Public Economics 230A
Lecture 1: Optimal Capital Taxation

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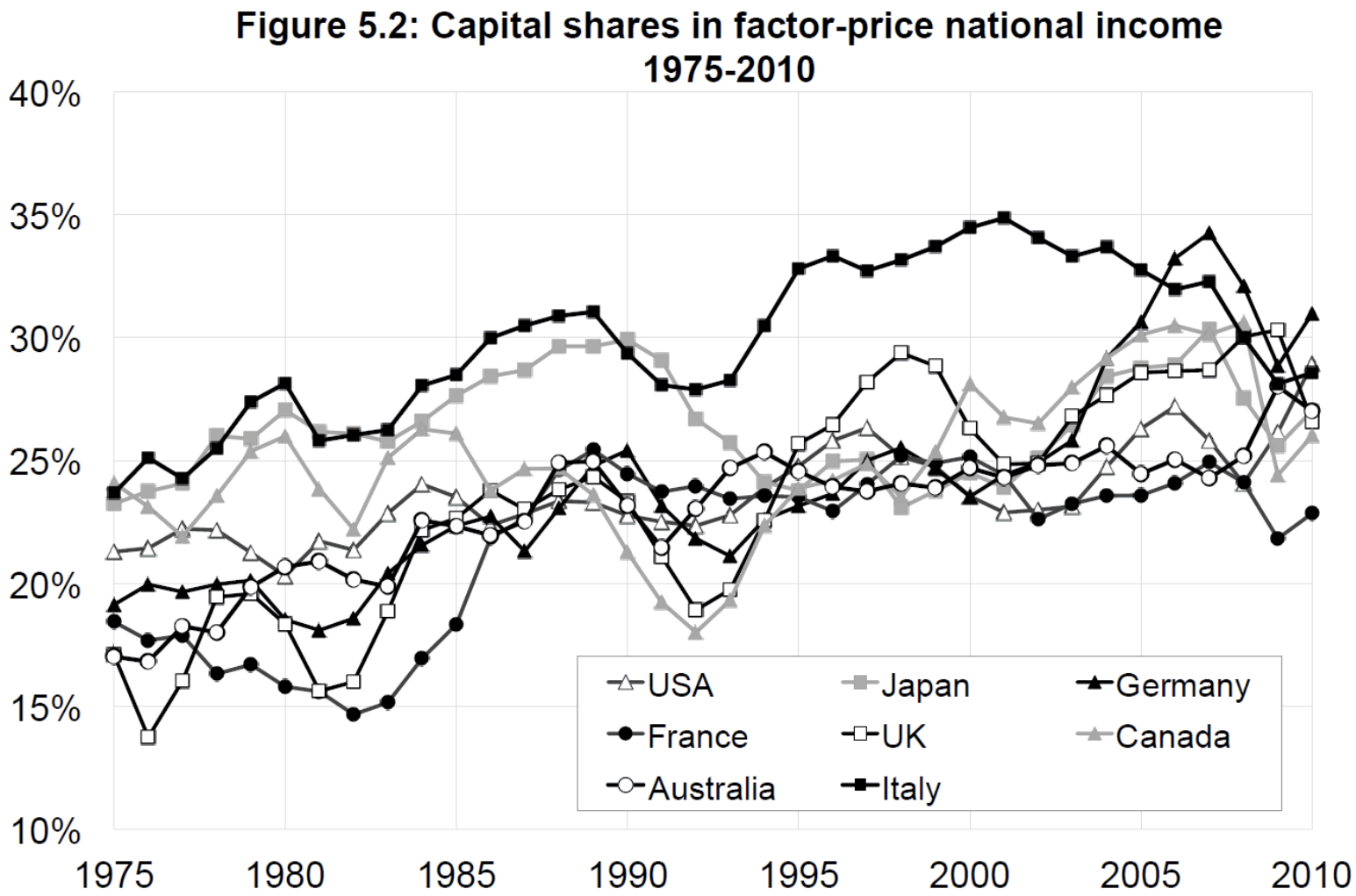
Motivation: Large and rising capital income share

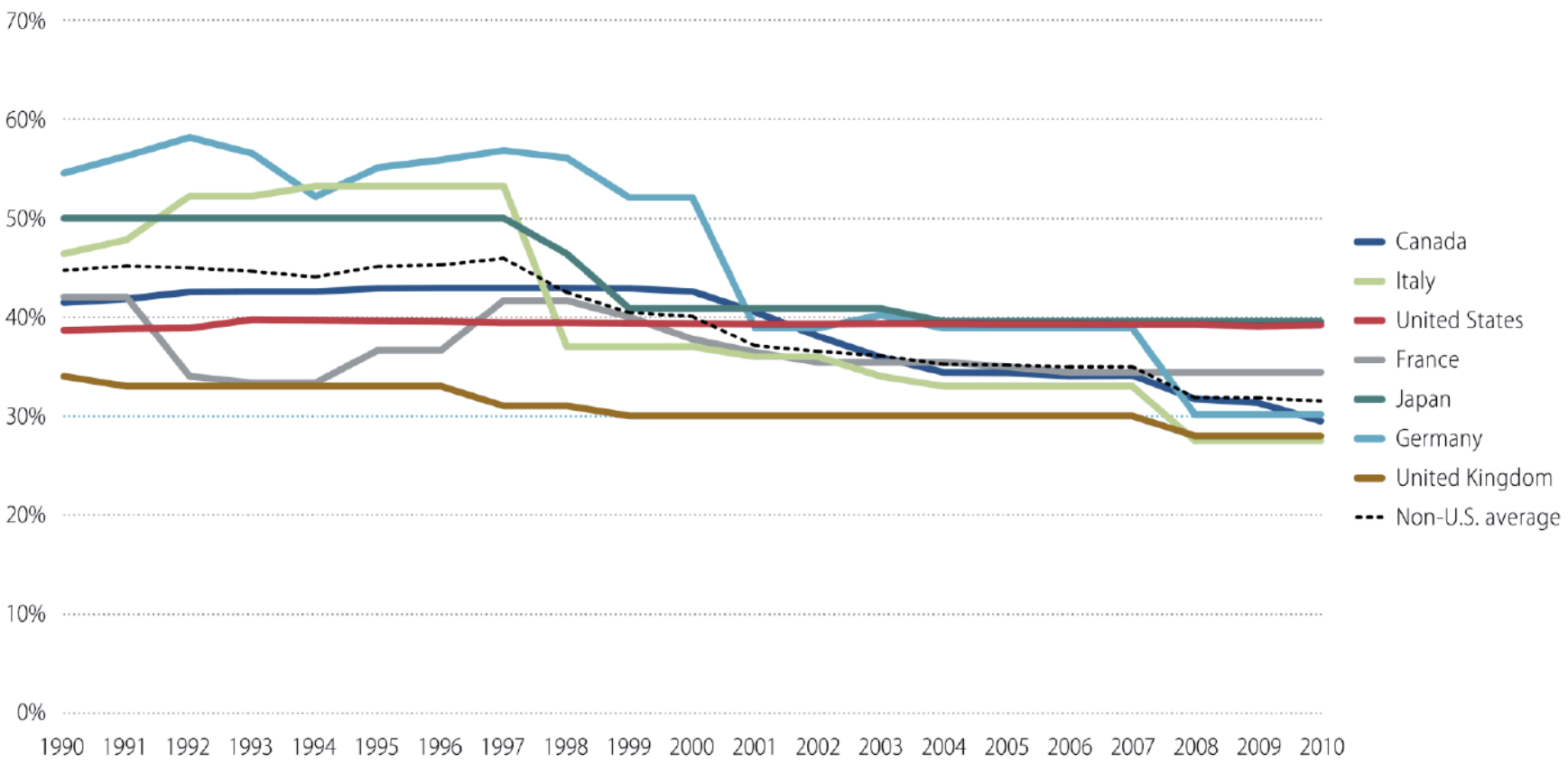


Source: Piketty-Zucman (2014)

Motivation: Declining capital income tax rates

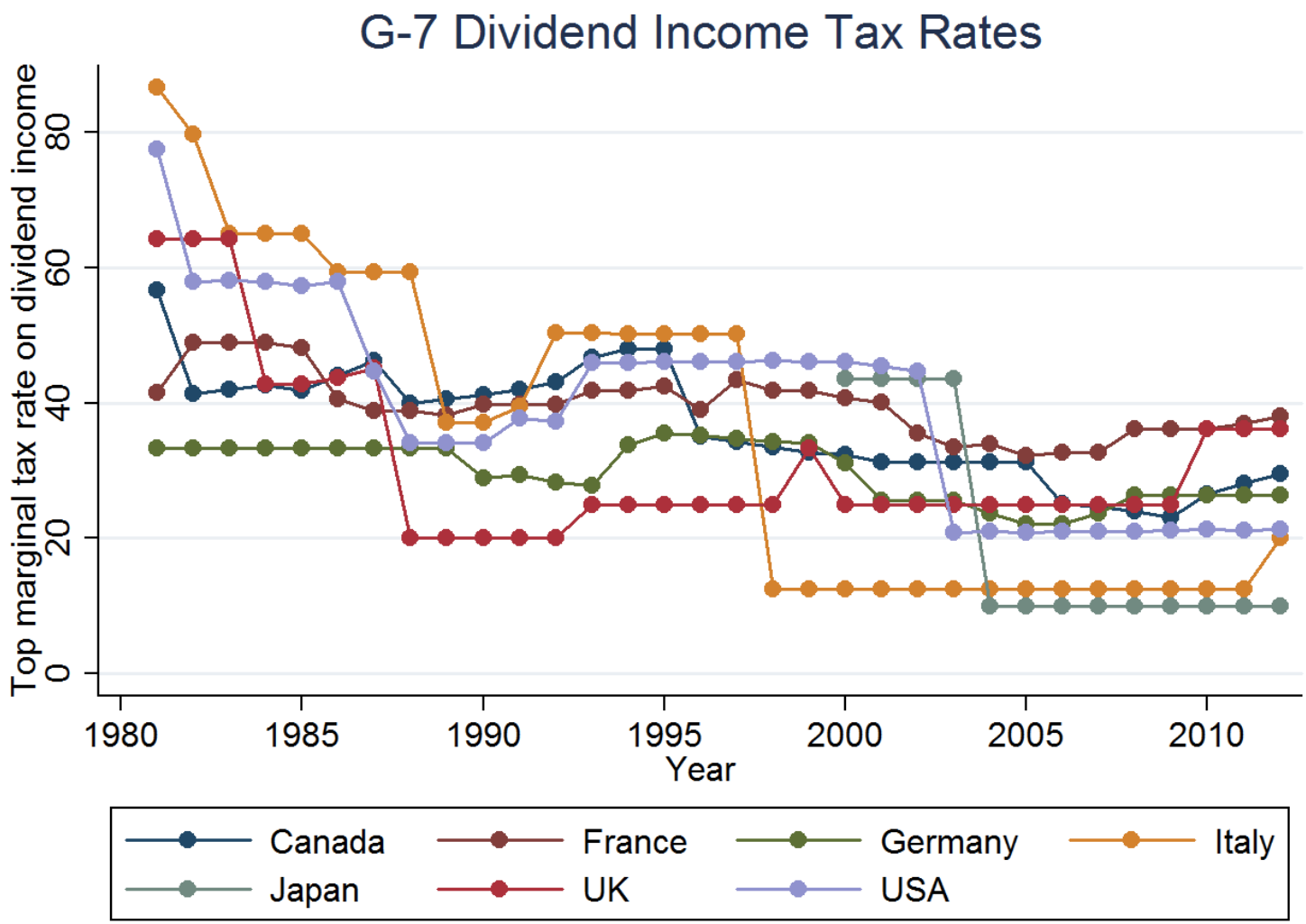
FIGURE 3

G-7 corporate tax rates, 1990-2010



Source: Auerbach (2010)

Motivation: Declining capital income tax rates



Source: Yagan (2015)

How much should we tax capital?

- Labor income taxation literature: Converged on Mirrlees (1971)
- Capital income taxation literature: All over the map
- Goals for today:
  1. Understand theoretical debate
  2. Compare theory to data
  3. Conclude with view of frontier

Arguments for zero capital income taxes

- Atikinson-Stiglitz (1976): PF pedigree
- Ramsey (1927)-Chamley (1986)-Judd (1985): macro pedigree
- Judd (1985)-Mankiw (2000): growth/history pedigree

Atkinson-Stiglitz (1976): Capital taxation is superfluous

- Consumers i earn labor in first period ("youth") and consume in both first period and second period ("retirement"):

$$\max_{c_1, c_{2,l}} U^i\left(v\left(c_{i1}, c_{i2}\right), l_{i1}\right)$$

$$\text{s.t. } c_{i1} + \frac{c_{i2}}{\left(1 + r\left(1 - \tau_k\right)\right)} = w_i l_{i1} - T_L\left(w_i l_i\right)$$

- Consumers differ by wages and weakly separable preferences over consumption and labor but share same subutility of consumption $v\left(c_{i1}, c_{i2}\right)$
- Government planner: maximize utilitarian social welfare function of individual utilities using nonlinear labor income tax $T_L\left(\cdot\right)$ and capital tax τ_k
- Optimum reached with $\tau_k = 0$

Atkinson-Stiglitz: Proof (1/2)

- Let $V(z, p+t) = \max_c v(c_1, c_2)$ such that $(p+t) \cdot c \leq z$ be the indirect utility of consumption vector c
- Take an initial tax system $(T(\cdot), t)$ with $t \neq 0$. Let $c(t)$ be consumer choice under that initial tax system.
- Suppose that this initial tax system is optimal.

Atkinson-Stiglitz: Proof (2/2)

- Alter the tax system in a specific way: Replace $(T(.), t)$ with $(\bar{T}(.), t = 0)$ where $\bar{T}(z)$ is chosen such that indirect utility is held constant at every earnings choice z:
  $V(z - T(z), p + t) = V(z - \bar{T}(z), p)$
  - Utility $U^h(V, z)$ and earnings (labor supply) choices z unchanged for all individuals.
- By definition of indirect utility, attaining $V(z - \bar{T}(z), p)$ at price p costs at least $z - \bar{T}(z)$
- Consumer also attains $V(z - \bar{T}(z), p) = V(z - T(z), p + t)$ when choosing $c(t)$
  - Hence: $z - \bar{T}(z) \leq p \cdot c(t) = z - T(z) - t \cdot c(t)$
  - Hence, gov collects more taxes under new tax system: $\bar{T}(z) \geq T(z) + t \cdot c(t)$. Initial tax system cannot be optimal.

Atkinson-Stiglitz: Discussion

- Holds for arbitrarily many consumption periods and even when nonlinear labor income tax is suboptimal, as long as existing labor income tax can be perturbed (Kaplow 2006)
- Mechanism: Weak separability $\rightarrow$ capital taxation cannot relax incentive compatibility constraints or mitigate labor-leisure distortion, so all it does is distort consumption decisions
- Influential because of transparency and relationship to optimal nonlinear labor income tax problem (Mirrlees 1971)

Chamley (1986): No steady state capital tax

- Benchmark macro setup
  - Representative agent (Ramsey 1927)
  - Infinite horizon
  - Nonstochastic general equilibrium
  - Linear tax rates, no confiscation of period-zero capital
- "Primal" approach: solve for optimal allocations and back out taxes that generate those allocations (Atkinson-Stiglitz 1980; Chari-Kehoe 1999)

Chamley: Setup

1. Consumers:

$$\max_{c,l\geq 0,k,b} \sum \beta^t U(c_t, l_t) \quad \text{s.t.} \quad (1+\tau_{ct})\, c_t + k_{t+1} + b_{t+1}$$
$$\leq (1-\tau_{kt})\,(1+r_t-\delta)\, k_t + (1-\tau_{lt})\, w_t l_t + R_t b_t$$

2. Producers:

$$\max_{k_t,l_t} F(k_t, l_t) - r_t k_t - w_t l_t$$

3. Government budget constraint:

$$g_t + R_t b_t \leq \tau_{lt} w_t l_t + \tau_{kt}\,(1+r_t-\delta)\, k_t + \tau_{ct} c_t + b_{t+1}$$

4. Feasibility constraint:

$$c_t + g_t + k_{t+1} \leq F(k_t, l_t) + (1-\delta)\, k_t$$

Chamley: Government's problem

- Define "competitive equilibrium": sequence of allocations $\{c_t, l_t, k_t, b_t\}$ where (1)-(4) are satisfied

- Government's problem:

$$\max_{\tau_{lt},\tau_{kt},\tau_{ct}} \sum \beta^t U\left(c_t\left(\tau_{lt}, \tau_{kt}, \tau_{ct}\right), l_t\left(\tau_{lt}, \tau_{kt}, \tau_{ct}\right)\right)$$

  where $c_t\left(\tau_{lt}, \tau_{kt}, \tau_{ct}\right)$ and $l_t\left(\tau_{lt}, \tau_{kt}, \tau_{ct}\right)$ are allocations in a competitive equilibrium and there is no lump-sum taxation: $\tau_{k0} = 0$, $\tau_{c0} = 0$.

Chamley: Focus on labor and capital taxes

- Only restrictions on tax rates come from consumer's (intratemporal and intertemporal) FOCs:

$$-\frac{U_{l,t}}{w_t U_{c,t}} = \frac{1-\tau_{lt}}{1+\tau_{ct}}$$

$$\frac{U_{c,t-1}}{\beta\left(1+r_t-\delta\right)U_{c,t}} = \frac{\left(1-\tau_{kt}\right)\left(1+\tau_{ct-1}\right)}{1+\tau_{ct}}$$

- $2 * \infty$ equations + $3 * \infty$ unknowns $\implies$ must arbitrarily assign ∞ of them

- Here, assume $\tau_{ct} = 0 \ \forall t$, but note equivalence between capital taxes and increasing consumption taxes

Chamley: Solving the model

- Maximize social welfare over CE allocations (where $a_t \equiv (k_t + b_t) U_{c,t-1}$ for convenience):

$$\max_{c_t, k_t, a_t} \sum \beta^t U(c_t, l_t)$$

$$\begin{aligned} [\theta_t] \quad & U_{c,t} c_t + U_{l,t} l_t + a_{t+1} - a_t / \beta = 0 \\ [\lambda_t] \quad & F(k_t, l_t) + (1 - \delta) k_t - c_t - g_t - k_{t+1} = 0 \end{aligned}$$

- FOCs:

$$\{c_t\}: \ \beta^t U_{c,t} + \theta_t \left[U_{c,t} + U_{cc,} c_t + U_{cl,t} l_t \right] = \lambda_t$$

$$\{k_{t+1}\}: \ \lambda_{t+1} \left[1 + F_{k,t+1} - \delta \right] = \lambda_t$$

$$\{a_{t+1}\}: \ \theta_t = \beta \theta_{t-1}$$

Chamley: No steady state optimal capital tax

- Steady state: Assume $c_t \to c^{ss}, l_t \to l^{ss}, k_t \to k^{ss}, g_t \to g^{ss}$.
- Then government's FOCs reduce to:

$$\beta \left(1 + F_k^{ss} - \delta\right) = 1$$

- Recall consumer's intertemporal FOC:

$$\beta \left(1 - \tau_k^{ss}\right) \left(1 + r^{ss} - \delta\right) = 1$$

- Since $r^{ss} = F_k^{ss}$, these two conditions imply $\tau_k^{ss} = 0$.

Chamley: Discussion

- Transition: highest possible capital tax early on, declining thereafter
- Intuition: $\tau_k^{ss} > 0 \rightarrow$ ever-increasing unbounded tax on future consumption, and would rather smooth distortions (Judd 1999)

$$\frac{\beta\left(1+r^{ss}-\delta\right)U_{c,t+1}}{U_{c,t}} = \frac{1}{1-\tau_k^{ss}}$$

$$\lim_{T\to\infty}\frac{\beta^T\left(1+r^{ss}-\delta\right)^T U_{c,t+T}}{U_{c,t}} = \lim_{T\to\infty}\left(\frac{1}{1-\tau_k^{ss}}\right)^T = \infty$$

- Influential because of dynamic general equilibrium: consumers, firms, and government earn and spend in every period

Judd (1985) / Mankiw (2000): Heterogeneity

- Two types of agents: savers (as in Chamley) and spenders (hand-to-mouth: earn labor income but hold no capital)
- Striking result: Even (steady-state) spenders want no capital tax!
- Mechanism: Capital complements labor enough and is responsive enough to capital taxes that $(1-\tau_l^{ss})\, w^{ss} l^{ss}$ is maximized with $\tau_k^{ss} = 0$ and $\tau_l^{ss} > 0$
- Justification: Three hundred years of capital deepening and technology growth alongside dramatic increases in unskilled wages
- Similar force at work in Scheuer (2014) on entrepreneurship subsidies

What do these models miss?

1. Nonlinear tax instruments in Chamely-Judd
2. Steady state may not be optimal in Chamley-Judd
3. Relabeling of labor income as capital income
4. Preference heterogeneity
5. Finite tax elasticities of savings and investment
6. Divergent private and social valuations of future
7. Preferences for wealth equality
8. Future earnings uncertainty
9. Capital-labor substitutability

Saez (2013): Optimal progressive capital taxes

- Setup:
  - Infinite horizon like Chamley (1986)
  - Individuals start with different inheritances
  - Planner has access to two-bracket tax instrument: positive only above a chosen threshold
- Result: Positive rate above a wealth threshold can be optimal (also in Farhi-Werning 2010)
- Intuition: Drive large fortunes down to threshold in steady state $\rightarrow$ generate redistribution without infinitely compounding distortion
- U.S. estate tax has exactly this shape: 0% rate on estates up to \$5.5m threshold, 40% thereafter

Straub-Werning (2014): Chamley fragility

- Chamley assumption: capital tax rate is bounded above in every period (in order to prevent early confiscation sunk capital)
- Key Chamley proof: "The [capital tax upper bound constraint] cannot be binding forever (the marginal utility of private consumption...would grow to infinity...which is absurd)."
- Straub-Werning: True only if interior steady state is optimal. But $c_t \to 0$ can be optimal if initial debt is large enough
- Intuition: Extraordinary distortions on consumption are bad, but extraordinary distortions on labor can be worse
- Broader point: PDV of utility can be higher with $\tau_{kt} > 0 \ \forall t$ than with $\tau_{kt} = 0 \ \forall t$, so $\tau_k^{ss} = 0$ can be poor policy guide

Relabeling labor income as capital income

- Assumption: Government observes labor income and observes capital income separately

- Practice: Can be very difficult to distinguish
  - Entrepreneurs (Bill Gates's Microsoft capital gains: labor or capital income?)
  - Hedge fund and private equity owners ("carried interest" taxed as capital gains)
  - Owner-managers of small businesses can pay themselves bonuses instead of declaring profits

Evidence on income shifting

- Gordon-Slemrod (1998, 2000): 1980s reductions in top individual income tax rates $\rightarrow$ large increase in business income being taxed as individual income (S corporation and partnership) rather than corporate income (C-corporation)
- Pirttila-Selin (2011): Finnish capital tax cut $\rightarrow$ large shift from labor income base to capital income, especially among self-employed
- Jacob-Michaely-Alstadsæter (2015): Swedish dividend tax cut $\rightarrow$ owner-managers reduced their wage compensation and increased dividends

Theory on income shifting

- Government can't distinguish capital and labor income at all and shifting elasticity is infinite $\rightarrow \tau_k = \tau_l$ (Piketty-Saez 2013; Christianson-Tuomala 2008)
- Finite but sufficiently strong shifting elasticity $\implies \tau_k^{ss} > 0$ even in Chamley (own numerical simulations)
- But this rationale for $\tau_k > 0$ requires reason for not just taxing consumption
- Income shifting seems important in real world
  - $\tau_k \approx \tau_l$ in many countries
  - U.S. S corporations allow owner-managers of closely-held businesses to have their profits taxed at individual income tax rates (obviates incentive to evade taxes by labeling profits as bonuses)

Preference heterogeneity in Atkinson-Stiglitz

- Standard Atkinson-Stiglitz: individual's allocation between c_1 and c_2 contains no information beyond income
- But if high-skilled have stronger preferences for c_2, individual's consumption allocation contains information on the person's skill
  - Taxing capital loosens the IC constraints (Akerlof 1978; Saez 2002; Diamond-Spinnewijn 2011)
- Real world: Patience is very correlated with skill (Parker-Fischhoff 2005, Bettinger-Slonim-2005, Kirby-Winston-Santiesteban 2005; see Banks-Diamond 2010)

Finite tax elasticities of savings and investment

- Why do people save?
  - Modigliani/Tobin (like Atkinson-Stiglitz application): life-cycle consumption smoothing
  - Chamley-Judd: dynastic: infinite horizon consumption smoothing
- If people save for different reasons, can get different optimal tax prescriptions
- Proceed here in three steps:
  1. Is most wealth life-cycle savings rather than inheritances?
  2. If not, is zero capital tax indeed optimal in closed economy?
  3. What about in an open economy?

Inheritance share of total wealth

- Huge debate: Kotlikoff-Summers 1981, Kotlikoff vs. Modigliani in JEP 1988
- Modigliani: does not capitalize inherited wealth $\rightarrow$ inheritance share is 20-30%
- Kotlikoff-Summers: do capitalize inherited wealth, even if heirs consume out of it $\rightarrow$ inheritance share is 80%

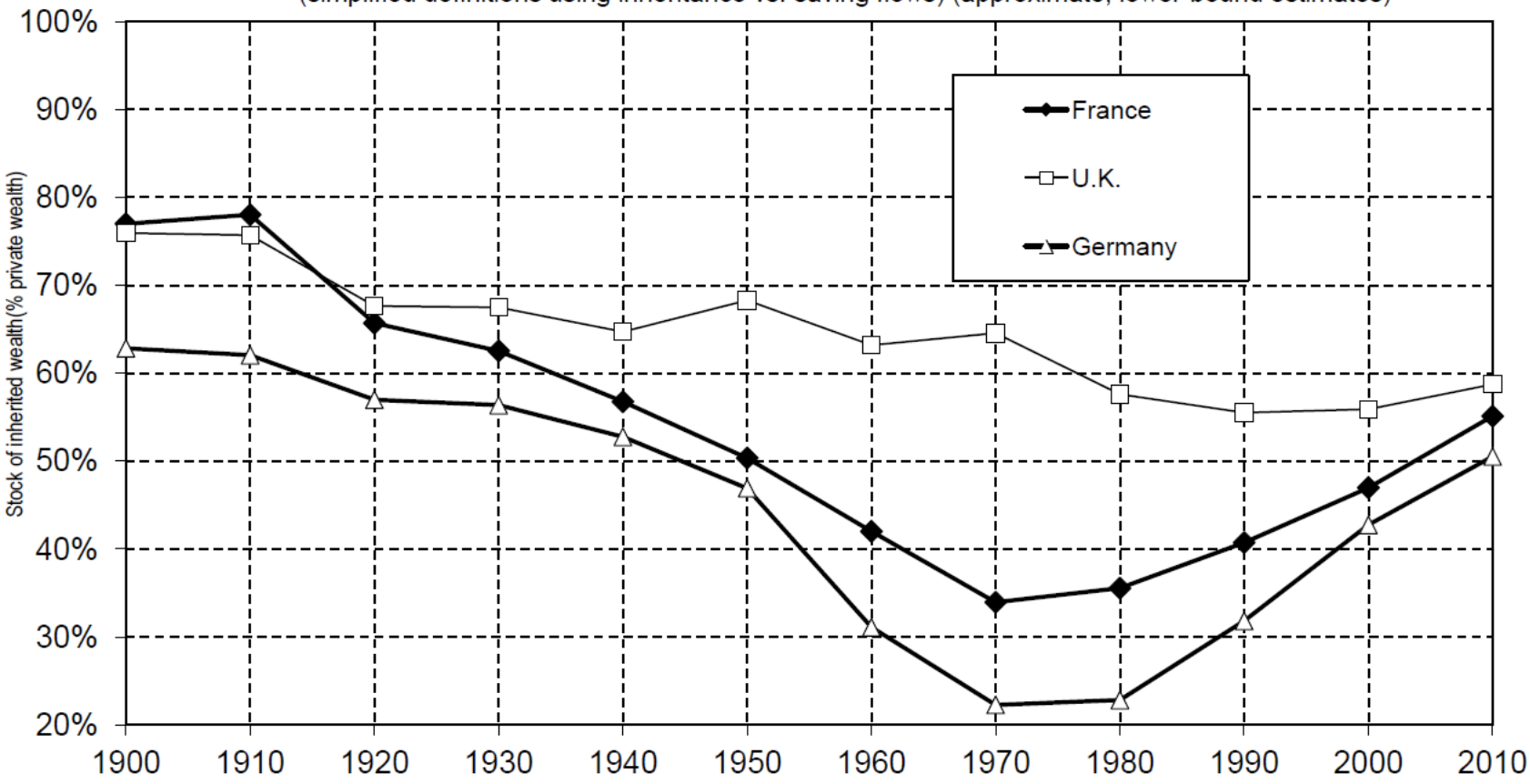
Inheritance share of total wealth

- Piketty-Postel-Vinay-Rosenthal (2013): use micro data to split population into two groups such that inheritances are capitalized but inheritance share is bounded at 100% (see Piketty-Zucman 2014)
  - "Self-made individuals": [current wealth] $>$ [capitalized value of inheritance]
  - "Rentiers": [current wealth] $<$ [capitalized value of inheritance]
- Inheritance share can grow large when $r > g$ (Piketty 2011, Piketty Zucman 2014)
- Inheritance share over 50% in Europe (likely smaller in U.S.?)

Inheritance share of total wealth in Europe

Figure 4.6. The inheritance stock in Europe 1900-2010

(simplified definitions using inheritance vs. saving flows) (approximate, lower-bound estimates)



The inheritance share in aggregate wealth accumulation follows a U-shaped curve in France and Germany (and to a more limited extent in the U.K. and Germany. It is possible that gifts are under-estimated in the U.K. at the end of the period.

Source: Piketty-Zucman (2014)

Why do people give inheritances?

- Ramsey-Chamley-Judd: Bequest motive only
- Structural estimation: Only half of bequeathed wealth is due to bequest motive (Kopczuk Lupton 2007)
- Income shocks to parents affect parents' consumption more than kids' consumption (Altonji-Hayashi-Kotlikoff 1992, 1997)

Why do people give inheritances?

- Accidental bequests because of imperfect annuitization (Finkelstein-Poterba 2002, 2004) $\rightarrow$ potential rationale for estate taxation (bequest is not worth much to donor)
- Social status / wealth-in-the-utility-function (Carroll 2008) $\rightarrow$ potential rationale for estate (and other capital) taxation if only rank matters
- Social/family pressure $\rightarrow$ potential rationale for estate taxation since can strengthen donors' bargaining power and make them better off (Aura 2005; Wilhelm 1996; Light-McGarry 2004)
- Strategic bequests to extract labor from children (Bernheim-Shleifer-Summers 1985) $\rightarrow$ bequest is consumption for donor (Atkinson-Stiglitz no-taxation applies) but is effectively labor income for donee and thus optimally taxed

Optimal inheritance taxation (Piketty-Saez 2013)

- Atkinson-Stiglitz fails when consumers have inheritance income, not just labor income
  - Intuition: two dimensions of heterogeneity (wage and inheritance) $\rightarrow$ need two nonlinear tax instruments

- Optimal inheritance tax rate from "Meritocratic Rawlsian" perspective:

$$\tau_B = \frac{1 - \bar{b}}{1 + \varepsilon_B}$$

  where $\bar{b}$ is share of average bequest that zero-receivers leave, and ε_B is the inheritane tax elasticity of bequests

- Nests version of Ramsey-Chamley-Judd ($\varepsilon_B = \infty$ when r is exogenous)

- But value of ε_B is unresolved empirically (Kopczuk-Slemrod 2001)

Potential for small tax elasticity of savings

- Classic two-period consumption model:

$$\max_{c_1, c_2} u(c_1) + \delta(c_2)$$

$$\text{s.t. } c_1 + c_2/(1+r) \leq z_1 + z_2/(1+r)$$

- With capital tax, budget constraint becomes:

$$c_1 + c_2/(1 + r(1-\tau_k)) \leq z_1 + z_2/(1 + r(1-\tau_k))$$

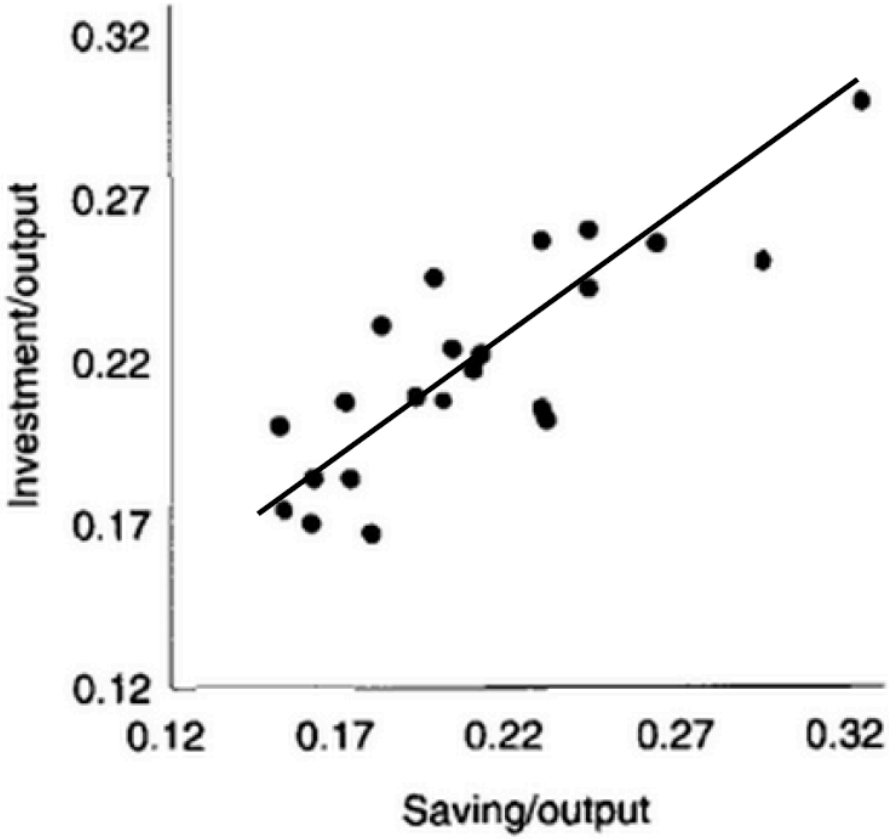
Potential for small tax elasticity of savings

- Substitution effect: $\tau_k \uparrow \Rightarrow$ price of $c_2 \uparrow$ relative to $c_1 \Rightarrow c_2 \downarrow$
- Wealth effect: $\tau_k \uparrow \Rightarrow$ poorer (if already saving) $\Rightarrow$ could increase c_2 (i.e. capital tax elasticity of savings can be zero or negative!)
- Rich donor heuristic for how much to bequeath (e.g. Bill Gates): "I want my kids to have \$10 million after taxes. What's the pre-tax amount I need to leave them?"
- Deadweight loss can be large even with zero elasticity (Feldstein 1978)
  - Policy relevance depends on marginal social welfare weight placed on savers

Tax elasticity of investment in open economy

- In small open economy, taxation of domestic residents' capital income may have no impact on domestic capital accumulation
  - Domestic investment always earns r^* no matter what $(1 - \tau_k) r^*$ domestic residents earn
- How internationally mobile is capital?

Challenge to international capital mobility



$\beta = .62$
(.09)

Figure 3.4
Industrial-country saving and investment rates, 1982–91

Source: Obstfeld-Rogoff (1996), Feldstein-Horioka (1980)

Divergent private and social valuations of future

- In overlapping generations model, steady state is dynamically inefficient if $r < g$ (Phelps 1961; Diamond 1965)
  - Economy is investing too much: can generate Pareto improvement by consuming more today and holding future consumption fixed

- Modified Golden Rule: $r = \delta + \gamma g$, with $r = F_k$, $\delta =$ social (gov.) discount rate and CRRA(γ) utility curvature $u'(c) = c^{-\gamma}$
  - Standard perturbation argument, but for planner (Piketty-Saez 2013)

$$u'(c_t) = \frac{1+r}{1+\delta} u'(c_{t+1})$$

$$\left(\frac{c_{t+1}}{c_t}\right)^{\gamma} = \frac{1+r}{1+\delta}$$

$$1 + r = (1+\delta)(1+g)^{\gamma}$$

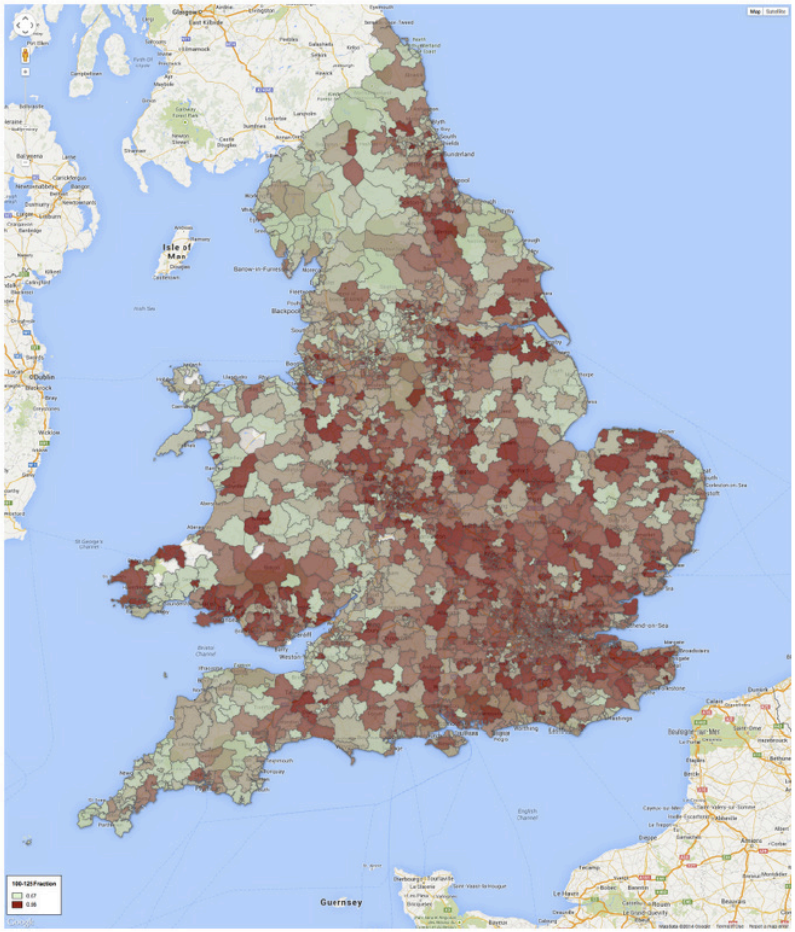
which is approximately equivalent to $r = \delta + \gamma g$ for small increments

Divergent private and social valuations of future

- What value for δ? [Nordhaus vs. Stern]
  - Reasonable upper bound: private sector rate of 1.4% (Giglio-Maggiori-Stroebel 2015)

Measuring very long discount rates

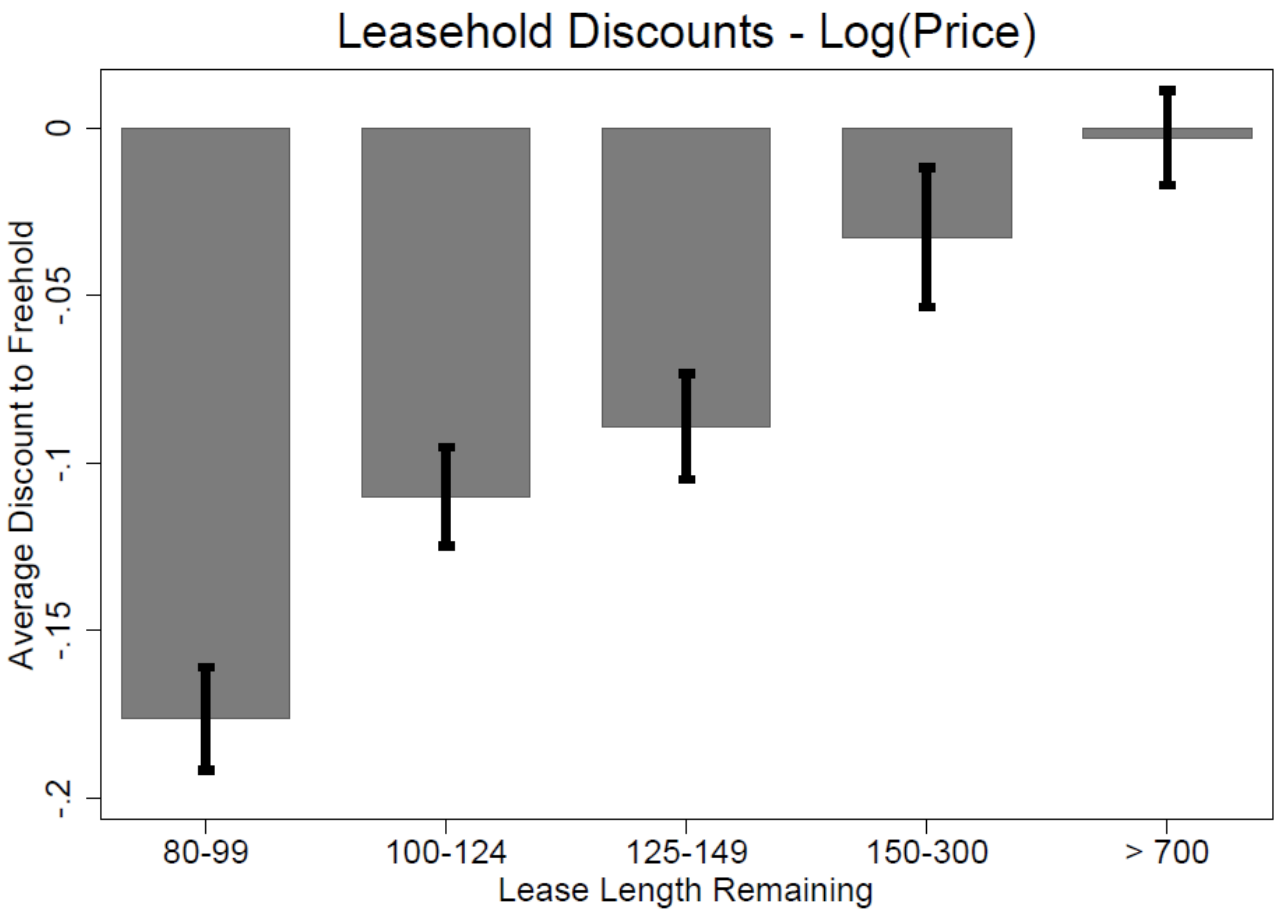
Figure A.7: U.K. Flats: Fraction of 100-124 years leaseholds



Note: Figure shows the fraction of flat transactions with 100-124 years remaining in each UK 3-digit postcode. Green and red correspond to the 10th and 90th percentile of the distribution of the fraction across postcodes.

Source: Giglio-Maggiori-Stroebel 2015

Measuring very long discount rates



(b) Price Discount by Remaining Lease Length

Source: Giglio-Maggiori-Stroebel 2015

Divergent private and social valuations of future

- What value for δ? [Nordhaus vs. Stern]
  - Reasonable upper bound: private sector rate of 1.4% (Giglio-Maggiori-Stroebel 2015)
  - Even 1.4% may be too high: extra dessert for Cleopatra $\rightarrow$ millions go without cancer treatment today (Cowen-Parfit 1991)

- What value for γ?
  - γ high $\rightarrow$ care a lot about inequality $\rightarrow$ want small capital stock and thus large r $\rightarrow$ global warming is not important
  - γ low $\rightarrow$ do not care about inequality $\rightarrow$ want large capital stock and thus small r $\rightarrow$ should care a lot about global warning

- Real world: $r > g$ $\rightarrow$ below socially optimal level of capital unless δ or γ is large $\rightarrow$ capital *subsidy* (King 1980, Atkinson-Sandmo 1980)
  - But if gov. really cares, ideally uses debt to get there, separating capital stock objectives from redistribution objectives (Piketty-Saez 2013)

Assessing golden rule / dynamic efficiency

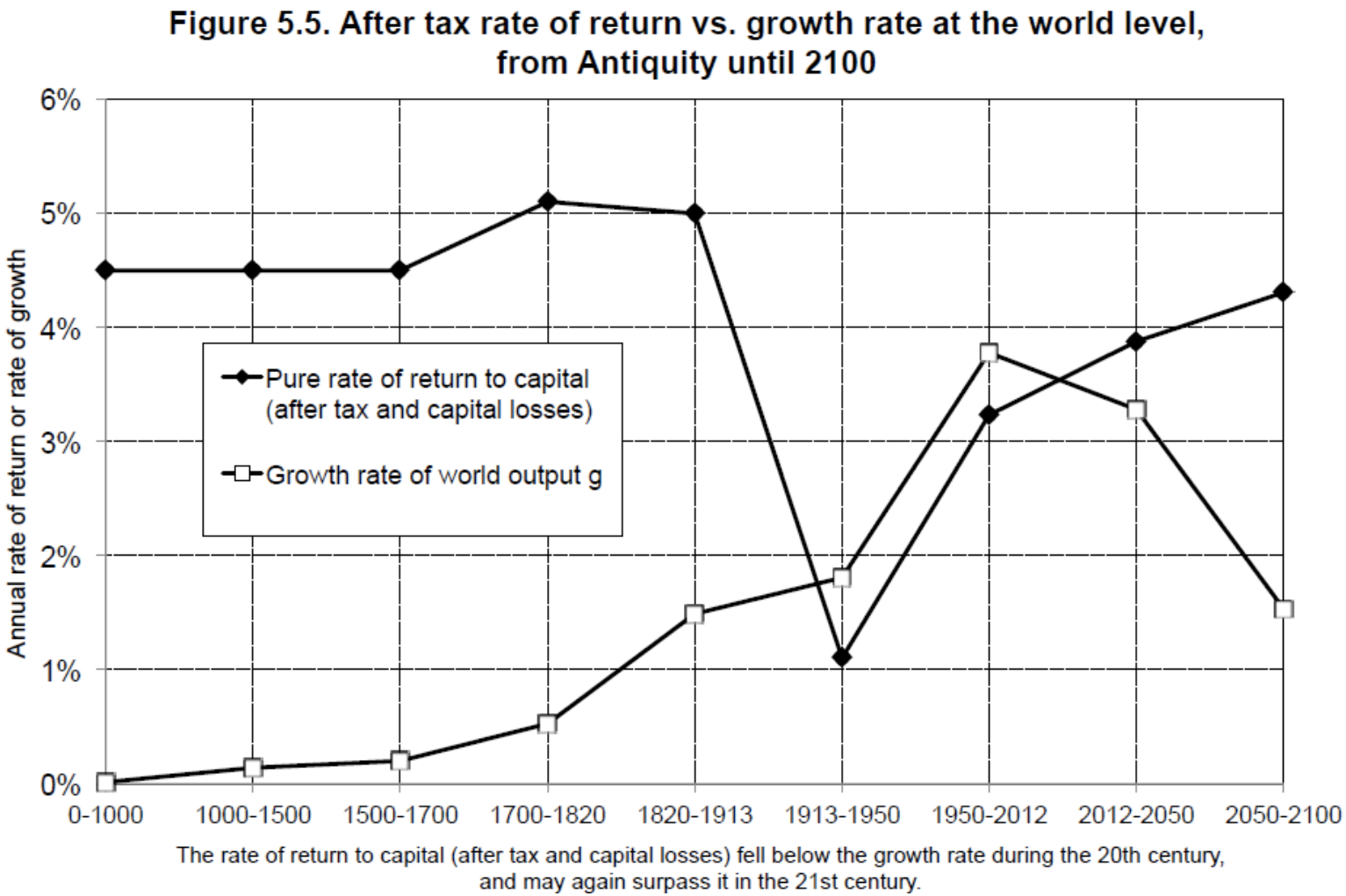
TABLE 2

Gross profit and investment: the U.S. nonfinancial corporate sector (percent)

Year	Gross profit / V	Gross investment / V	D / V
1953	29·1	14·7	13·6
1954	28·7	13·3	14·3
1955	25·1	13·3	10·2
1956	21·0	12·3	7·0
1957	19·4	10·8	7·5
1958	20·6	9·6	10·0
1959	18·2	9·8	7·6
1960	16·7	9·2	6·3
1961	16·9	8·9	7·5
1962	15·5	8·9	6·9
1963	18·0	9·8	8·0
1964	17·1	9·5	7·3
1965	17·5	10·5	6·9
1966	17·4	11·7	5·9
1967	18·4	11·6	6·9
1968	16·1	9·7	6·2

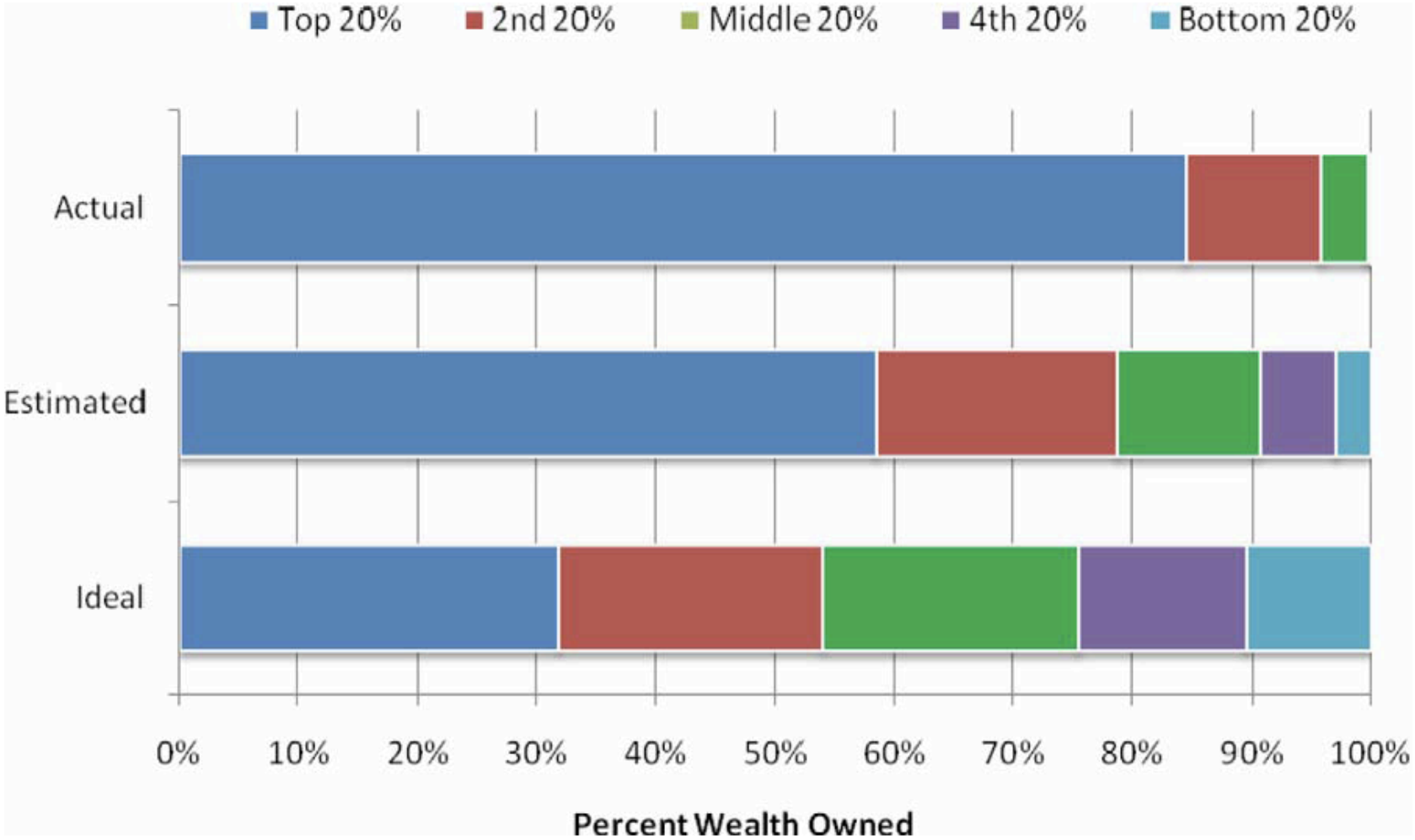
Source: Abel, Mankiw, Summers, Zeckhauser (1989)

Assessing golden rule / dynamic efficiency



Source: Piketty-Zucman (2014)

Preferences for wealth equality



Source: Norton-Ariely 2011

Preferences for wealth equality?

- U.S. estate tax: 40% rate above $5.5 million exemption after charitable and spousal deductions $\rightarrow$ only 0.1% of decedents liable
- Support for estate tax rises from 17% to 53% when Mechanical Turk survey respondents are (dramatically) informed that only the richest are liable (Kuziemko-Norton-Saez-Stantcheva 2013)

Preferences for wealth equality?

Besides the income tax, the government can also level the playing field with **the federal estate tax.**

The **Federal Estate Tax** (also known as the **Death Tax**) applies when a deceased person leaves **more than $5 million** in wealth to his or her heirs. Wealth left to a spouse or charitable organizations is exempt from estate tax.

Only 1 person out of 1000 is wealthy enough to face the estate tax.

Average Americans do not have anything close to $5 million in wealth, so the estate tax does not affect them and they can pass on their property to their children tax-free.

Eliminating the estate tax would allow the very richest families to pass down all of their wealth to their children tax-free. Hence, children of rich people would also start off very rich themselves.

Increasing the estate tax is a way to level the playing field between the children of wealthy parents and children of middle-class parents.

Future earnings uncertainty (New Dynamic Public Finance)

- Setup (Golosov-Kocherlakota-Tsyvinski 2003, Kocherlakota 2004):
  - Two periods of consumption: c_1 and c_2
  - Work only in second period (for simplicity)
  - Everyone is identical in period 0 but receives stochastic wage draw w in period 1
  - Utility: $u(c_1) + \beta [u(c_2) - h(l)]$ s.t. $c_1 + c_2/(1+r) = wl/(1+r)$

Future earnings uncertainty (New Dynamic Public Finance)

- Euler with no government intervention (i.e. *private* optimum):

$$u'(c_1) = \beta(1+r)\int u'(c_2(w))\, f(w)\, dw$$

- As in Mirrlees, government wants to redistribute from high w to low w in period 1, but observes only c_1, c_2, wl

- At *government* optimum, "inverse Euler" equation holds by same type of perturbation argument for *social* welfare:

$$\frac{1}{u'(c_1)} = \frac{1}{\beta(1+r)}\int \frac{1}{u'(c_2(w))} f(w)\, dw$$

Future earnings uncertainty (New Dynamic Public Finance)

- Jensen's inequality: for $K(\cdot)$ convex

$$K\left(\int x(w) f(w) dw\right) < \int K(x(w)) f(w) dw$$

- Here, let $K(x) = 1/x$ and $x(w) = u'(c_2(w))$:

$$\frac{1}{\int u'(c_2(w)) f(w) dw} < \int \frac{1}{u'(c_2(w))} f(w) dw = \frac{\beta(1+r)}{u'(c_1)}$$

$$u'(c_1) < \beta(1+r) \int u'(c_2(w)) f(w) dw$$

- Result: government optimally distorts consumption to the present relative to the agent's Euler (private optimum), e.g. with a capital tax

Future earnings uncertainty (New Dynamic Public Finance)

- Mechanism: Being poorer in second period makes it costlier to pretend to be low-skilled $\rightarrow$ loosens gov.'s IC constraints
- Tangible policy implication: asset test for disability insurance (Golosov-Tsyvinski 2006)
- But overall welfare gains of optimal capital-and-labor taxation appear small (0.1% in aggregate welfare) relative to optimal labor income taxation (Farhi-Werning 2011; Golosov-Troshkin-Tsyvinski 2011)

Capital-labor substitutability

- Historically: Strong reason to think that capital has complemented labor

Big Mac Index

Table 1: McDonalds Cashier or Crew Wages and Big Mac Prices, December 1998

Country	Estimated hourly wage rate (1)	Reported Big Mac price (2)	Exchange Rate per $1 (3)	$ hourly wage rate (4)	$ Big Mac price (5)	Economist $ Big Mac 3/99** (6)	Big Macs per hour of work (7)
Russia	8.00	25.5	19.57	0.41	1.30		0.31
Korea	1700	3000	1210	1.41	2.48		0.57
Brazil	2.87	4.45	1.73*	1.66	2.57	1.71	0.65
Poland	4.12	5.3	3.50	1.18	1.51	1.38	0.78
Czech Rep.	45.00	53	30.30	1.49	1.75		0.85
UK	3.60		0.62*	5.80	3.07	3.07	1.89
USA	6.00		1.00	6.00	2.43	2.43	2.12
Germany	11.28	4.95	1.67	6.76	2.97	2.72	2.28
France	40.22	17.5	5.76	6.99	3.04	2.87	2.30
Italy	10417	4500	1646	6.33	2.73	2.5	2.31
Belgium	280.00	114	34.50	8.12	3.30		2.46
Sweden	64.90	25	8.03	8.09	3.11	2.88	2.60
Japan	844	280	120*	7.03	2.33	2.44	3.01

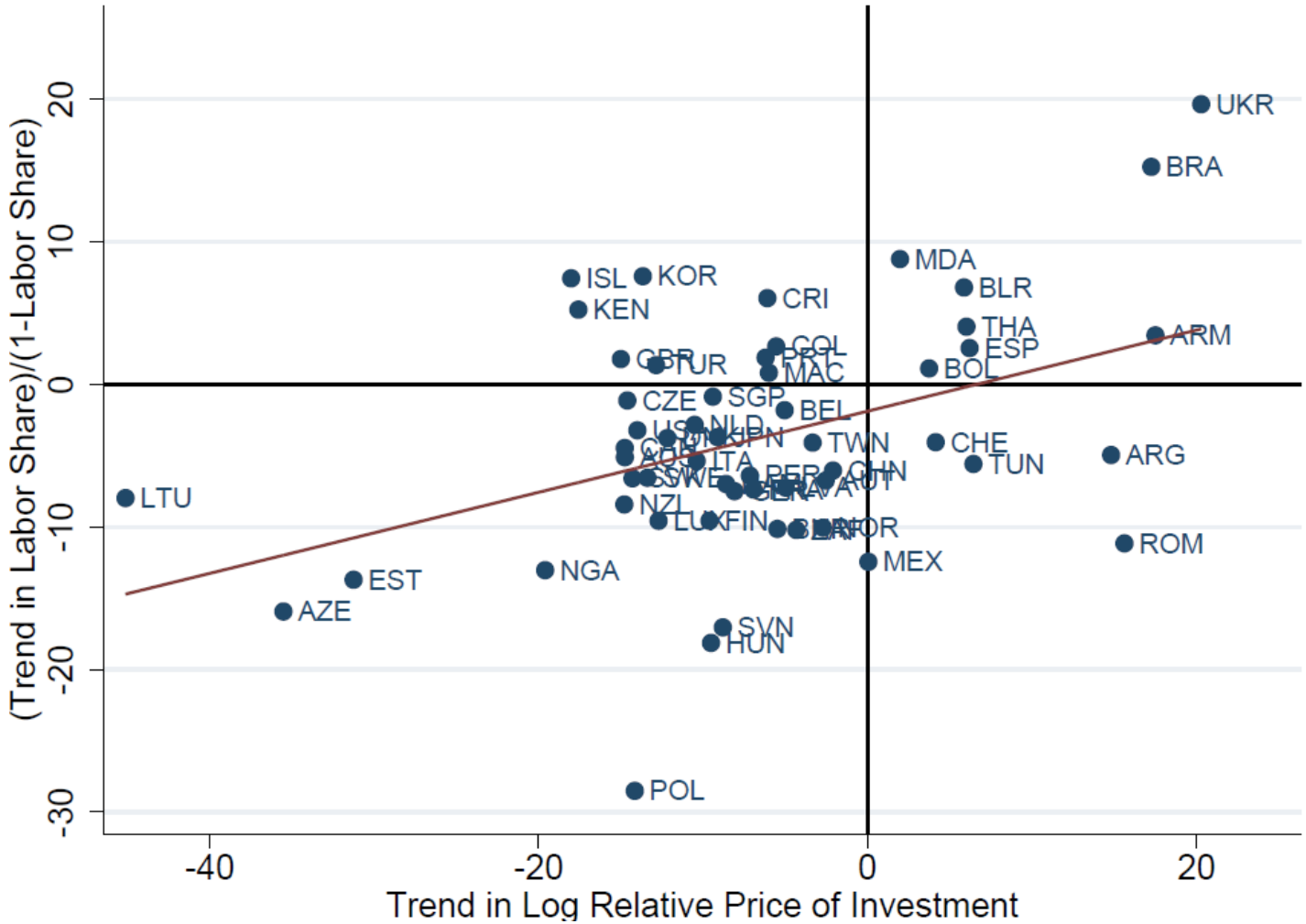
Source: Ashenfelter-Jurajda (2001)

Capital-labor substitutability

- Historically: Strong reason to think that capital has complemented labor

- Future: Unclear (Katz Murphy 1992)
  - [Elasticity of substitution between capital and labor of 1.25] + [25% global decline in relative price of investment] $\rightarrow$ explains half of 5-pp global decline in the labor share of income
  - Possible intuition for deviation from long-run trend: you don't need more than one car (i.e. products produced by low-skilled have hit inelastic demand, so more efficient production no longer increases quantity produced)

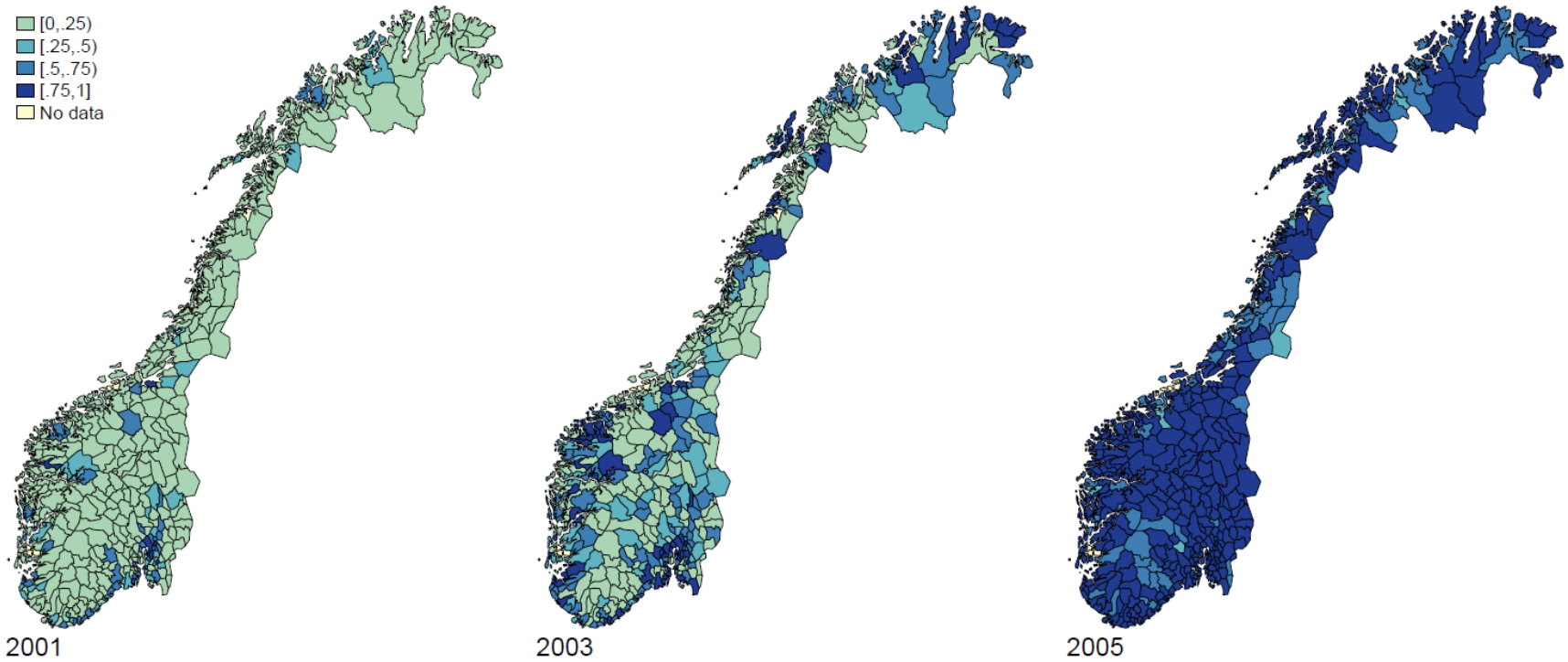
Labor share changes and the price of investment



Source: Karabarbounis-Nieman (2013)

Case study of complementarity: Rollout of broadband

Figure A4. Geographical distribution of broadband coverage rates.

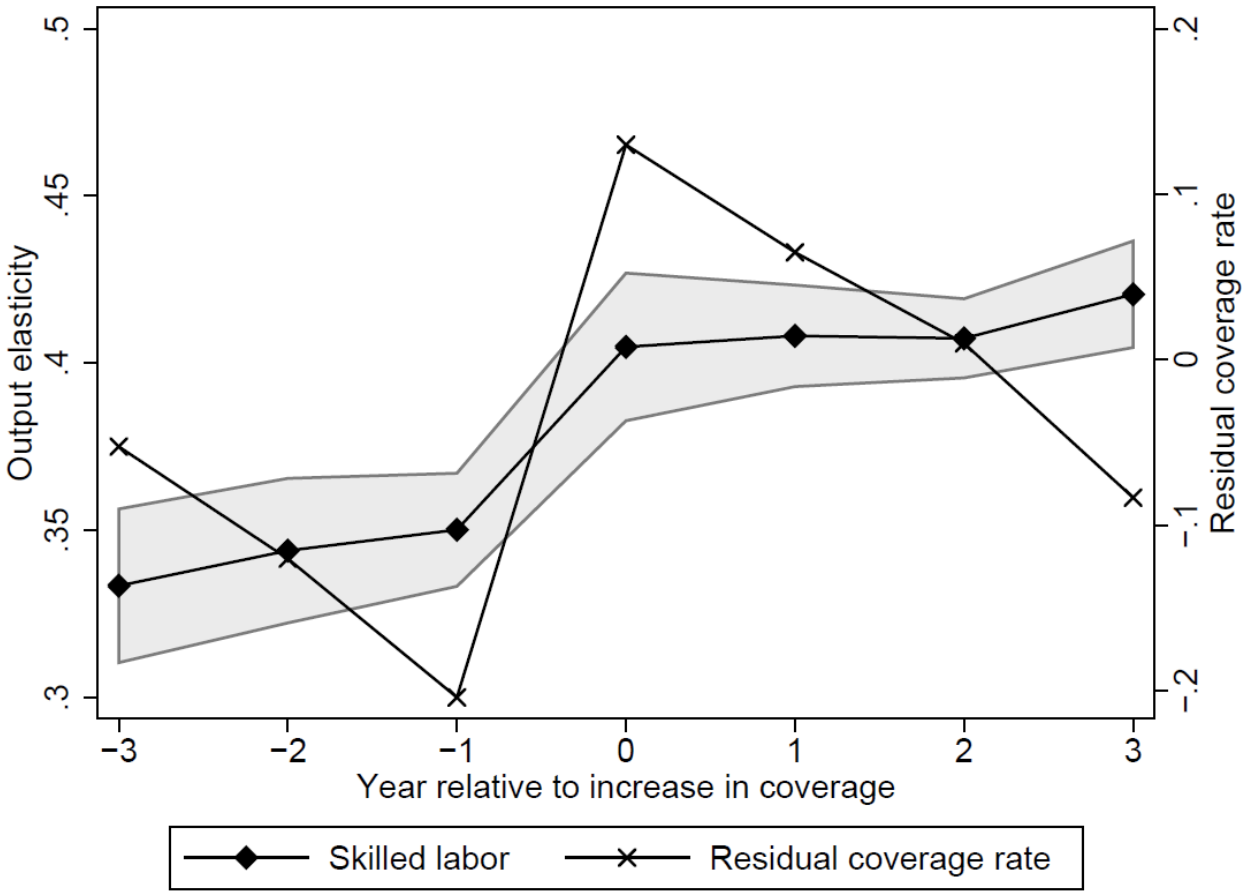


Note: The graphs show the geographical distribution of broadband coverage rates of households in 2001, 2003 and 2005.

Source: Akerman-Gaarder-Mogstad (2013)

Case study of complementarity: Rollout of broadband

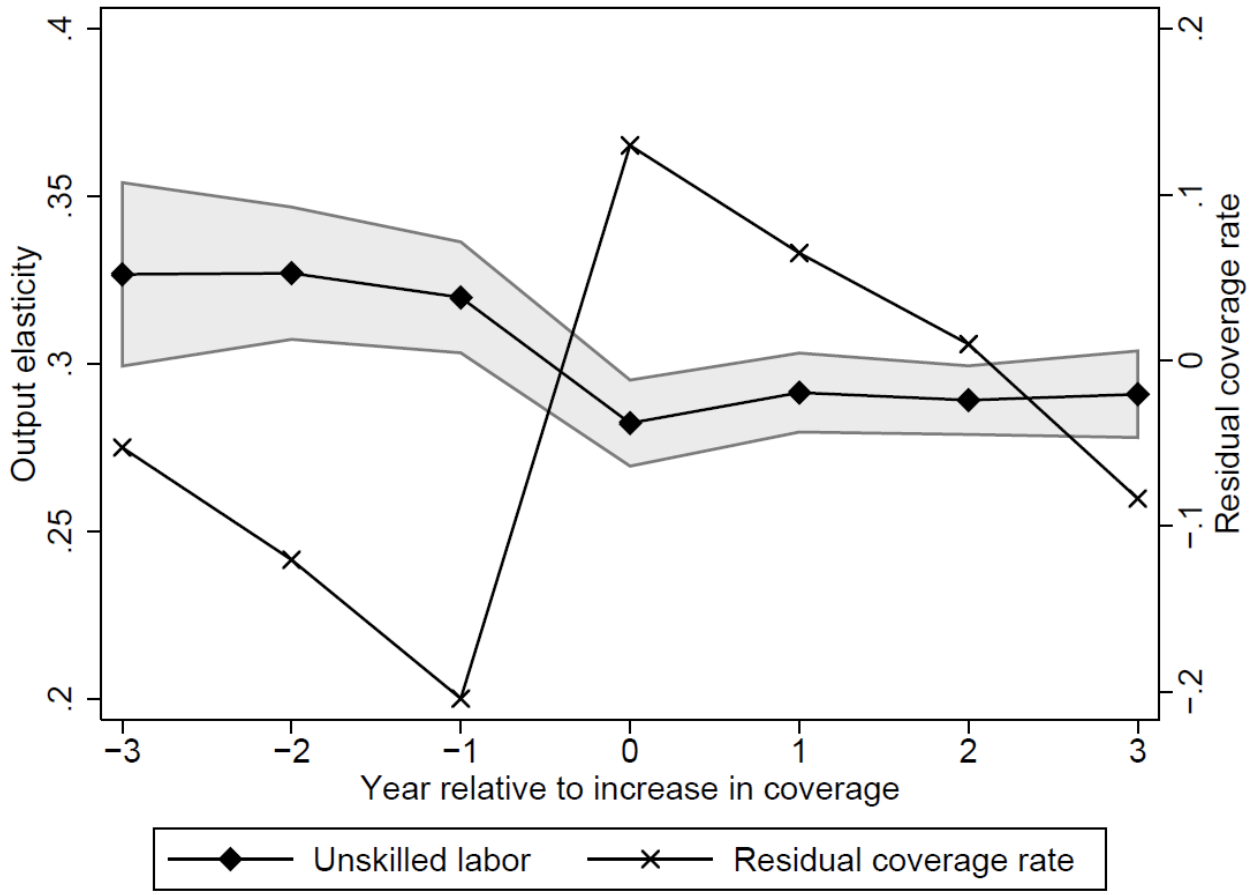
(a) Output elasticity: Skilled labor



Source: Akerman-Gaarder-Mogstad (2013)

Case study of complementarity: Rollout of broadband

(b) Output elasticity: Unskilled labor



Source: Akerman-Gaarder-Mogstad (2013)

Key empirical questions

- Tax elasticities of savings and investment
- Degree of international capital mobility
- Externalities of investment on workers
- Share of savings used for causes valued by government