

Capital Taxation

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MOTIVATION

1) Capital income is about 25% of national income (labor income is 75%) but distribution of capital income is much more unequal than labor income

Capital income inequality is due to differences in savings behavior but also inheritances received

⇒ Equity suggests it should be taxed more than labor

2) Capital Accumulation correlated strongly with growth [although causality link is not obvious] and capital accumulation might be sensitive to the net-of-tax return.

⇒ Efficiency cost of capital taxation might be high.

MOTIVATION

3) Capital more mobile internationally than labor

Key distinction is **residence** vs. **source** base capital taxation:

Residence: Capital income tax based on residence of owner of capital.

Most individual income tax systems are residence based (with credits for taxes paid abroad)

Incidence falls on owner \Rightarrow can only escape tax through evasion (tax heavens) or changing residence (mobility of persons)

Tax evasion of capital income through tax heavens is a very serious concern (Zucman QJE'13, '15)

Source: Capital income tax based on location of capital (most corporate income tax systems are source based)

Incidence is then partly shifted to labor if capital is mobile.

Example: Open economy with fully mobile capital and source taxation:
Local GDP: $wL + rK = F(K, L) = L \cdot F(K/L, 1) = L \cdot f(k)$ where $k = K/L$ is capital stock per worker

Net-of-tax rate of return is fixed by the international rate of return r^* so that $(1 - \tau_c)F_K(K, L) = (1 - \tau_c)f'(k) = r^*$ where $k = K/L$ is capital stock per worker and τ_c corp tax rate

As $wL + r^*K = F(K, L)$, wage $w = F_L(K, L) = f(k) - r^* \cdot k$ falls with τ_c

4) Capital taxation is extremely complex and provides many tax avoidance opportunities

SAVING FLOWS

Saving is a flow and wealth or net worth is a stock

Three saving flows:

- 1) **Personal saving:** individual income less individual consumption [fell dramatically in the US since 1980s, recent \uparrow since 2008]
- 2) **Corporate Saving:** retained earnings = after tax profits - distributions to shareholders
- 3) **Government Saving:** Taxes - Expenditures [federal, state and local]

Taxes on savings might affect different savings flows differently: savings subsidy through a tax credit can \uparrow individual savings but \downarrow govt saving [if govt spending stays constant]

Piketty (2014) book: Capital in the 21st Century

Analyzes income, wealth, inheritance data over the long-run:

1) Growth rate $n + g$ = population growth + growth per capita. Population growth will converge to zero, growth per capita for frontier economies is modest (1%) \Rightarrow long-run $g \simeq 1\%$, $n \simeq 0\%$

2) Long-run steady-state Wealth to income ratio (β) = savings rate (s) / annual growth ($n + g$): $\beta = s / (n + g)$

Low growth \Rightarrow high wealth-to-income ratio.

Proof: $K_{t+1} = (1 + n + g) \cdot K_t = K_t + s \cdot Y_t \Rightarrow K_t / Y_t = s / (n + g)$

With $s = 8\%$ and $n + g = 2\%$, $\beta = 400\%$ but with $s = 8\%$ and $n + g = 1\%$, $\beta = 800\% \Rightarrow$ Wealth will become important

Piketty (2014) book: Capital in the 21st Century

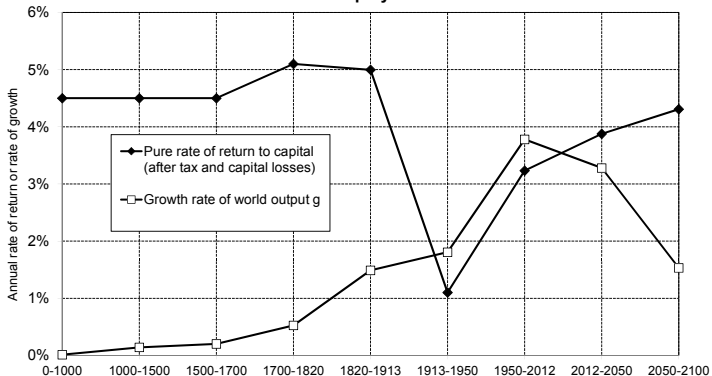
3) After-tax rate of return on wealth $\bar{r} = r(1 - \tau_K) = 4 - 5\%$ significantly larger than $n + g$ [except exceptional period of 1930–1970]

With $\bar{r} > n + g$, role of inheritance in wealth and wealth concentration become large [past swallows the future]

Explanation: Rentier who saves all his return on wealth accumulates wealth at rate \bar{r} bigger than $n + g$ and hence his wealth grows relative to the size of the economy. The bigger $\bar{r} - (n + g)$, the easier it is for wealth to “snowball”

⇒ Capital taxation reduces r to $\bar{r} = r \cdot (1 - \tau_K)$ ⇒ This can reduce wealth concentration

Figure 10.10. After tax rate of return vs. growth rate at the world level, from Antiquity until 2100



The rate of return to capital (after tax and capital losses) fell below the growth rate during the 20th century, and may again surpass it in the 21st century. Sources and series : see piketty.pse.ens.fr/capital21c

WEALTH AND CAPITAL INCOME IN AGGREGATE

Definition: Capital Income = Returns from Wealth Holdings

Aggregate US **Personal** Wealth $\simeq 4 * \text{GDP} \simeq \60 Tr

Tangible assets: residential real estate (land+buildings) [income = rents]
and unincorporated business + farm assets [income = profits]

Financial assets: corporate stock [income = dividends + retained earnings], fixed claim assets (corporate and govt bonds, bank accounts) [income = interest]

Liabilities: Mortgage debt, Student loans, Consumer credit debt

Substantial amount of financial wealth is held indirectly through: pension funds [DB+DC], mutual funds, insurance reserves

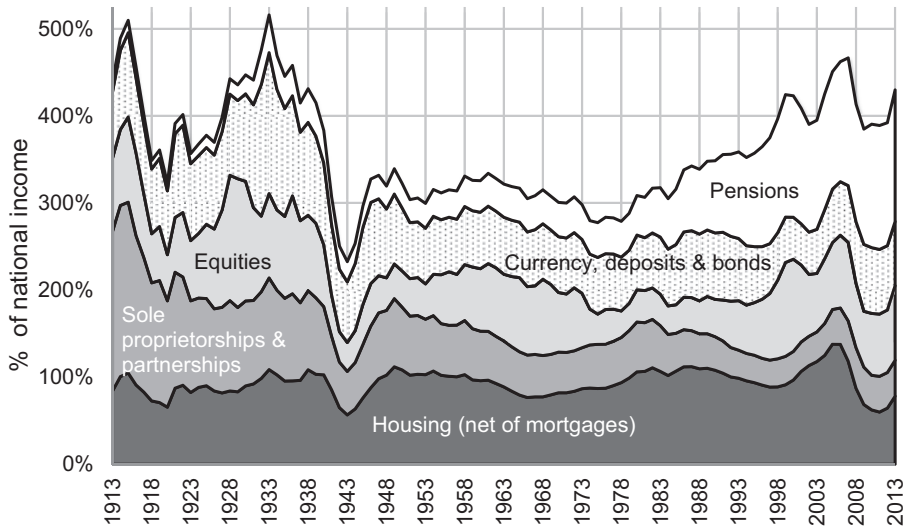
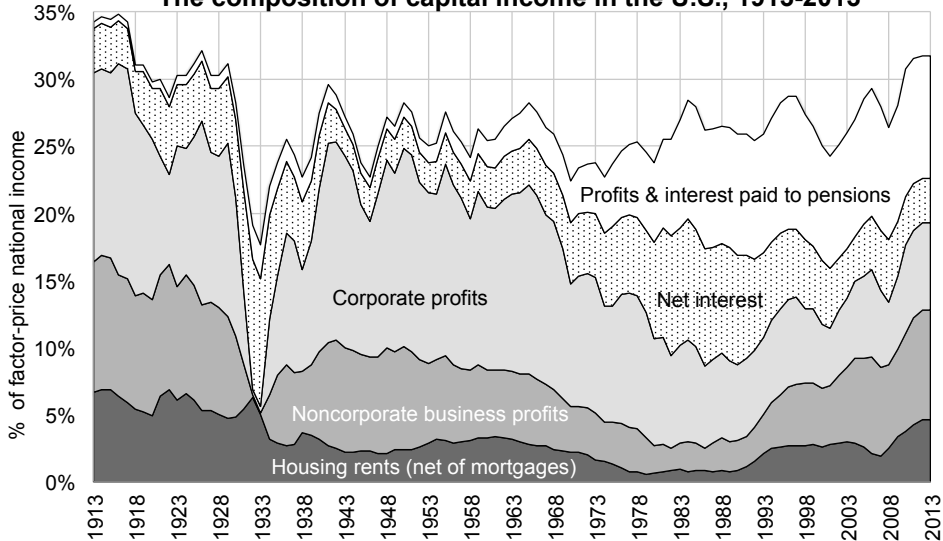


FIGURE II

Aggregate US Household Wealth, 1913–2013

Source: Saez and Zucman (2014)

The composition of capital income in the U.S., 1913-2013



INDIVIDUAL WEALTH AND CAPITAL INCOME

Differences in Wealth and Capital income due to:

- 1) Age
- 2) past earnings, and past saving behavior $E_t - C_t$ [life cycle wealth]
- 3) Net Inheritances received I_t [transfer wealth]
- 4) Rates of return r_t

[details in Davies-Shorrocks '00, Handbook chapter]

WEALTH DISTRIBUTION

Wealth inequality is very large (much larger than labor income)

US Household Wealth is divided 1/3,1/3,1/3 for the top 1%, the next 9%, and the bottom 90% [bottom 1/2 households hold almost no wealth]

Financial wealth is more unequally distributed than (net) real estate wealth

Share of real estate wealth falls at the top of the wealth distribution

Growth of private pensions [such as 401(k) plans] has “democratized” stock ownership in the US

WEALTH MEASUREMENT

In the US, wealth distribution much less well measured than income distribution because no systematic administrative source (no wealth tax). 3 methods to estimate wealth distribution:

1) Surveys: US Survey of Consumer Finances (SCF)

Top 10% wealth share has grown from 67% in 1989 to 75% in 2010

Top 1% wealth share has grown “only” from 30% in 1989 to 35% in 2010
[Kennickell '09, '12]

Problems: small sample size, measurement error, only every 3 years, starts in 1989

2) **Estate multiplier method:** use annual estate tax statistics and re-weights individual estates by inverse of death probability [based on age \times gender \times social class]

Kopczuk-Saez NTJ'04 create series 1916-2000 and find fairly small increases in wealth concentration in recent decades

Problems: social class effect on mortality not well known, significant estate tax avoidance, noisy measure of "young wealth", estates cover only the super rich (top .1% in recent years)

3) **Capitalization method:** use capital income from individuals tax statistics and estimates rates of returns by asset class to infer wealth: shows big increase in wealth concentration [Saez-Zucman '16]

CAPITAL TAXATION IN THE US

Good US references: Gravelle '94 book, Slemrod-Bakija '04 book

1) **Corporate Income Tax** (fed+state): 21% Federal tax rate on profits of corporations [complex rules with many industry specific provisions]: effective tax rate much lower and incidence depends on mobility of capital

2) **Individual Income Tax** (fed+state): taxes many forms of capital income

Realized capital gains and dividends (dividends since '03 only) receive preferential treatment

Imputed rent of home owners, returns on pension funds, state+local government bonds interest are exempt

FACTS OF US CAPITAL INCOME TAXATION

3) **Estate and gift taxes:**

Fed taxes estates above \$11.2M exemption for singles and \$22.4M for married, tax rate is 40% above exemption.

Charitable and spousal giving is exempt

Substantial tax avoidance activity through tax accountants

Step-up of realized capital gains at death (lock-in effect)

4) **Property taxes** (local) on real estate (old tax):

Tax varies across jurisdictions. About 0.5% of market value on average, like a 10% tax on imputed rent if return is 5%

Lock-in effect in states that use purchase price base such as California

Life-Cycle model: Atkinson-Stiglitz JpubE '76

Heterogeneous individuals and government uses nonlinear tax on earnings.
Should the govt also use tax on savings?

$$V^h = \max U^h(v(c_1, c_2), l) \text{ st } c_1 + c_2 / (1 + r(1 - \tau_K)) = wl - T_L(wl)$$

If utility is weakly separable and $v(c_1, c_2)$ is the same for all individuals, then the government should use only labor income tax and should not use tax on savings

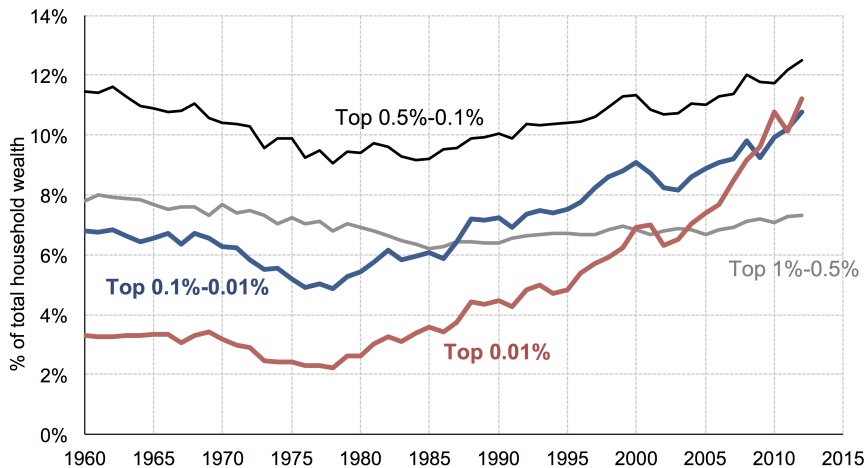
$$\text{E.g.: } v(c_1, c_2) = u(c_1) + \frac{u(c_2)}{1+\delta}$$

Tax on savings justified within Saez (2002) framework if:

- (1) High skill people have higher taste for saving (e.g, high skill people have lower discount rate, better education)
- (2) c_2 is complementary with leisure.
- (3) Inheritances (won't have same consumption patterns conditional on earned income).

A Simpler Theory of Optimal Capital Taxation

Emmanuel Saez and Stefanie Stantcheva



A Simpler Model of Capital Taxation

For exposition: Exogenous and uniform labor income z

Heterogeneous discount rate δ_i (assume $\delta_i > r$)

Exogenous and uniform rate of return r on wealth k , income: rk

Time invariant tax $T_K(rk)$

Initial wealth k_i^{init} , exogenous.

Individual i has instantaneous utility $u_i(c, k) = c + a_i(k)$

linear in consumption c and increasing and concave in wealth k .

Maximizes:

$$U_i = \delta_i \cdot \int_{t=0}^{\infty} [c_i(t) + a_i(k_i(t))] e^{-\delta_i t}$$

$$\text{s.t. } \frac{dk_i(t)}{dt} = rk_i(t) - T_K(rk_i(t)) + z_i(t) - c_i(t)$$

Solving the Individual's Maximization Problem

$$U_i = \delta_i \cdot \int_{t=0}^{\infty} [c_i(t) + a_i(k_i(t))] e^{-\delta_i t}$$

$$\text{s.t. } \frac{dk_i(t)}{dt} = rk_i(t) - T_K(rk_i(t)) + z_i(t) - c_i(t)$$

$$\text{Hamiltonian: } c_i(t) + a_i(k_i(t)) + \lambda_i(t) \cdot [rk_i(t) - T_K(rk_i(t)) + z_i(t) - c_i(t)]$$

$$\text{FOC in } c_i(t) : \quad \lambda_i(t) = 1 \Rightarrow \text{constant multiplier}$$

$$\text{FOC in } k_i(t) : \quad a'_i(k_i(t)) + \lambda_i(t) \cdot r \cdot (1 - T'_K) = -\frac{d\lambda_i(t)}{dt} + \delta_i \cdot \lambda_i(t)$$

$$\Rightarrow a'_i(k_i(t)) = \delta_i - \bar{r} \quad \text{where} \quad \bar{r} = r \cdot (1 - T'_K)$$

Steady State

Utility for wealth puts limit on impatience to consume ($\delta_i > \bar{r}$)

MU for wealth $a'_i(k) = \delta_i - \bar{r} =$ value lost in delaying consumption

Wealth accumulation depends on heterogeneous preferences $a_i(\cdot)$, δ_i , and net-of-tax return \bar{r} (substitution effects, no income effects)

\Rightarrow Heterogeneity in (non-degenerate) steady-state wealth.

At time 0: jump from k_i^{init} to $k_i(t)$ (consumption quantum Dirac jump):

$$U_i = \underbrace{rk_i(t) - T_K(rk_i(t)) + z_i(t)}_{c_i(t)} + a_i(k_i(t)) + \delta_i \cdot (k_i^{init} - k_i(t))$$

Dynamic model equivalent to a static model:

$$U_i = c_i + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) \quad \text{with} \quad c_i = rk_i - T_K(rk_i) + z_i$$

Announced vs. unannounced tax reforms have same effect.

Wealth in the Utility

Technical reason: to smooth otherwise degenerate steady state ($\delta_i = \delta = \bar{r}$)

Possible, but more complicated is uncertainty (in paper).

Entrepreneurship: “cost” of managing wealth, $-h_i(k)$ (return $r_i > \delta_i$).

Wealth brings non-consumption utility flows: Weber’s “*spirit of capitalism*.”

Keynes (1919, 1931) “*love of money as a possession*”, “*the virtue of the cake [savings] was that it was never to be consumed.*”

Social status (measure of ability, performance, success)

Power and political influence.

Philanthropy and moral recognition, warm glow bequests.

Empirical evidence in favor of wealth in the utility:

Carroll (2000): helps explain top wealth holdings.

Isomorphism with Static Labor Taxation Model

$$U_i = c_i + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) \quad \text{with} \quad c_i = rk_i - T_K(rk_i) + z_i$$

is mathematically isomorphic to static labor income model:

$$U_i = c_i - h_i(z_i) \quad \text{with} \quad c_i = z_i - T_L(z_i)$$

Optimal K tax analysis isomorphic to optimal L income tax theory.

Differences of degree rather than of kind, quantitative differences.

Key differences (e.g.: uncertainty, shocks to productivity vs. taste) reflected in estimable elasticities.

In general model, slow adjustment will be reflected in lower elasticity.

Bypasses transitional dynamics, greatly simplifies K tax analysis

Like labor supply decisions (not instantaneous, e.g. human capital investment).

Government Optimization

Government sets a time invariant budget balanced $T_K(\cdot)$ to maximize its social objective

$$\int_i g_i \cdot U_i(c_i, k_i) di \quad \text{with } g_i \geq 0 \quad \text{social marginal welfare weight}$$

Optimal $T_K(\cdot)$ depends on three key ingredients:

- (1) **Social preferences:** g_i = value of \$1 extra given to i ($\int_i g_i = 1$).
- (2) **Efficiency costs:** Elasticity $e_K = (\bar{r}/k) \cdot (dk/d\bar{r})$ measures how wealth k responds to $\bar{r} = r \cdot (1 - T'_K)$
- (3) **Distribution of capital income:** $H_K(rk)$ (for nonlinear tax).

Optimal Linear Capital Taxation at rate τ_K

$k^m(\bar{r}) \equiv \int_i k_i di$ average wealth (depends on \bar{r} with elasticity e_K).

Revenues $\tau_K k^m(\bar{r})$ rebated lump-sum.

τ_K maximizes $SWF = \int_i g_i \cdot U_i(c_i, k_i) di$ with

$$U_i = \underbrace{rk_i \cdot (1 - \tau_K) + \tau_K \cdot rk^m(\bar{r})}_{c_i} + z_i + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i)$$

Standard optimal tax derivation (using envelope thm for k_i):

$$\frac{dSWF}{d\tau_K} = rk^m \cdot \underbrace{\int_i g_i \cdot \left(1 - \frac{k_i}{k^m}\right)}_{\text{Mechanical Revenue net of Welfare Effect}} - rk^m \cdot \underbrace{\frac{\tau_K}{1 - \tau_K} \cdot e_K}_{\text{Behavioral Effect}}$$

Optimal τ_K such that $dSWF / d\tau_K = 0$.

Optimal Linear Capital Tax τ_K

$$\tau_K = \frac{1 - \bar{g}_K}{1 - \bar{g}_K + e_K} \quad \text{with} \quad \bar{g}_K = \frac{\int_i g_i \cdot k_i}{\int_i k_i} \quad \text{and} \quad e_K = \frac{\bar{r}}{k^m} \cdot \frac{dk^m}{d\bar{r}} > 0$$

Zero capital tax result: $\tau_K = 0$ only if:

$\bar{g}_K = 1$ (no inequality in rk , or no redistributive concerns $g_i \equiv 1$), or

$e_K = \infty$.

$\tau_K > 0$ as long as g_i decreasing in k_i , or wealth concentrated among low g_i agents.

$\tau_K = 1/(1 + e_K)$ is revenue-maximizing in Rawlsian case: $g_i = 0$ if $k_i > 0$.

Top revenue maximizing rate: $\tau_K = 1/(1 + a_K^{top} \cdot e_K^{top})$ with a_K^{top} the Pareto tail parameter for top bracket.

Optimal Nonlinear Capital Tax

$$T'_K(rk) = \frac{1 - \bar{G}_K(rk)}{1 - \bar{G}_K(rk) + \alpha_K(rk) \cdot e_K(rk)}$$

- 1) $\bar{G}_K(rk) \equiv \frac{\int_{\{i: rk_i \geq rk\}} g_i d_i}{P(rk_i \geq rk) \int_i g_i d_i}$ is the average g_i above capital income level rk
- 2) $\alpha_K(rk)$ the local Pareto parameter of capital income distribution
- 3) $e_K(rk)$ the local elasticity of k wrt to $1 - T'_K(rk)$ at income level rk

Capital income is very concentrated (top 1% capital income earners have 60%+ of total capital income)

⇒ Asymptotic formula:

$T'_K(\infty) = (1 - G_K(\infty)) / (1 - G_K(\infty) + \alpha_K(\infty) \cdot e_K(\infty))$ relevant for most of the tax base

Equity Considerations: The Ant and the Grasshopper



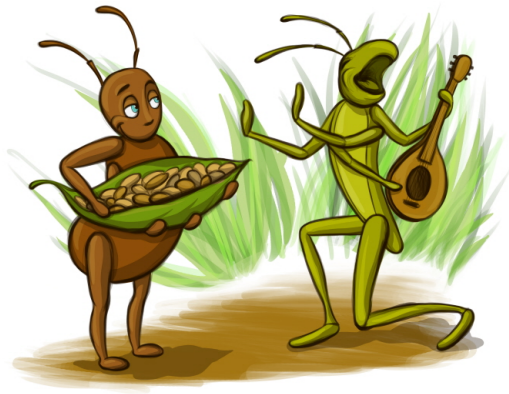
Credit: Adelya Tumasyeva

Equity Considerations: The Ant and the Grasshopper



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Equity Considerations for Capital Taxation: Generalized Welfare Weights

(1) Inequality in wealth deemed fair and wealth is not a tag

Equality of opportunity argument: grasshopper had same savings opportunities as ant, conditional on labor earnings.

Capital accumulated by sacrificing consumption, why punish saving behavior?

What if ant had higher work (grain harvesting) ability? → role for nonlinear labor income tax.

→ g_i independent of and uncorrelated with k_i → $\tau_K = 0$.

Equity Considerations for Capital Taxation: Generalized Welfare Weights

(2) Inequality in wealth viewed as unfair

Even conditional on labor earnings, high wealth comes from higher patience δ_i or higher valuation of wealth a_i – unfair heterogeneity, like earnings ability.

or parental wealth (k_i^{init}) – ant's parents left extra grain.

or higher returns r_i (luck) – ant speculated on grain-forward derivatives.

→ g_i decreasing in $k_i \rightarrow \tau_K > 0$.

Equity Considerations for Capital Taxation: Generalized Welfare Weights

(3) Wealth as a tag

May or may not care about k per se (g_i may not depend on k_i directly).

But wealth may be tag for aspects that enter g_i negatively: parental background (see Saez-Stantcheva), ability.

Having more grain means more likely to come from rich family.

$\bar{G}_K(rk)$ is representation index of agents from poor background at income rk .

$$\rightarrow \text{corr}(g_i, k_i) < 0 \rightarrow \tau_K > 0.$$

Adding in Labor Income Responses & Labor Taxation

Add in choice of labor income, with potentially arbitrary heterogeneity in disutility $h_i(z)$.

$$U_i = rk_i + z_i - T(rk_i + z_i) + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) - h_i(z_i)$$

$$T'_L(z) = \frac{1 - \bar{G}_L(z)}{1 - \bar{G}_L(z) + \alpha_L(z) \cdot e_L(z)}$$

- 1) $\bar{G}_L(z) \equiv \frac{\int_{\{i: z_i \geq z\}} g_i d_i}{P(z_i \geq z) \int_i g_i d_i}$ is the average g_i above labor income level z
- 2) $\alpha_L(z)$ the local Pareto parameter of capital income distribution
- 3) $e_L(z)$ the local elasticity of k wrt to \bar{r} at income level rk

Separable labor and capital taxes each set according to Mirrlees (1971) and Saez (2001) formulas.

Joint Preferences in Capital and Labor and Cross-Elasticities

Agent's dynamic problem is again equivalent to maximizing:

$$U_i = c_i + v_i(k_i, z_i) + \delta_i(k_i^{init} - k_i) \quad \text{with} \quad c_i = \bar{r}k_i + z_i - T_L(z_i)$$

Choice (c, k, z) is such that:

$$v_{iz}(k_i, z_i) = 1 - T_L'(z_i), \quad v_{ik}(k_i, z_i) = \delta_i - \bar{r}, \quad c_i = \bar{r}k_i + z_i - T_L(z_i)$$

Optimal capital tax (at any, possibly non-optimal τ_L):

$$\tau_K = \frac{1 - \bar{g}_K - \tau_L \frac{z^m}{k^m} e_{Z,(1-\tau_K)}}{1 - \bar{g}_K + e_K}$$

$$\text{with} \quad \bar{g}_K = \frac{\int_i k_i g_i}{k^m}, \quad e_{Z,(1-\tau_K)} = \frac{dz^m}{d(1-\tau_K)} \frac{(1-\tau_K)}{z^m}$$

Comprehensive nonlinear income taxation $T(rk + z)$

Govt uses solely comprehensive taxation $T(y)$ with $y_i \equiv rk_i + z_i$

$$U_i = rk_i + z_i - T(rk_i + z_i) + a_i(k_i) + \delta_i \cdot (k_i^{init} - k_i) - h_i(z_i)$$

Standard Mirrlees' formula applies to comprehensive income tax problem

$$T'(y) = \frac{1 - \bar{G}_Y(y)}{1 - \bar{G}_Y(y) + \alpha_Y(y) \cdot e_Y(y)}$$

with $\bar{G}_Y(y) \equiv \frac{\int_{\{i: y_i \geq y\}} g_i d_i}{P(y_i \geq y) \int_i g_i d_i}$

$\alpha_Y(y)$ local Pareto parameter for y distribution,

$e_Y(y)$ local elasticity of y with respect to $1 - T'$.

Tax shifting and Comprehensive Taxation

Suppose individual i can shift x dollars from labor income to capital income at utility cost $d_i(x)$

Reported labor income z_L and capital income z_K are elastic to tax differential $\tau_L - \tau_K$

If shifting elasticity is infinite, then $\tau_L = \tau_K$ is optimal

If shifting elasticity is finite, then optimal τ_L, τ_K closer than they would be absent any shifting

If shifting elasticity is large then e_K can appear large, but wrong to set τ_K at $1/(1 + e_K)$ in that case

Heterogeneous Returns

Heterogeneous returns r_i important in practice:

Same sufficient stats formula, but replace:

$$\bar{g} = \frac{\int_i g_i \cdot r_i k_i}{\int_i r_i k_i} \quad \text{and} \quad e_K = \frac{(1 - \tau_K)}{\int_i r_i k_i} \cdot \frac{d \int_i r_i k_i}{d(1 - \tau_K)}$$

Values of e_K (responsiveness of k to taxes) and \bar{g}_K (social judgement about capital income) could be affected.

Different Types of Capital Assets

Could have \neq elasticities (housing vs. financial assets)

Different social judgments or distributional characteristics \bar{g}_K^j .

Formulas hold asset by asset, determined by: \bar{g}_K^j , e_K^j , and cross-elasticities $e_{K^s, (1-\tau_K^j)}$.

$$\tau_K^j = \frac{1 - \bar{g}_K^j}{1 - \bar{g}_K^j + e_K^j}$$

$$\bar{g}_K^j = \frac{\int_i g_i \cdot k_i^j}{\int_i k_i^j}, \quad e_K^j = \frac{\bar{r}^j}{k^{m,j}} \cdot \frac{dk^{m,j}}{d\bar{r}^j} > 0, \quad e_{K^s, (1-\tau_K^j)} = \frac{\bar{r}^j}{k^{m,s}} \cdot \frac{dk^{m,s}}{d\bar{r}^j}$$

Different Types of Capital Assets

Could have \neq elasticities (housing vs. financial assets)

Different social judgments or distributional characteristics \bar{g}_K^j .

Formulas hold asset by asset, determined by: \bar{g}_K^j , e_K^j , and cross-elasticities $e_{K^s, (1-\tau_K^j)}$.

$$\tau_K^j = \frac{1 - \bar{g}_K^j - \sum_{s \neq j} \tau_K^s \frac{k^{m,s}}{k^{m,j}} e_{K^s, (1-\tau_K^j)}}{1 - \bar{g}_K^j + e_K^j}$$

$$\bar{g}_K^j = \frac{\int_i g_i \cdot k_i^j}{\int_i k_i^j}, \quad e_K^j = \frac{\bar{r}^j}{k^{m,j}} \cdot \frac{dk^{m,j}}{d\bar{r}^j} > 0, \quad e_{K^s, (1-\tau_K^j)} = \frac{\bar{r}^j}{k^{m,s}} \cdot \frac{dk^{m,s}}{d\bar{r}^j}$$

Consumption taxation: The Policy Debate

Can a consumption tax be better than a wealth tax and more progressive than a tax on labor income?

Bill Gates: *“Imagine three types of wealthy people. One guy is putting his capital into building his business. Then there’s a woman who’s giving most of her wealth to charity. A third person is mostly consuming, spending a lot of money on things like a yacht and plane. While it’s true that the wealth of all three people is contributing to inequality, I would argue that the first two are delivering more value to society than the third. I wish Piketty had made this distinction, because it has important policy implications.”*

Consumption Taxation in our Model

Consider linear consumption tax at (inclusive) tax rate τ_C so that:

$$\frac{dk_i(t)}{dt} = r(1 - \tau_K)k_i(t) + z_i(t) - T_L(z_i(t)) - c_i(t)/(1 - \tau_C)$$

Agents care about real wealth $k^r = k \cdot (1 - \tau_C)$.

Even with wealth-in-utility, τ_C equivalent labor tax + tax on initial wealth (Kaplow, 1994, Auerbach, 2009).

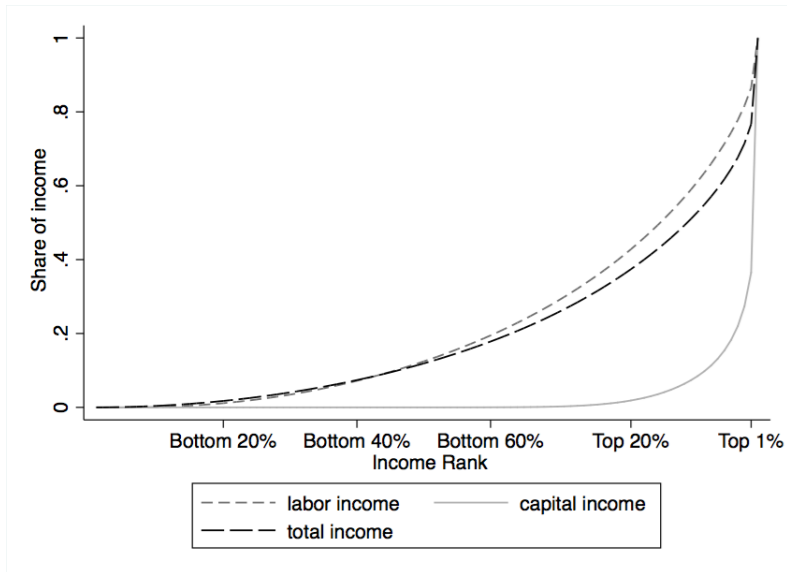
Thought experiment: equal labor income.

With τ_C , wealthy look like pay more taxes, but paid less when accumulated more nominal wealth. Real wealth inequality unaffected.

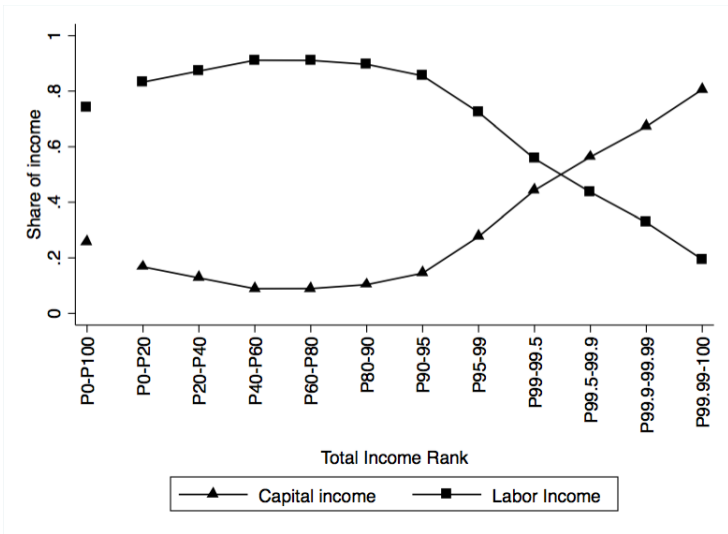
With 2-dim heterogeneity: labor tax not sufficient (Atkinson-Stiglitz).

$\Rightarrow \tau_C$ cannot address steady-state capital income inequality

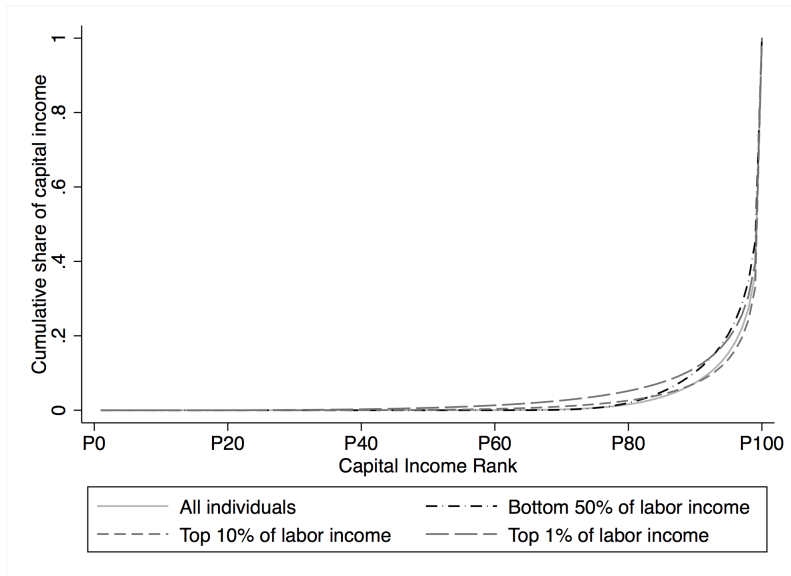
Fact 1: K income more unequally distributed than L income



Fact 2: At the top, total income is mostly capital income



Fact 3: Two-dimensional heterogeneity, inequality in K income even conditional on L income



Methodology for Computing Optimal Tax Rates

Suppose constant elasticity of labor, capital, and total income (e_L, e_K, e_Y) and that choice at zero tax represents preference type: (θ_i, η_i) .

Based on the IRS micro data, use pairs (z_i, rk_i) to invert individual choices to obtain (θ_i, η_i) .

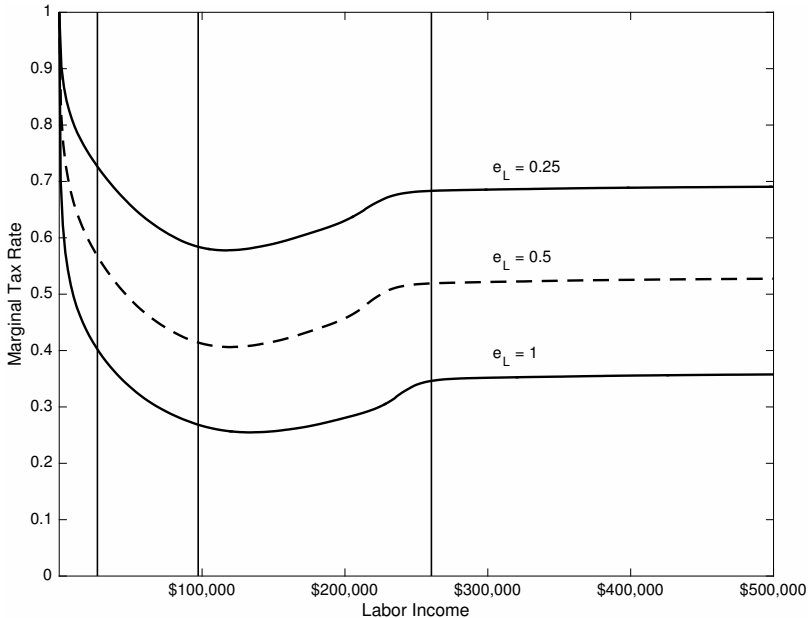
Non-parametrically fit type distributions and empirical Pareto parameters.

Solve for optimal T'_K, T'_L , and T'_Y using sufficient stats formulas.

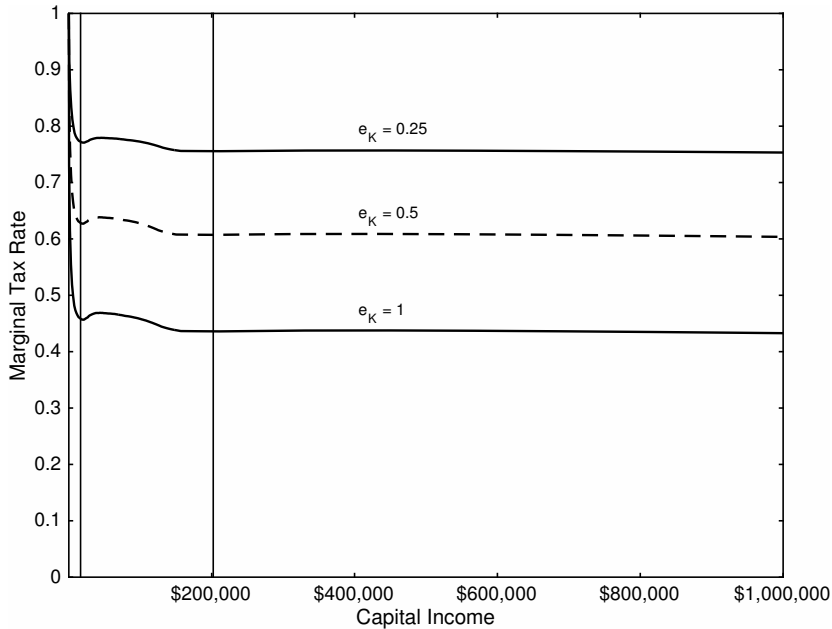
For capital – our simpler theory provides a much easier way to compute optimal tax rates based on the data.

Simulations set $g_i = \frac{1}{\text{disposable income}_i}$ and use several values for elasticities.

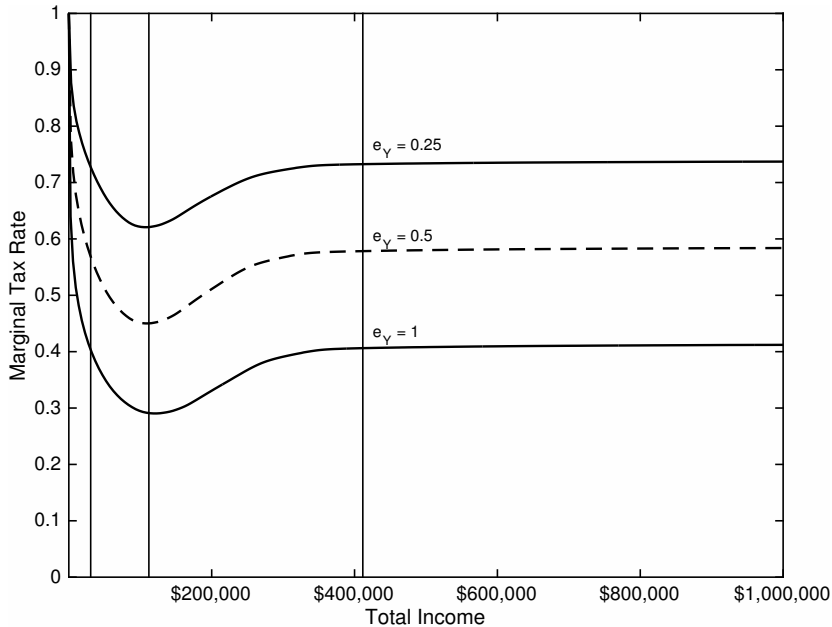
Optimal Labor Income Tax Rate $T'_L(z)$



Optimal Capital Income Tax Rate $T'_K(rk)$



Optimal Tax Rate on Comprehensive Income $T'_Y(y)$



The generalized model

Utility is

$$V_i(\{c_i(t), k_i(t), z_i(t)\}_{t \geq 0}) = \delta_i \cdot \int_{t=0}^{\infty} u_i(c_i(t), k_i(t), z_i(t)) e^{-\delta_i t} dt$$

with $u_i(\underset{+}{c}, \underset{+}{k}, \underset{-}{z})$ **concave in c** , concave in k , concave in z

\Rightarrow consumption smoothing \Rightarrow sluggish transitional dynamics (a sum of anticipatory and build-up effects).

Convergence to steady state no longer instantaneous:

$$u_{ik} / u_{ic} = \delta_i - \bar{r}, u_{ic} \cdot (1 - T'_L) = -u_{iz} \text{ and } c = rk + z - T(rk, z).$$

Social welfare:

$$SWF = \int_i \omega_i V_i(\{c_i(t), k_i(t), z_i(t)\}_{t \geq 0})$$

Optimal Linear Capital Tax in the Steady State

Given τ_K and τ_L , rebated lump-sum \rightarrow convergence to steady state.

At time 0, start from steady state, consider unanticipated small reform $d\tau_K$, with elasticities:

$$e_K(t) = dk^m(t) / d\bar{r}(\bar{r}/k^m(t)) \rightarrow e_K.$$

$$e_{L,(1-\tau_K)} = dz^m / d\bar{r}(\bar{r}/z^m).$$

Optimal linear capital income tax in steady state:

$$\tau_K = \frac{1 - \bar{g}_K - \tau_L \frac{z^m}{k^m} e_{L,1-\tau_K}}{1 - \bar{g}_K + \bar{e}_K}$$

If fast responses $\bar{e}_K \approx e_K$, quantitative results of simpler model hold.

Slow adjustment: $\bar{e}_K < e_K$.

But is it reasonable to exploit short-run sluggishness?

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If fast responses $\bar{e}_K \approx e_K$, quantitative results of simpler model hold.

Slow adjustment: $\bar{e}_K < e_K$.

But is it reasonable to exploit short-run sluggishness?

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