New Directions in Business Tax Research

Eric Zwick Chicago Booth and NBER

NTA Session, November 17, 2018

Who am I?

Academic

- PhD in Business Economics at Harvard.
- BA in Econ/Math at Swarthmore
- Associate Professor of Finance at Chicago Booth
- ► NBER Fellow in Public Econ, Corporate Finance

Research

- Corporate Behavior and Public Policy
- Fiscal Stimulus and Taxation
- Entrepreneurship and Income Inequality
- Behavioral Finance in Housing Markets

Other Background

- Web and software developer
- Start-ups: music software (MIT Media lab spinoff), semantic search engine (like Wolfram Alpha), Kerry-Edwards campaign
- Policy: UST Office of Tax Analysis and IRS Office of Research
- Avid golfer and guitarist

"Tax economists can no longer complain, as they had a right to do in 1980, of the difficulty of studying the economic impact of taxation in a world where the tax system never changed."

- Slemrod (1995)

INSPIRATIONAL QUOTES

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"Tax economists can no longer complain, as they had a right to do in [2000], of the difficulty of studying the economic impact of [business] taxation in a world where the [business] tax system never changed [except for the time it changed in 1986 at the same time as a massive confounding change in individual taxes]."

- Zwick (2025)

SINCE THEN...

- 1. Multiple rounds of temporary investment incentives in the form of bonus depreciation.
- 2. Expansions of depreciation incentives targeting small firms specifically.
- 3. Expansions of net operating loss carrybacks to inject liquidity into the corporate sector.
- 4. Large reduction in payout taxes.
- 5. Broadening in the rules that permit business activity to operate in the pass-through sector.
- 6. Repatriation holiday for deferred foreign income.
- 7. A panoply of state tax changes.
- 8. Reforms outside the United States.
- 9. And, last but not least, the massive and fascinating Tax Cuts and Jobs Act of 2017.

TODAY'S TALK

Studying business tax as exciting now as ever

What this talk is: Uses recent research to suggest research avenues

- What I've learned from my papers
- What I've learned from some other papers
- What I'd love to see more work on

What this talk is not: Comprehensive survey of research

- I will talk about 2 papers in some depth, 5 papers in passing
 - There is no substitute for reading papers!
- Focus on empirical research, graphs not equations
- Warning: I will speculate and I have a point of view!

1. Real Responses

RESPECT FOR OUR PROGENITORS

Question: What is the effect of taxes on the behavior of firms?

Hall and Jorgenson (1967) remains the default lens through which we interpret real responses to tax policy. (Great paper!)

Key Simplifications:

- Representative firm, no heterogeneity
- Reduces policy instruments to single user cost
- Focus on intensive margin
- Steady state responses better modeled than dynamics

Next: Recent evidence of departures from the standard model

TAXES AND BUSINESS INVESTMENT



Chetty-Saez (2005)

- \blacktriangleright Analyze 2003 dividend tax cut: reduced top $\tau^{\rm DIV}$ from 38.6% to 15%
- Design:
 - Basic effect: single diff in aggregate time series (only possible because dividend initiations are high-frequency outcome, unlike investment)
 - Mechanisms: DD across firms
- Results:
 - ► No ringing endorsement of either traditional or new view.
 - But suggests that agency considerations (imperfect monitoring of managers by owners) matter.

Effect of 2003 dividend tax cut on dividend payouts



EFFECT OF '03 DIV. TAX CUT ON INITIATIONS OF REGULAR DIVIDENDS



EFFECT OF 2003 DIVIDEND TAX CUT ON DIVIDEND-PAYING FRACTION



HETEROGENEITY SUGGESTIVE OF AGENCY PROBLEMS



Yagan (2015)

- Chetty-Saez results consistent with positive, negative, or zero effect on investment
- Key challenge for identifying investment effects: must control for business cycle
- Design:
 - DD between C-corporations (directly affected by 2003 dividend tax cut) and S-corporations (not directly affected because never subject to dividend taxation).
- Results:
 - Zero effect that rejects basic traditional view
 - Alternative dividend tax cuts unlikely to have substantially larger effects (either new view is largely correct, or traditional view channels are inoperative in practice).

MUST CONTROL FOR BUSINESS CYCLE



Source: Yagan (2015)

Yagan (2015)

► After incorporating, a corporate elects either C or S tax status.

	Tax rate on annual income	Tax rate on dividends
C-corporations (treatment)	35%	15%
S-corporations (control)	35%	0%

- S-corporations: <100 non-institutional investors, one stock class.
- ► Operate in same narrow industries and at the same scale throughout the United States → common trends.

EXAMPLE: RETAIL HARDWARE CHAINS





- Largest hardware chain
- C-corporation

- Third-largest hardware chain
- S-corporation

Source: Yagan (2015)

EXAMPLE: RETAIL HARDWARE CHAINS



Menard Inc. (S-corporation)

Source: Yagan (2015)

BALANCED ACROSS INDUSTRIES AND SIZE IN \$1M-\$1BN SIZE RANGE

- NAICS 1: Agriculture & Forestry
- NAICS 2: Construction & Mining
- NAICS 3: Manufacturing
- NAICS 4: Retail & Wholesale Trade
- NAICS 5: Information & Professional Services
- NAICS 6: Health Care
- NAICS 7: Entertainment, Food, & Hotels
- NAICS 8: Other Services



ZERO EFFECTS ON INVESTMENT AND EMPLOYEE COMPENSATION



EFFECTS CONSTANT ACROSS FIRM SIZE DISTRIBUTION



Source: Yagan (2015)

IMMEDIATE FINANCIAL RESPONSE CONFIRMS RELEVANCE/SALIENCE



Yagan (2015)

- Net-of-dividend tax elasticity of investment: 0.00, with 0.08 95% confidence upper bound.
- Traditional view prediction: [0.21, 0.41] depending on cost-of-capital elasticity of investment (based on Hassett-Hubbard consensus range).

Yagan (2015)

 Preferred explanation: New view is correct and most firms fund marginal investments out of retained earnings (e.g., median firm is 22 years old)

Zwick and Mahon (2017)

Consider a firm buying \$1M of computers.

Year	0	1	2	3	4	5	Total
Deductions (000s)	200	320	192	115	115	58	1000
Tax Benefit ($\tau = 35\%$)	70	112	67.2	40.3	40.3	20.2	350

ZWICK AND MAHON (2017)

Consider a firm buying \$1M of computers.

Normal times:

Year	0	1	2	3	4	5	Total
Deductions (000s) Tax Benefit ($ au=$ 35%)	200 70	320 112	192 67.2	115 40.3	115 40.3	58 20.2	1000 350
Cash back $\underline{NPV} = \$311K$.							

Bonus times (50%):

Year	0	1	2	3	4	5	Total
Deductions (000s)	600	160	96	57.5	57.5	29	1000
Tax Benefit ($ au=$ 35%)	210	56	33.6	20.2	20.2	10	350
Cash back $\underline{NPV} = \$331K$.							

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Consider a firm buying 1M of computers.

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Tax Benefit ($ au=$ 35%)	70	112	67.2	40.3	40.3	20.2	350

Cash back today = 70K.

Bonus times (50%):

Year	0	1	2	3	4	5	Total
Deductions (000s)	600	160	96	57.5	57.5	29	1000
Tax Benefit ($ au=$ 35%)	210	56	33.6	20.2	20.2	10	350
Cash back $\underline{today} = \$210K$.							

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- ▶ Bonus I: 30% in 2001, 2002; 50% in 2003, 2004
- ▶ Bonus II: 50% in 2008-09, 12-13; 100% in 2010-11
- Stated goal: to promote business investment and spur growth. Estimated cost: \$20-40B per year

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- ▶ Bonus II: 50% in 2008-09, 12-13; 100% in 2010-11



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

Normal times:

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

Bonus times (50%):

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

- 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
- Stated goal: to promote business investment and spur growth.



BONUS EMPIRICAL DESIGN

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

	Computers	Telephone Lines
Tax Life	5 year	15 year
$z_T(0)$	0.890	0.659
$z_{T}(0.5)$	0.945	0.829
Δz_T	0.055	0.170

BONUS EMPIRICAL DESIGN

- $1. \ \mbox{Bonus allowance}$ 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) Publishing (511)	Utilities (221) Pipeline Transport (486)
Data Processing (518)	Railroads (482)
Ground Transit (485)	Accommodations (721)
Professional Services (541)	Food Manufacturing (311)

BONUS EMPIRICAL DESIGN

- 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



where $\omega_N(T)$ is computed prior to the policy (1993-2000).
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- 4. Use cross-sectional variation in bonus generosity to identify the effect of bonus (diff-in-diffs)

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

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

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

Larger sample, one policy change

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- 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)
- 5. Identifying assumption: parallel trends.
 - ► If no bonus, average outcome paths similar across industries.
 - Concern: time-varying industry shocks coinciding with bonus.
 - E.g., durables investment more resilient in downturns.
 - Test graphically, with controls, placebo test, triple-diff.

BUSINESS TAX DATA

- $1.~\mbox{US}$ corporate tax data, 1993-2010
 - Size-stratified samples of ~ 100,000 corporate tax returns produced yearly by IRS Statistics of Income (SOI) division
 - We build a panel of returns covering 1993 to 2010.
 - Investment, income, expenses, balance sheet, payouts, employment, industry, filing geography
- 2. Sample restrictions
 - Subchapter C and S corporations
 - Positive deductions or income
 - Attached investment form
 - Average eligible investment greater than \$100K

Final sample: 818,576 firm year observations; 128,151 firms.

CALENDAR DIFF-IN-DIFFS: BONUS I Intensive Margin



CALENDAR DIFF-IN-DIFFS: BONUS I EXTENSIVE MARGIN



CALENDAR DIFF-IN-DIFFS: BONUS II Intensive Margin



CALENDAR DIFF-IN-DIFFS: BONUS II Extensive Margin



ROBUSTNESS AND IDENTIFICATION

1. Research design

- Slow moving technology × rule changes, well-measured
- Instrument "close" to the outcome
- Two separate episodes, separate recessions, same effect size

Parallel Trends
 Placebo Test
 Industry Controls
 Triple Diff
 Firm Controls
 Other DVs

ROBUSTNESS AND IDENTIFICATION

- 1. Research design
- 2. Industry omitted variables
 - Parallel trends pictures
 - Placebo test with structures (ineligible) investment
 - Evidence of industry cyclicality goes other way (Dew-Becker, 2011)
 - Industry controls: industry Q; 2-digit industry-by-t², 2-digit industry-by-GDP, 2-digit industry-year FE
 - Difference-in-difference-in-differences (DDD) test using regional variation in policy salience/state coordination
 - Heterogeneity analysis (in a few slides)

Parallel Trends Placebo Test Industry Controls Triple Diff Firm Controls Other DVs

CALENDAR DIFF-IN-DIFFS: BONUS I Placebo Test



CALENDAR DIFF-IN-DIFFS: BONUS I Placebo Test



$$\frac{I_t}{K_{t-1}} = \alpha_i + \beta \underbrace{\left(\frac{Q}{1-\tau} - \frac{1-\tau z}{1-\tau}\right)}_{\text{tax-adjusted }Q} + \varepsilon_{it}$$

$$\frac{I_t}{K_{t-1}} = \alpha_i + \delta_t + \beta \frac{1 - \tau z}{1 - \tau} + \gamma X_{it} + \varepsilon_{it}$$







HETEROGENEOUS EFFECTS BY FIRM SIZE



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HETEROGENEOUS EFFECTS BY FIRM SIZE



FACT 2: COSTLY FINANCE AMPLIFICATION

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

		LHS Variable is Log(Eligible Investment)									
	Sales		Div F	ayer?	Lagged	d Cash	Ever	Fail?			
	Small	Big	No	Yes	Low	High	Yes	No			
$z_{N,t}$	6.29*** (1.21)	3.22*** (0.76)	5.98*** (0.88)	3.67*** (0.97)	7.21*** (1.38)	2.76** (0.88)	1.78** (0.78)	4.37*** (0.69)			
Test	<i>p</i> =	.030	<i>p</i> =	.079	<i>p</i> =	.000	<i>p</i> =	.012			
Obs Clusters R ²	177620 29618 0.44	255266 29637 0.76	274809 39195 0.69	127523 12543 0.80	176893 45824 0.81	180933 48936 0.76	242267 57157 0.71	493074 70844 0.71			

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How does the costly finance story work?

- Retiming deductions increases after-tax NPV and reduces today's liquidity needs. Higher discount rate
- Complication: Investment still requires cash up front.
 - Firms must be able to borrow, even if at a large spread.

Model Firm Tax Split

Consider a **nontaxable** firm buying \$1M of computers.

Year	0	1	2	3	4	5	Total
Deductions (000s)	0	520	192	115	115	58	1000
Tax Benefit ($\tau = 35\%$)	0	182	67.2	40.3	40.3	20.2	350

MODEL FIRM TAX SPLIT

Consider a **nontaxable** firm buying \$1M of computers.

Normal times n	ontaxable:
----------------	------------

Year	0	1	2	3	4	5	Total
Deductions (000s)	0	520	192	115	115	58	1000
Tax Benefit ($ au=$ 35%)	0	182	67.2	40.3	40.3	20.2	350
Тах	bei	nefit	NPV	= \$3	307K.		

Bonus times nontaxable (50%):

Year	0	1	2	3	4	5	Total
Deductions (000s)	0	760	96	57.5	57.5	29	1000
Tax Benefit ($ au=$ 35%)	0	266	33.6	20.2	20.2	10	350
Тах	bei	nefit	NPV	= \$3	317K.		

MODEL FIRM TAX SPLIT

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Tax benefit today = 0.

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Tax Benefit ($ au=$ 35%)	0	266	33.6	20.2	20.2	10	350
Та	хb	enefi	t tod	ay =	\$0 .		

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

		LHS Variable is Log(Eligible Investment)							
	All	CF	Pre-2005	Post-2004	Controls	Trends			
Taxable $\times z_{N,t}$	3.83*** (0.79)	3.08 ^{***} (0.93)	1.95* (0.92)	6.43 ^{***} (1.46)	4.32*** (0.96)	4.15 ^{***} (0.82)			
z _{N,t}	-0.15 (0.90)	0.60 (1.05)	0.38 (1.06)	-3.03* (1.55)	-0.69 (1.15)	0.88 (0.94)			
$\stackrel{{\sf Medium LCF}}{\times z_{N,t}}$									
$\stackrel{High LCF}{\times z_{N,t}}$									
Observations Clusters (Firms) R ²	735341 128001 0.71	580422 100883 0.74	514035 109678 0.74	221306 63699 0.80	585914 107985 0.73	722262 124962 0.72			

 $T_{it} = 1 \iff$ first dollar of depreciation deduction affects taxes this year

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$\stackrel{\sf Medium \ LCF}{\times \ z_{N,t}}$							-2.56 (1.46)		
$\begin{array}{l} {\rm High\ LCF} \\ \times \ {z_{N,t}} \end{array}$							-3.70* (1.55)		
Observations Clusters (Firms) R ²	735341 128001 0.71	580422 100883 0.74	514035 109678 0.74	221306 63699 0.80	585914 107985 0.73	722262 124962 0.72	119628 40282 0.84		

Concern: Poor growth opportunities for nontaxable firms

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Taxable $\times z_{N,t}$	3.83 ^{***} (0.79)	3.08 ^{***} (0.93)	1.95* (0.92)	6.43 ^{***} (1.46)	4.32*** (0.96)	4.15 ^{***} (0.82)			
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How does the myopia story work?

- ► Firms ignore future tax effects. ⇒ Higher discount rate
- **Complication**: Investment is a forward-looking decision.
 - Firms must use different accounts for investment decisions and tax implications.
- Results inconsistent w/simple costly finance story.
 - Firms ignore future constraints.

BUNCHING EMPIRICAL DESIGN

1. Section 179 allows firms to **expense** equipment up to a limit and **ignore depreciation schedule**.

$$\theta, z = 1$$
 for $I_t \leq \text{Kink}_t$

2. Each year, there is a maximum deduction.

$$z < 1$$
 for $I_t > Kink_t$

3. From 1993 to 2009, the kink went from \$17.5K to \$250K.

BUNCHING EMPIRICAL DESIGN

Consider a firm buying \$50K of computers in 2005.

Without Section 179:

Year	0	1	2	3	4	5	Total
Deductions	10	16	9.6	5.75	5.75	2.9	50 0.890

With Section 179:

Year	0	1	2	3	4	5	Total
Deductions	50	0	0	0	0	0	50
$z_5(1)$							1.0

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3. From 1993 to 2009, the kink went from \$17.5K to \$250K.

Empirical design:

- $1. \ \mbox{Cut-off}$ induces cross sectional variation at the kink
- 2. Bunching around this cut-off reveals depreciation savvy

BUNCHING IN 1993-96



BUNCHING IN 1997



BUNCHING IN 1998


BUNCHING IN 1999



BUNCHING IN 2000



Bunching in 2001-02



BUNCHING IN 2003



Bunching in 2004



Bunching in 2005



BUNCHING IN 2006



Bunching in 2007



BUNCHING IN 2008-09



FACT 3: FIRMS IGNORE FUTURE TAX BENEFITS



FACT 3: FIRMS IGNORE FUTURE TAX BENEFITS



Advertisers Ignore Future Tax Benefits

CREST CAPITAL	Equipment Financing	Vehicle Financing	Software Financing	Our Process	Vendor Programs	Contact Us
					Endorsed by SE	CTION 179.0RG
		2014 Section 179 Tax Deduction Calculator				
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Advertisers Ignore Future Tax Benefits

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Savings computed relative to zero deduction benchmark

Advertisers Ignore Future Tax Benefits

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Equipment financier	2014 Section 179 Tax Deduction Calculator*					
	Enter Cost of Equipment Here	\$ 1000				
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	Normal 1st Year Depreciation:	\$ \$0.00				
	Total First Year Deduction:	\$ \$1,000.00				
	Cash Savings on your Purchase: (assuming a 35% tax bracket)	\$\$350.00				
	Lowered Cost of Equipment: (after Tax Savings)	\$ \$650.00				
		Email My Options				

Savings computed relative to zero deduction benchmark

Ohrn (2018)

Most serious proposals

- are designed to be revenue neutral
- combine a lower rate and base broadening measures

Despite widespread support for such proposals

- relatively little is know about the effects of a reduced corporate tax rate
- tax expenditures that would need to be eliminated to achieve the lower rate have been shown to significantly increase business activity

This paper

- uses variation in effective tax rates generated by the Domestic Production Activities Deduction (DPAD) and a novel identification strategy
- ► to estimate how corporate investment, financing, and payout activities respond to decreased tax rates in the U.S.
- uses the results to compare rate reducing and base narrowing

VARIATION IN QPAI PERCENT

- QPAI Percent generally stable over time
- QPAI Percent moves cyclically
- Significant Variation in QPAI Percent by industry and sector



VARIATION IN QPAI PERCENT

- QPAI Percent concentrated in large asset-classes
- High QPAI industries increase QPAI Percent
- Low QPAI industries do not increase QPAI Percent



Source: Statistics of Income corporate returns with net income, SOI corporate source book.

GRAPHICAL DIFFERENCE-IN-DIFFERENCES



Notes: Panel (A) and (B) presents results from regressions of the form

$$\mathsf{Outcome}_{i,t} = \beta_0 + \sum_{t=2000}^{2012} \beta_t \left[\mathsf{QPAI} \, \mathsf{Percent}_{j,s} \times \mathbb{I}[\mathsf{Year}_t] \right] + \gamma X_{i,t} + \eta_i + \gamma_t + \epsilon_{it} + \beta_{it} + \gamma_t +$$

in which the outcome is regressed on firm-level average QPAI interacted with years 2001–2012. The coefficients are then grafted onto time-trends in the outcome variable. The difference between the blue line the black dashed line in each year is interpreted as the difference in the outcome between a 100% QPAI firm and a 0% QPAI firm.

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SUÁREZ-SERRATO AND ZIDAR (2016)

- Question: What are the welfare effects of cutting corporate taxes in an open economy on workers, firm owners, and landowners?
- Contributions:
 - $1. \ {\rm New} \ {\rm evidence} \ {\rm on} \ {\rm business} \ {\rm location}$
 - 2. New **framework** for evaluating welfare effects
 - 3. New assessment of corporate taxation in an open economy

WHO BENEFITS FROM STATE CORPORATE TAX CUTS?



WE RELAX TWO CRUCIAL ASSUMPTIONS

$1. \ \mbox{Firms}$ 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

OUTLINE: 3 STEPS

$1. \ \mbox{Develop spatial equilibrium model with firms}$

- ► Allow workers, firm owners, landowners to bear incidence
- Map reduced-form effects to parameters governing welfare

$2. \ \mbox{Reduced-form effects of corporate tax cuts}$

- 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

CUMULATIVE EFFECTS OF BUSINESS TAX CUTS ON EST. GROWTH



4 Reduced-Form Equations of the Model

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

$$\begin{split} \Delta \ln w_{c,t} &= \underbrace{(\dot{w}(\theta))}_{\beta^{W}} \Delta \ln(1 - \tau^{b}_{c,t}) + \phi^{1}_{t} + u^{1}_{c,t} \\ \Delta \ln N_{c,t} &= \underbrace{\left(\varepsilon^{LS} \dot{w}(\theta)\right)}_{\beta^{N}} \Delta \ln(1 - \tau^{b}_{c,t}) + \phi^{2}_{t} + u^{2}_{c,t} \\ \Delta \ln r_{c,t} &= \underbrace{\left(\frac{1 + \varepsilon^{LS}}{1 + \eta_{c}} \dot{w}(\theta)\right)}_{\beta^{R}} \Delta \ln(1 - \tau^{b}_{c,t}) + \phi^{3}_{t} + u^{3}_{c,t} \\ \Delta \ln E_{c,t} &= \underbrace{\left(\frac{1}{-\sigma^{F}(\varepsilon^{PD} + 1)} - \frac{\gamma}{\sigma^{F}} \dot{w}(\theta)\right)}_{\beta^{E}} \Delta \ln(1 - \tau^{b}_{c,t}) + \phi^{4}_{t} + u^{4}_{c,t} \end{split}$$

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	$1 + \left(rac{\hat{eta}^{N} - \hat{eta}^{\mathcal{E}}}{\hat{eta}^{W}} + 1 ight) (\hat{eta}^{W} - rac{\delta}{\gamma})$

Firm Owner's Share of Incidence for Calibrated Values of γ and $\epsilon^{\rm PD}$



UPDATING HALL AND JORGENSON

Goal: Improved model of corporate behavior that accounts for different effects and helps us understand when they matter

Summers (1981): Burden of depreciation allowances is on new capital, of corporate tax is on new and old capital, of payout tax is mainly on old capital.

Other potential avenues:

- Financial frictions
- Agency frictions between managers and shareholders
 - Can someone please estimate the bargaining elasticity of Piketty, Saez, and Stantcheva (2014)?
- Agency frictions between firms and external parties, such as accountants and parties who benefit from tax changes (e.g., realtors in the FTHC).
- For public companies, the role of financial accounting and earnings management.
- Whether firms sometimes pursue a tax minimization objective apparently at the expense of profit maximization.

2. Labeling Responses

Income Shifting, Economic Measurement, and Optimal Tax

Question: How do we think about business tax in a world:

- where capital income is not the factor share of widget-making machines,
- that sell those widgets in a competitive market,
- and produce those widgets in a closed economy?

Two shifting responses:

- 1. Location of activity and income within country across states and across national boundaries.
- 2. Nebulous boundary between labor and capital for entrepreneurs and human capital workers.

Next: Evidence on income shifting and labeling

TORSLOV, WIER, AND ZUCMAN (2018)

	Billions of current US\$	% of net corporate profits
Global gross output (GDP)	75,038	
Depreciation	11,940	
Net output	63,098	
Net corporate output	34,083	296%
Net corporate profits	11,515	100%
Net profits of foreign-controlled corp.	1,703	15%
Of which: shifted to tax havens	616	5%
Net profits of local corporations	9,812	85%
Corporate income taxes paid	2,154	19%

TAX HAVEN AFFILIATES OF US MULTINATIONALS HAVE BEEN INCREASINGLY PROFITABLE

(% of compensation of employees) 350% 300% 250% Tax haven affiliates 200% 150% 100% Non-haven affiliates 50% 0% 1966 1971 1976 1981 1986 1991 1996 2001 2006 2011 2016

Pre-tax profits of affiliates of U.S. multinationals

GLOBALIZATION HAS BEEN PAPER PROFITS-NOT MACHINES-MOVING TO LOW-TAX PLACES



... Tax revenue rose in many havens, while they \downarrow or stagnated in high-tax countries



The lower the rate, the higher the revenue



Corporate income tax revenue vs. tax rate in Ireland

SMITH, YAGAN, ZIDAR, ZWICK (2018)

Fact: Private business income is the main source of top incomesQuestion: What is the nature of biz income and why is it rising?

Data: Link 11 million firms to their owners and workers

Approach: Provide facts and assess the idle rich hypothesis

- 1. Most top earners are working rich: they derive most of their income from human capital, not physical or financial capital.
- 2. The human capital income of private business owners exceeds top wage income and top public equity income.

Bottom line: Entrepreneurs who actively manage their own firms play a leading role in driving top income inequality
ARE THE RICHEST AMERICANS IDLE RICH OR ENTREPRENEURS/WORKERS?



Imputed National Income

PRIVATE BUSINESS INCOME MAKES UP MOST OF TOP CAPITAL INCOME

2014 FISCAL INCOME SERIES



62 / 89

LINKED FIRM-OWNER-WORKER DATA

S-corporations/Partnerships: Private "pass-through" businesses

- Taxed only at owner level, lower taxes
- ▶ S-corporations: Dominant form, \leq 100 U.S. individual owners
- ▶ More S-corps than C-corps, even with >500M sales
- Nearly all public companies are C-corps

Pass-through taxation \rightarrow firm-owner-worker paper trail

- ► Forms 1120S/1065 + 1120S/1065 K1 + 1040 + W-2
- ▶ 11M firms, 20M owners, 158M firm-owner-years 2001-2014

▶ PSZ Figure S.34 → Isolating mixed income → Pass-through income → Quantifying RE

MOST TOP EARNERS OWN A PRIVATE BUSINESS Tax units ranked by fiscal income, full sample in 2014.



Compare: 9,900 S&P 1500 execs with total pay \approx \$32B (Execucomp)

TOP PASS-THROUGH OWNERS ARE WORKING AGE

MILLION-DOLLAR EARNERS' FISCAL INCOME BY ACE IN 2014



TOP 1% BUSINESS INCOME EARNERS RESEMBLE WORKING RICH

MAIN OWNER SAMPLE: S-CORPORATIONS AND PSHIPS 2001-2014. STATISTICS IN 2014 USD.

- 1. Top owners are **active** (as reported), **working age**, and **undiversified**
 - Not passive, not holding many firms
 - Often have considerable W2 income
 - Not many octogenarians or children
 - Median # of firms owned = 1
- $2. \ \mbox{Top pass-throughs} \ \mbox{are mid-market} \ \mbox{and closely held}$

Profits by firm size

- Median # of owners = 2
- ▶ 47% top sales in firms w/< 50M sales, 81% w/< 500M
- Not superstar firms with many owners
- 3. Top pass-throughs are **diverse** and **skill-intensive**
 - ► Representatives from all sectors, also geographically diverse
 - Not just finance, technology, physical capital Profits by industry

INDUSTRIES: DIVERSE, SKILL-INTENSIVE

2014 MAIN SAMPLE. STATISTICS IN MILLIONS OF 2014 USD.

	Top 1% Passthru			C-corps	
Industry (NAICS)	Rank	Profits	Industry (NAICS)	Rank	Profits
Legal svc (5411)	1	28643	Petroleum/coal products mfg. (3241)	1	98696
Other financial investment actvty (5239)	2	28207	Pharmaceutical/medicine mfg. (3254)	2	63295
Other professional/technical svc (5419)	3	8196	Nondepository credit intrmd (5222)	3	46573
Offices of physicians (6211)	4	8018	Other telecommunications (5179)	4	35288
Automobile dealers (4411)	5	6712	Computer/peripheral equipment mfg. (3341)	5	33250
Oil/gas extraction (2111)	6	6290	Other general merchandise stores (4529)	6	27027
Management/techncl consulting svc (5416)	7	5940	Druggists' goods merch whlsl (4242)	7	25191
Activities related to real estate (5313)	8	5209	Aerospace product/parts mfg. (3364)	8	22997
Computer sys design/related svc (5415)	9	4771	Semiconductor/electronic compnt mfg. (3344)	9	21460
Other specialty trade cntrctr (2389)	10	4730	Motor vehicle mfg. (3361)	10	20521
Misc. durable goods merch whlsl (4239)	11	3853	Soap, cleaning compound,/toiletry mfg. (3256)	11	20326
Other fabricated metal prod mfg. (3329)	12	3754	Oil/gas extraction (2111)	12	18375
Other miscellaneous mfg. (3399)	13	3328	Other financial investment actvty (5239)	13	17712
Accounting/bookkeeping svc (5412)	14	3129	Grocery/related product whisi (4244)	14	15945
Insurance agencies/brokerages (5242)	15	2934	Software publishers (5112)	15	15010

Top pass-throughs are diverse and skill-intensive

- Representatives from all sectors, also geographically diverse
- Not just finance, technology, physical capital

Top 1% owner death \rightarrow large declines in survival and profits



Owner retirement
Top 1% owner death

IMPACT OF C-TO-S SWITCH



Are top earners idle or working?



Self-made, parent-linked entrepreneurs

How do top earners generate their income?



Toward a Modern Business Tax Regime

Implications of Entrepreneurial Income:

- Optimal tax and empirical research needs to account for the mix of capital and labor income
- Requires bottom up research with micro data
- Understanding connections between payout, retained earnings, corporate and non-corporate profits, managerial compensation, and how the tax code treats them

Implications of International Income:

- Relative magnitude of real versus reporting response still debated
- Because of data limitations, still missing a nuanced treatment of multinational corporate structure, including cross-border supply chains

Goal: A politically and economically stable business tax system, that minimizes distortions and taxpayer burden, while achieving socially desired goals for revenue and redistribution?

Rents? If some amount of the capital share is supranormal profits, taxes should be high. Conclusion is less clear with fixed costs of entry.

3. Timing Responses

TIMING MATTERS

Context: In the 1986 reform, a lot of discussion about timing responses as confounding the interpretation of real responses.

• E.g., accelerated capital gains realizations.

But for Investment:

- Timing responses are important part of real response
- Presumed and embedded in models and discussion of fiscal policy, especially fiscal stimulus.
- Also central to macro models of monetary policy

Next: Research on timing responses

HOUSE-SHAPIRO (2008)

More accelerated depreciation research!

- For long-lived capital goods, a temporary increase in the amount that can be immediately expensed
 - $\blacktriangleright \ \rightarrow$ strong incentives to accelerate investment
- ► Major tool to stimulate investment: 30%-50% "accelerated" ("bonus") depreciation 2001-2004 for assets with recovery periods ≤ 20 years
- ► Because of discounting, this created heterogeneous subsidies (change in 1 - Γ) across asset classes
- Similar DD empirical strategy to Cummins-Hassett-Hubbard (1994) (later used by Zwick and Mahon (2017)), except across asset classes directly rather than across firms specializing in different asset classes.

Recovery periods by asset type

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

TABLE 2—RECOVERY PERIODS AND DEPRECIATION METHODS BY TYPE OF CAPITAL

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

SUBSIDY FROM ACCELERATED DEPRECIATION

	Nominal interest rate = 0.03			Nomina	Nominal interest rate = 0.05			Nominal interest rate = 0.07		
Recovery period	$\lambda^m = 0$	$\lambda^m = 0.3$	$\lambda^m = 0.5$	$\lambda^m = 0$	$\lambda^m = 0.3$	$\lambda^m = 0.5$	$\lambda^m = 0$	$\lambda^m = 0.3$	$\lambda^m = 0.5$	
Panel A: Present value of depreciation allowances: $\lambda^m + (1 - \lambda^m) z^m$										
3 years	0.972	0.981	0.986	0.955	0.968	0.977	0.939	0.957	0.969	
5 years	0.949	0.964	0.975	0.918	0.943	0.959	0.890	0.923	0.945	
7 years	0.927	0.949	0.964	0.884	0.919	0.942	0.846	0.892	0.923	
7 years (150DB)	0.914	0.939	0.957	0.863	0.904	0.932	0.818	0.872	0.909	
10 years	0.896	0.927	0.948	0.837	0.886	0.919	0.786	0.850	0.893	
10 years (150DB)	0.878	0.915	0.939	0.811	0.868	0.905	0.752	0.826	0.876	
15 years	0.824	0.877	0.912	0.733	0.813	0.867	0.659	0.761	0.829	
20 years	0.775	0.842	0.887	0.667	0.767	0.833	0.582	0.708	0.791	
Panel B: Tax subsidy due to the bonus depreciation allowance, percent										
3 years	0.0	0.26	0.44	0.0	0.42	0.70	0.0	0.57	0.95	
5 years	0.0	0.48	0.79	0.0	0.76	1.26	0.0	1.01	1.69	
7 years	0.0	0.68	1.13	0.0	1.06	1.77	0.0	1.40	2.33	
7 years (150DB)	0.0	0.80	1.33	0.0	1.25	2.08	0.0	1.64	2.73	
10 years	0.0	0.96	1.60	0.0	1.47	2.45	0.0	1.91	3.18	
10 years (150DB)	0.0	1.11	1.86	0.0	1.70	2.83	0.0	2.19	3.65	
15 years	0.0	1.58	2.64	0.0	2.34	3.89	0.0	2.93	4.88	
20 years	0.0	2.00	3.33	0.0	2.87	4.78	0.0	3.51	5.85	

TABLE 3—QUANTIFYING DEPRECIATION ALLOWANCES

Source: Authors' calculations based on statutory MACRS recovery schedules, 0.3425 corporate tax rate, and 0.2975 distribution tax rate.

RESULT: RELATIVE INCREASE IN LONG-LIVED INVESTMENT



HOUSE AND SHAPIRO (2008)

- Clearest finding: Large increase in investment, on average monotonically related to subsidy
- Interpretation: Very elastic investment supply (cf. Goolsbee 1998) and high internal adjustment costs
- Questions:
 - What is the implied cost-of-capital elasticity of investment?
 - Why do investment effects persist after 2004?

Empirical Evidence from Household Policies



Berger, Turner, and Zwick (2018)



80 / 89

Berger, Cui, Turner, and Zwick (in prep)



Public Meets Macro

Macroeconomists need us:

- ► To study the responses of investment to temporary changes
- Improve models of corporate behavior and highlight mechanisms
- These models need to be meaningfully dynamic to match the nature of the response we want to study
- Help them improve the study of fiscal policy

With low growth/inflation, fiscal policy likely to be more important in the future. Tax-based policy often easier to implement (though hard to commit to making temporary).

Why is this important?

- Hierarchy of fiscal policy tools in terms of bang for buck
- Recipe book to direct design, implementation, and enforcement
- Don't wait for the next recession to prepare for it!

4. Concluding Inspiration

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).

7

Source: Jason Furman.

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





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.

What Do the IGM Experts Say?

Lowering the effective marginal tax rate on US corporations' repatriated profits **for a year** would boost US capital investment significantly. (11/2014)

Permanently lowering the effective marginal tax rate on US corporations' repatriated profits, such as by moving to a territorial-based tax system, would boost US capital investment significantly. (11/2014)



What Do the IGM Experts Say?

Implementing a "**destination based cash flow tax (including border adjustment)**" of the type advocated by Speaker Ryan would substantially reduce the US **trade deficit** within the next few years. (04/2017) Implementing a "destination based cash flow tax (including border adjustment)" of the type advocated by Speaker Ryan would substantially **raise prices** for US consumers. (04/2017)



What Do the IGM Experts Say?

To the extent that a given tax change might affect revenues partly by affecting national-income growth, **existing research provides enough guidance** to generate informative bounds on the size of any growth-driven revenue effect. (02/2015) Although they do not always agree about the precise effects of tax policies, another reason why economists often give disparate advice on policy is because of **differing views about choices between raising average prosperity and redistributing income**. (10/2012)





THE FUTURE OF BUSINESS TAX IS SO BRIGHT I GOTTA WEAR SHADES

From http://www.ericzwick.com/public_goods/love_the_market.pdf

12. Enjoy, treat, and protect yourself. No matter the placement, the job you're asking for is an amazing job. You get to work on whatever you want and with whomever you want. And what you're working on matters (at least to you). Keep this in mind when you're feeling down. Make time for fun. Maintain a support group of people off the market. Avoid the echo chamber of nervous grad students as best as you can.

Let's get to work! Thank you!