

Distributional Tax Analysis in Theory and Practice

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Overview

Introduction: Relevant Questions

- **Classical Tax Incidence Analysis and its Drawbacks**
- **Proposed Distributional Tax Analysis**
 - Method for current-tax and tax-reform analysis
 - Illustration with a two-sector model, and optimal tax analysis
- **The Model in Practice**
 - US Tax History
 - Tax reforms: Corporate and Individual Tax Increase
- **Non Standard Behavioural Effects**
- Discussion

Introduction

Important Questions about Taxation

- High income countries collect **30 - 50% national income** in taxes
- **Who pays these taxes?** How would they affect the different socioeconomic groups? – crucial for policymakers to have a way to **allocate taxes and analyse effects**
- Conventional taxation models – do not satisfactorily answer, but
 - used by bodies such as **Government Agencies** – inform public debate, legislative processes, policies, etc.
- Paper proposes a methodology that **overcomes the shortcomings of the conventional models**

Classical Tax Incidence Analysis and its Drawbacks

- **Internal inconsistency:** assignment based on counterfactual incomes (income under alternative or no taxes) as opposed to actual pre-tax income
- **Biased trends** in tax progressivity and inequality: ex. legal shift from C to S corporation
- Does **not** allow for **individual-level analysis**
- Requires assumptions about **behavioural responses** to taxes, or **counterfactuals**

General Aims of the Framework

- provide information on current distribution of income and tax payments by income groups = ***distributional current-tax analysis***
- simulate how a change to the tax system would affect different socioeconomic groups = ***distributional tax-reform analysis***
- **two** separate methodologies for each

Key Findings

- **effective tax rate** for the top 1% significantly **declined** over the past century (from 50% to 32%) – **underestimated** by conventional methods
- importance of **corporate taxes** in tax progressivity – especially for top groups
- for **evaluating** tax reforms, only **two main statistics** are required: the *mechanical tax changes* by income group (ignoring behavioral responses) and the *aggregate revenue effect* due to behavioral responses. Pre-tax price effects can be ignored

Distributional Tax Analysis

Method

Current-tax analysis aims at **allocating taxes to the effectively affected agents**:

- Labour taxes to corresponding workers (including payroll taxes paid by employers!)
- Consumption taxes to corresponding consumers
- Capital taxes to the owners of corresponding assets

Taxes = "wedges between pre-tax prices and post-tax prices" (will come back later)

Why?

- Workers' labour supply decisions depend on their *after-tax* earnings
- Employers' decision on *pre-tax* cost of labor
- Similar idea for capital and consumption

→ It is a very general and easy-to-use setting, measuring what is *effectively* paid by people

How does it compare with conventional analysis?

- Does not depend on income classification
 - Whether a consultant decides to report income as salaried worker, a self-employed individual incorporated or not in a company, income tax is allocated the same way
- Does not rely on counterfactual income
- No need to specify behavioural responses
- Offers consistent trends in tax progressivity

Distributional tax-reform analysis

If interested in distributional **tax-reform** analysis, one would now need to understand the income and welfare effects of such a reform and therefore the response(s) of tax base

- Need to account for equity / efficiency trade-off
- Requires a model of behaviour

Distributional tax-reform analysis Tax incidence

Tax incidence theory focuses on effect of taxes on pre-tax prices (e.g. corporate tax increase → wage decrease). Should we care?

- Distributional tax analysis only focuses on the welfare effect of tax reforms
- Any pre-tax price effect following tax change can be neutralized by adjusting other taxes, at zero budgetary cost
→ Pre-tax price effects can be ignored

Equity side

- mechanical impact of tax changes (ignoring behavioral responses)
- weighted across group by marginal social welfare weights

Efficiency side

- aggregate revenue effect due to behavioral responses

Key point of the paper: Price effects turn out to be normatively irrelevant for distributional tax-reform analysis!

Illustration: Two-sector capital and labor model

- Aggregate production function $Y = F(K, L)$
- w = economy-wide pre-tax wage rate, r = pre-tax rate of return on capital
- Profits maximization $\rightarrow w = F_L$ and $r = F_K$
- Assume labor is fixed, labor income taxed at rate τ_L
- Capital supply depends on the net-of-tax return $\bar{r} = r \cdot (1 - \tau_K)$ where τ_K is tax rate on capital income

► More in Appendix

Equilibrium :

$$r = f'(k), w = f(k) - kf'(k) = \int_0^k f'(k) dk - rk, k = k(r \cdot (1 - \tau_K))$$

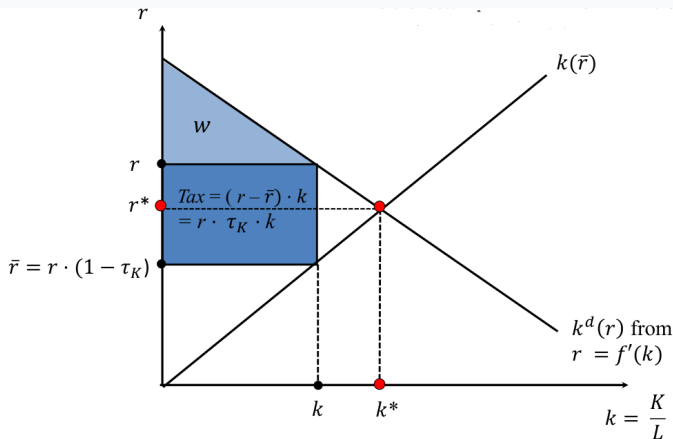


Figure: Capital tax

Tax-reform analysis

Now we consider small tax change, i.e small increase in τ_K , study its effects dk , dw and dr . Differentiating the equilibrium equations and re-arranging :

$$\frac{dr}{r} = \frac{(1 - \alpha)e_K}{(1 - \alpha)e_K + \sigma} \cdot \frac{d\tau_K}{1 - \tau_K}$$

$$\frac{dk}{k} = -e_K \cdot \frac{\sigma}{(1 - \alpha)e_K + \sigma} \cdot \frac{d\tau_K}{1 - \tau_K}$$

$$dw = -kdr$$

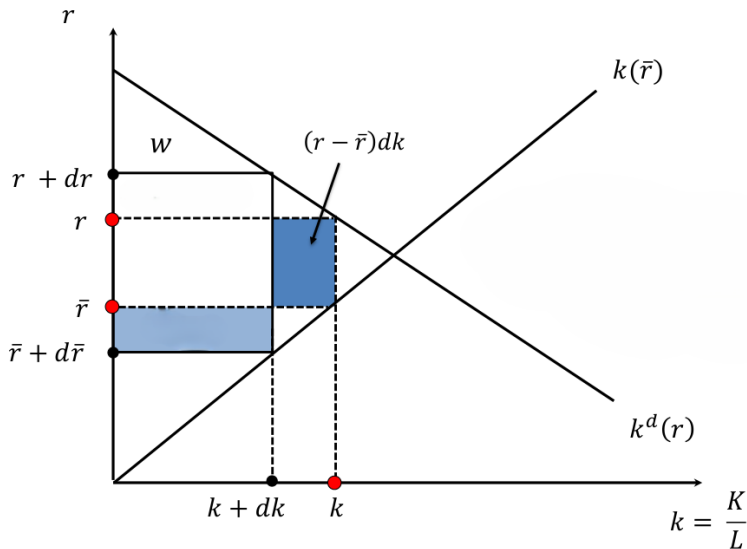


Figure: Capital tax reform

Optimal tax analysis

Suppose marginal welfare weight on capitalists is 0 :

- Government sets τ_K to maximise $w + (r - \bar{r})k$
- Maximising over τ_K yields optimal tax rate $\tau_K^* = 1/(1 + e_K)$
- Optimal rate only depends on supply elasticity e_K !

→ Effect of capital tax increase on wages = irrelevant to assess whether this reform is desirable

Model in Practice

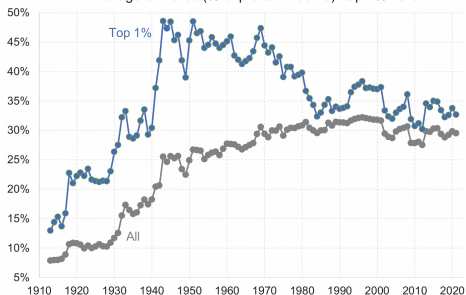
US Tax History

- How does the current level of tax progressivity compare historically?
- Have we ever seen high effective tax rates on the rich imposed in the US? If so, which were more important?
- Apply distributional analysis: goal is to **compute evolution of effective tax rates by income groups**

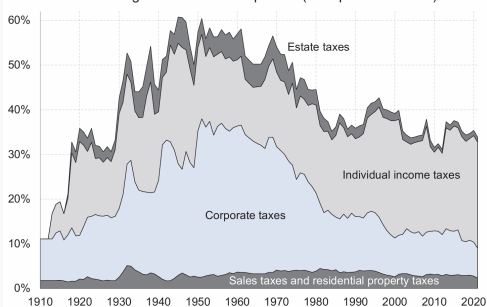
US Tax Progressivity

- using: PSZ 2018 US distributional accounts (*controversies regarding this dataset outside the scope of the presentation*)
- looking at: **effective tax rate** (= total taxes paid divided by pre-tax income)
- goal: constructing a **homogeneous** series of said taxes paid by top income groups

Average tax rates (% of pre-tax income): top 1% vs. all



Average tax rate of the top 0.1% (% of pre-tax income)



Importance of **Corporate Tax**

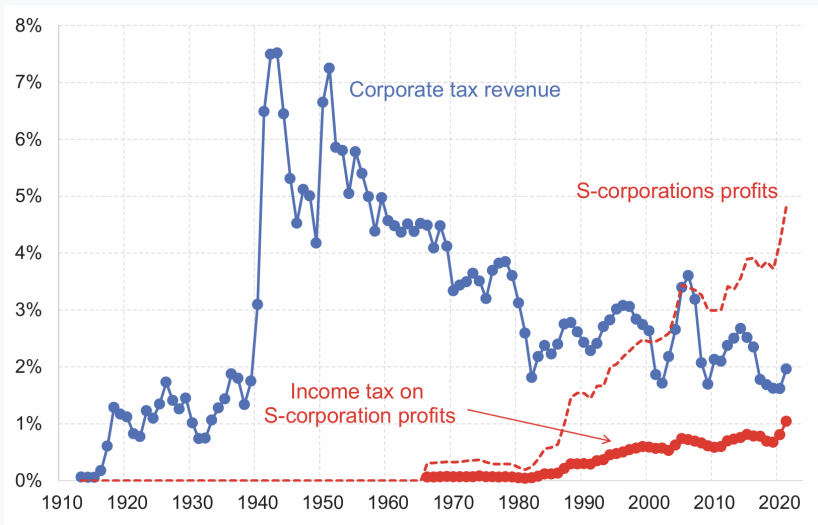
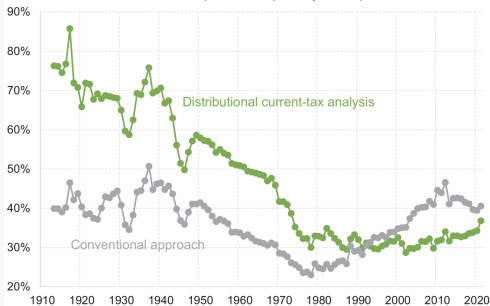


Figure: Corporate Tax Revenue and National Income

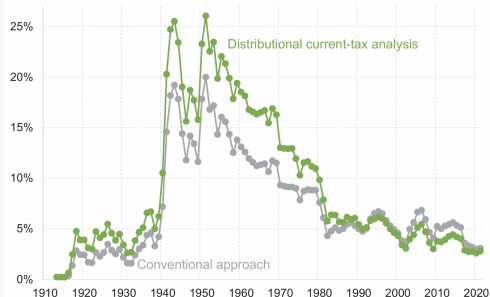
**Does it matter how corporate tax is
allocated?**

- **Important:** in the conventional framework, C-corporation taxes are only attributed to **owners** at **75%**, as corporate tax. Labour takes the other 25% (because of assumed behavioural effects)
 - S-corp taxes attributed 100% to owners, through **individual** income tax
- one way to understand this: a tax cut in corporate income would also be thought to benefit workers

Fraction of corporate tax paid by the top 1%



Corporate tax paid by the top 1% (% of pre-tax income)



- sharp contrast between methodologies in pre-50s period
- importance of pension funds post-50s
- CBO does not account for non-taxable income (pension funds...)
- progressivity bias introduced by S-corps
- **CBO underestimates decline in the top effective tax rate**

Tax Reforms

In practice:

- estimate how pre-tax income, post-tax income, taxes paid and income-equivalent welfare would change after a tax reform

Sufficient statistics to evaluate the reform:

- mechanical change in tax liability by income groups (ass. no behavioural response and no price effects!)
- aggregate revenue effect due to supply side responses (ignoring price effects!)
- social marginal welfare weights

A. Reform of the US federal corporate income tax

Income groups	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%			
	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	

Note: Desirable for elasticity up to 3, raises net revenue for elasticity up to 4.

B. Reform of the US federal individual income tax

Income groups	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			
	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) = -(5) 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	

Note: Desirable for top income elasticities up to 1.75. Estimated for elasticity of 0.25.

Incorporating non-standard incidence

Incorporating Non-Standard Behavioural Effects

- Recent literature identified evidence of non-standard behavioural responses to taxation
- These effects do not appear, and cannot be allowed for, in neo-classical models

Tax	Who bears the burden of a tax change	Notes and key references	Nature of main behavioural responses
Individual income Tax	Individuals 100%	Consistent with conventional incidence	Avoidance/evasion Real responses
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
Consumption taxes			
Value-added-tax or excise tax increase	Consumers 100%	Benzarti et al. (2020) on VAT in Europe	Evasion
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
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
Payroll taxes			
Employee side payroll tax	Workers 100%	Consistent with conventional incidence	Labor supply response
Employer side payroll tax	Corresponding workers 0% Workers collectively $2/3^*$ Profits $1/3^*$	Saez et al. (2012) for Greece, Bozio et al. (2022) for France, Saez et al. (2019) for Sweden Saez et al. (2019) for Sweden, Benzarti and Harju (2021) for Finland. Likely depends on bargaining power	Employer labor demand responses

Table: Modern Literature on Non-Standard Tax Incidence

Replacing health insurance premiums by a payroll tax

- In the US : health insurance (partly) provided by the employer
- Equivalent to a particular payroll tax on employers : Similar to a head tax per worker
- Look at a reform : replacing the head tax by a flat payroll tax

Income groups	Current system		
	Average pre-tax income	Current head tax (\$ per adult)	Current head tax (% pre-tax income)
	(1)	(2)	(3)
P0-50	\$20,889	\$1,440	6.9%
P50-90	\$80,618	\$6,505	8.1%
P90-99	\$243,587	\$7,826	3.2%
P99-99.9	\$1,085,455	\$6,212	0.6%
top 0.1%	\$10,288,542	\$5,841	0.1%
All	\$84,672	\$4,259	5.0%

Figure: Current system distributional analysis

Income groups	Conventional incidence and directed incidence			Employee payroll tax with rigid wages			Employer payroll tax with rigid wages		
	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)
P0-50	4.5%	0.0%	2.4%	4.5%	-3.3%	-0.9%	4.5%	-2.4%	0.0%
P50-90	7.0%	0.0%	1.1%	7.0%	-2.1%	-1.0%	7.0%	-1.1%	0.0%
P90-99	3.2%	0.0%	-1.9%	5.2%	2.1%	0.2%	5.2%	1.9%	0.0%
P99-99.9	0.6%	0.0%	-2.1%	2.7%	3.5%	1.4%	2.7%	2.1%	0.0%
Top 0.1%	0.1%	0.0%	-1.3%	1.3%	3.8%	2.5%	1.3%	1.3%	0.0%
All	5.0%	0.0%	0.0%	5.0%	0.0%	0.0%	5.0%	0.0%	0.0%

Table: Reform effect, for three different scenarios

Discussion

- relies on the theoretical possibility of tax readjustment – not very clear nor convincing response in case it is not possible
 - crucial if we want to assume no pre-tax price effects!
- reliance on legislation
 - very country specific implementation– is it even possible in most situations?
 - more importantly, switches focus from finding optimal tax strategy to other practical considerations
 - would need to implement multiple other practical reforms
 - call for more research on various other topics

Thank you for listening!

The End

Illustration: Two-sector capital and labor model

Production :

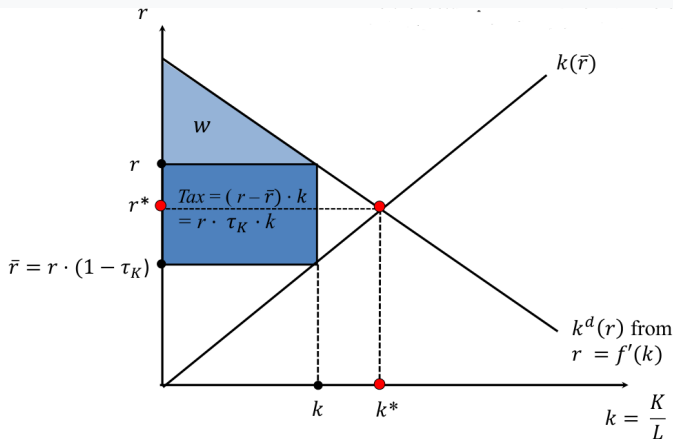
- Aggregate production function $Y = F(K, L)$
- Perfect competition
- w = economy-wide pre-tax wage rate, r = pre-tax rate of return on capital
- Profits maximization $\rightarrow w = F_L$ and $r = F_K$
- Assume CRS : no pure profits $\rightarrow F(K, L) = rK + wL$
- Denote by σ the elasticity of substitution between K and L and by $\alpha = rK/Y$ the share of capital income in the economy

Supply side :

- Assume labor is fixed, labor income taxed at rate τ_L
- Capital depends on the net-of-tax return $\bar{r} = r \cdot (1 - \tau_K)$ where τ_K is tax rate on capital income
- We can express everything in terms of capital per unit of labor $k = K/L$. As L is fixed, the supply of capital $k = k(\bar{r})$ depends solely on $\bar{r}$.
- Define $f(k) = F(1, K/L) = F(K, L)/L$ as output per unit of labor $\rightarrow F_K = f'(k)$ and $F_L = f(k) - kf'(k)$

Equilibrium :

$$r = f'(k), w = f(k) - kf'(k) = \int_0^k f'(k) dk - rk, k = k(r \cdot (1 - \tau_K))$$



Tax-reform analysis

Now we consider small tax change, i.e small increase in τ_K , study its effects dk , dw and dr . Differentiating the equilibrium equations and re-arranging :

$$\frac{dr}{r} = \frac{(1 - \alpha)e_K}{(1 - \alpha)e_K + \sigma} \cdot \frac{d\tau_K}{1 - \tau_K}$$

$$\frac{dk}{k} = -e_K \cdot \frac{\sigma}{(1 - \alpha)e_K + \sigma} \cdot \frac{d\tau_K}{1 - \tau_K}$$

$$dw = -kdr$$

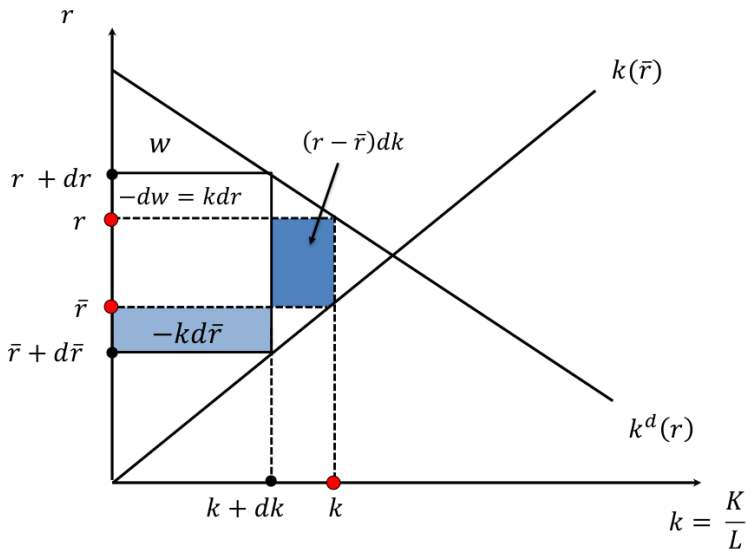


Figure: Capital tax reform

Optimal tax analysis

Suppose marginal welfare weight on capitalists is 0 :

- Government sets τ_K to maximise $w + (r - \bar{r})k (= f(k(\bar{r})) - \bar{r}k(\bar{r}))$
- Maximising over τ_K yields optimal tax rate $\tau_K^* = 1/(1 + e_K)$
- Optimal rate only depends on supply elasticity e_K !

→ Effect of capital tax increase on wages = irrelevant to assess whether this reform is desirable

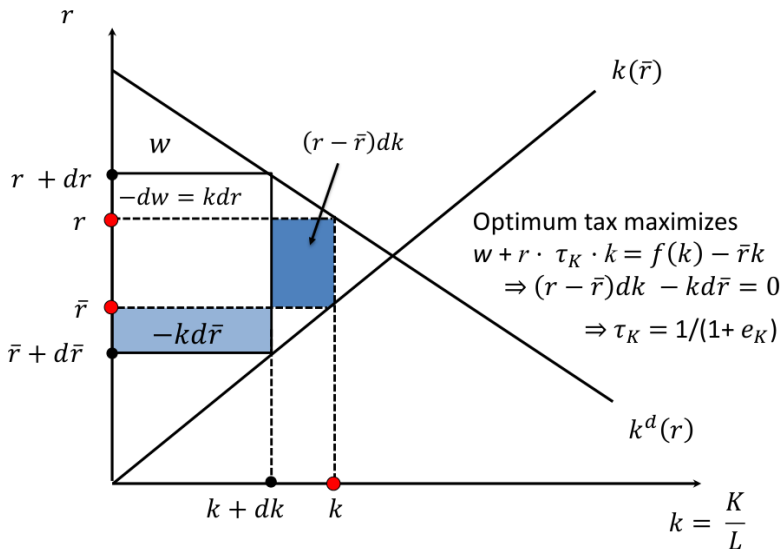


Figure: Capital Tax reform and Optimum