Corporate Taxes and Economic Inequality: A Credit Channel

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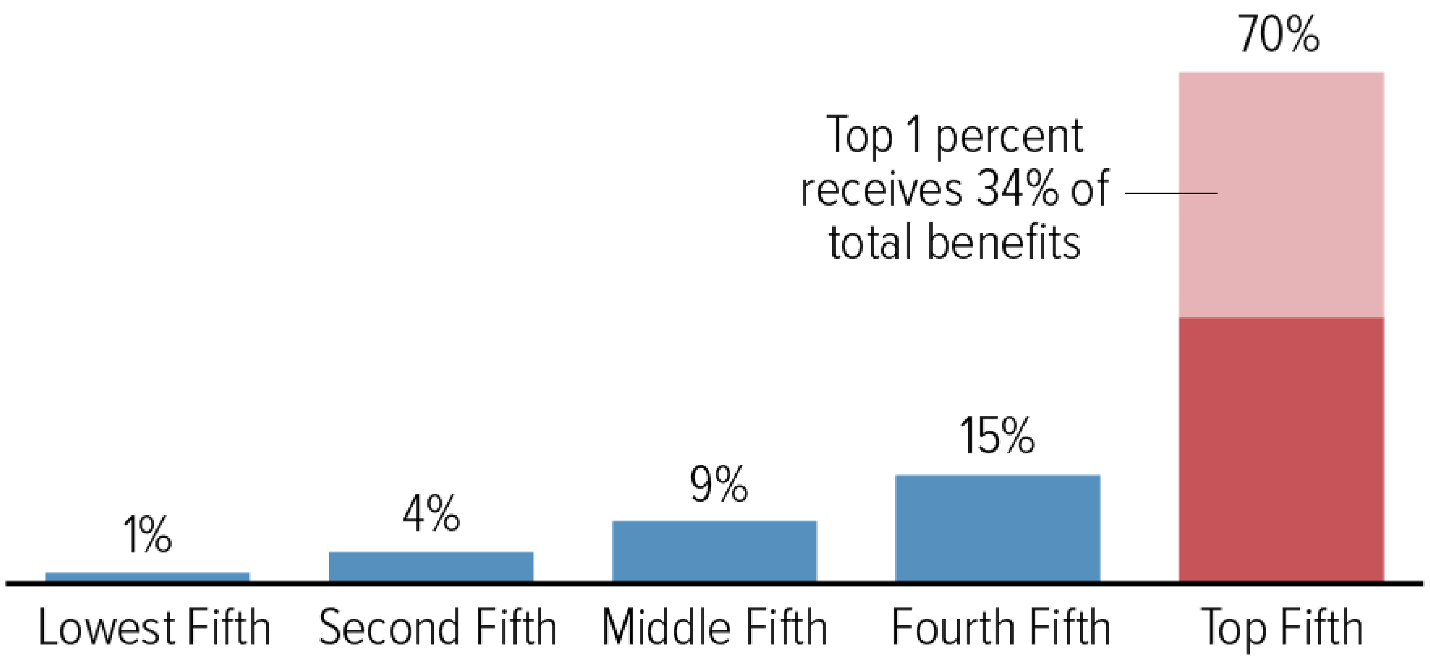
Corporate taxes and economic inequality

- Somewhat of a consensus that lower corporate tax rates increase economic inequality
  - Top earners shift income from labor to capital (e.g., Saez and Zucman, 2019)
  - Increased power of large corporations, benefiting the asset-rich vis-à-vis the productivity-led investments.
  - Large corporations hire the most talented and this increases within-firm inequality.

Cutting Corporate Tax Rates Mostly Benefits Those at the Top

Share of benefits by income group, 2017



Source: Tax Policy Center, Table T17-0180

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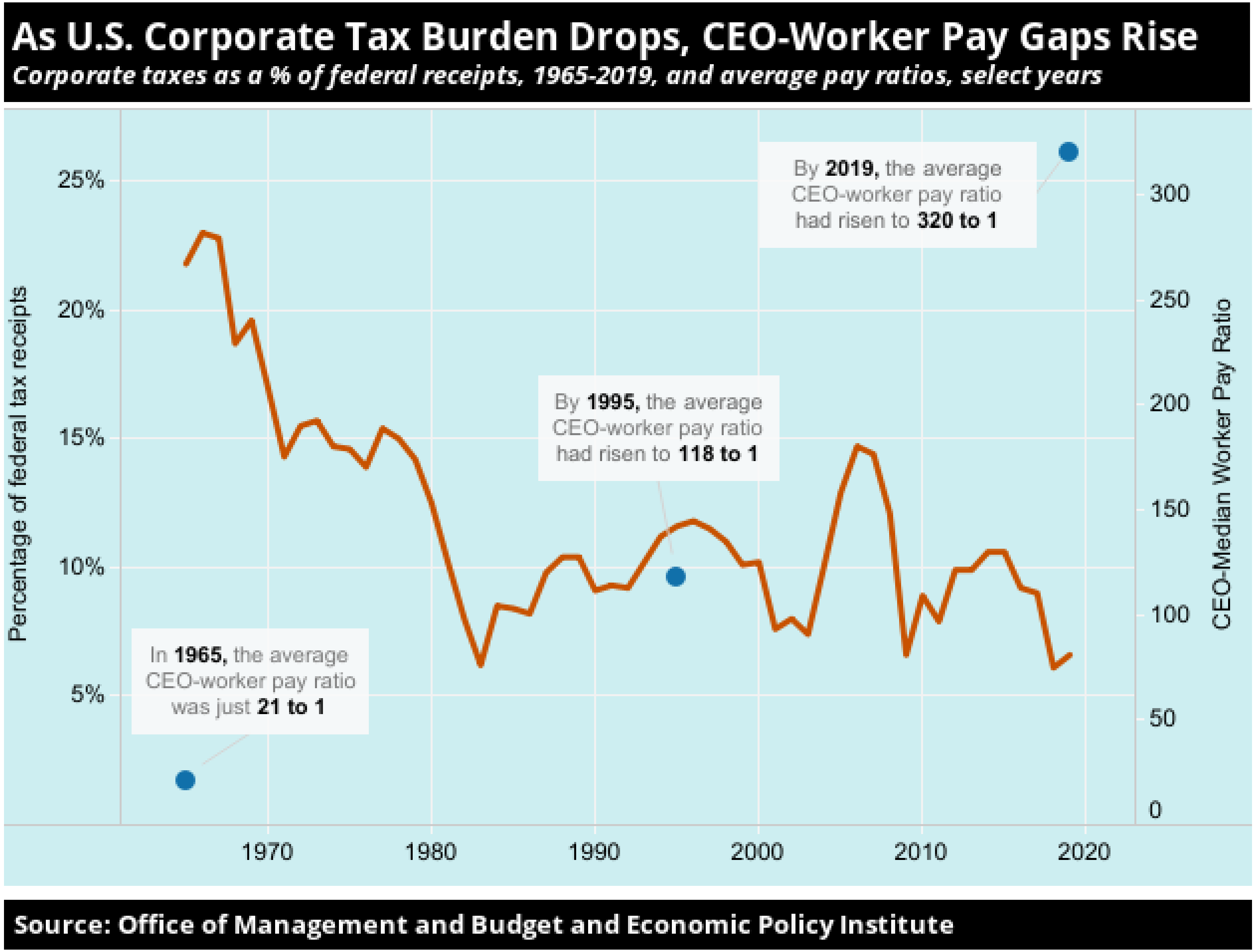
As U.S. Corporate Tax Burden Drops, CEO-Worker Pay Gaps Rise
Corporate taxes as a % of federal receipts, 1965-2019, and average pay ratios, select years
Percentage of federal tax receipts
25%
20%
15%
10%
5%
CEO-Median Worker Pay Ratio
300
250
200
150
100
50
0
1970
1980
1990
2000
2010
2020
In 1965, the average CEO-worker pay ratio was just 21 to 1
By 1995, the average CEO-worker pay ratio had risen to 118 to 1
By 2019, the average CEO-worker pay ratio had risen to 320 to 1
Source: Office of Management and Budget and Economic Policy Institute

Corporate taxes and credit

- The effect is more ambiguous

- Negative effect based on the debt restructuring theory (e.g., DeAngelo and Masulis, 1980):
  - expansionary taxation policy decreases firms’ and banks’ propensity to use debt as a tax shield
  - higher liquidity and after-tax profitability implies increased reliance on firms’ internal funds

- Positive effect
  - an increase in after-tax profitability lowers firms’ default risk and increases banks’ incentives to increase their credit supply
  - banks themselves may benefit from tax cuts, suggesting higher after-tax profits and associated expansionary lending opportunities

Evidence

- Studies mainly show that a tax cut decreases the cost of loan leading to a positive effect on the loan supply

- No equivalent effect of tax hikes, especially for large firms) mainly due to high market power of these firms and competitive lending conditions

Question

- Which firms / business owners benefit and in what proportions from the potential credit expansion after a decrease in the corporate tax rate?

- A CREDIT CHANNEL OF TAXATION POLICY

Motivation

- Inequality decreases if:
  - banks relax their lending standards and predominantly expand credit to previously credit-constrained firms
  - they offer significantly lower lending rates to low-income business owners on the margin (compared to the decrease in lending rates to relatively rich)

- Inequality increases if:
  - changes in the credit supply occur predominantly via lower credit costs or higher loan amounts for relatively rich or existing borrowers

Our study

1. Identify the credit channel of taxation policy, through which changes in corporate tax rates differentially affect credit (loan amount and loan spread) to the relatively poor versus the relatively rich

2. Show how this effect translates to future income or wealth of loan applicants and their placement in the income or wealth distribution

Data (1)

- Confidential data from a single North European bank
- Observe:
  - Loan applicants' (majority business owners) current and future income and wealth
  - Hold the supply-side constant
  - Loan applications (both accepted and rejected)
  - Credit score and all hard information on applicants
  - A sharp decrease (9%) in the corporate tax rate in the bank's country (treated firms)
  - The bank also lends to other firms outside the country (control firms)
  - Whether firms are credit constrained (can borrow from other banks)

Data (2)

- Check sample representativeness across several dimensions
  - Using Compustat data for large European banks, we find very similar averages of key ratios with our bank
  - Data from SAFE very similar loan rejection rates
  - Data from Orbis shows that averages of key ratios for European firms are very similar with the firms in our data
  - Data from several studies (e.g., Berger et al., 2014; Bonfim et al., 2018) show very similar bank-firm exclusive relationship lending

Loan outcome equation (1)

$$Loan\ outcome_{it} = a_0 + a_1T_t + a_2Y_{it} + a_3D_i + a_4T_t \times Y_{it} + a_5T_t \times D_i + a_5Y_{it} \times D_i + a_6T_t \times Y_{it} \times D_i + a_7C_{it} + u_{it}$$

- *Loan outcome:*
  - *Granted* (a dummy that equals 1 if the bank grants the loan to applicant *i* in year *t*; it equals 0 if the bank rejects the applicant)
  - *Loan amount* as the log of the loan amount for granted loans
  - *Loan spread* as the difference between the loan rate and the Euribor (log of basis points).

- *T* is a dummy taking the value 1 in the years before the tax decrease and the value 0 in the years after the tax decrease.

- *Y* is a dummy equal to 1 if the applicant is in the upper 25% of our sample's income distribution and equal to 0 if he/she is in the lower 25%.

- *D* is a dummy equal to 1 if the firm is in the country experiencing the tax decrease and 0 otherwise.

- *C* is a vector of controls, including the credit score where suitable.

Loan outcome equation (2)

$$
\begin{aligned}
&Loan\ outcome_{it} \\
&= a_0 + a_1 T_t + a_2 Y_{it} + a_3 D_i + a_4 T_t \times Y_{it} + a_5 T_t \times D_i + a_5 Y_{it} \times D_i + a_6 T_t \times Y_{it} \times D_i + a_7 CS_{it} + a_8 C_{it} + u_{it}
\end{aligned}
$$

- Main idea is that a_6 shows the differential effect of the corporate tax rate on *Granted*, *Loan amount*, or *Loan spread* for different levels of applicant income or wealth and for the treated versus untreated firms

- In *Granted* specifications, we expect a negative coefficient: a tax decrease further increases the probability of loan origination for the relatively poor and treated applicants

- In the *Loan amount* specifications, a positive and significant coefficient a_6 means that the impact of a tax decrease on the loan amount (reflected in a positive and significant a_1) is smaller for treated applicants (exposed to a tax decrease) who are relatively poor (Y = 1) at the time of the loan application

- In the *Loan spread* specifications, a negative and significant coefficient a_6 pinpoints that a tax decrease has a larger effect on loan spreads for relatively poor applicants

Making causal claims

- The tax reform took place in the three-year period 2005 to 2007
  - a very large decrease in the corporate tax rates
  - other major taxes such as the personal income tax rate and the definition of the tax base were not affected during that period
  - the reform was presented as a permanent cut and this indeed materialized
  - Two other countries sharing borders with the bank's country did not make any changes to their own corporate tax rate during that period and firms from these countries applying for credit to our bank serve as a control group

- A triple differences model: treated firms from the bank's country (that issues the corporate tax decrease) and control firms from surrounding countries (that have not issued a corporate tax change)
  - The firm and business owners characteristics are very similar for the two groups

- The credit score creates a sharp discontinuity around the probability of granting the loan and fully explains the bank's credit decision on that basis
  - Any other observed variable, including Y, T, and C, should be in the bank's information set and thus in the credit score
  - Largely limits the possibility of omitted variables confounding the triple diff

Tax decrease, income, and loan decisions

The table reports coefficient estimates and standard errors (clustered by firm) in parentheses from the estimation of equation 1. The dependent variable is the bank's loan decision (granted or denied loan), and all variables are defined in Table 1. The lower part of the table reports the number of observations, the adjusted R-squared, and whether control variables are used. All specifications are estimated with OLS, except from specifications 4 and 5, which are estimated with Heckman's two-stage model. For specifications 4 and 5, we also report the number of observations used in the first stage and the estimate on Lambda. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% levels.

Relatively poor loan applicants in a country experiencing a tax cut (treated) see an increase in their probability of getting a loan by 4.6% compared to relatively poor but untreated applicants (in other countries) and relatively rich applicants.

	1	2	3	4
	Granted	Granted	Granted	Granted
Income quartile	0.105***	0.101***	0.108***	0.110***
	(0.028)	(0.027)	(0.034)	(0.034)
Tax decrease × Income quartile	0.013	0.011	0.011	0.011
	(0.012)	(0.011)	(0.014)	(0.014)
Tax decrease × Issuing country	0.002	0.002	0.005	0.008
	(0.016)	(0.017)	(0.021)	(0.022)
Income quartile × Issuing country	-0.004	-0.004	-0.006	-0.007
	(0.025)	(0.025)	(0.028)	(0.027)
Tax decrease × Income quartile × Issuing country	-0.046**	-0.046**	-0.055**	-0.056**
	(0.021)	(0.021)	(0.026)	(0.026)
Lambda			-0.178	-0.180
			(0.129)	(0.134)
Observations	29,255	29,255	29,255	29,255
Observations (first stage)			87,870	111,746
Adj. R-squared	0.96	0.96		
Control variables	No	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Loan amount and loan pricing

The table reports coefficient estimates and standard errors (clustered by firm) in parentheses from the estimation of equation 1. The dependent variable is given on the top of each specification, and all variables are defined in Table 1. The lower part of the table reports the number of observations, the adjusted R-squared and whether control variables are used. Specifications 1 and 3 are estimated with OLS and specifications 2 and 4 with Heckman's two-stage model. For the Heckman specifications we also report the number of observations used in the first stage and the estimate on Lambda. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% levels.

The relatively rich loan applicants in the issuing country take 7.2% larger loans in the post-treatment period (compared to relatively rich loan applicants pretreatment, untreated applicants, and relatively poor applicants).

	1	2	3	4
	Loan amount	Loan amount	Loan spread	Loan spread
Income quartile	0.065**	0.073***	-0.020**	-0.023***
	(0.030)	(0.035)	(0.006)	(0.010)
Tax decrease × Income quartile	0.032**	0.034**	-0.016**	-0.025***
	(0.014)	(0.016)	(0.007)	(0.009)
Income quartile × Issuing country	-0.003	-0.005	0.001	0.001
	(0.016)	(0.021)	(0.003)	(0.005)
Tax decrease × Income quartile × Issuing country	0.072***	0.087***	-0.077***	-0.083***
	(0.018)	(0.023)	(0.017)	(0.021)
Credit score	0.196***	0.172***	-0.257***	-0.272***
	(0.024)	(0.033)	(0.046)	(0.054)
Tax decrease × Credit score	0.047***	0.051***	-0.071***	-0.079***
	(0.013)	(0.018)	(0.022)	(0.022)
Lambda		-0.217		0.170
		(0.141)		(0.197)
Observations	25,038	25,038	25,038	25,038
Observations (first stage)		111,746		111,746
Adj. R-squared	0.91		0.92	
Control variables	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes

Robustness

- Placebo tests: Slide the event date backward or forward
- Use observations from the period 2016-2018 (no tax reform) as a control group (same effect)
- Use observations from the period 2016-2018 as a treatment group (no effect)
- Use observations inside the 10% or the 5% margin around the cutoff point of the credit score (same effect)
- Use different definitions of income/wealth

Future income and wealth

- To make inequality inferences, we need a model on the effect of tax rate changes on future income/wealth of the poor vs. the rich due to credit availability

$$Income_{i,t+n} = d_0 + d_1 T_t + d_2 Y_{it} + d_3 D_i + d_4 T_t \times Y_{it} + d_5 T_t \times D_i + d_5 Y_{it} \times D_i + d_6 T_t \times Y_{it} \times D_i + d_7 CS_{it} + d_8 C_{it} + u_{it}$$

A positive d_6 suggests that a positive effect on future income (wealth) due to the corporate tax decrease is more potent for the treated high-income (richer) individuals

Future income

The table reports coefficient estimates and standard errors (clustered by firm) in parentheses from the estimation of equation 2. The dependent variable is applicants' future income, and all variables are defined in Table 1. The lower part of the table reports the number of observations, the adjusted R-squared, and the type of fixed effects used in each specification. Specifications 1 and 3 are estimated with OLS, and specifications 2 and 4 with Heckman's two-stage model. For the Heckman specifications we also report the number of observations used in the first stage and the estimate on Lambda. The ***, **, and * marks denote statistical significance at the 1%, 5%, and 10% levels.

	1	2	3	4	5
	Income t+3	Income t+3	Income t+5	Income t+5	Income t+5
Income quartile	0.088***	0.090***	0.119***	0.131***	0.076***
	(0.006)	(0.013)	(0.008)	(0.017)	(0.018)
Tax decrease × Income quartile	0.011	0.017	0.010	0.019	0.008
	(0.012)	(0.017)	(0.015)	(0.020)	(0.023)
Income quartile × Issuing country	-0.003	-0.003	-0.005	-0.006	-0.003
	(0.012)	(0.015)	(0.013)	(0.017)	(0.017)
Tax decrease × Income quartile × Issuing country	0.073***	0.080***	0.082***	0.087***	0.022
	(0.027)	(0.030)	(0.029)	(0.033)	(0.019)
Tax decrease × Income quartile × Issuing country × High loan amount					0.037**
					(0.018)
Tax decrease × Income quartile × Issuing country × High probability of origination					0.034**
					(0.015)
Credit score	0.372***	0.361***	0.350***	0.357***	0.310***
	(0.071)	(0.081)	(0.064)	(0.072)	(0.070)
Tax decrease × Credit score	0.027	0.042	0.018	0.025	0.020
	(0.022)	(0.030)	(0.023)	(0.034)	(0.029)
Lambda		-0.247		-0.273	
		(0.303)		(0.307)	
Observations	25,038	25,038	25,038	25,038	25,038
Observations (first stage)		111,746		111,746	
Adj. R-squared	0.90		0.86		0.86
Control variables	Yes	Yes	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes	Yes	Yes

Treated and richer loan applicants have higher income three (7.3%) and five years (8.2%) after the loan application (compared to the untreated and poorer loan applicants) because of the tax decrease

Is the effect due to the credit channel?

1. Get the partial prediction of the loan amount/loan spread specifications and use them in equation 2
   - Half the response of forward income is gone (half the response is duet o the credit channel)
   - For wealth, the equivalent amount is around 40%

2. Use a quadruple interaction term including dummies for high vs. low loan amounts and high vs. low probability of loan origination
   - The quadruple terms absorb the effect on the triple terms
   - The inequality effect is indeed channeled via the credit channel

Conclusions

- We ask whether following a decrease in corporate tax rates, the distribution of bank lending goes more to the rich vs. the poor

- Using detailed data on business loans, we show that
  - The relatively poor get easier access to credit
  - Loan amounts increase and loan spreads decrease for the relatively rich
  - Future income and wealth of relatively rich increase faster due to the credit channel