Distributional Tax Analysis in Theory and Practice: Harberger Meets Diamond-Mirrlees

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Introduction

Who pays taxes, and who would be affected by tax reforms, are arguably some of the most important questions in modern democracies

- ▷ High-income countries collect 30%–50% of national income in taxes
- ▷ Large impact on disposable income income of all social groups
- ▷ Critical to have a sound & practical way to allocate taxes across groups and to analyze who would gain/lose from proposed changes to the tax system

This paper offers **a new framework grounded in optimal tax theory** to address these questions

Why is there a need for a new framework?

There is a long tradition of distributional tax analysis

- ▷ Empirically: pioneering work of Colm and Tarasov (1941), Musgrave et al. (1951), and Pechman and Okner (1974)
- ▷ Theoretically: key tax incidence work of Harberger (1962, 1964)
- ▷ Building on it, US government agencies publish distributional tax tables to analyze distribution of federal taxes and impact of reforms

This conventional approach has shortcomings

- ▷ Complex: tries to achieve too many things at the same time
- ▷ Delivers inconsistent estimates of tax progressivity

Two distinct objectives require two distinct methodologies

Distributional tax analysis serves two purposes:

1. Provide information on the current distribution of income and tax payments
   - ▷ Key to quantify income inequality and the direct effects of taxes
   - ▷ Call this **distributional current-tax analysis**
2. Simulate how a change to the tax system would affect the different groups
   - ▷ Key to assess desirability of reform
   - ▷ Call this **distributional tax-reform analysis**

By separating each analysis one can obtain a clear, consistent, and policy-relevant view of the tax system and of the impact of potential reforms

Current-Tax Analysis

Distributional current-tax analysis

Current-tax analysis describes price distortions created by tax system, as one writes a model of optimal taxation

- ▷ Taxes are wedges between pre-tax prices (relevant for production) & post-tax prices (relevant for work, saving, & consumption decisions of households)
- ▷ Taxes based on labor income are assigned to corresponding workers
- ▷ Taxes based on capital or capital income to owners of corresponding assets
- ▷ Taxes based on consumption to corresponding consumers

→ Comprehensive and consistent picture of "who pays what"

Distributional current-tax analysis: remarks

Current-tax analysis differs from following statutory incidence

- ▷ Example: both employer and employee payroll taxes are a tax on labor → assigned to corresponding workers
- ▷ Economics, not accounting: follows standard modeling of supply/demand

Yet it does not require specifying behavioral responses

- ▷ Describes actual taxes and pre-tax incomes, not counterfactuals → simple
- ▷ Can be applied annually or life-time, cf. Bruil et al. (2024) in NL

Captures equity aspect of taxes, silent about efficiency costs

- ▷ Consistent with standard equity/efficiency distinction in optimal tax models

Differences with the conventional approach

Conventional tax incidence approach tries to answer counterfactual question:
"What would incomes be if there were no taxes?"

- ▷ Requires many assumptions $\rightarrow$ complex to implement and lacks robustness
- ▷ Mixes efficiency and equity $\rightarrow$ results hard to understand ("a corporate tax cut would be a tax cut for workers". No!)
- ▷ Zero-tax counterfactual not policy-relevant
- ▷ Counterfactual not even well-defined based on recent empirical work. Example: asymmetric effects of VAT reforms: history matters

The case of the corporate tax

In practice, the conventional US approach allocates taxes in the same way as we do for most taxes. Main difference is the treatment of the corporate tax:

- ▷ Our approach: corporate tax assigned to ultimate shareholders
- ▷ Conventional approach: 25% of corporate tax shifted all workers, 75% shifted to all capital owners proportionally to reported capital income

Example: Warren Buffett owns 30% of Berkshire Hathaway

- ▷ Is assigned 30% of its corporate tax in our approach (as if Berkshire Hathaway was a pass-through business $\rightarrow$ neutral wrt organizational form)
- ▷ Is assigned ≈ 0 in conventional approach (minuscule individual income) $\rightarrow$ no link between what a corporation pays in tax and what its owners pay

Our approach makes it possible to meaningfully study the tax payments of the richest

Using only publicly available data

Millions of US$	Jeff Bezos	Warren Buffett
US federal taxes	**43**	**930**
Individual income tax	43	5
Corporate tax	0	925
Payroll taxes	0	0
Consumption taxes	0	0
US state and local income taxes	**140**	**241**
Individual income tax	0	1
Corporate taxes	70	53
Business property taxes	69	187
Consumption taxes	~0	~0
Residential preoperty taxes	~0	~0
Foreign taxes	**154**	**337**
Corporate taxes	123	337
Business property taxes	31	0
Total taxes	**337**	**1,508**
Pre-tax income	2,221	8,176
Effective tax rate	**15.2%**	**18.4%**
Federal	1.9%	11.4%
State and local	6.3%	2.9%
Foreign	6.9%	4.1%

Application of Current-Tax Analysis: Evolution of US Tax Progressivity

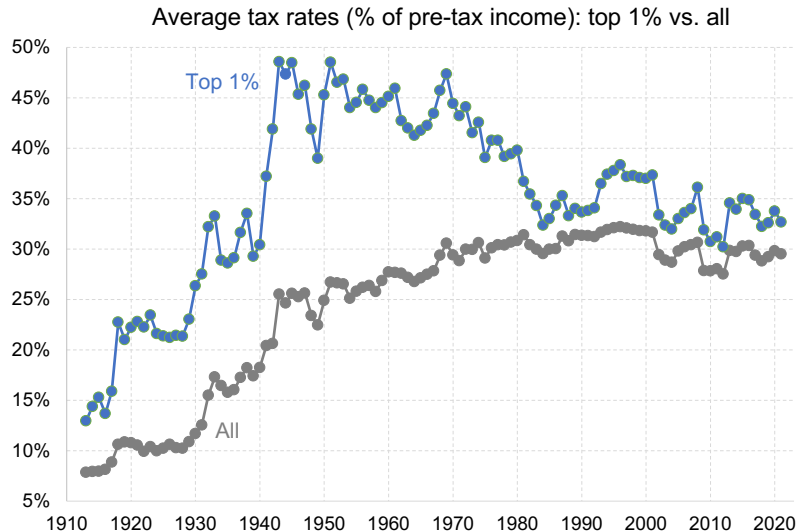
Data and methodology

Goal: compute evolution of effective tax rates by income groups

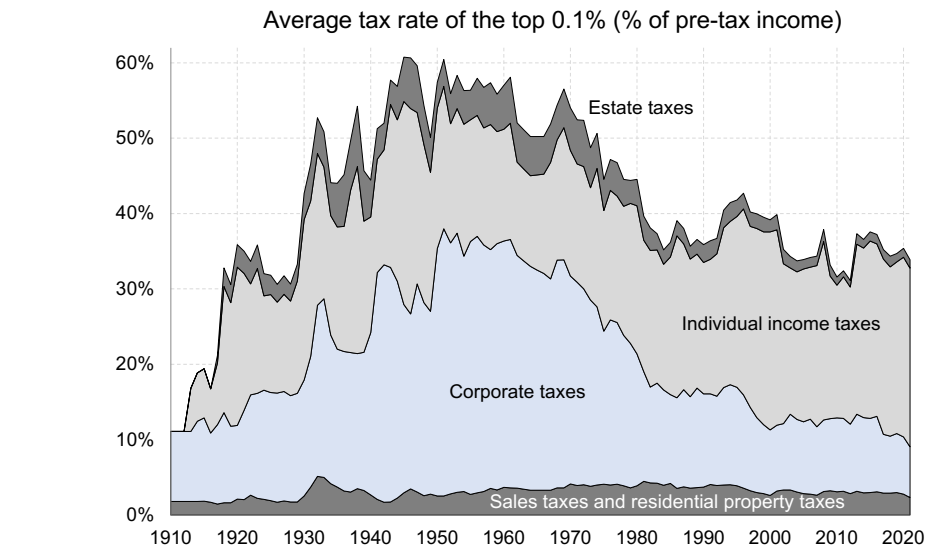
- ▷ Effective tax rate = taxes paid / pre-tax income
- ▷ Taxes include all taxes paid at all levels of government and are allocated following current-tax methodology
- ▷ Pre-tax income includes all income after the operation of the pension systems (but before other government intervention) and matches national income
- ▷ Data: Piketty-Saez-Zucman (2018) distributional national accounts, updated

Key result: **large decline in tax progressivity since middle of 20th century, driven by changes in the corporate tax**

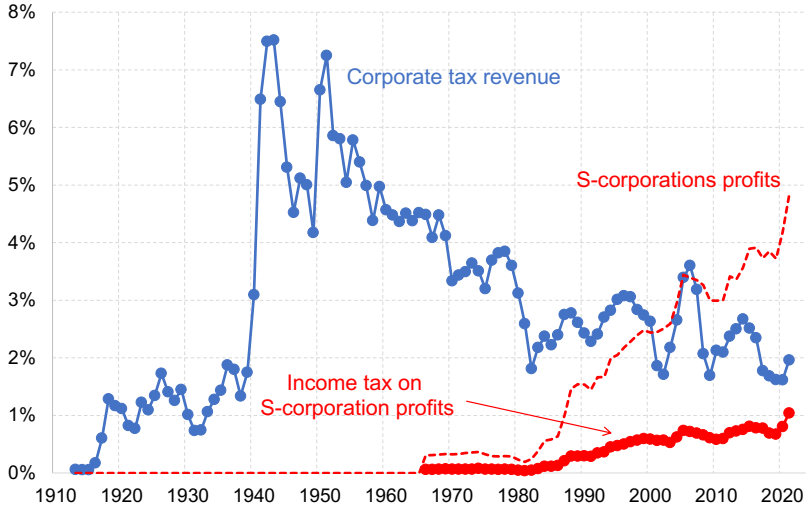
The decline of tax progressivity in the US



It is through the corporate tax that US achieved high degree of progressivity in mid-20th century



Corporate tax revenues in the United States (% of US national income)

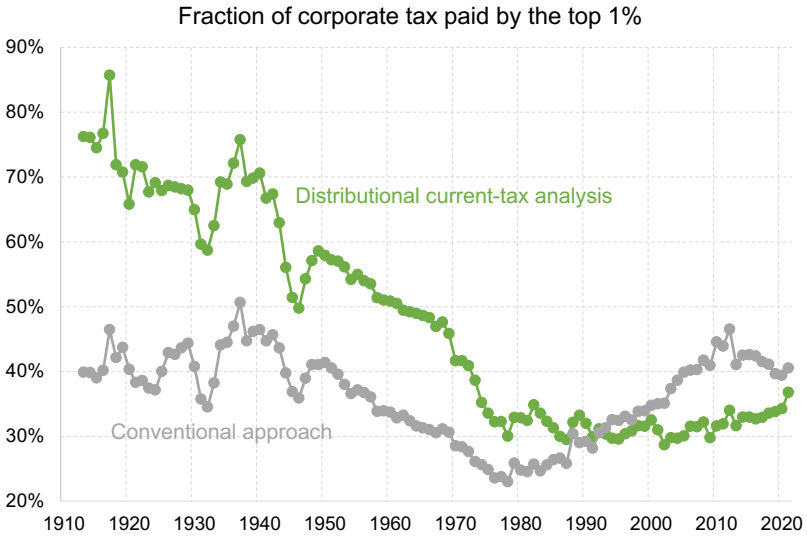


Comparison with conventional approach

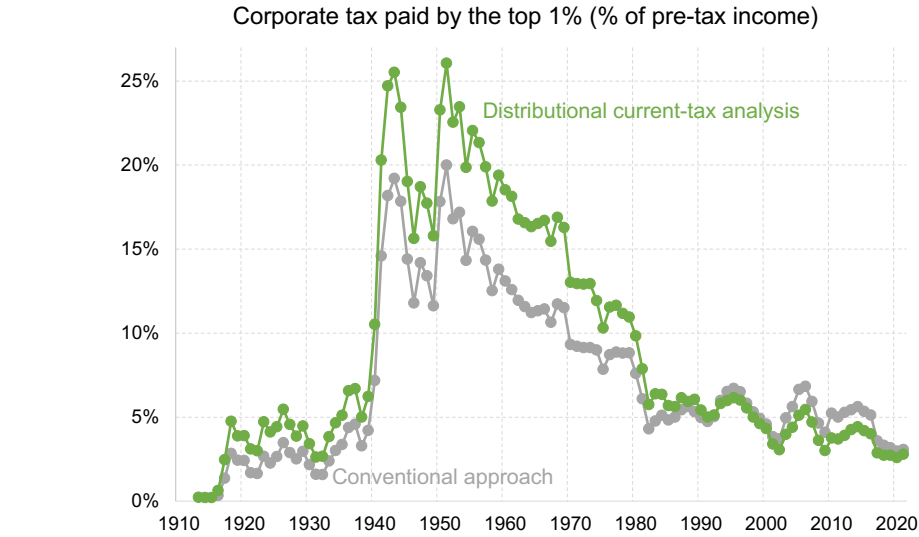
Proper treatment of corporate tax is key to establish trends

- Corporate tax very large in middle of 20th century
- Conventional approach (25% on all labor, 75% on reported capital income): tax spread to workers and small unincorporated businesses in mid-century
- Additional issue in CBO methodology: no corporate tax assigned to pensioners, despite large ownership of equity by pension funds
  - Bias since the 1980s due to rise of pension funds
  - Too much corporate tax assigned to the rich today

Allocating the corporate tax: CBO approach vs. our approach



Effective corporate tax rate at the top: CBO approach vs. our approach



Tax-Reform Analysis

Distributional tax-reform analysis

Consider now how a tax reform would affect pre-tax income, taxes paid, and welfare for each income group

- ▷ In contrast to current-tax analysis, requires a model of behavior
- ▷ Model should capture not only equity but also efficiency aspect of reform
- ▷ Classical tax incidence analysis emphasizes GE effect of taxes on pre-tax prices (e.g., if corporate tax $\nearrow$, capital $\searrow$ and wages $\searrow$ hurting workers)

Contribution of paper: clarify the sufficient statistics needed to conduct tax-reform analysis in standard neoclassical models

- ▷ Key point: **price effects turn out to be normatively irrelevant**

Illustrative model

Perfectly Competitive Production:

- ▷ Aggregate CRS production function $Y = F(K, L) = L \cdot F(K/L, 1) = L \cdot f(k)$
- ▷ $r = F_K = f'(k) =$ pre-tax rate of return on K defines demand $k^d(r)$
- ▷ $w = F_L =$ pre-tax wage.
- ▷ CRS $\Rightarrow F(K, L) = rK + wL \Rightarrow w = f(k) - rk \Rightarrow w = \int_0^k f'(\tilde{k})d\tilde{k} - rk$

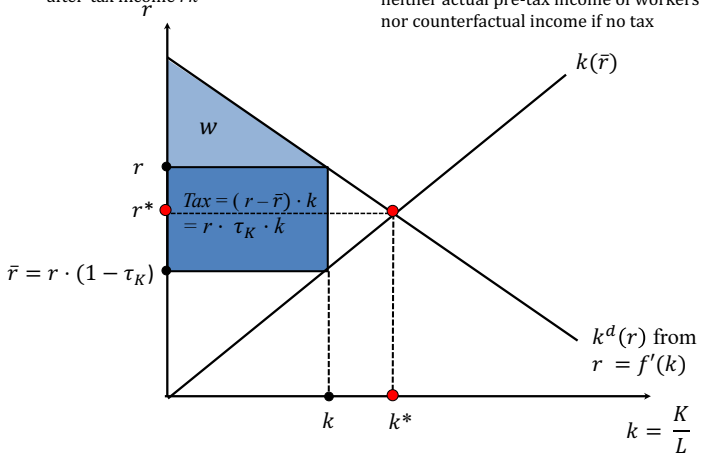
Supply side:

- ▷ Assume labor L is fixed (inelastic labor supply)
- ▷ Capital supply $k(\bar{r})$ depends on the net-of-tax return $\bar{r} = r \cdot (1 - \tau_K)$

General equilibrium with capital tax

Current-tax analysis:
- Pre-tax income of workers is w
- Pre-tax income of capitalists is rk, after-tax income $\bar{r}k$

Conventional analysis:
- Ignores change in k and deadweight burden
- Pre-tax income of workers = $w+(r-r^*)k$: neither actual pre-tax income of workers w, nor counterfactual income if no tax



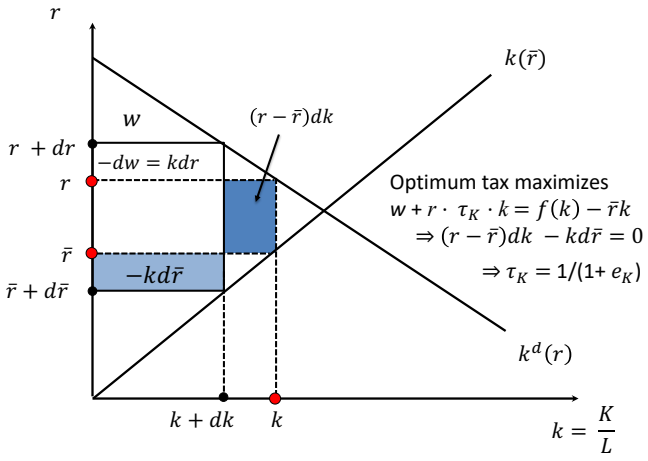
Optimal tax analysis

Suppose social marginal welfare weight on capitalists is zero

- ▷ Society sets τ_K to maximize $w + (r - \bar{r})k = f(k(\bar{r})) - \bar{r}k(\bar{r})$.
- ▷ $\Rightarrow$ usual inverse-elasticity rule optimal tax rate $\tau_K^* = 1/(1 + e_K)$
- ▷ Key insight: optimal tax rate only depends on the supply elasticity e_K
- ▷ Household supply elasticity is a sufficient statistics for the optimal tax rate and the production side elasticities are irrelevant (Diamond & Mirrlees, 1971)

$\rightarrow$ **Effect of capital tax increase on wages irrelevant to assess reform desirability**

Capital tax reform and optimum



Harberger meets Diamond-Mirrlees

Harberger (1962) model is the cornerstone of corporate tax incidence

- ▷ Harberger's model has two sectors: corporate (taxed) vs. other (untaxed)
- ▷ Perfect mobility of capital across sectors $\Rightarrow \bar{r}^{\text{corp}} = r^{\text{other}}$
- ▷ Supply of capital to corporate sector is infinitely elastic to its net-of-tax price $\bar{r}^{\text{corp}} \Rightarrow e_K = \infty$
- ▷ $\tau_K = 0$ is optimal for any social objective
- ▷ Equivalent interpretation: taxing capital solely in corporate sector creates a production inefficiency which violates the production efficiency theorem of Diamond & Mirrlees (1971) for optimal taxes

$\rightarrow$ **Corporate tax is a terrible tax by assumption in Harberger model.**

Distributional tax-reform analysis: sufficient statistics

Distributional tax reform table only needs to report:

- ▷ Mechanical change in tax liability by income groups assuming no behavioral responses and no price effects ($\rightarrow$ directly given by current-tax analysis)
- ▷ Aggregate revenue effect from household responses ignoring GE price effects

Along with social marginal welfare weights for each group of the population, these are sufficient statistics to evaluate the value or cost of the reform

- ▷ Pre-tax price GE effects can be ignored because they can be neutralized by adjusting other taxes at zero budget cost
- ▷ E.g., model says one does not need to know how a corporate tax change would affect wages to assess desirability of this reform

Reform: 10% increase in the corporate tax rate: Assume $e_K = 0.5$

A. Reform of the US federal corporate income tax

	Current income and taxes				Tax reform analysis			
	Pretax income	All corporate taxes	Federal corporate tax		Consider a 10% increase in the federal corporate income tax rate, from 21% to 23.1%			
Income groups	Share	Share	Share	Taxes. ($ billion)	Mechanical tax increase ($ billion)	Tax loss supply side ($ billion)	Social welfare weights	Social welfare cost ($ billion) = -(5) x (7)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
P0-50	12%	4%	3%	$7	$0.7	-$0.1	1.38	-$1.0
P50-90	38%	29%	18%	$50	$5.0	-$0.7	0.69	-$3.4
P90-99	26%	30%	18%	$50	$5.0	-$0.7	0.35	-$1.7
P99-99.9	12%	16%	9%	$26	$2.6	-$0.4	0.17	-$0.5
top 0.1%	12%	21%	13%	$36	$3.6	-$0.5	0.09	-$0.3
Non-US residents	0%	0%	39%	$109	$10.9	-$1.5	0	$0.0
All	**100%**	**100%**	**100%**	**$279**	**$27.9**	**-$3.7**	**1.00**	**-$6.9**
					Net revenue:		**$24.1 billion**	
					Net value of reform:		**$17.2 billion**	

Reform: 10% increase in the individual income tax for top 1%: Assume $e = 0.5$

	Current income and taxes (2021)					Tax reform analysis			
	Pretax income	Fiscal income	Federal individual income tax			Consider a 10% increase in the Federal individual income tax for the top 1% only			
Income groups	Share of total pretax income	as % of pretax income	Share of total individual income tax	Tax rate = Taxes / Pretax income	Taxes ($ billion)	Mechanical tax increase ($ billion)	Tax loss supply side ($ billion)	Social welfare weights	Social welfare cost ($ billion) = -(6) x (8)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
P0-50	12%	53%	2%	1.7%	$46	$0.0	$0.0	1.38	$0.0
P50-90	38%	67%	26%	6.8%	$552	$0.0	$0.0	0.69	$0.0
P90-99	26%	68%	30%	11.6%	$639	$0.0	$0.0	0.35	$0.0
P99-99.9	12%	72%	19%	16.5%	$404	$40.4	-$5.7	0.17	-$7.0
top 0.1%	12%	74%	22%	18.1%	$467	$46.7	-$6.3	0.09	-$4.0
All	**100%**	**67%**	**100%**	**9.9%**	**$2,108**	**$87.1**	**-$12.0**	**1.00**	**-$11.0**
						Net revenue:			**$75.1 billion**
						Net value of reform:			**$64.1 billion**

Pragmatic Tax Reform Analysis

Recent empirical work has uncovered non-standard tax incidence:

- **Corporate tax** cuts are shared between owners and workers through bargaining (Fuest et al. 2022 for Germany, Kennedy et al. 23 for US)
- **Consumption tax**: VAT increases are passed on consumers 100% while VAT decreases are partly pocketed by producers (Benzarti et al. 2020)
- **Employee payroll tax** born by workers one-to-one but **employer payroll tax** born collectively by workers and profits likely due to wage rigidities

$\Rightarrow$ Non-standard effects more compellingly identified than elusive GE price effects of standard incidence $\Rightarrow$ Should be incorporated in tax reform analysis in priority

Incorporating non-standard behavioral responses

Tax	Who bears the burden of a tax change	Notes and key references	Nature/hierarchy of main behavioral Responses	Size of behavioral Responses
	(1)	(2)	(3)	(4)
Individual income Tax	Individuals 100%	Consistent with conventional incidence	Avoidance/evasion Real responses	Varies with context, can be large Likely small. Inattentiveness (Rees-Jones, Taubinsky 2020)
Corporate income tax	Profits 2/3* Workers 1/3* Consumers 0%*	Fuest, Peichl, and Siegloch (2018) for Germany and Kennedy et al. (2022) for the US. Likely depends on bargaining power. Asymmetric effects?	Avoidance/evasion Real responses	Varies with context, can be large Likely medium, varies with design
Consumption taxes				
Value-added-tax or excise tax **increase**	Consumers 100%	Benzarti et al. (2020) on VAT in Europe	Evasion Consumer demand	Varies with context, can be large Larger response for tax on specific goods
Value-added-tax or excise tax **decrease**	Consumers 50% Profits 37.5%* Workers 12.5%*	Benzarti et al. (2020) on VAT in Europe Benzarti and Carloni (2019). Likely depends on bargaining power	Consumer demand	Response muted by 50% price passthrough
Sales taxes (not posted on prices)	Consumers 100%	Consistent with conventional incidence. Poterba (1996) and Besley and Rosen (1999) for local sales tax in the US	Evasion Consumer demand response	Can be large for small retailers Muted by inattentiveness (Chetty et al. 2009)
Payroll taxes				
Employee side payroll tax	Workers 100%	Consistent with conventional incidence	Labor supply response	Likely small (higher for less attached subgroups)
Employer side payroll tax	Corresponding workers 0%	Saez et al. (2012) for Greece, Bozio et al. (2022) for France, Saez et al. (2019) for Sweden	Employer labor demand responses	Can be large for targeted tax changes
	Workers **collectively** 2/3* Profits 1/3* Consumers 0%*	Saez et al. (2019) for Sweden, Benzarti and Harju (2021) for Finland. Likely depends on bargaining power. Asymmetric effects?		

Replacing US health insurance premiums ($15K per worker) with a 12% employee payroll tax

Conventional incidence: workers bear the current insurance premiums and would pay the new payroll tax $\Rightarrow$ low paid workers gain (high paid workers lose)

Pragmatic incidence: wage rigidities play a big role in actual incidence

- New employee payroll tax: would be paid by workers but employers would partly pocket the premiums they no longer need to pay and partly increase wages across the board $\Rightarrow$ Not as progressive as conventional incidence
- Directed incidence: employers required by law to convert premiums into wages ($15K per worker) and then new employee 12% payroll tax starts. Generates the conventional incidence immediately.

Replacing US health insurance premiums ($15K per worker) with a 12% employee payroll tax

	Current system			Reform replacing current employer health care contributions by flat 11.8% payroll tax								
				Conventional incidence and directed incidence			Employee payroll tax with rigid wages			Employer payroll tax with rigid wages		
Income groups	Average pre-tax income	Current head tax ($ per adult)	Current head tax (% pre-tax income)	New payroll tax (% pre-tax income)	% change in pre-tax income	Change in after-tax income (% pre-tax income)	New payroll tax (% pre-tax income)	% change in pre-tax income	Change in after-tax income (% pre-tax income)	New payroll tax (% pre-tax income)	% change in pre-tax income	Change in after-tax income (% pre-tax income)
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
P0-50	$20,889	$1,440	6.9%	4.5%	0.0%	2.4%	4.5%	-3.3%	-0.9%	4.5%	-2.4%	0.0%
P50-90	$80,618	$6,505	8.1%	7.0%	0.0%	1.1%	7.0%	-2.1%	-1.0%	7.0%	-1.1%	0.0%
P90-99	$243,587	$7,826	3.2%	5.2%	0.0%	-1.9%	5.2%	2.1%	0.2%	5.2%	1.9%	0.0%
P99-99.9	$1,085,455	$6,212	0.6%	2.7%	0.0%	-2.1%	2.7%	3.5%	1.4%	2.7%	2.1%	0.0%
top 0.1%	$10,288,542	$5,841	0.1%	1.3%	0.0%	-1.3%	1.3%	3.8%	2.5%	1.3%	1.3%	0.0%
All	**$84,672**	**$4,259**	**5.0%**	**5.0%**	**0.0%**	**0.0%**	**5.0%**	**0.0%**	**0.0%**	**5.0%**	**0.0%**	**0.0%**

Conclusion

We analyze the distribution of taxes with an equity-efficiency framework:

- ▷ A tax on the rich is progressive (equity)
- ▷ But it might be bad if it hurts the economy (efficiency)
- ▷ Efficiency is hard to evaluate but equity is easy with our current-tax framework

Our main recommendation: agencies/researchers should report current-tax tables and then model behavioral responses in a second step for tax reform analysis

- ▷ Relative to current practice that conflates both steps, this would greatly clarify the public debate on taxes