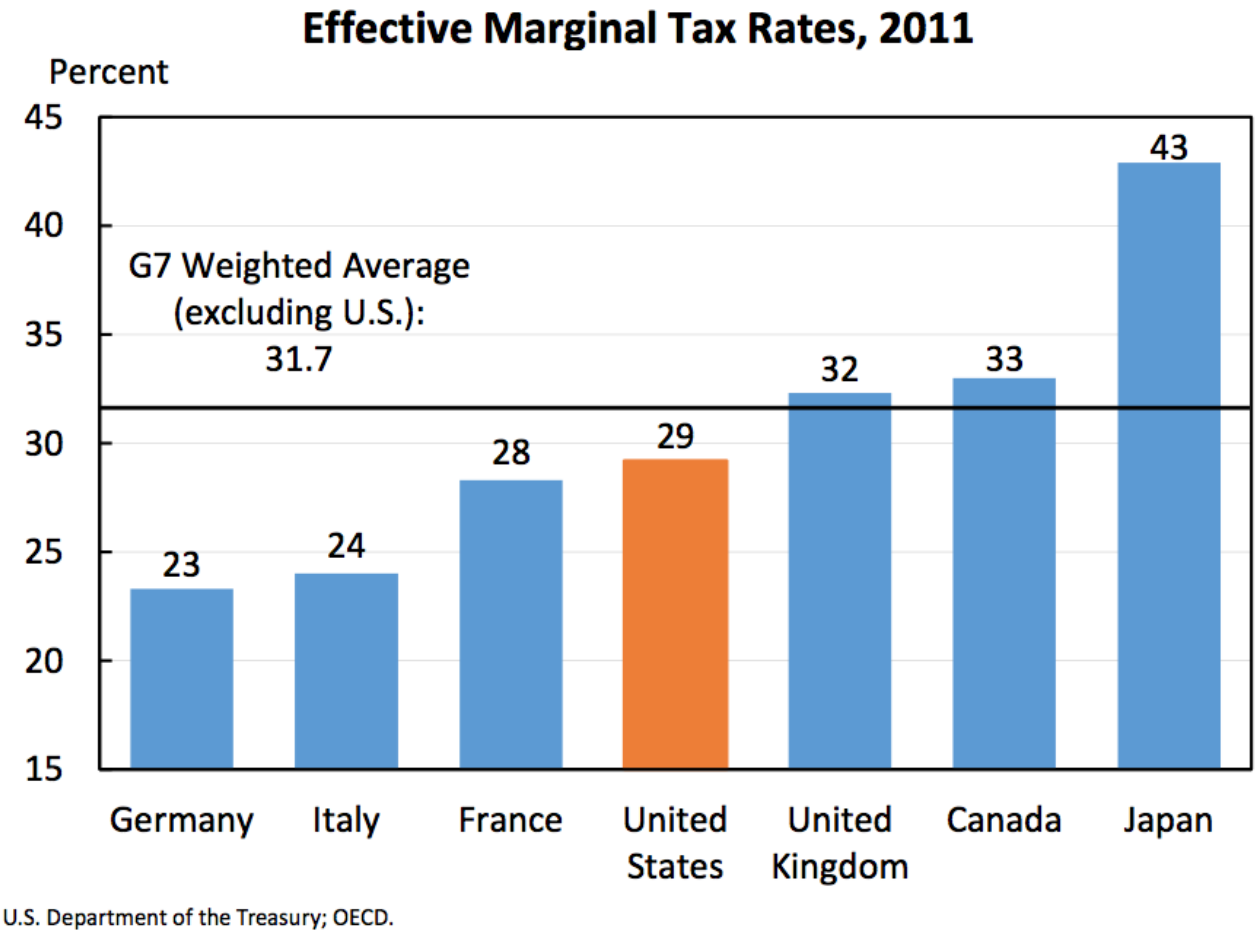
Key Corporate Tax Provisions before TCJA

Pre TCJA: US had more generous tax base provisions



Source: Furman/CEA (2014).

Effective US rates were thus closer to other G7 countries



Source: Furman/CEA (2014).

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 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

Type of capital	Recovery period, R (years)	Tax depreciation rate, $\hat{\delta}$ (percent)	Method
Tractor units for over-the-road use, horses over 12 years of age or racehorses with over 2 years in service	3	66.7	200 DB
Computers and office equipment; light vehicles, buses and trucks	5	40.0	200 DB
Miscellaneous equipment, office furniture, agricultural equiment	7	28.6 or 21.4	200 DB or 150 DB
Water transportation equipment (vessels and barges); single-purpose agricultural structures	10	20.0 or 15.0	200 DB or 150 DB
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	15	10.0	150 DB
Farm buildings (other than single purpose structures), railroad structures, telephone communications, electric utilities, water utilities structures including dams, and canals	20	7.5	150 DB
Nonresidential real property (office buildings, storehouses, warehouses, etc.)	39	2.6	SL

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 Shaprio (AER, 2008).

Bonus depreciation

TABLE 1—REGULAR AND BONUS DEPRECIATION SCHEDULES FOR FIVE-YEAR ITEMS

Year:	0	1	2	3	4	5	Total
Normal depreciation							
Deductions (000s)	200	320	192	115	115	58	1,000
Tax benefit ($\tau = 35$ percent)	70	112	67.2	40.3	40.3	20.2	350
Bonus depreciation (50 percent)							
Deductions (000s)	600	160	96	57.5	57.5	29	1,000
Tax benefit ($\tau = 35$ percent)	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 percent declining balance method (2× straight line until straight line is greater). The bottom schedule applies when 50 percent 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

$$\underbrace{z_T^0}_{\substack{\text{PV of \$1} \\ \text{Normal times}}} \equiv \underbrace{D_0}_{\substack{\text{Year 0} \\ \text{Deduction}}} + \underbrace{\sum_{t=1}^{T} \frac{1}{(1+r)^t} D_t}_{\substack{\text{PV of Year 1 to T} \\ \text{Deductions}}} \quad \text{with} \quad \sum D_i = 1$$

$$\underbrace{z_T(\theta)}_{\substack{\text{PV of \$1} \\ \text{Bonus times}}} \equiv \underbrace{\theta}_{\text{Bonus}} + (1-\theta) z_T^0 \quad \text{with} \quad \theta \in (0, 1]$$

Source: Zwick and Mahon (AER, 2017).

Bonus depreciation

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Normal times:

Year	0	1	2	3	4	5	Total
Deductions	200	320	192	115	115	58	1000
$z_5(0)$							0.890

Bonus times (50%):

Year	0	1	2	3	4	5	Total
Deductions	600	160	96	57.5	57.5	29	1000
$z_5(0.5)$							**0.945**

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.

Short Duration (NAICS)	Long Duration (NAICS)
Rental and Leasing (532)	Utilities (221)
Publishing (511)	Pipeline Transport (486)
Data Processing (518)	Railroads (482)
Ground Transit (485)	Accommodations (721)
Professional Services (541)	Food Manufacturing (311)

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.
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)

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

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

Approach of Cummins, Hassett and Hubbard (1994, 1996), Desai and Goolsbee (2004), Edgerton (2010).

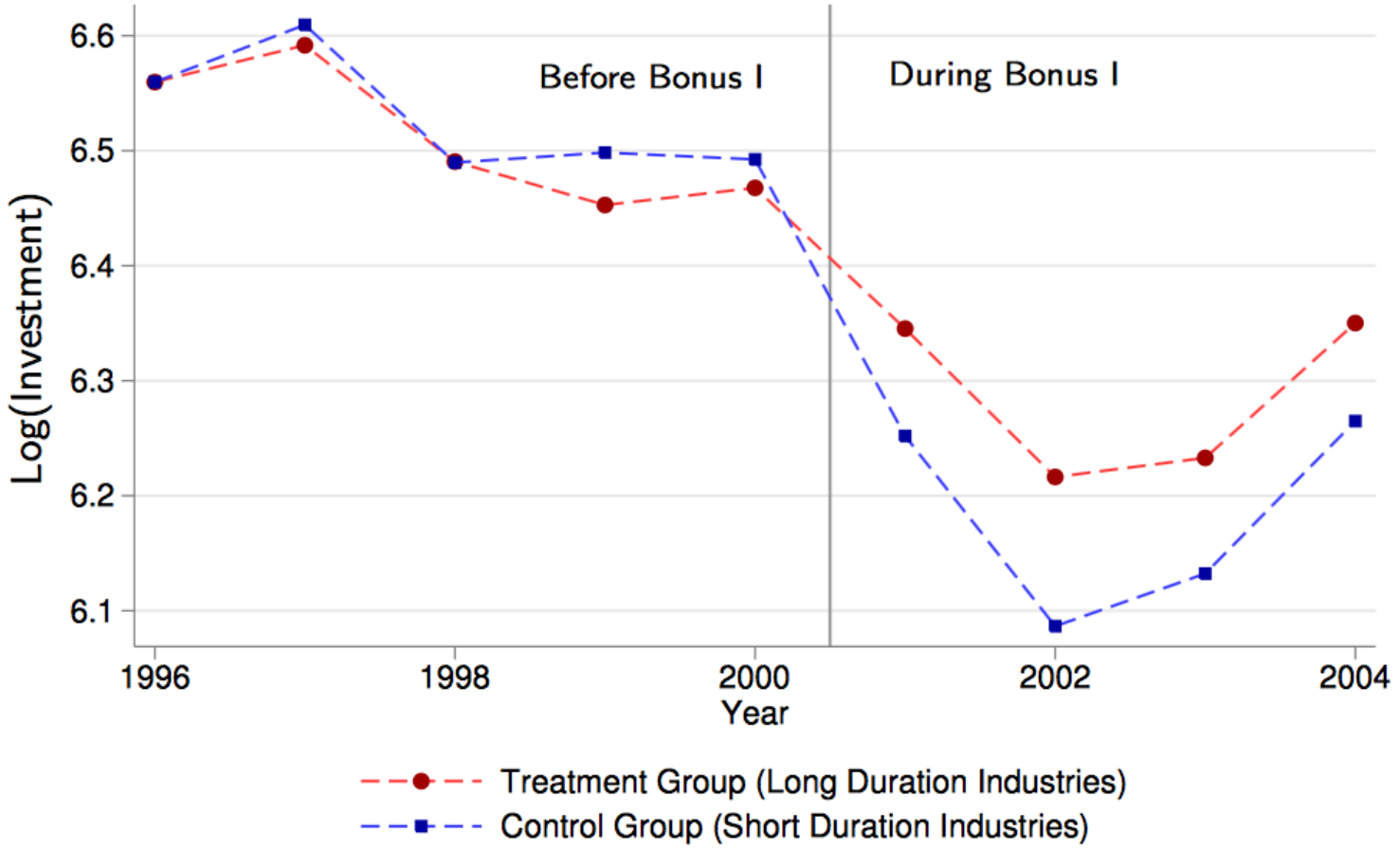
- Larger sample, one policy change

Source: Zwick and Mahon (AER, 2017).

Bonus depreciation

Calendar Diff-in-Diffs: Bonus I

Intensive Margin

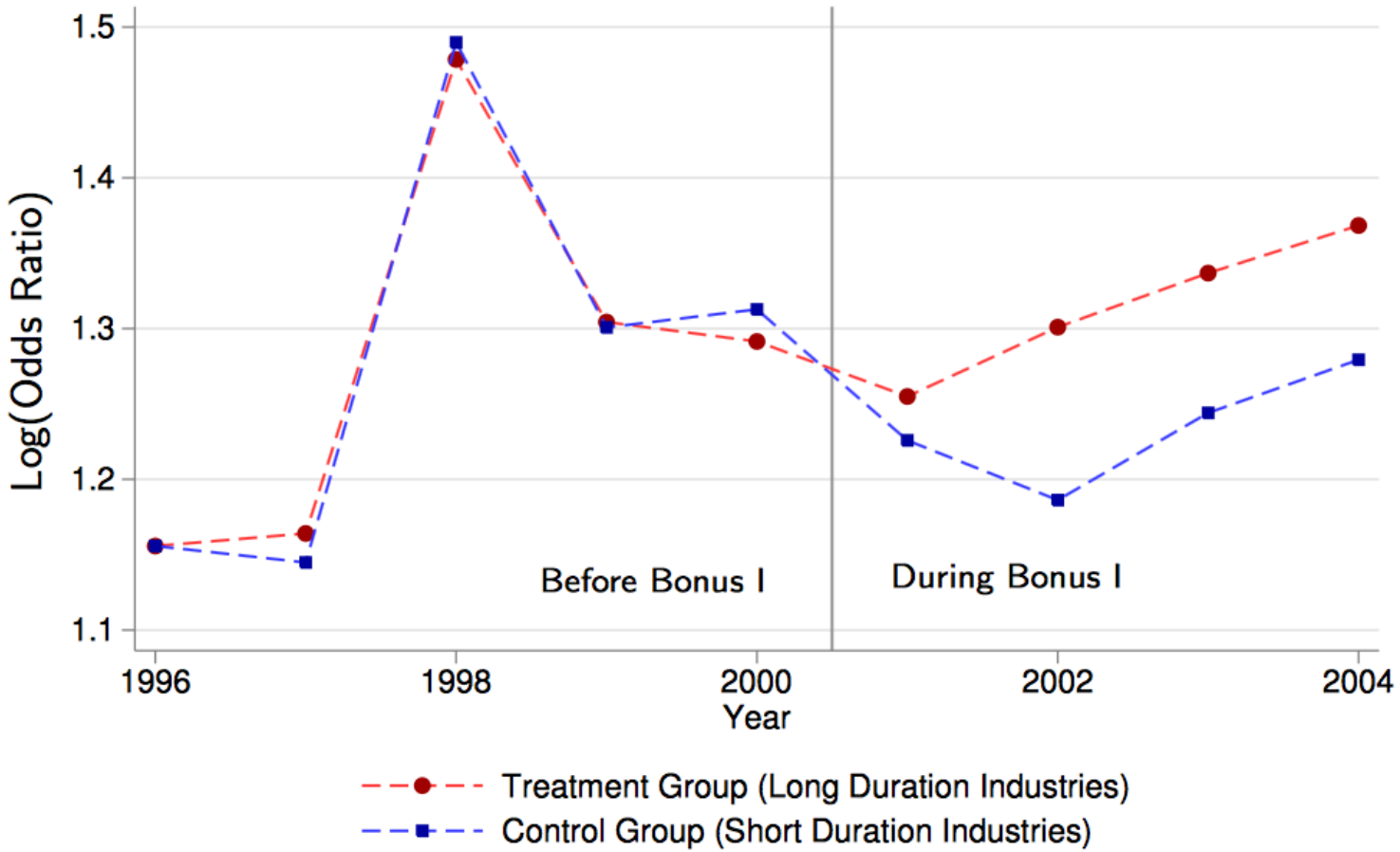


Source: Zwick and Mahon (AER, 2017).

Bonus depreciation

Calendar Diff-in-Diffs: Bonus I

Extensive Margin



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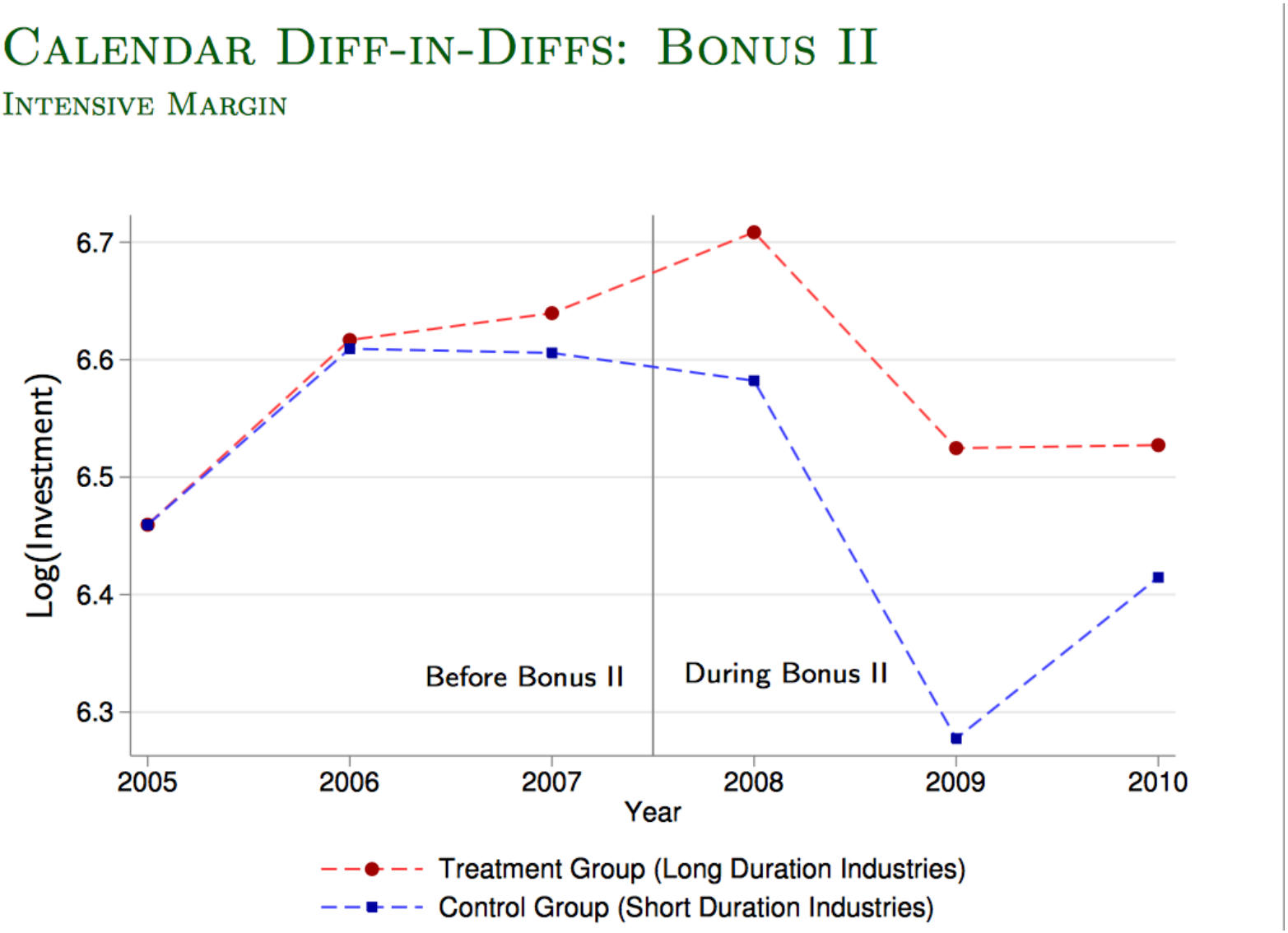
Bonus depreciation

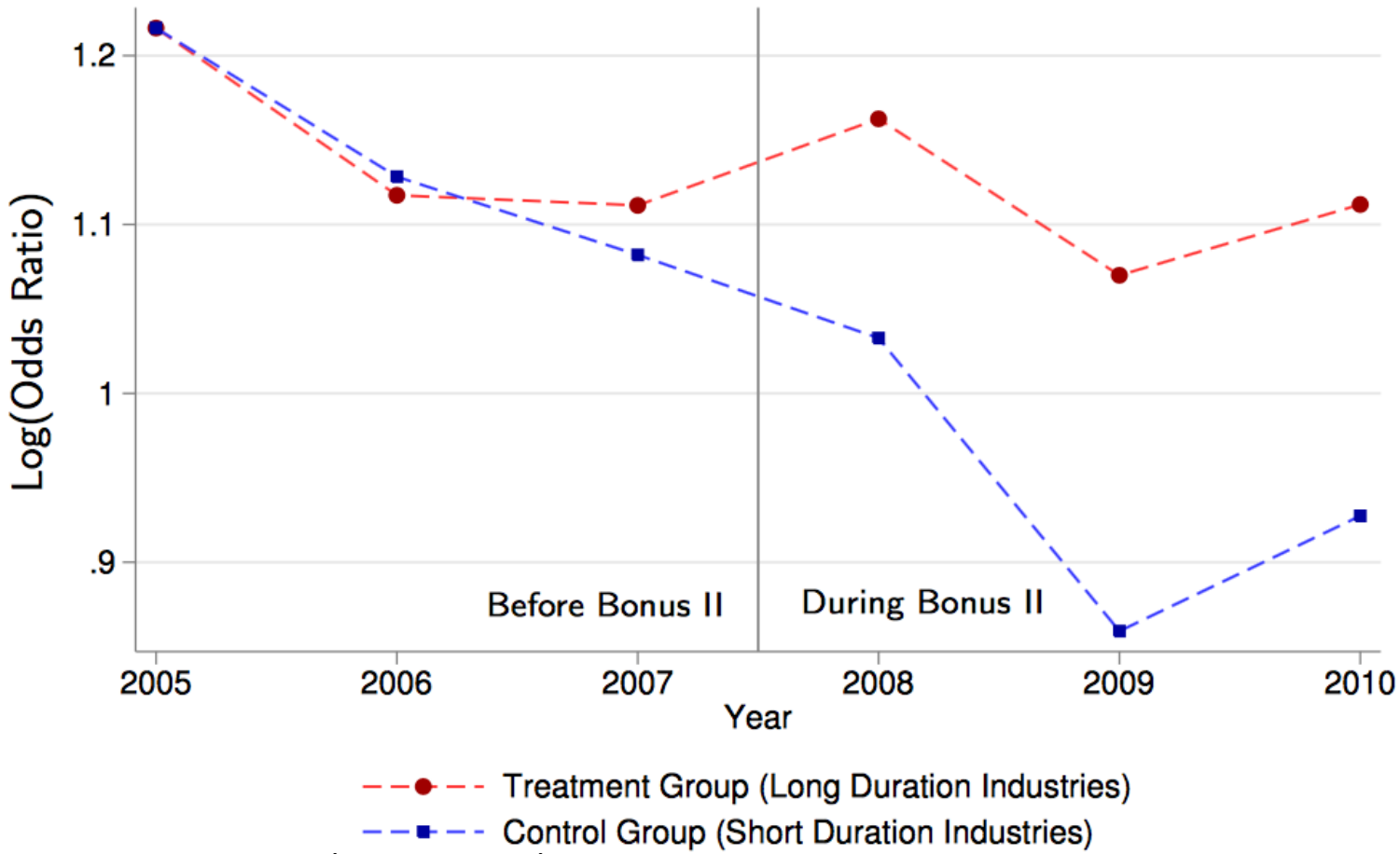


Source: Zwick and Mahon (AER, 2017).

Bonus depreciation

Calendar Diff-in-Diffs: Bonus II

Extensive Margin



Source: Zwick and Mahon (AER, 2017).

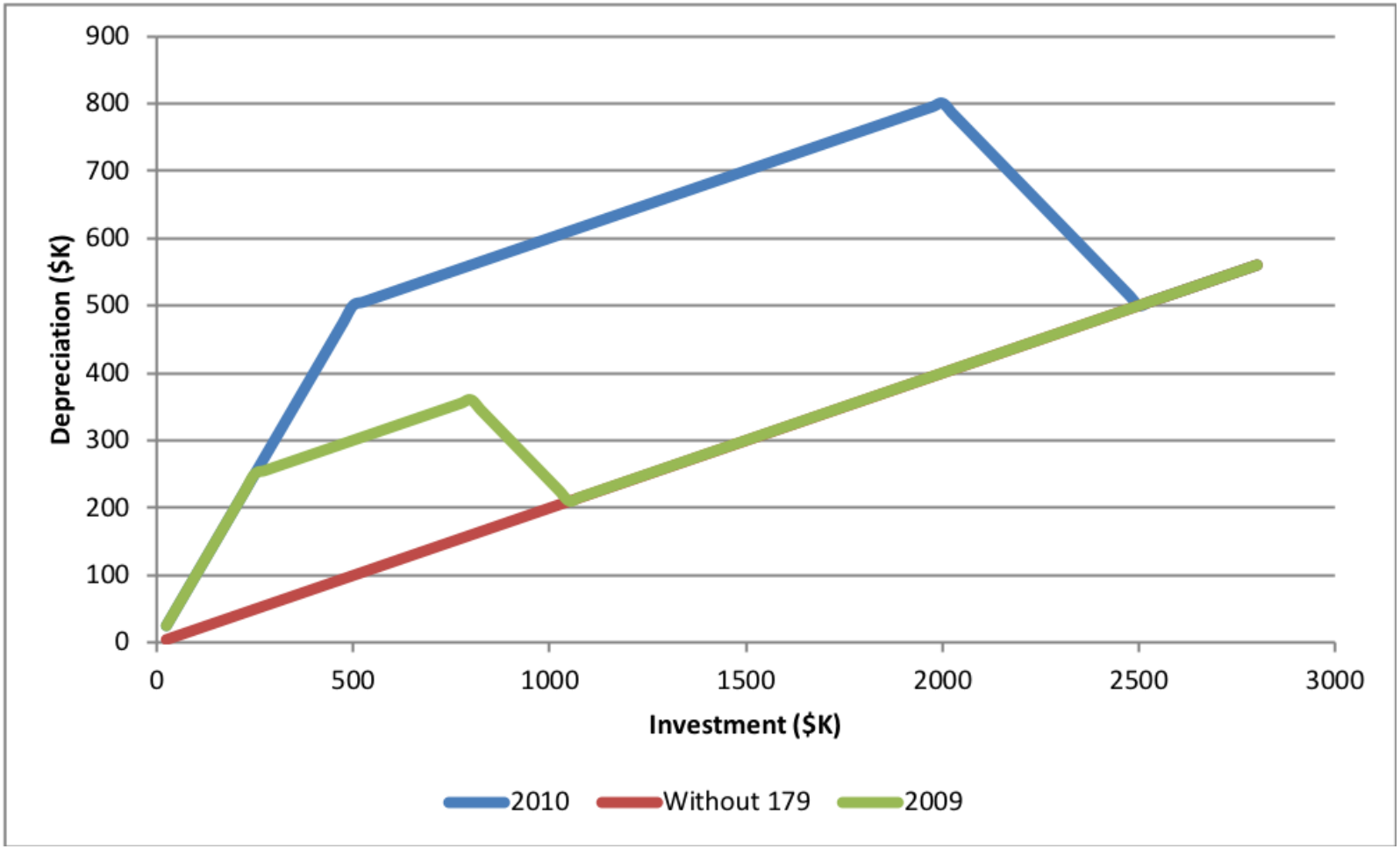
What are some key tax base provisions?

- 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

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

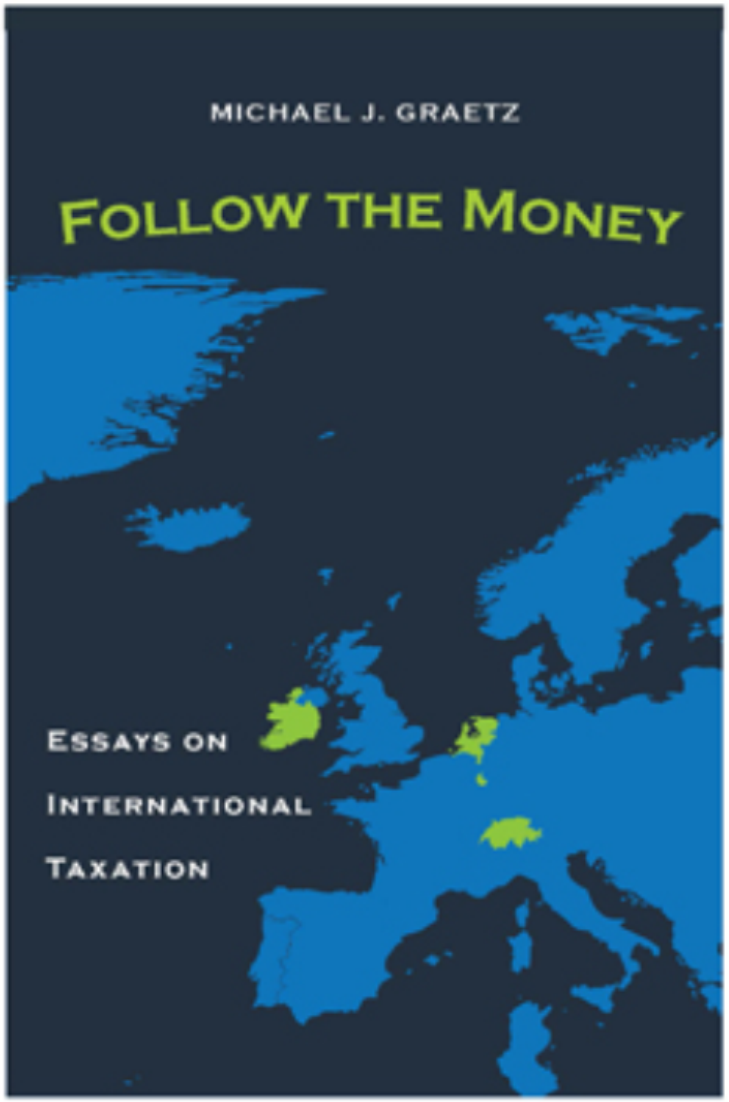
Ending fiscal period[a]	Carryback	Carryforward	Enacting legislation
1998-12 to 2000-12	2 years	20 years	TRA 1997 (permanent)[c]
2001-01 to 2002-12	5 years	20 years	JCWAA 2002 (temporary)[d]
2003-01 to 2007-12	2 years	20 years	TRA 1997 (permanent)
2008-01 to 2010-11	5 years	20 years	ARRA 2009 (temporary)[b,e]
			WHBAA 2009 (temporary)[b,f]
2010-12 to 2012-11	2 years	20 years	TRA 1997 (permanent)

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

Source: Mahon and Zwick (2017).

Institutional detail on international tax



Follow the Money Front Cover

Source: `http://documents.law.yale.edu/follow-the-money` (can download book for free).

Important provisions and issues

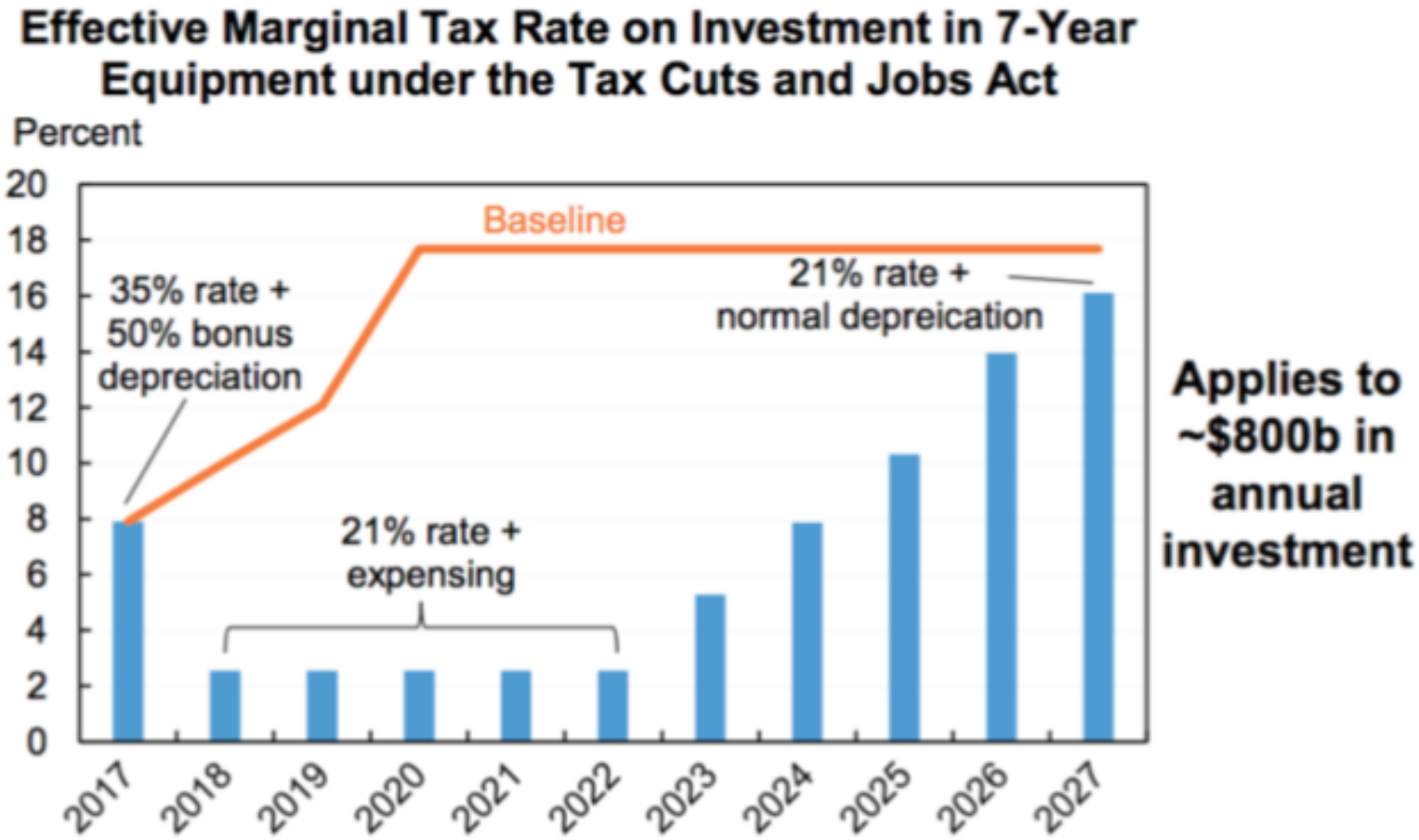
- Worldwide versus territorial
- Check the box regulations (effective 1997)
- Foreign Tax Credit (passive versus general income, us expense allocation rules, loss rules, HIRE act changes)
- Transfer pricing
- Subpart F rules
- Deductibility of interest payments and "thin capitalization" rules
- Intellectual 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)

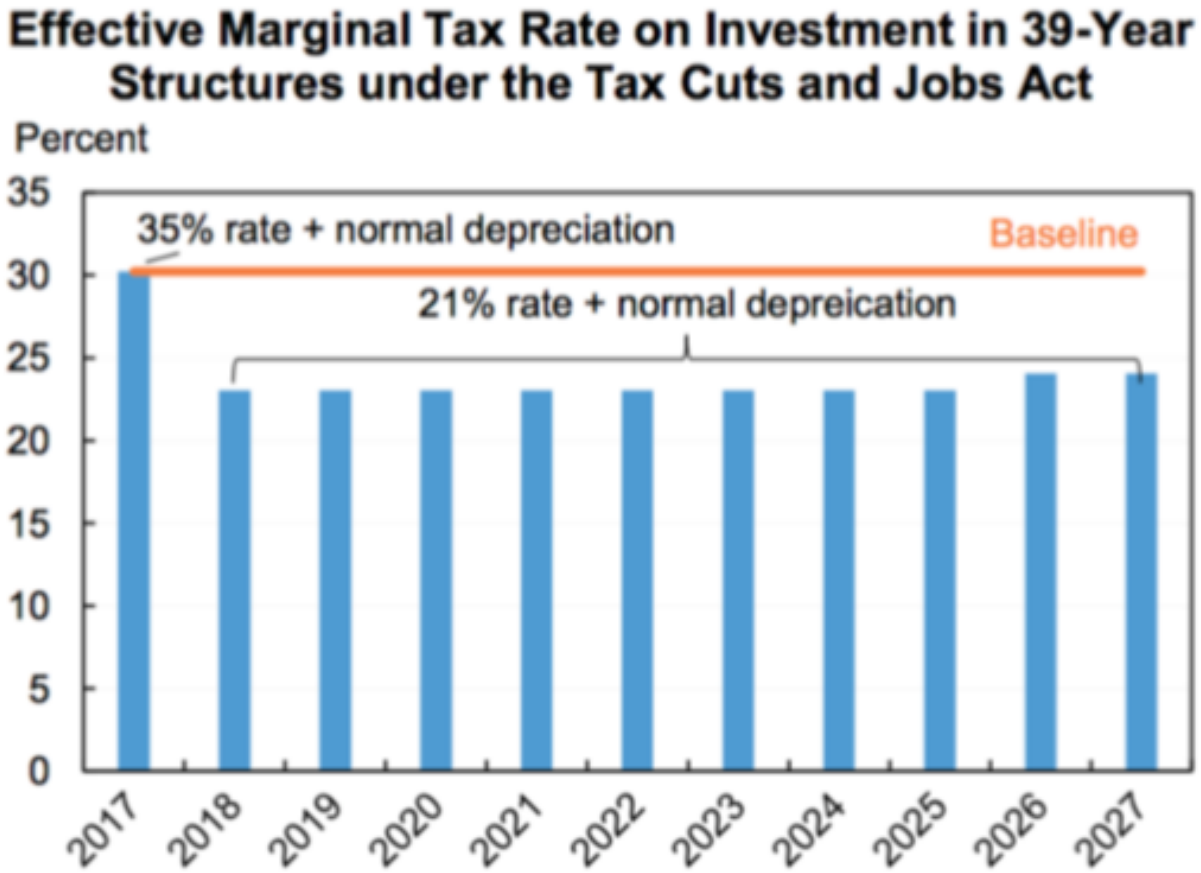
The effective marginal tax rate on equipment investment falls somewhat, then rises sharply



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.

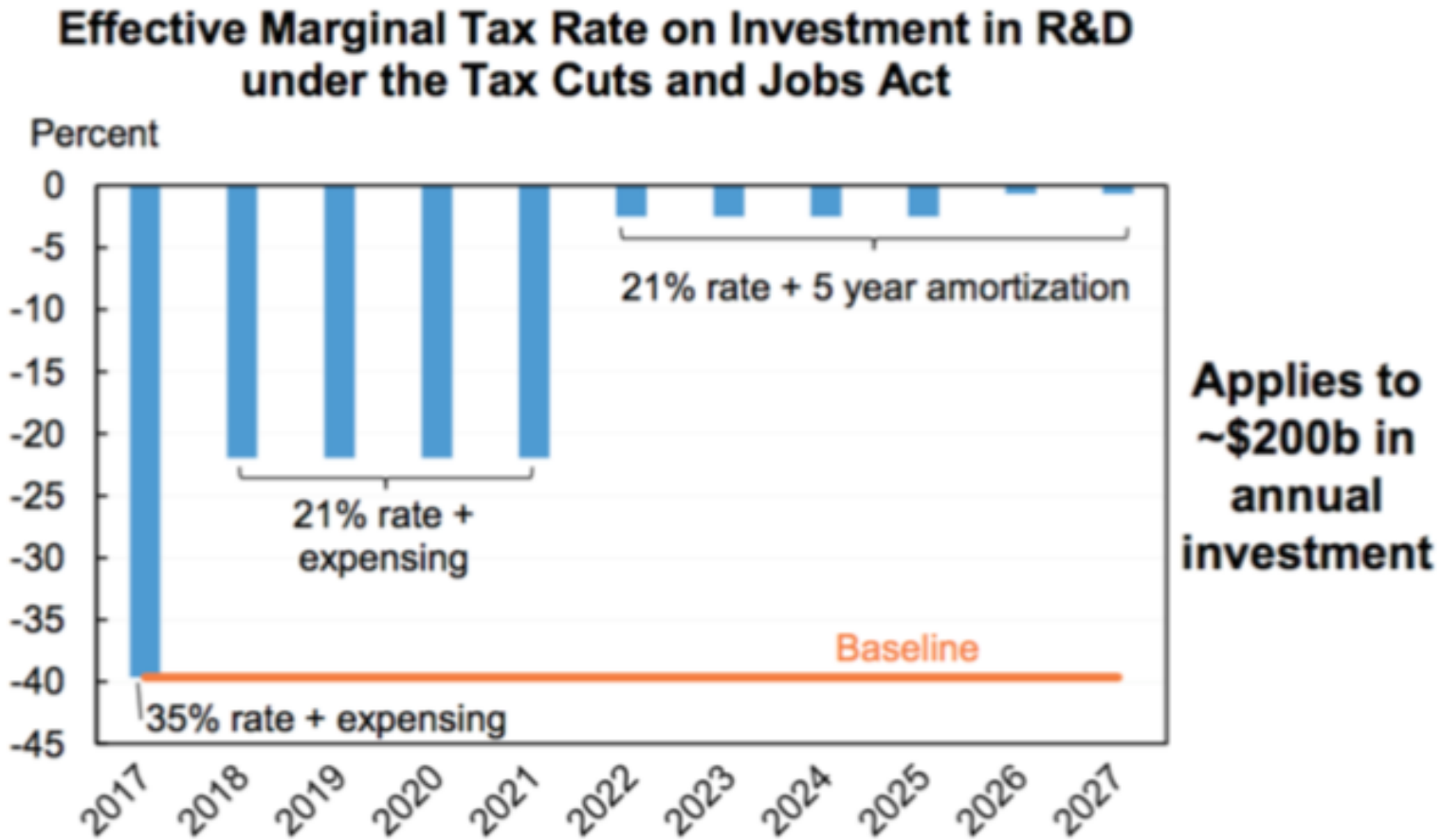
The effective marginal tax rate on structures investment falls



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



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.

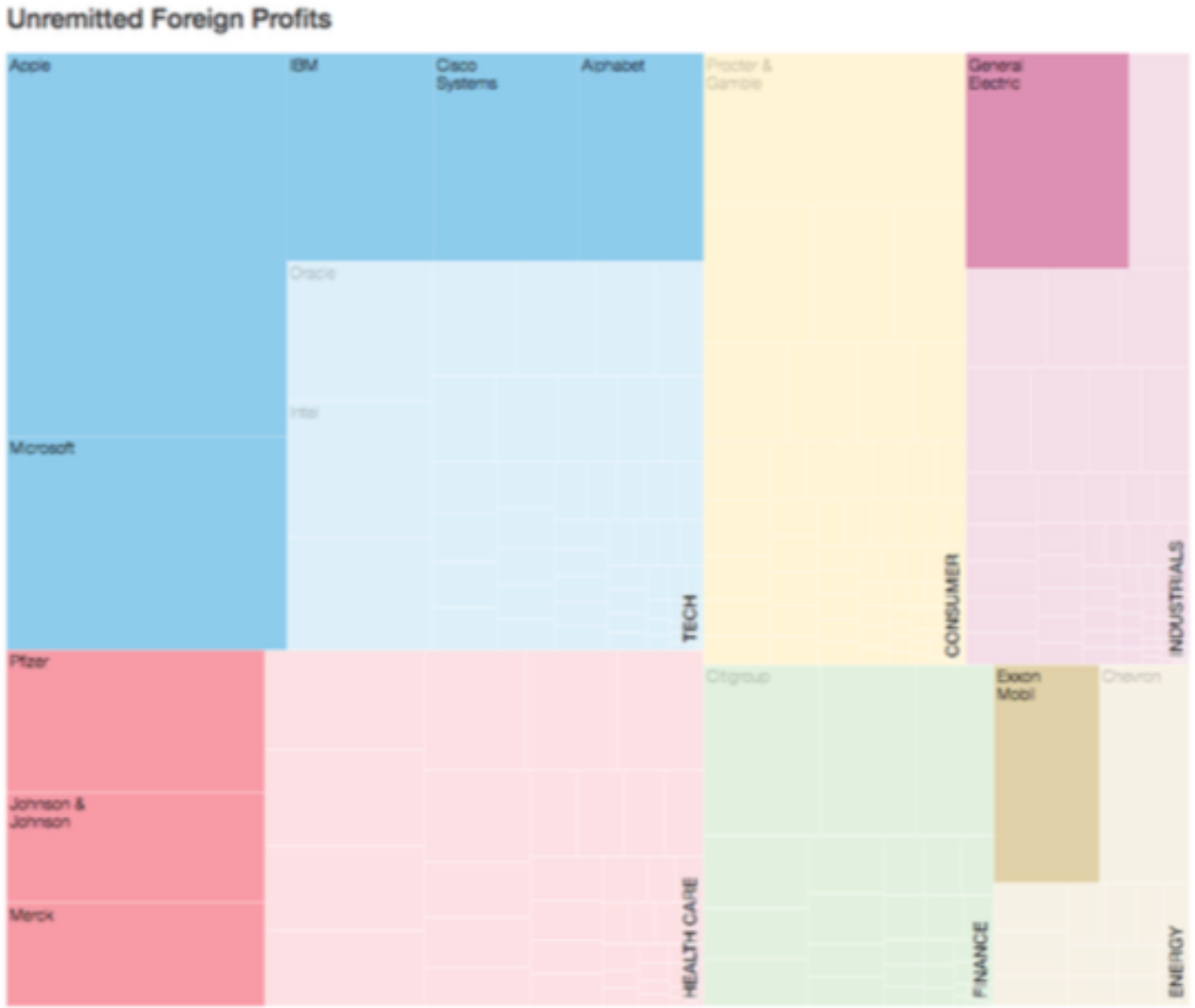
Source: Jason Furman.

TCJA Bucket 2: Pass-through Provisions

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.

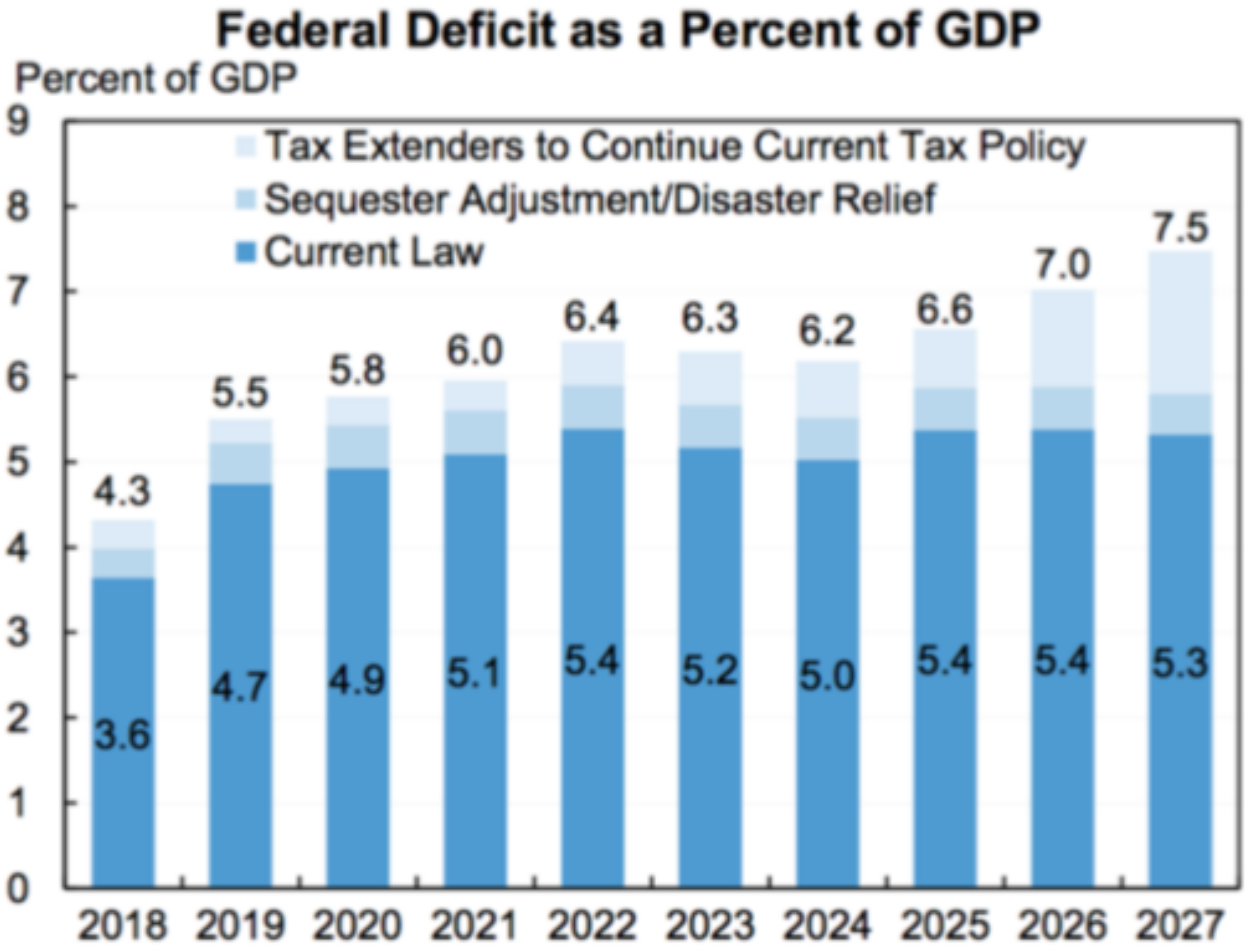


Source: WSJ.

TCJA Bucket 3: International Provisions

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

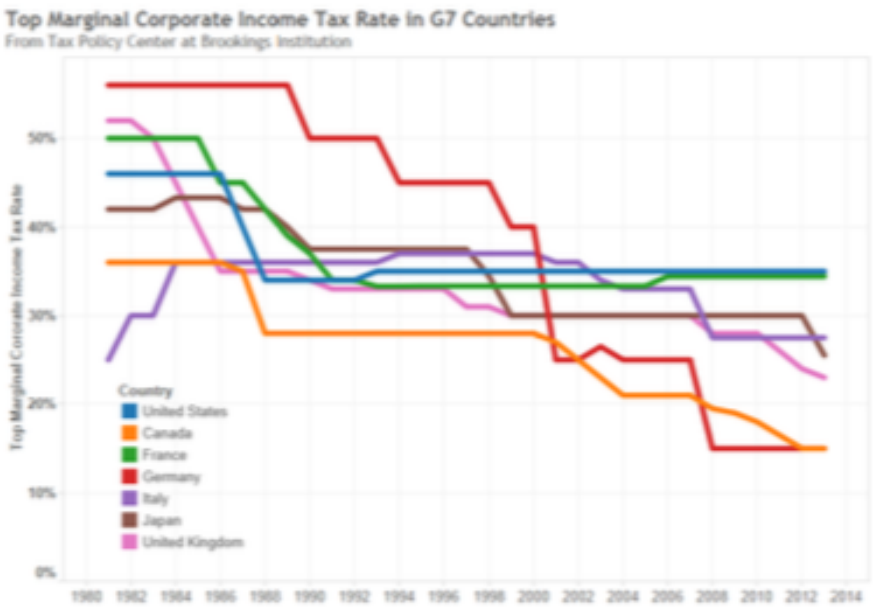


Source: Committee for a Responsible Federal Budget; Congressional Budget Office; author's calculations.

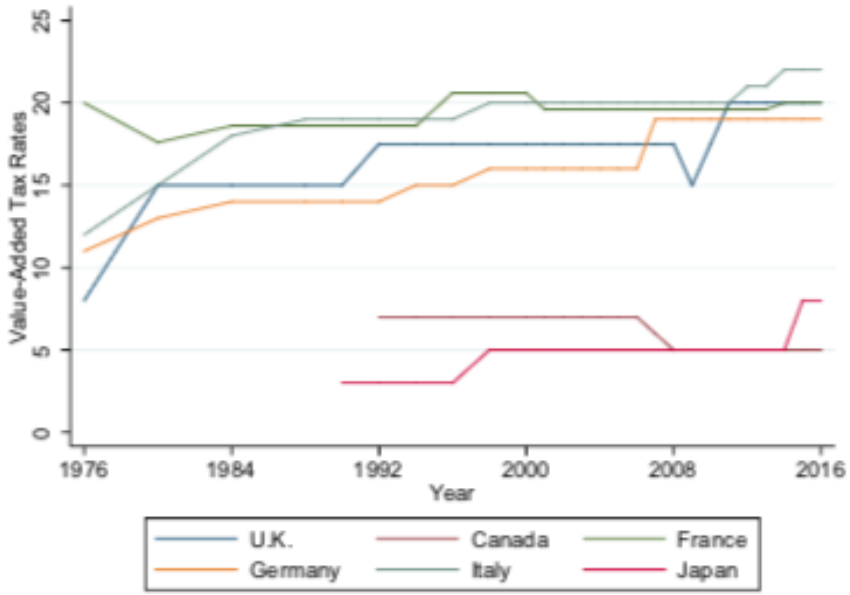
Source: Jason Furman.

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

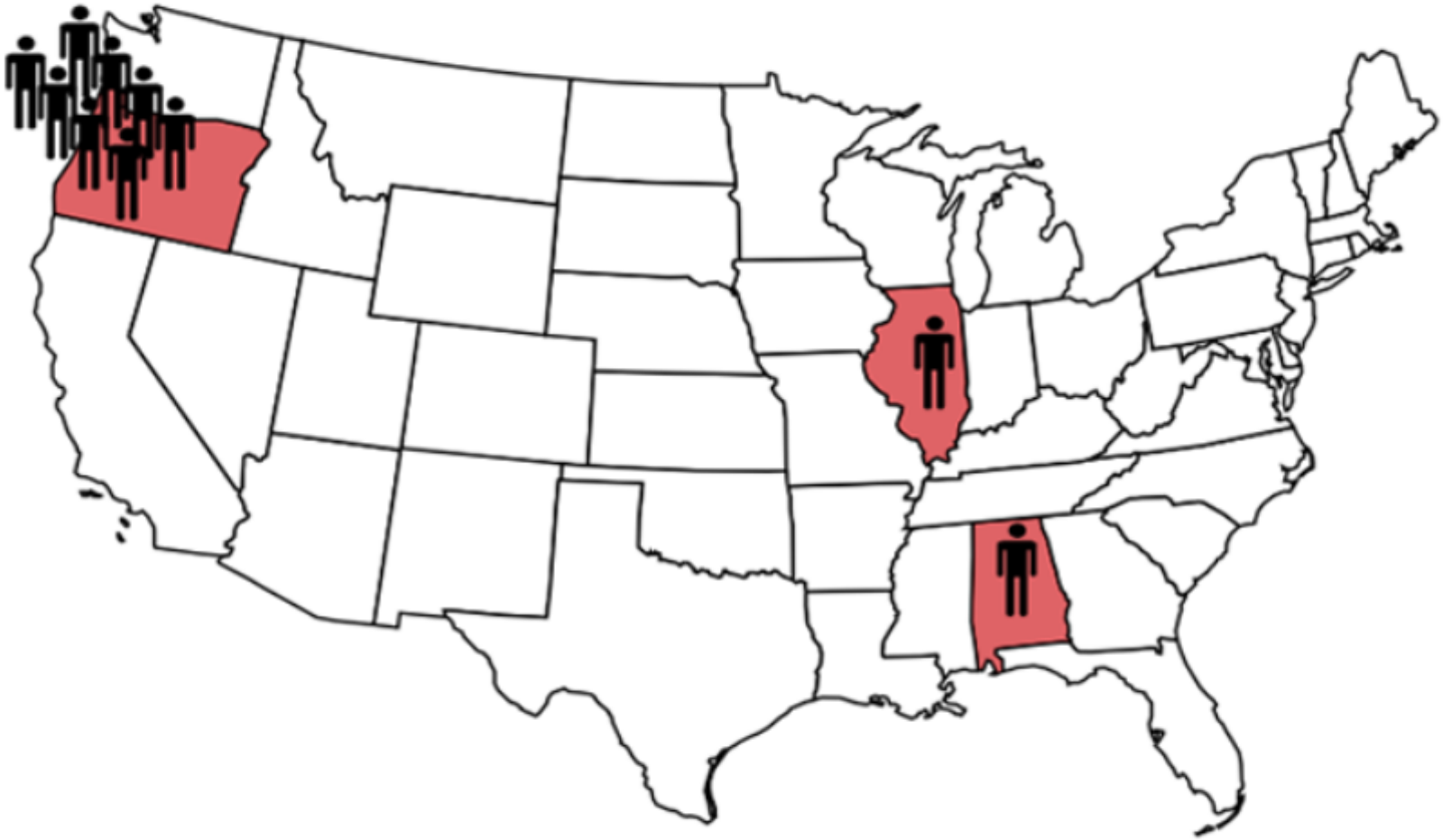
1. Partnership and S-corps: τ^{INC} personal income tax rate
   - Synthetic changes as in Zidar (2013) using NBER's TAXSIM
2. Single-state C-corps: τ^{c} corporate income tax rate
   - Digitized corporate tax rates from "Book of the States"
3. Multi-state C-corps: τ^{A} apportioned corporate income tax rate
   - Depends on corporate rate, apportionment, and activity weights

$$\tau_i^A = \sum_s \tau_s^c \omega_{is}$$

- where $\omega_{is} = \underbrace{\left(\theta_s^w \frac{W_{is}}{W}\right)}_{payroll} + \underbrace{\left(\theta_s^\rho \frac{R_{is}}{R}\right)}_{property} + \underbrace{\left(\theta_s^x \frac{X_{is}}{X}\right)}_{sales}$

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

Nike apportionment example



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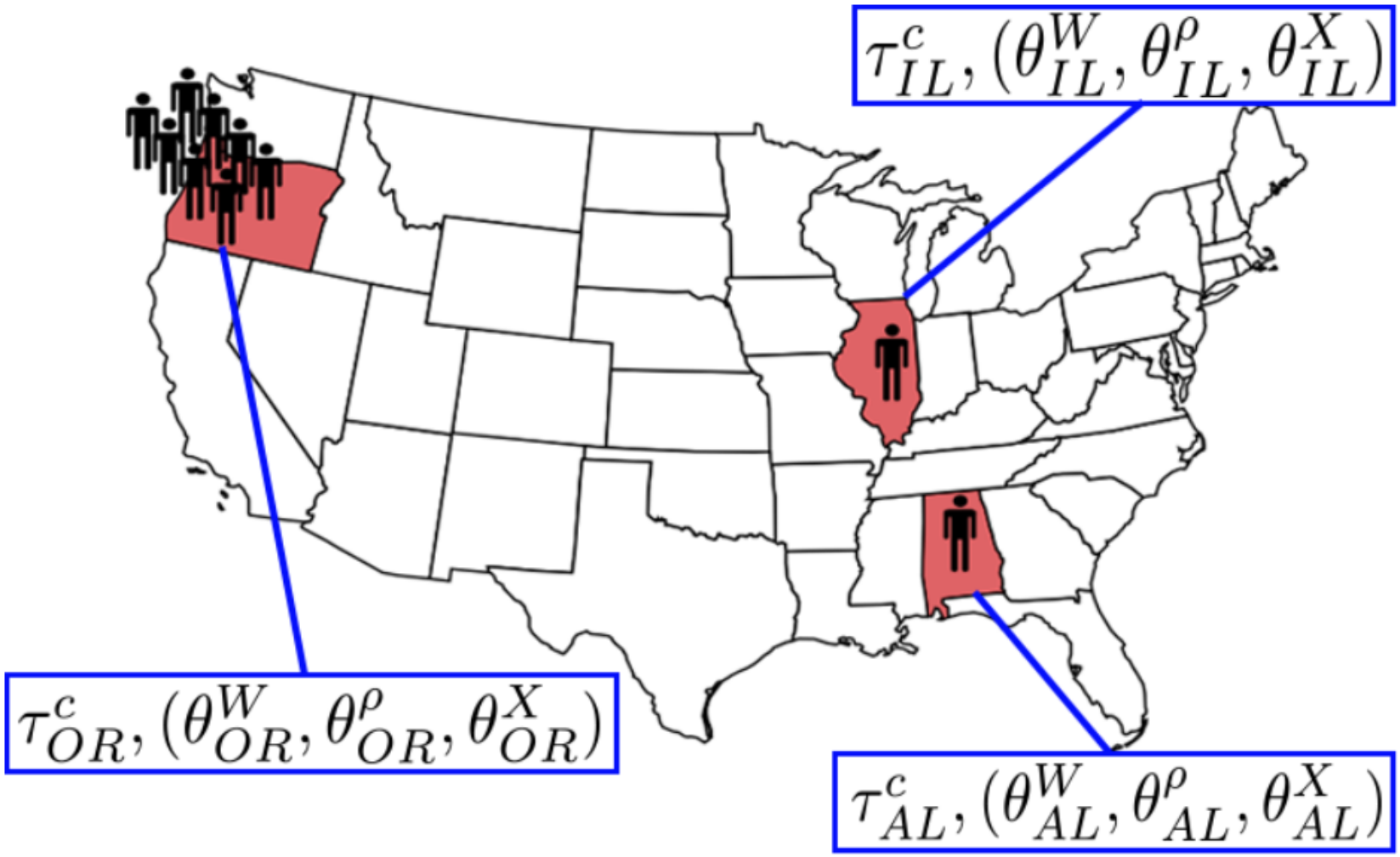


Source: Suárez Serrato and Zidar (AER, 2016).

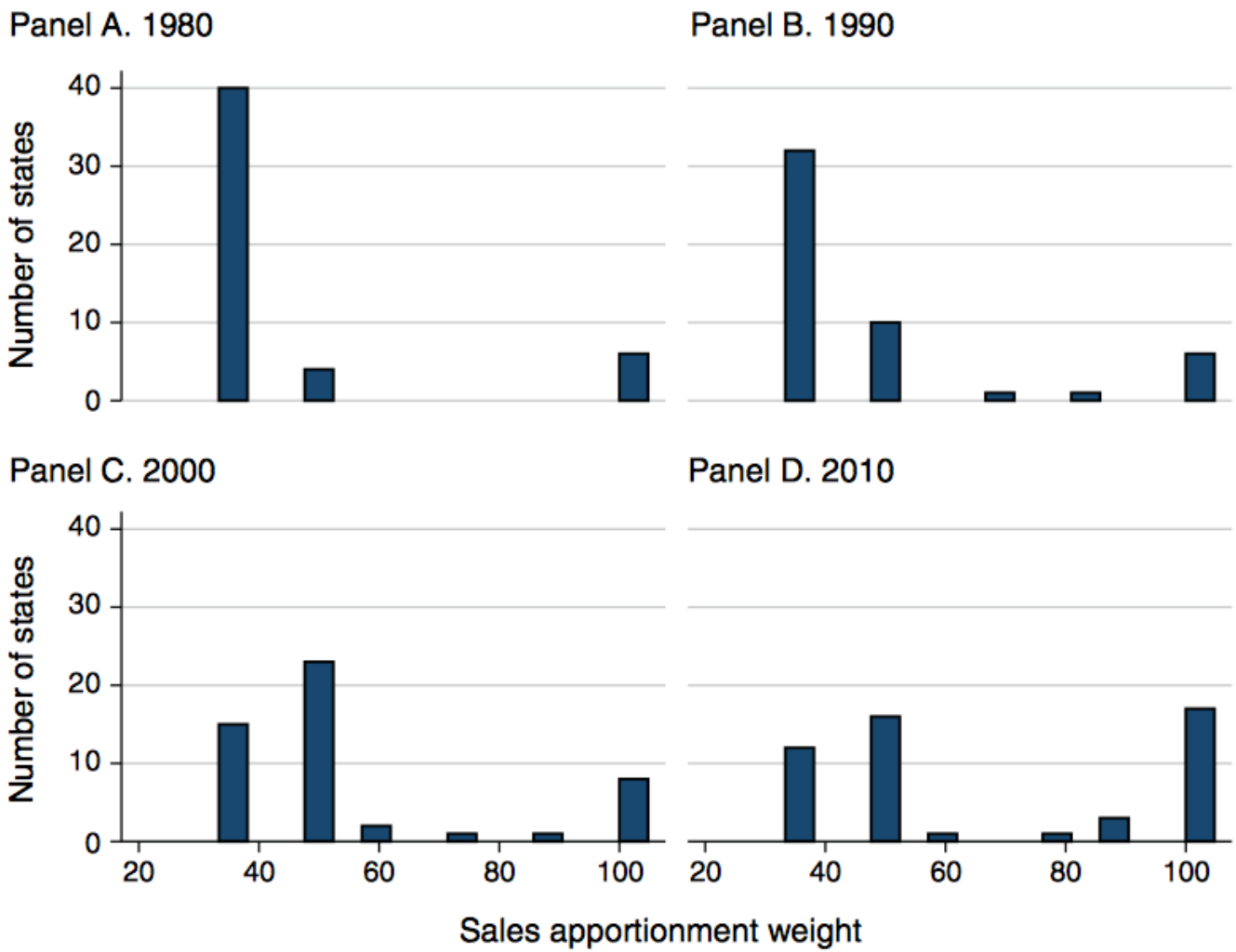
Nike apportionment example

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

State	I. Using Payroll	II. Using Sales
	Apportioned Profit (\$M)	
OR	(80% of 6) = 4.8	2
IL	(10% of 6) = .6	2
AL	(10% of 6) = .6	2
	Corporate Tax Liability (\$M)	
OR with $\tau^c_{OR} = 50\%$	2.4	1
IL with $\tau^c_{IL} = 10\%$	.06	0.2
AL with $\tau^c_{AL} = 0\%$	0	0
Total Tax Liability (\$M)	3	1.2

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

Evolution of apportionment weights



Three reforms

- Formula apportionment
- Corporate tax integration
- Boarder 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

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.

Boarder Adjustment

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.

Boarder Adjustment

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.

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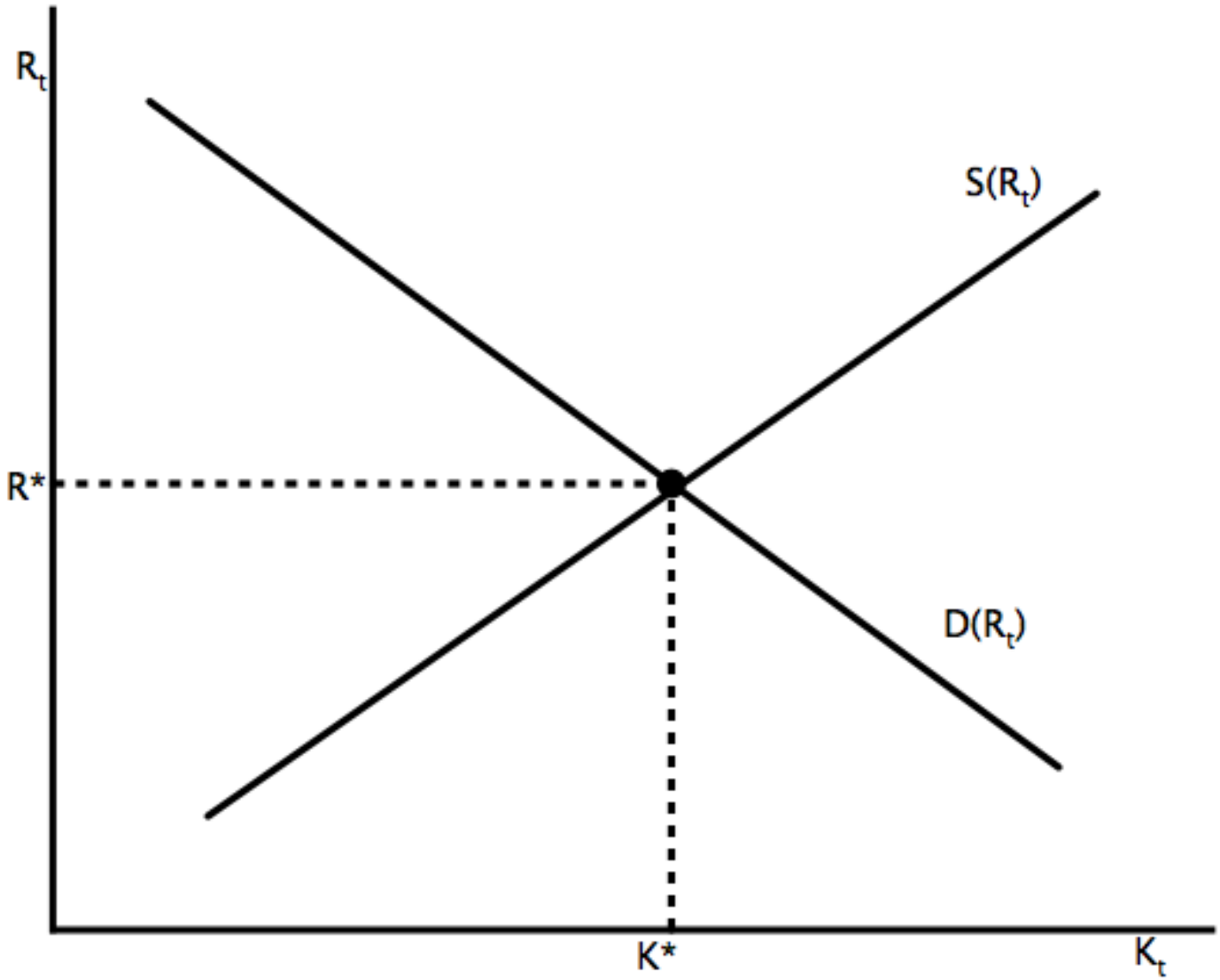
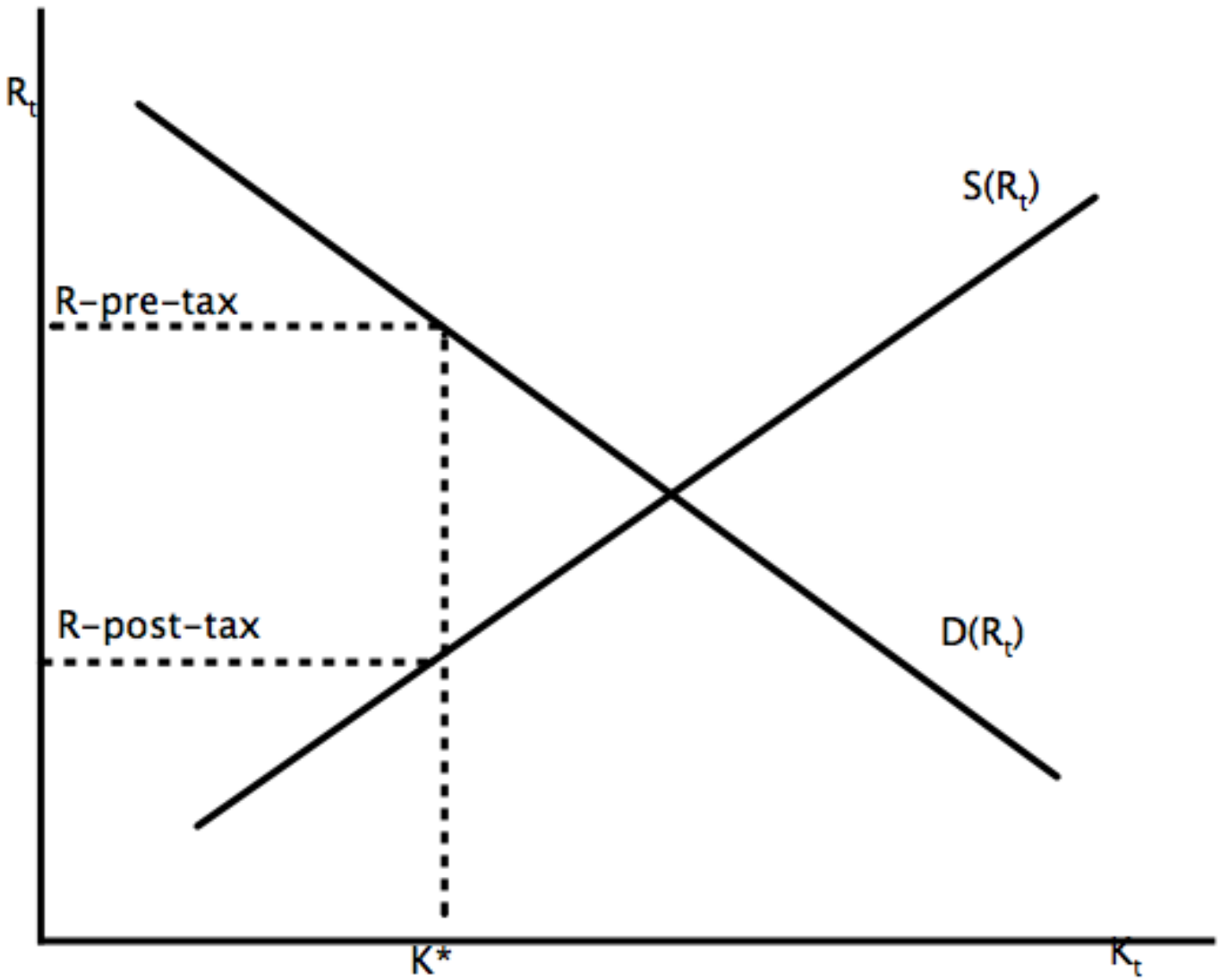
Theory

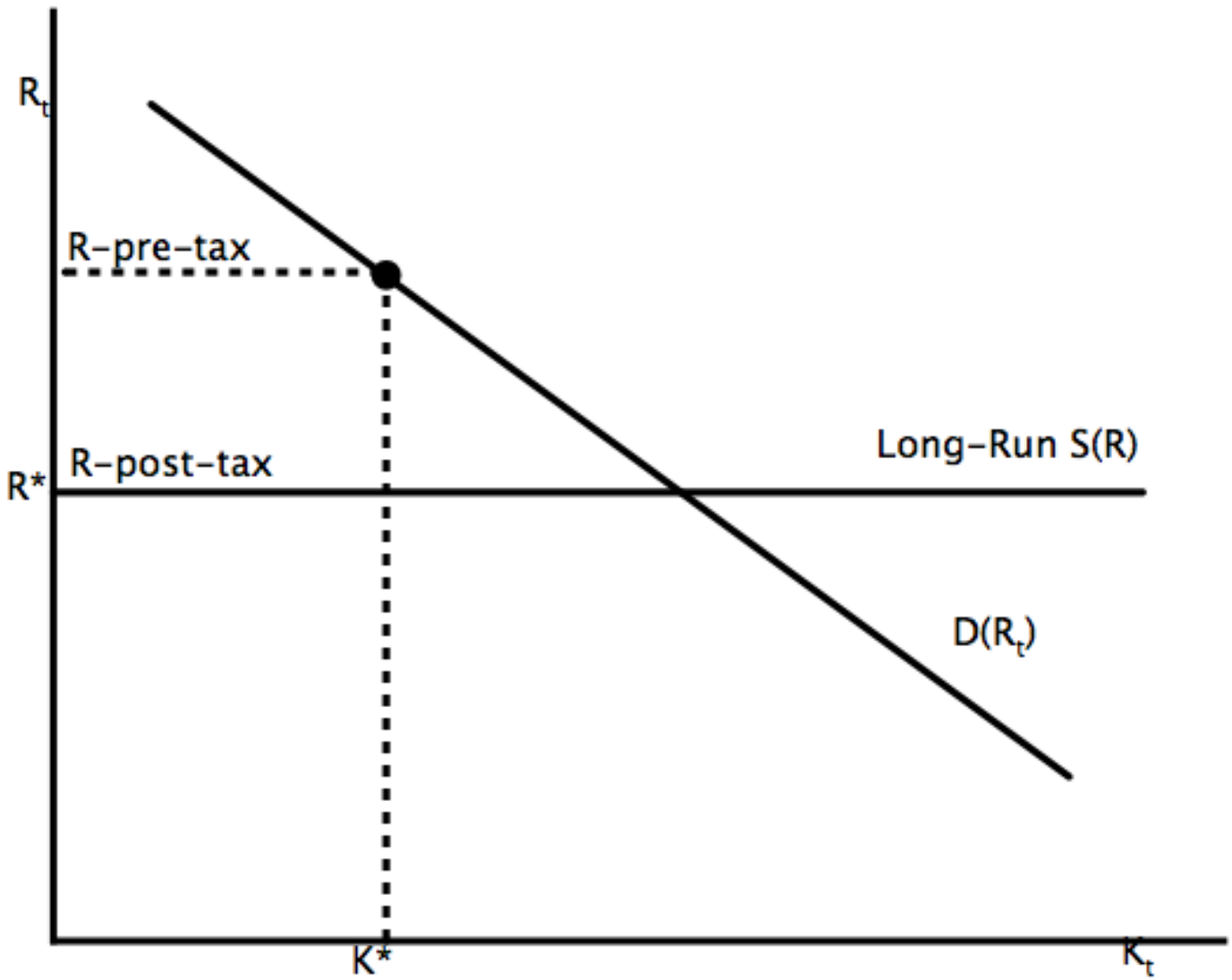
Impact of a Capital Tax



Impact of a Capital Tax



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)

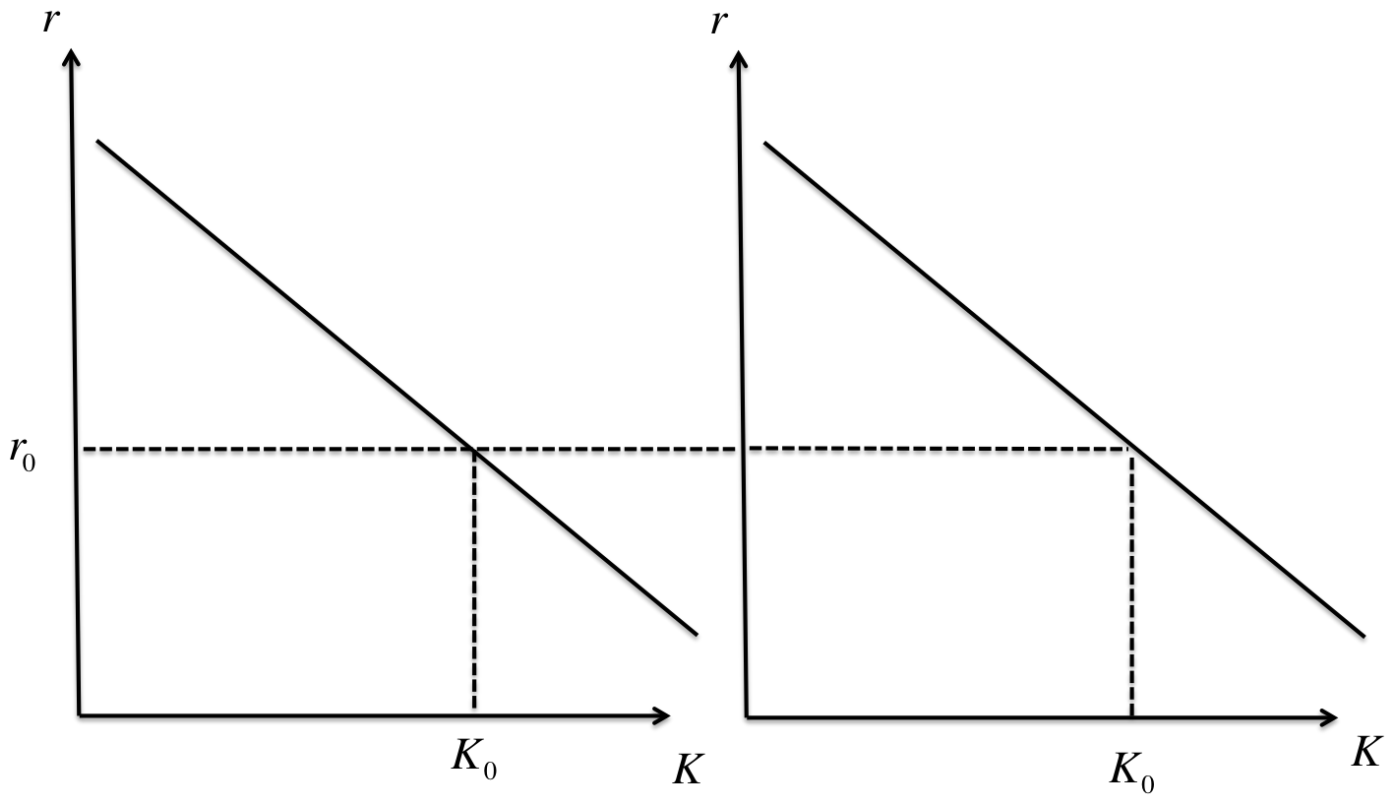
Simple spatial model: One factor, two locations

Impact of Capital Tax: One factor, two locations

Setup

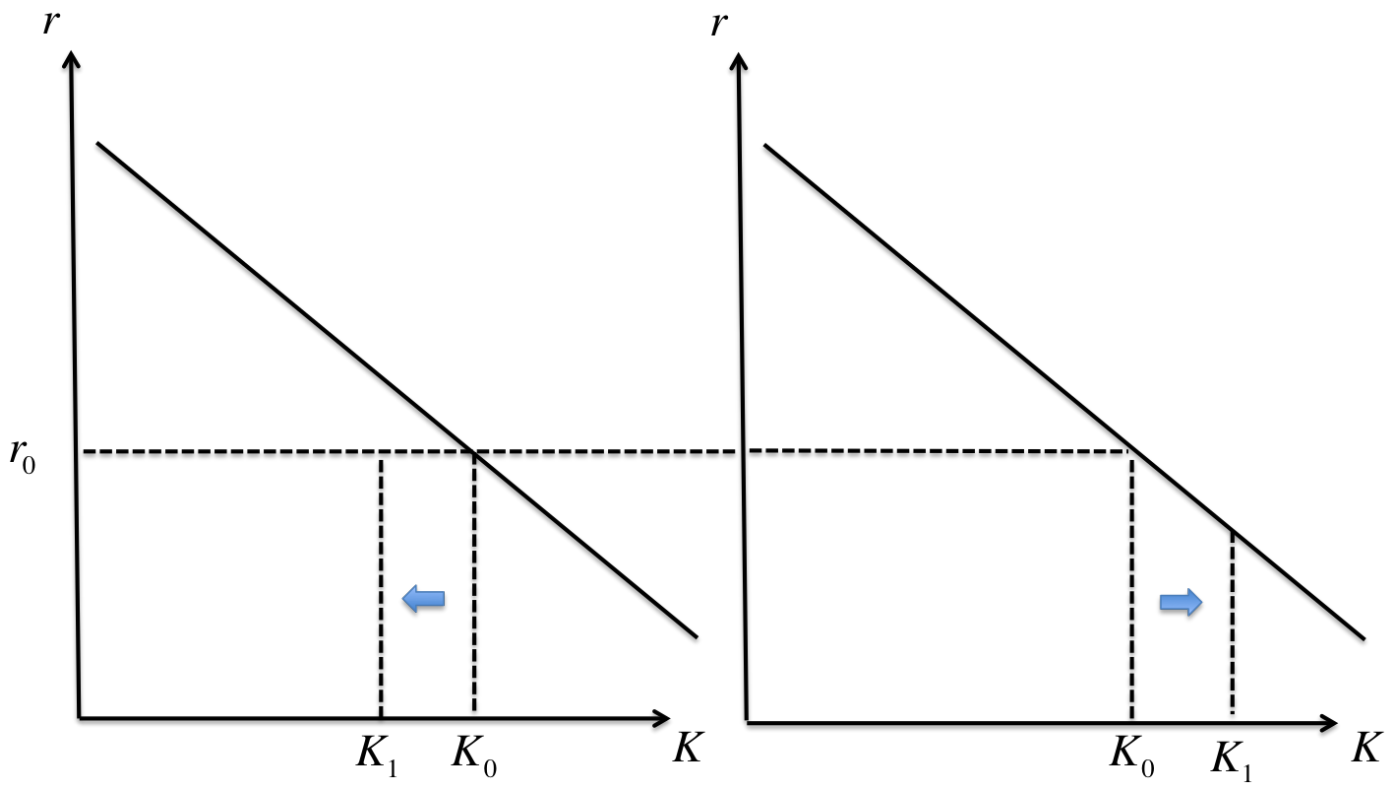
1. One factor (capital)
2. Two locations: east and west
3. Capital market in each location
4. Total K fixed in economy overall

Initial equilibrium



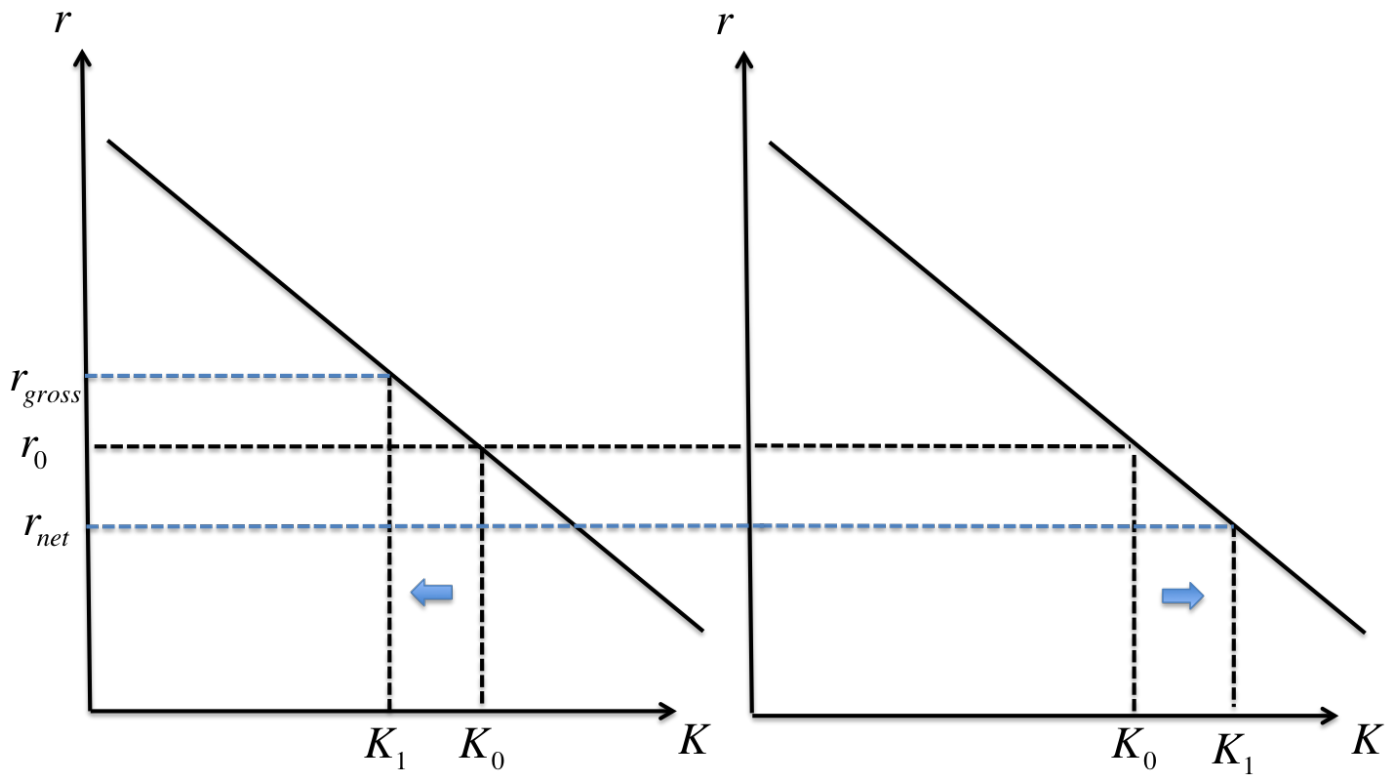
Tax in west

Causes capital to flee to east



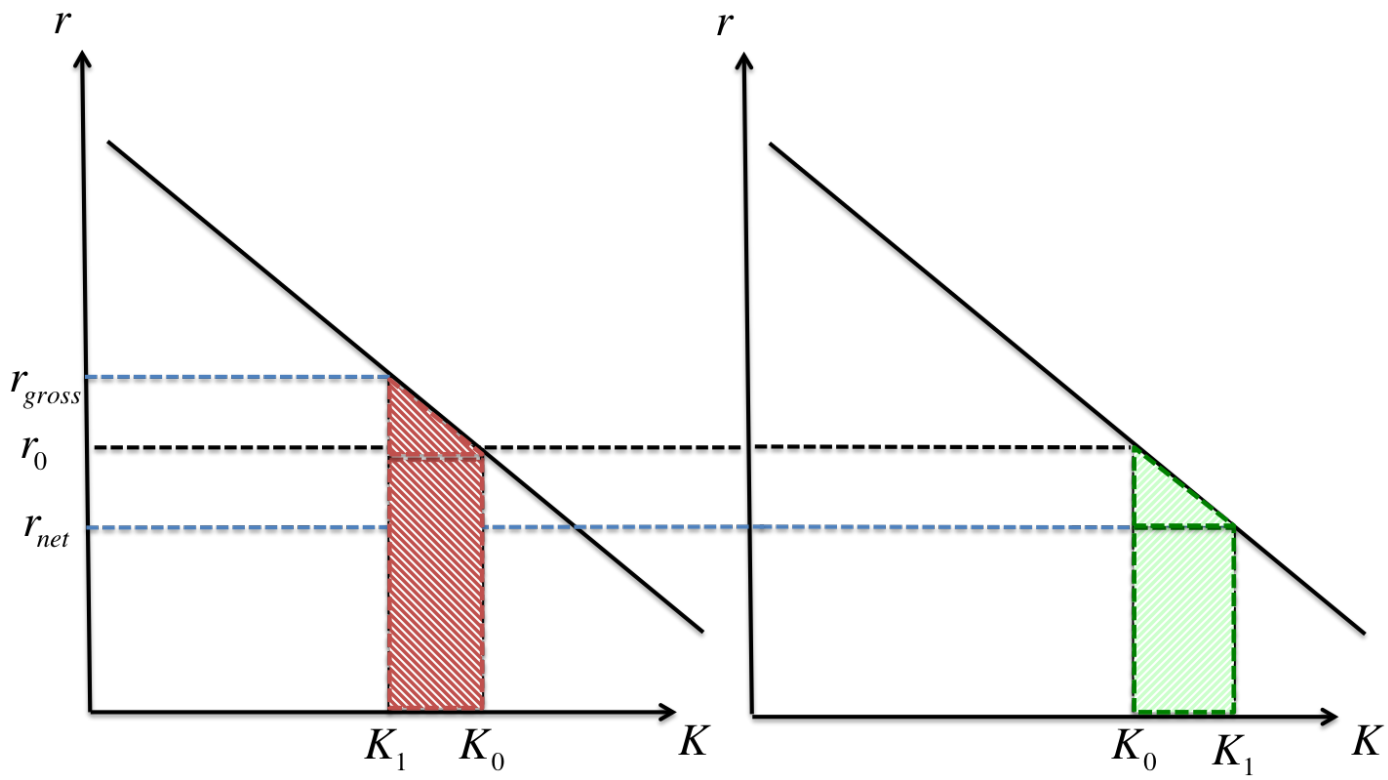
New allocation of capital

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



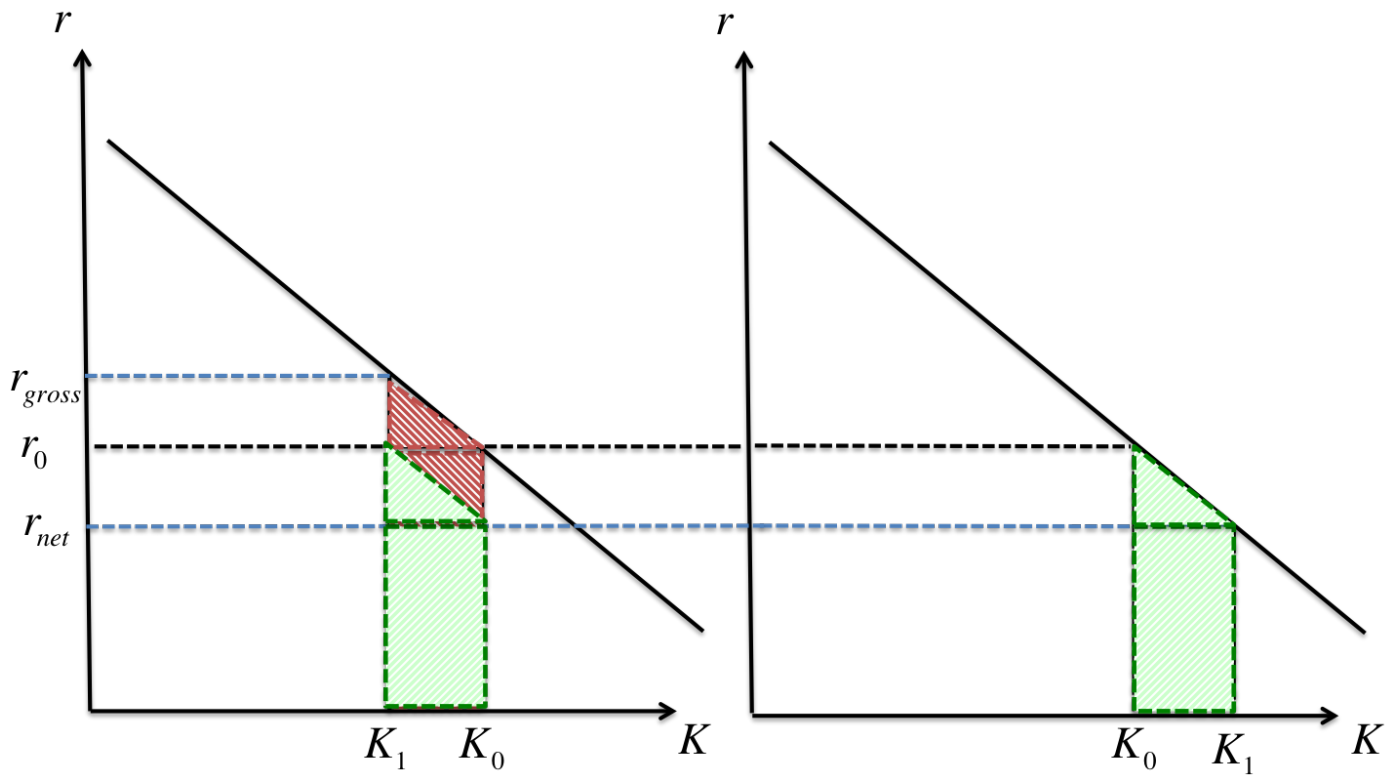
Welfare changes in each location

- 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

Takeaways

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

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Evidence

Hines (AER, 1996)

- Paper: Heins, James R. "Altered States: Taxes and the Location of Foreign Direct Investment in America." American Economic Review, Vol. 86, No. 5 (1996): 1076-1094.
- 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

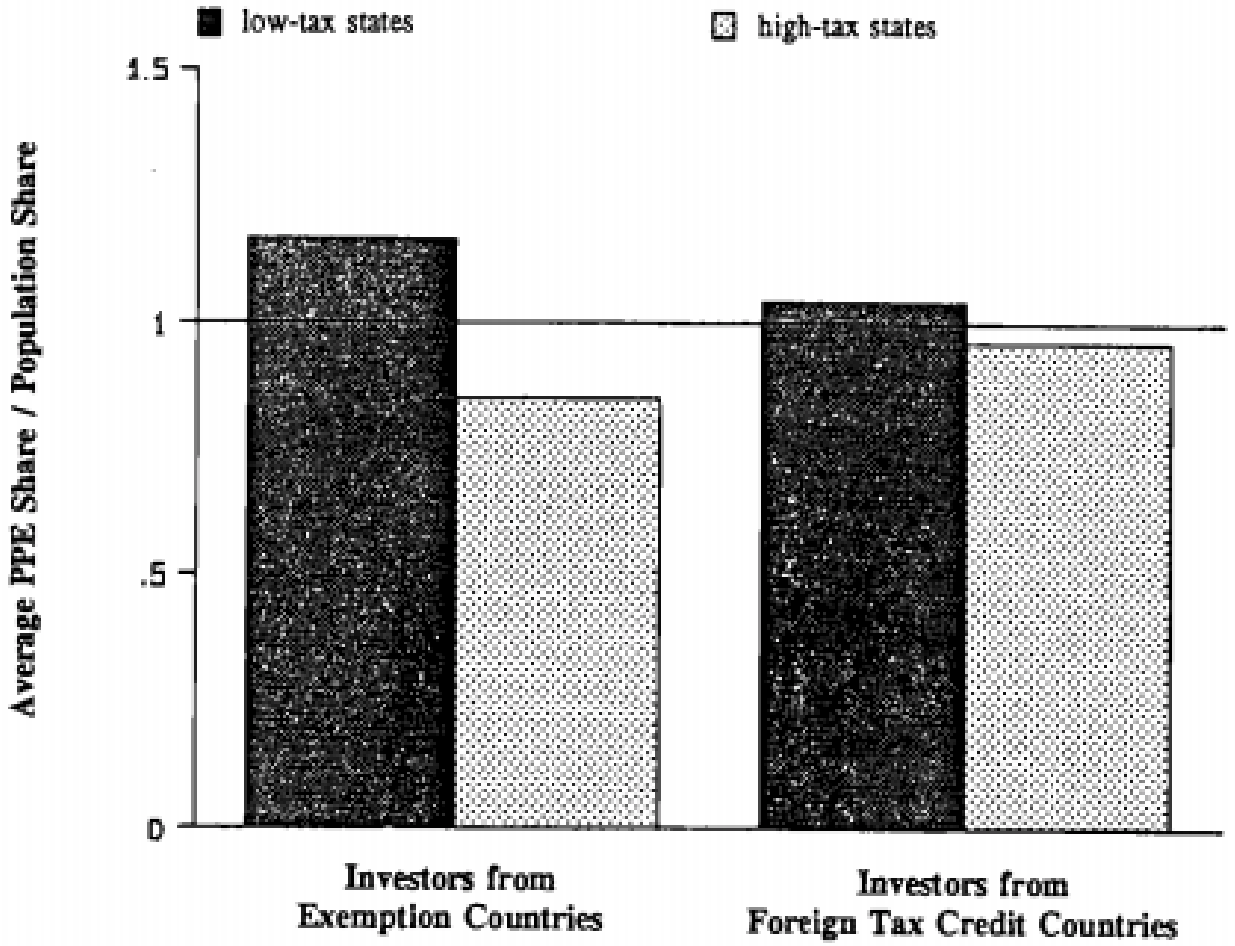
Countries have different policies on taxation of domestic firm income earned abroad.

- 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

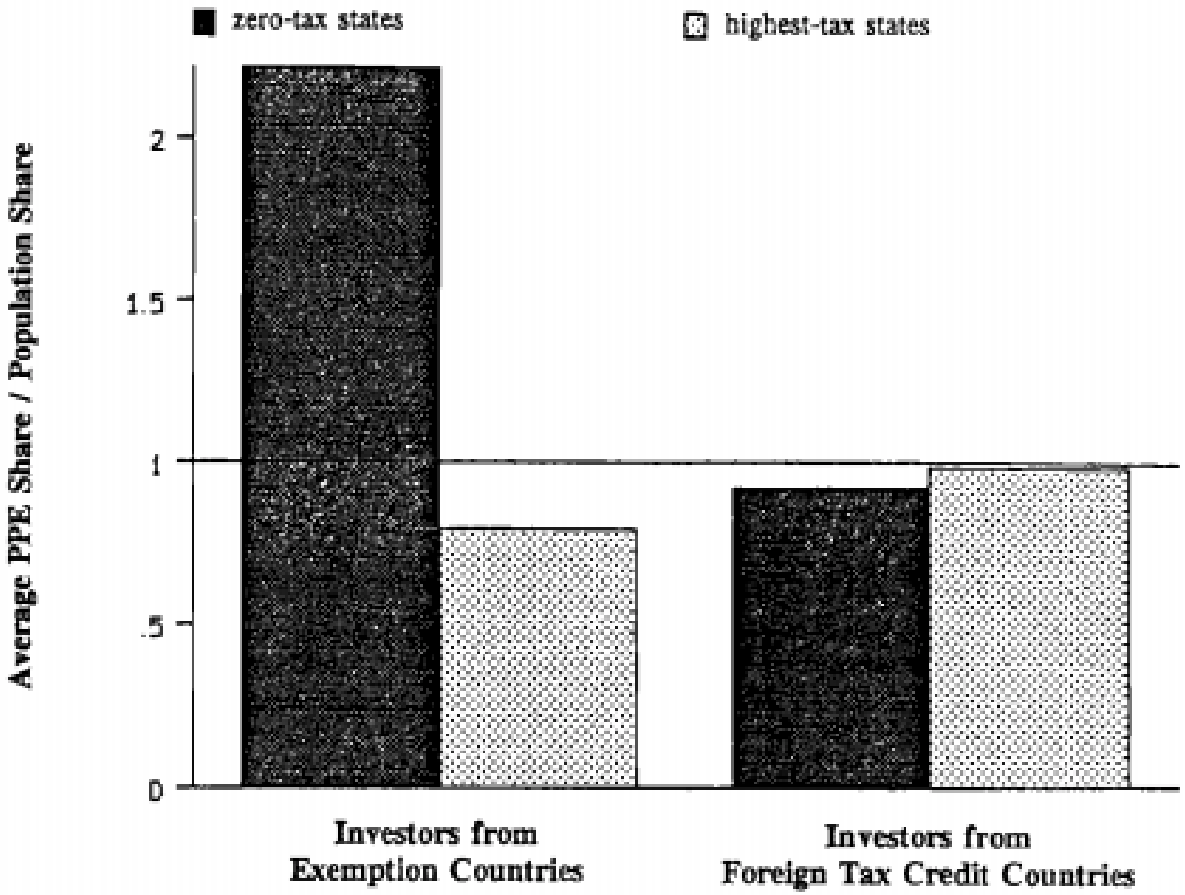
- Investment data: BEA 1987 Census of Manufactures
  - State-by-country FDI data
  - Investing countries: Australia, Canada, France, Germany, Japan, Switzerland, and the United Kingdom $\rightarrow$ "Together, the seven [...] countries account for 78% of the manufacturing PPE controlled by foreign investors 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%.

State Taxes Influence Allocation of FDI in the US

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

Suárez Serrato and Zidar (AER, 2016)

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

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

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

Allow for monopolistically competitive & heterogeneously productive firms

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

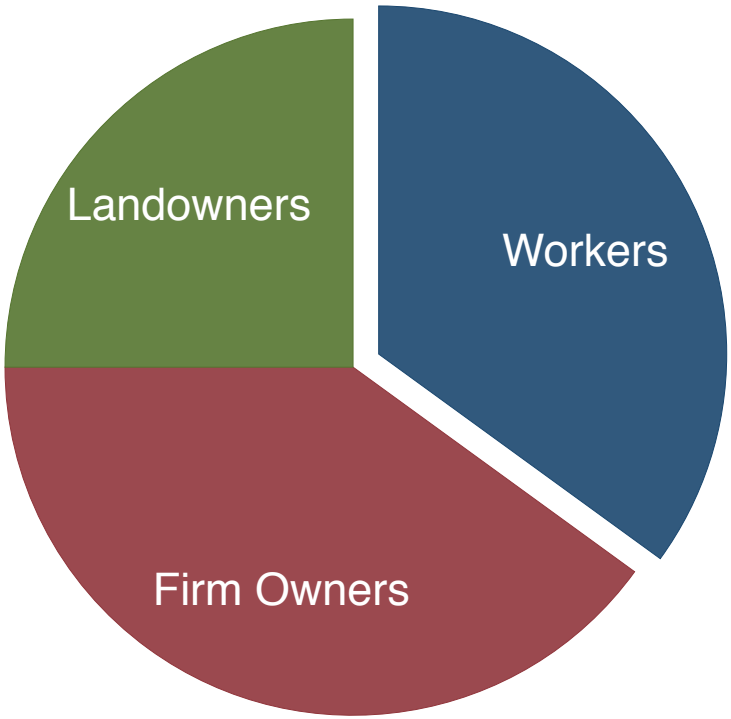
- **Question:** What are the welfare effects of cutting **corporate taxes** in an open economy on **workers**, **firm owners**, and **landowners**?

- **Contributions**

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

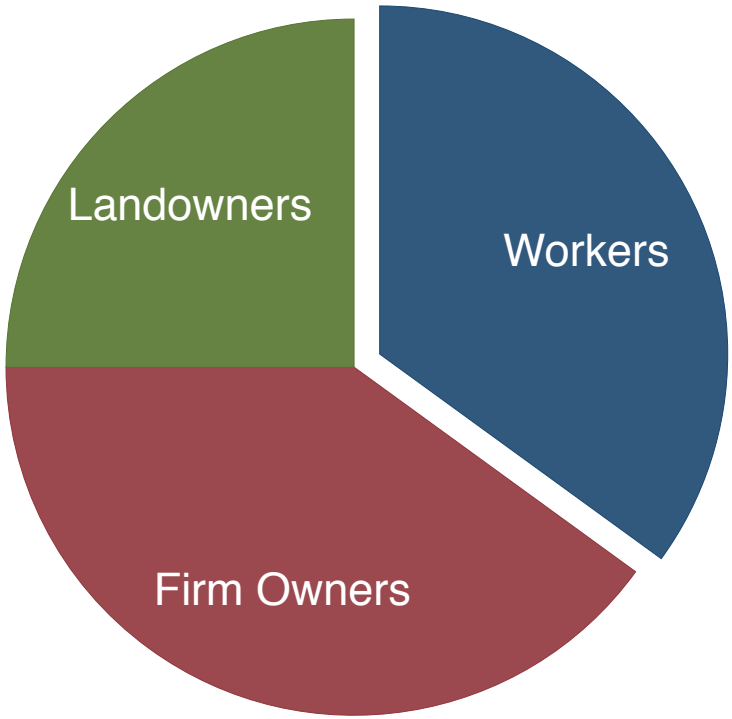
Who Benefits from State Corporate Tax Cuts?

Our Estimate

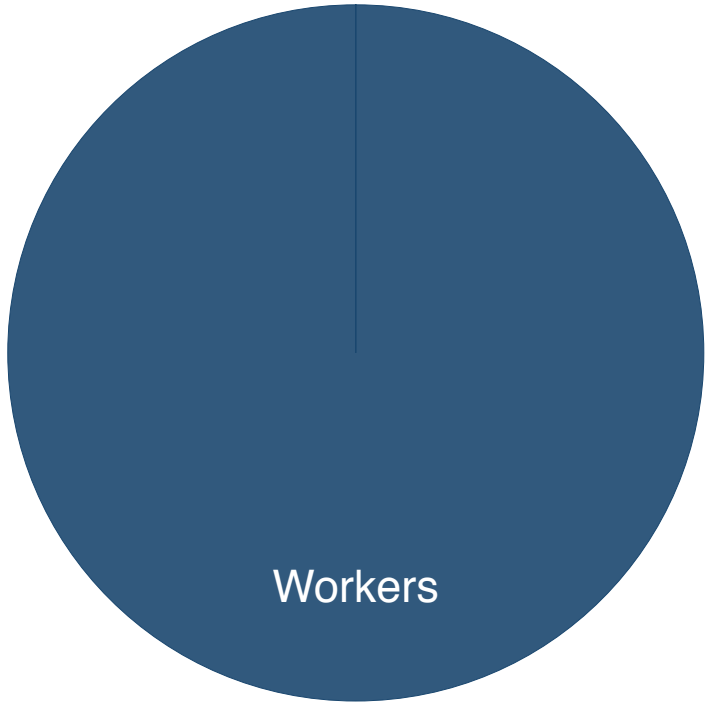


Who Benefits from State Corporate Tax Cuts?

Our Estimate



Standard Model



Paper Outline: 3 Steps

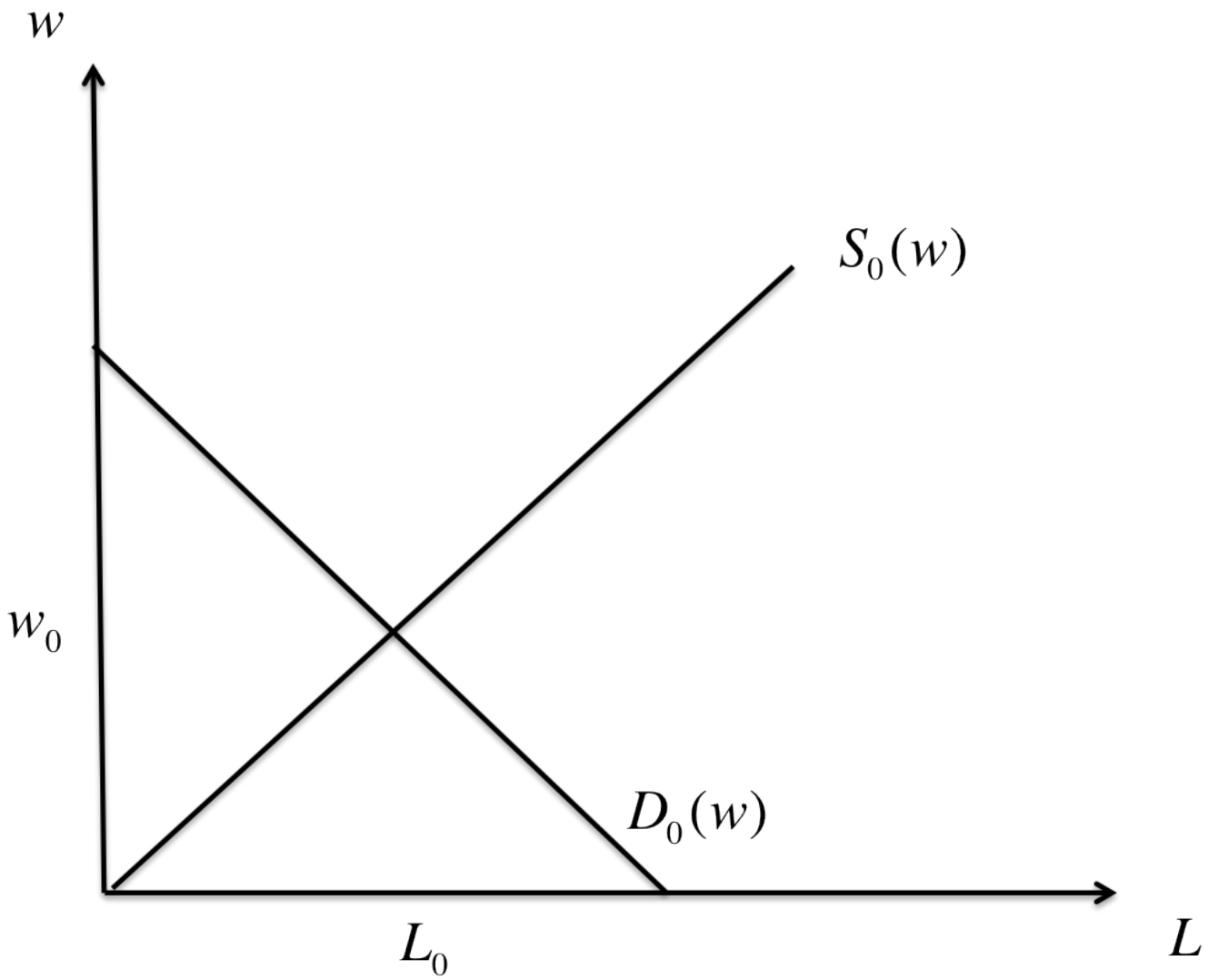
1. **Develop spatial equilibrium model with firms**
   - Allow workers, firm owners, landowners to bear incidence
   - Map reduced-form effects to parameters governing welfare
2. **Reduced-form effects of corporate tax cuts**
   - Implement state apportionment system using establishment data
   - Number 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

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]

Equilibrium in the Local Labor Market



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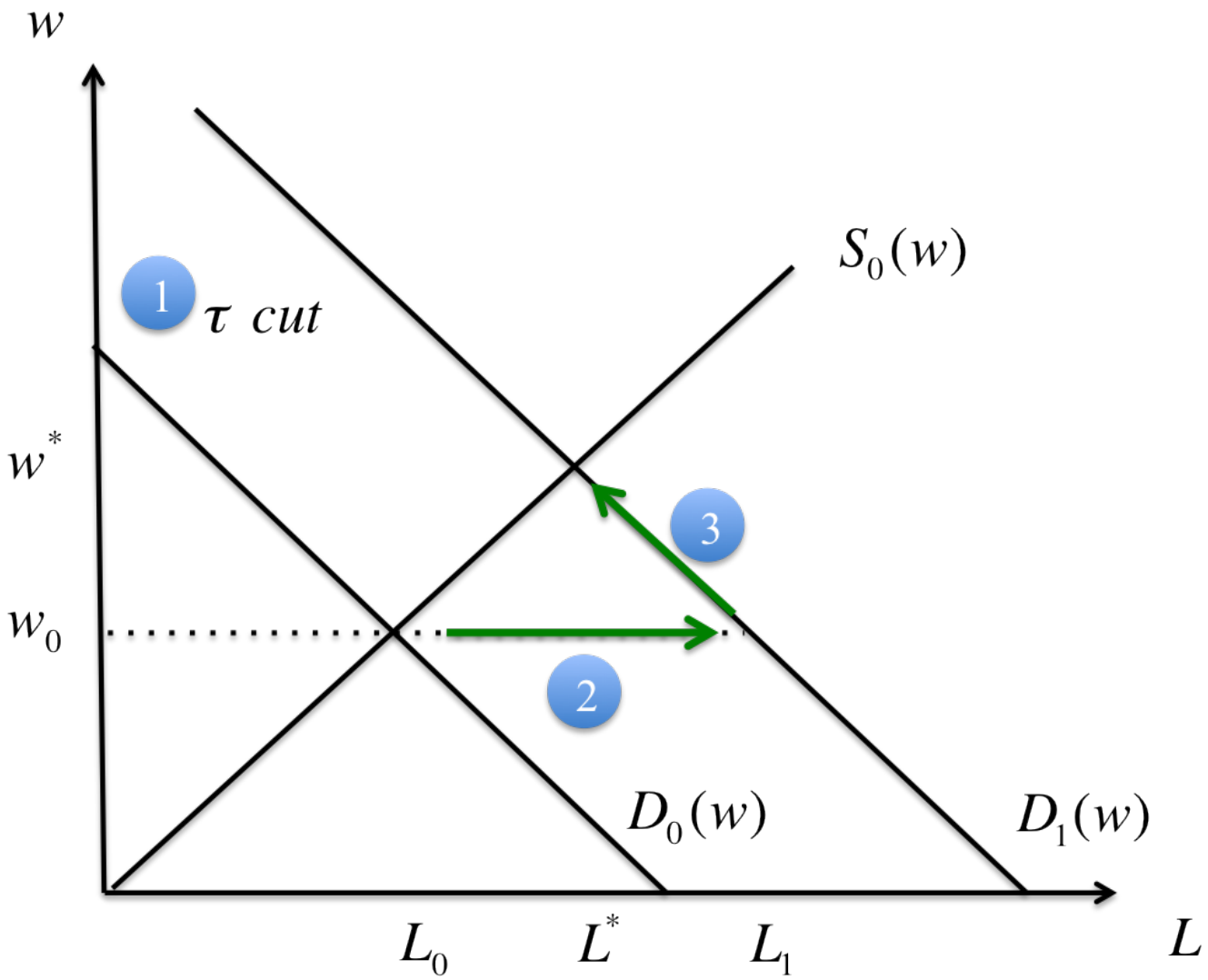

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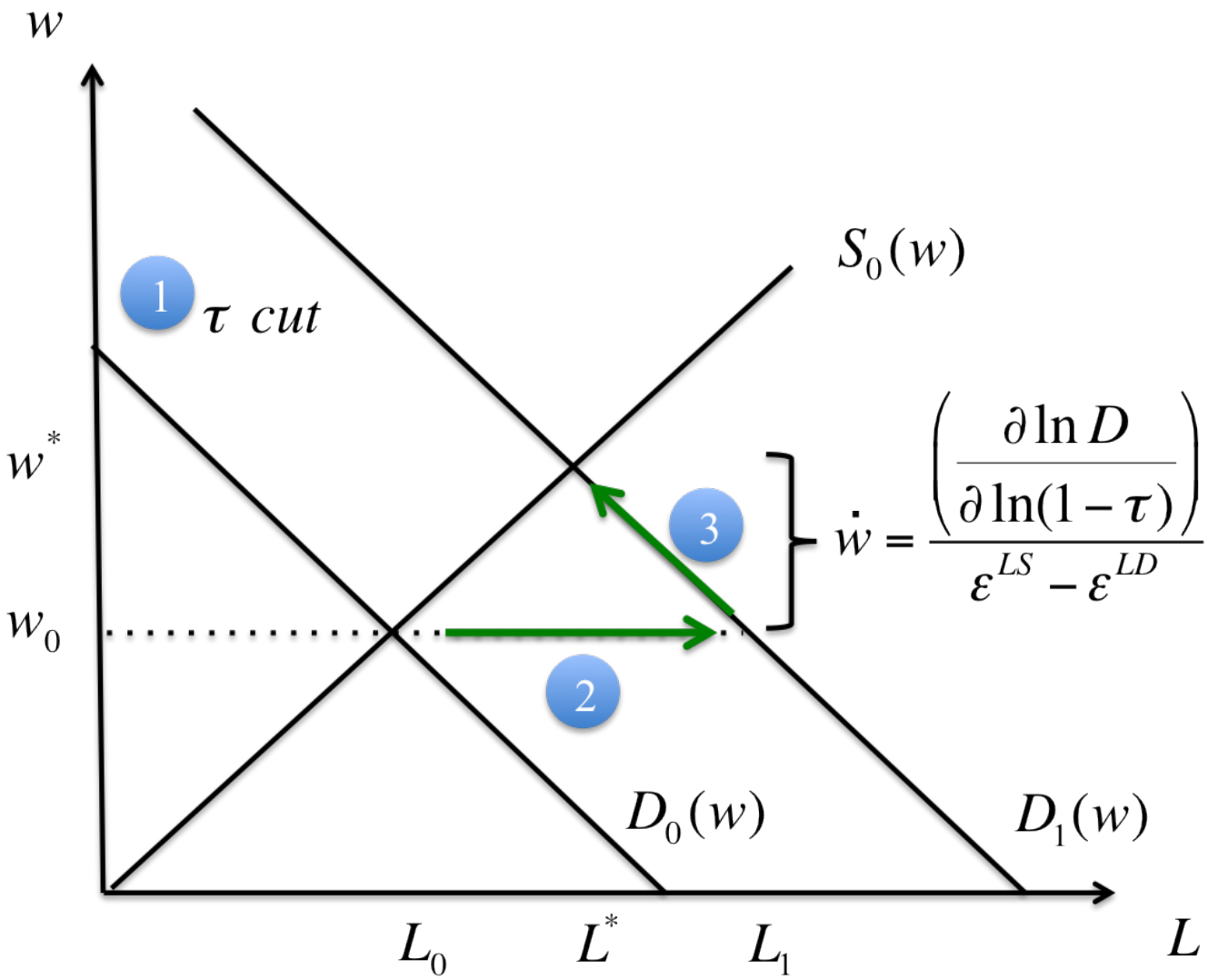
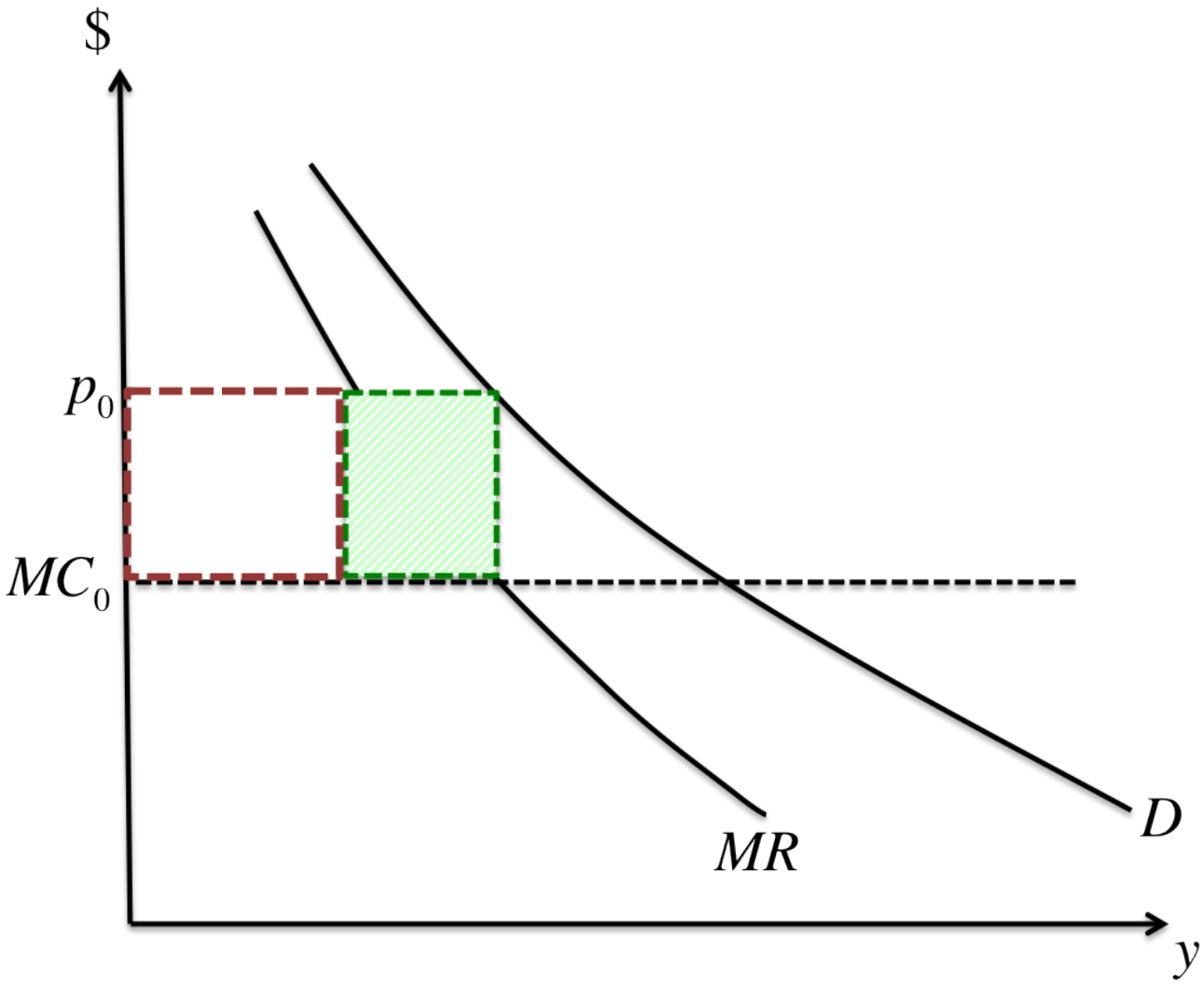


Establishment Production



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

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

4 Reduced-Form Equations of the Model

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

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

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

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

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

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

Overview of Giroud and Rauh (JPE, forthcoming)

- Paper: Giroud, Xavier and Joshua Rauh. "State Taxation and the Reallocation of Business Activity: Evidence from Establishment-Level Data." NBER Working Paper No. 21534 (2015).
- 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

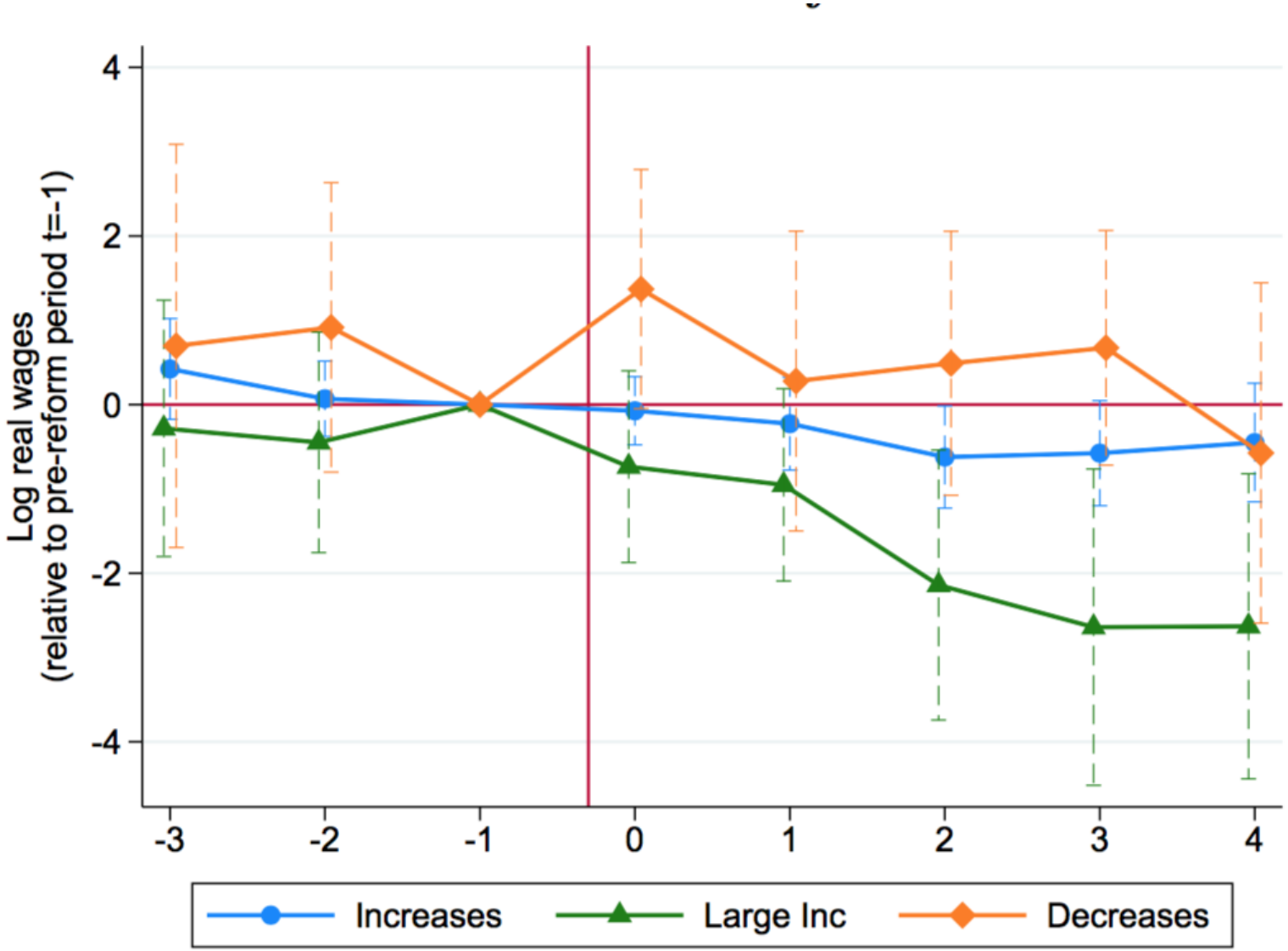
Findings:

- 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.

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

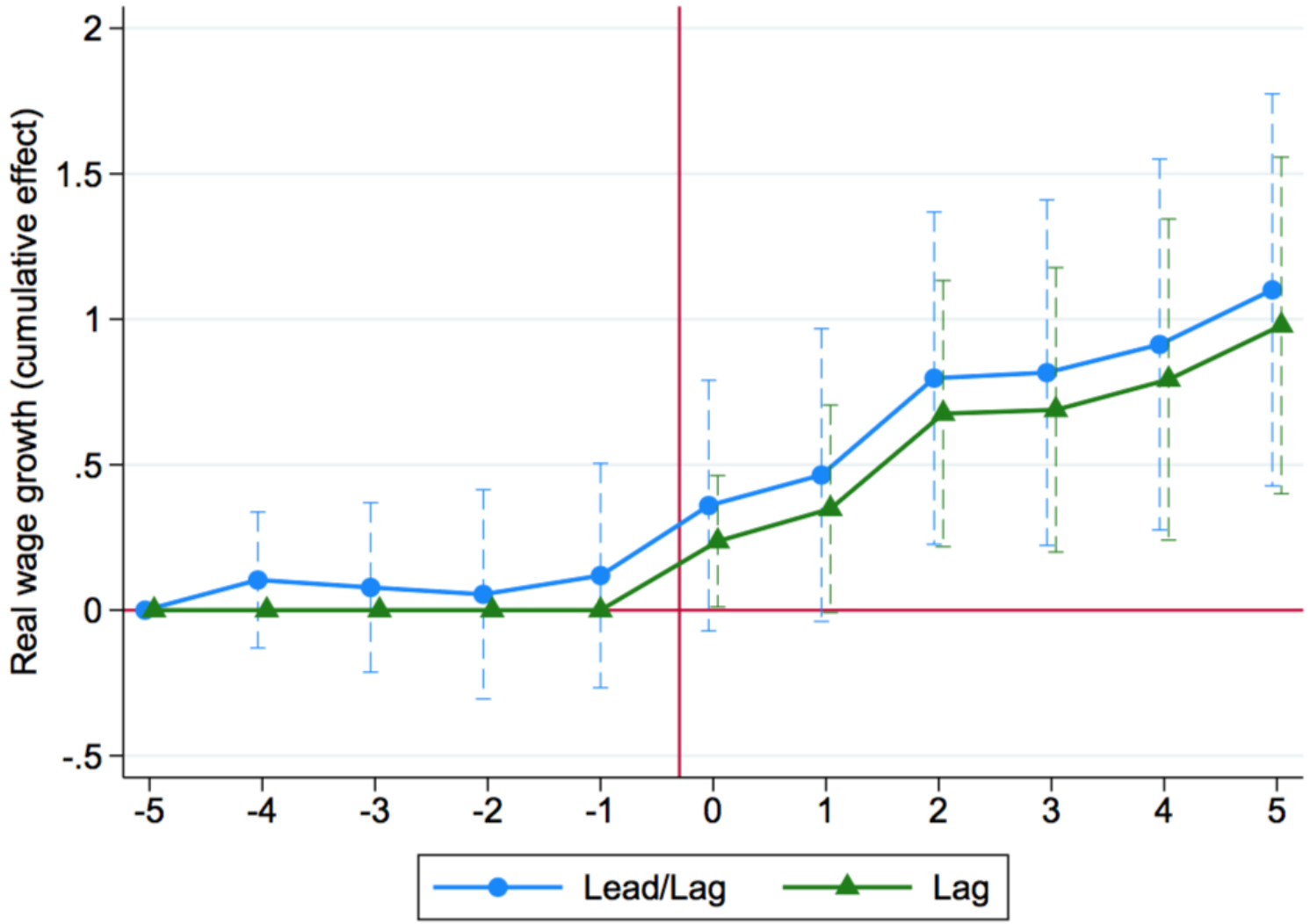
- Paper: C. Fuest, A. Peichl, S. Siegloch . "Do Higher Corporate Taxes Reduce Wages? Micro Evidence from Germany?"
- Question: What is the effect of corporate taxes on wages?
- Data: 20-year panel of German municipalities. Administrative linked employer-employee data
- Findings:
  - Workers bear roughly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



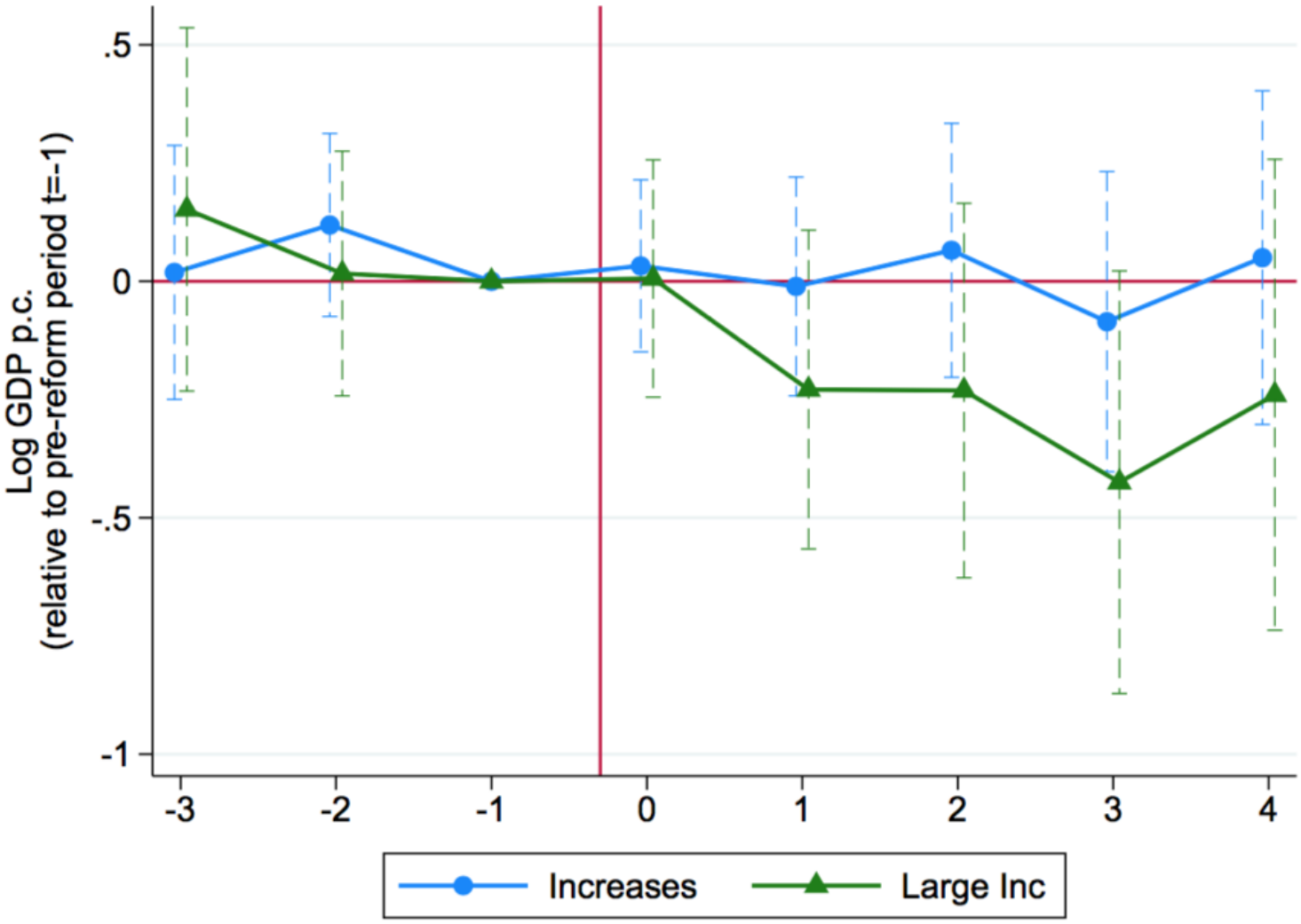
Source: Fuest, Peichl, Siegloch.

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.