

Economic Stimulus at the Expense of Routine-Task Jobs

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AFA, Atlanta
January 6th, 2019

Motivation

Much of the investment tax policy emphasizes job creation:

*Our bill aimed to help small businesses **invest, grow, and create jobs** by providing needed tax relief and certainty. ... In light of the positive effects these provisions would have on **small businesses**, on jobs, and on our economy, I urge my colleagues to support the tax relief package.*

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Cummins, Hassett and Hubbard (1994); Goolsbee (1998); House and Shapiro (2008); Edgerton (2010); Zwick and Mahon (2017), etc.

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Effect of such policies on labor outcomes is not well explored.

Ohrn (2016); Gaggl and Wright (2016); Zwick and Mahon (2017).

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Routine-task labor: Workers performing procedural and rule-based tasks.

- Tax preparers → Tax preparation software
- Automobile assemblers → Robotic arms
- Middle-skill

Literature: Routine-task jobs decline while other jobs thrive.

Autor, Levy, and Murnane (2003); Autor, Katz, and Kearney (2006);
Goos and Manning (2007); Autor and Dorn (2013); Jaimovich and Siu
(2014); Hershbein and Kahn (2018); Zhang (2018); etc.

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This paper: Did pro-growth tax policy on investment accelerate the divergence between routine-task jobs and other jobs?

This paper

We study the effect of Section 179, a major tax incentive for investment in equipment and software.

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- Explore variations in **state adoption** of the incentive (treatment vs control)
- Identify firms that are **eligible** for this incentive (use ineligible firms for placebo tests)
- Examine firms' **equipment/technology** investment (to convey the investment channel)
- Study the effects on employment, **routine**, **skilled**, and **non-routine unskilled** jobs separately

Preview of results

When states expand incentive for equipment investment, eligible firms:

- purchase more equipment/computers,
- make little change in total employment,
- **increase** skilled employees **quickly**,
- **reduce** routine-task employees with a **delay**.

How does Section 179 work? — An example

A firm is considering a \$250,000 investment in computers:

Year	0	1	2	3	4	5	Total
<i>State without Section 179</i>							
Deductions (000s)	50	80	48	28.8	28.8	14.5	250
State tax benefit ($\tau = 6.08\%$)	3.1	4.9	2.9	1.8	1.8	0.9	15.2
PV of tax benefit ($r = 10\%$)							12.95
<i>State with Section 179</i>							
Deductions (000s)	250	0	0	0	0	0	250
State tax benefit ($\tau = 6.08\%$)	15.2	0	0	0	0	0	15.2
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Differences in PV of tax benefits = \$2,272

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Potential amplification channels:

- Financial constraints: Differences in first year funding need = \$12,160
- Fixed adjustment costs: Investment may rise sharply when policy induces a firm across its adjustment threshold

A simple model

The firm uses three factors of production: L_n, L_r, K

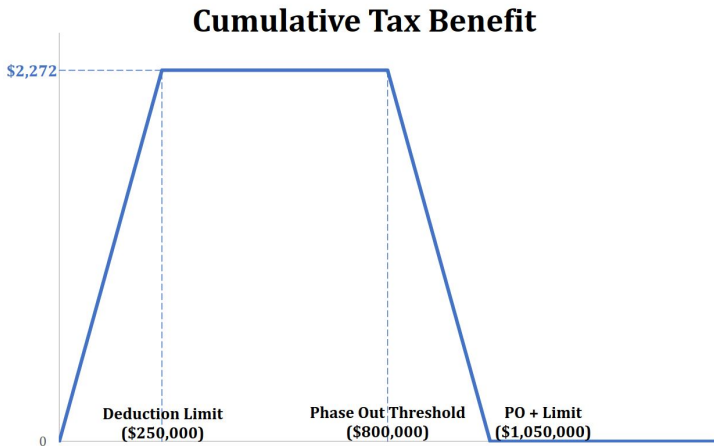
$$Y = L_n^\alpha (L_r^\mu + K^\mu)^{\frac{\beta}{\mu}}$$

- K substitutes for L_r
- K complements L_n
- Section 179 incentive: Reduce the effective price of K
- Predictions: K goes up, L_n goes up, L_r goes down

Who benefits from Section 179?

Section 179 targets **small businesses** by introducing:

Deduction Limits and **Phase-out Thresholds**

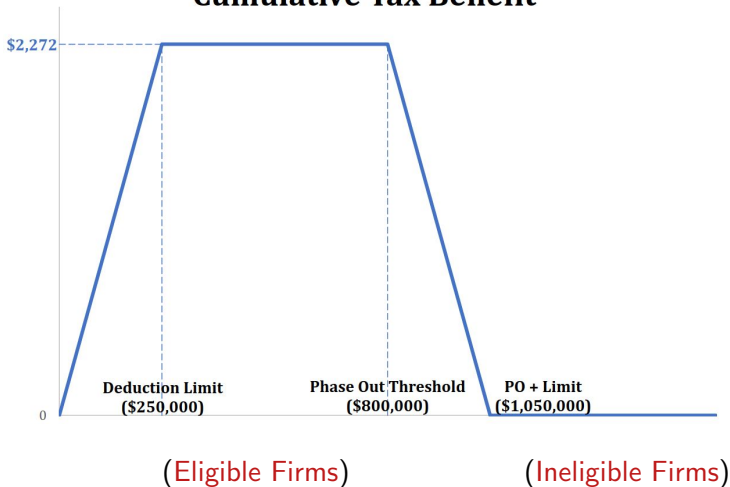


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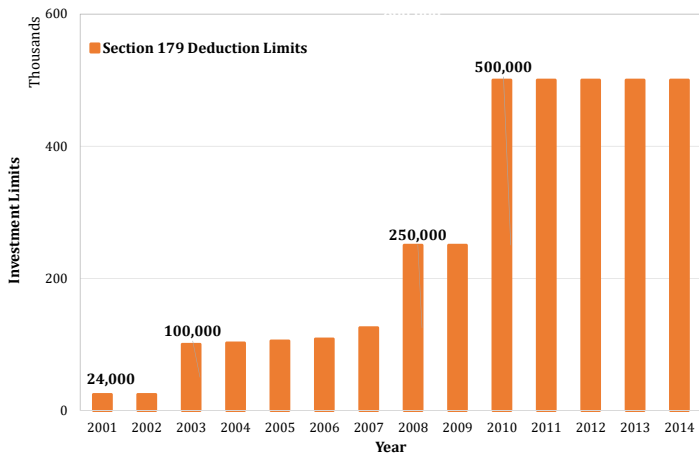
Deduction Limits and **Phase-out Thresholds**

Cumulative Tax Benefit



Changes in federal Section 179 deduction limits

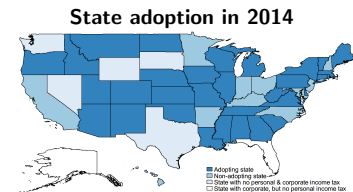
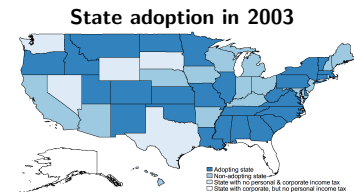
Deduction Limit of Federal Section 179 Increases over 2001-2014



- Firms in adopting states also deduct equipment investment from state taxes

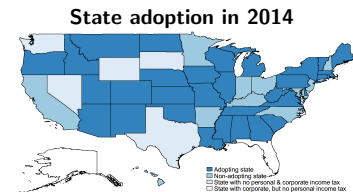
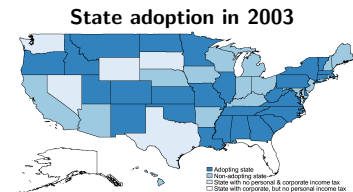
State Section 179 limits

State adoption of Section 179 is quite stable



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- **Key Variable:** Changes in state Section 179 deduction limits
- **Cross-sectional variation:** (mainly) states' adoption decisions in 2003
- **Time-series variation:** (mainly) changes in federal deduction limits

No Correlation with Changes in Other Characteristics of the States

- Computer investment of establishments:
Computer Intelligence Technology Database (CiTDB)
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- Characteristics of occupations:
 - Dictionary of Occupational Titles (DOT) & O*Net
- Hand-collected data on State 179 limits from CCH state tax handbook, supplemented by state websites, ...

Characterizing heterogeneous occupations

Routine-Task Occupations are defined based on Zhang (2018):

- 1 Each occupation's intensity in three dimensions of tasks:

$$T_o = [T_o^{Routine}, T_o^{Abstract}, T_o^{Manual}]$$

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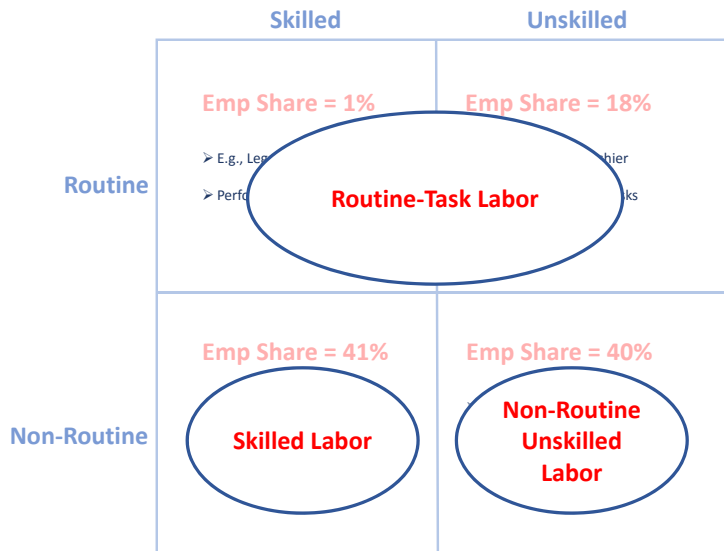
Skilled Occupations is occupations requiring:

- A college degree, or
- 2-Years of related work experience

Classification of occupations

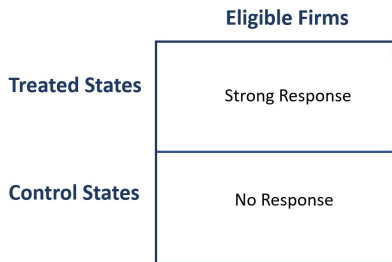
	Skilled	Unskilled
Routine	<p>Emp Share = 1%</p> <ul style="list-style-type: none">➤ E.g., Legal Secretary; Cook➤ Performing Routine-Tasks	<p>Emp Share = 18%</p> <ul style="list-style-type: none">➤ E.g., Assembler; Cashier➤ Performing Routine-Tasks
Non-Routine	<p>Emp Share = 41%</p> <ul style="list-style-type: none">➤ E.g., Manager; Engineer➤ Performing Abstract Tasks	<p>Emp Share = 40%</p> <ul style="list-style-type: none">➤ E.g., Driver; Janitor➤ Performing Manual-Tasks

Classification of occupations



Empirical design

Natural Experiments + First-Difference + Matching Estimation:



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	Eligible Firms	Ineligible Firms
Treated States	Strong Response	No Response
Control States	No Response	No Response

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$$\Delta Y_{f,s,t} = b_1 \Delta Limit_{s,t} + b_2 Eligible_{f,t} + b_3 \Delta Limit_{s,t} \times Eligible_{f,t} \\ + b_4 \Delta X_{s,t} + b_5 \Delta Y_{f,s,t-1} + FE_{EmpBin \times Ind \times Year} + \epsilon_{f,s,t+1}$$

$b_3 > 0$

- $FE_{EmpBin \times Ind \times Year}$: matching establishments based on a full interaction of 8 employment bins: (1, 4), (5, 9), (10, 14), (15, 24), (25, 49), (50, 99), (100, 199), and above 200, NAICS 4-digit, and year.

Result 1: Technology Investment

	Computer Investments (1)	Δ IT Intensity (2)
$\Delta\text{Limit}_t \times \text{Eligible}_t$	6.70** (2.88)	13.72*** (4.09)
$\Delta\text{Limit179}_t$	0.50 (3.52)	-5.80 (3.63)
Observations	353,912	342,420
Adjusted R^2	0.21	0.21

Additional Results: Purchase and Lease of Various Types of Capital

Result 2a: Total employment

$\Delta\text{Emp [t, t+3]}$

	(1)	(2)	(3)	(4)
$\Delta\text{Limit}_t \times \text{Eligible}_t$	-1.57 (3.15)			-5.67 (3.62)
$\Delta\text{Limit}_{t+1} \times \text{Eligible}_{t+1}$		1.35 (4.00)		-5.32 (4.41)
$\Delta\text{Limit}_{t+2} \times \text{Eligible}_{t+2}$			3.64 (3.98)	4.00 (3.85)
ΔLimit_t	2.66 (3.16)			5.63* (3.11)
ΔLimit_{t+1}		-0.07 (4.48)		5.90 (4.72)
ΔLimit_{t+2}			-2.14 (3.14)	-2.91 (3.03)
Observations	329,943	329,943	329,943	329,943
Adjusted R^2	0.08	0.09	0.10	0.11

Result 2b: Routine-task employment

$$\Delta \text{Emp}^R [t, t+3]$$

	(1)	(2)	(3)	(4)
$\Delta \text{Limit}_t \times \text{Eligible}_t$	-21.16*** (7.33)			-24.38*** (8.30)
$\Delta \text{Limit}_{t+1} \times \text{Eligible}_{t+1}$		-2.75 (9.58)		-9.43 (10.48)
$\Delta \text{Limit}_{t+2} \times \text{Eligible}_{t+2}$			-3.61 (9.94)	0.56 (10.45)
ΔLimit_t	4.21 (9.11)			5.83 (9.49)
$\Delta \text{Limit}_{t+1}$		-4.22 (8.92)		0.03 (9.23)
$\Delta \text{Limit}_{t+2}$			-3.15 (7.49)	-4.10 (8.20)
Observations	269,784	269,784	269,784	269,784
Adjusted R^2	0.23	0.23	0.23	0.23

Result 2c: Skilled employment

$\Delta \text{Emp}^S [t, t+3]$

	(1)	(2)	(3)	(4)
$\Delta \text{Limit}_t \times \text{Eligible}_t$	12.99** (6.07)			8.54 (6.57)
$\Delta \text{Limit}_{t+1} \times \text{Eligible}_{t+1}$		18.16*** (6.47)		13.45* (6.75)
$\Delta \text{Limit}_{t+2} \times \text{Eligible}_{t+2}$			15.99** (7.31)	13.84* (7.28)
ΔLimit_t	-4.59 (6.80)			-1.34 (7.07)
$\Delta \text{Limit}_{t+1}$		-11.55* (6.41)		-6.30 (6.50)
$\Delta \text{Limit}_{t+2}$			-7.23 (6.42)	-6.94 (6.85)
Observations	302,873	302,873	302,873	302,873
Adjusted R^2	0.20	0.20	0.20	0.20

Result 2d: Nonroutine-task unskilled employment

$$\Delta \text{Emp}^{NU} [t, t+3]$$

	(1)	(2)	(3)	(4)
$\Delta \text{Limit}_t \times \text{Eligible}_t$	-1.83 (6.31)			-4.81 (5.68)
$\Delta \text{Limit}_{t+1} \times \text{Eligible}_{t+1}$		-2.61 (6.75)		-8.35 (6.90)
$\Delta \text{Limit}_{t+2} \times \text{Eligible}_{t+2}$			3.15 (8.30)	3.35 (7.99)
ΔLimit_t	11.21* (5.63)			13.07** (5.36)
$\Delta \text{Limit}_{t+1}$		8.74 (6.04)		14.60** (6.12)
$\Delta \text{Limit}_{t+2}$			1.57 (8.63)	-1.20 (8.09)
Observations	304,617	304,617	304,617	304,617
Adjusted R^2	0.20	0.20	0.20	0.20

Result 3: Wage bills

$$\text{Wage Bill (WB)} = \text{Emp} \times \text{Wage Rate}$$

	$\Delta \text{WB}_{t,t+3}^{\text{Tot}}$	$\Delta \text{WB}_{t,t+3}^{\text{R}}$	$\Delta \text{WB}_{t,t+3}^{\text{S}}$	$\Delta \text{WB}_{t,t+3}^{\text{NU}}$
	(1)	(2)	(3)	(4)
$\Delta \text{Limit}_t \times \text{Eligible}_t$	-7.83** (3.68)	-25.47*** (8.38)	4.17 (6.37)	-6.18 (6.02)
$\Delta \text{Limit}_{t+1} \times \text{Eligible}_{t+1}$	-1.96 (4.98)	-5.95 (10.89)	9.89 (6.62)	-6.71 (7.55)
$\Delta \text{Limit}_{t+2} \times \text{Eligible}_{t+2}$	9.40** (3.68)	3.05 (9.73)	18.55*** (6.35)	7.91 (7.93)
ΔLimit_t	9.20** (3.67)	5.66 (9.57)	3.52 (6.67)	15.24** (5.76)
$\Delta \text{Limit}_{t+1}$	2.98 (4.89)	-5.40 (9.45)	-2.44 (6.56)	13.27* (6.62)
$\Delta \text{Limit}_{t+2}$	-7.66** (2.94)	-6.59 (7.79)	-11.31* (5.98)	-5.54 (8.23)
Observations	329,943	269,784	302,873	304,617
Adjusted R^2	0.11	0.23	0.19	0.20

Conclusion

Investment tax incentives yield **heterogeneous** labor outcomes

- Increase skilled labor vs. Reduce routine-task labor
- Increase happens sooner vs. Reduction happens later

Fresh micro-evidence supporting both routine-biased/ skill-biased tech. changes

Changes in state Section 179 limits

Lagged Changes in...	Changes in State Section 179 Limit (\$thousands)				
	(1)	(2)	(3)	(4)	(5)
Δ State Hiring Credits	-2.57 (5.31)				-1.33 (5.35)
Δ State Bonus Adoption	13.10*** (3.43)				12.54*** (3.34)
Δ State Budget Surplus		1.76 (1.29)			1.55 (1.32)
Δ State GSP		1.02 (0.82)			1.10 (0.83)
Δ State Credit Score		-3.37 (5.26)			-3.38 (5.48)
Δ State Unemployment			2.50 (7.44)		1.99 (7.18)
Δ State RShare			3.50 (2.78)		4.07 (2.64)
Δ State Pers. Inc. Tax Rate				-7.72 (7.81)	-7.56 (7.72)
Δ State Corp. Inc. Tax Rate				6.29 (4.89)	5.81 (4.76)
Δ State Democratic Dummy				1.80 (3.58)	2.52 (3.51)
Observations	624	624	624	624	624
Adjusted R^2	0.28	0.28	0.28	0.28	0.28

Robustness: Small business investment and changes in state Section 179 limit — Extensive Margin

NFIB Data: whether a small business purchased or leased equipment, furniture, building improve., land, vehicles.

Regression specification:

$$Inv.Dummy_{f,s,t} = b_1 \Delta Limit_{s,t} + b_2 \Delta X_{s,t} + FE_{EmpBin \times Ind \times Year \times PassThrough} + \epsilon_{f,s,t}$$

	Equipment		Furniture		Building Imp.		Land		Vehicle	
	Purch	Lease	Purch	Lease	Purch	Lease	Purch	Lease	Purch	Lease
$\Delta Limit_t$	9.36*** (3.19)	-1.15 (1.07)	-0.10 (2.08)	-0.15 (0.30)	4.30 (2.83)	-0.37 (0.37)	2.07 (1.52)	0.33 (0.59)	5.05 (3.17)	-0.40 (0.96)
Observations	90,529	90,529	90,529	90,529	90,529	90,529	90,529	90,529	90,529	90,529
Adjusted R^2	0.07	0.01	0.04	0.01	0.03	0.00	0.03	0.01	0.10	0.03

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