Optimal Wealth Taxation: Redistribution and Political Economy

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SED 2014 meeting

Introduction

- Wealth very unequal and skewed, on the rise?
- Industrial Revolution and Capitalism not that old
- Piketty-Saez: 20th century special due to shocks

- Increasing demands for redistribution

Q Should we tax wealth?

Q2 If so, do so progressively?

Theory?

- Theories?
  - Old Money vs. New Money
  - Zero tax!
    - **Old Money:** Chamley-Judd
    - **New Money:** Atkinson Stiglitz
  - Nonzero taxes
  - Focus: redistribution, top wealth

- Today: review arguments, some new ideas

Old Money

Chamley-Judd

- Focus on given initial wealth: **old money**
- Inequality and redistribution
- How to tax it?
- Surprise: no tax in long run
- Today: reassess these results (Werning, 2014)

Judd

- Heterogeneity
  - capitalists: save and supply capital
  - workers: supply labor, hand to mouth
- Initial wealth given
- Goal: redistribute to workers
- Taxes...
  - capital taxes on capitalists
  - rebated to workers
- Budget balance

Capitalists and Workers

$$\sum_{t=0}^{\infty} \beta^t U(C_t)$$

$$U(C) = \frac{C^{1-\sigma}}{1-\sigma}$$

$$\sum_{t=0}^{\infty} \beta^t u(c_t)$$

Capitalists and Workers

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$$R_t^* = f'(k_t) + 1 - \delta$$

$$R_t = (f'(k_t) - \delta)(1 - \tau_t) + 1$$

Capitalists and Workers

$$\max_{\{C_t, K_{t+1}\}} \sum_{t=0}^{\infty} \beta^t U(C_t)$$

$$\text{s.t. } C_t + a_{t+1} = R_t a_t$$

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$$u'(C_t) = \beta R_{t+1} U'(C_{t+1})$$

$$\beta^t U'(C_t) a_{t+1} \to 0$$

$$\sum_{t=0}^{\infty} \beta^t u(c_t)$$

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$$\sum_{t=0}^{\infty} \beta^t u(c_t)$$

$$c_t = f(k_t) - f'(k_t) k_t + T_t$$

$$c_t + C_t + k_{t+1} \leq f(k_t) + (1 - \delta) k_t$$

$$R_t^* = f'(k_t) + 1 - \delta$$

$$R_t = (f'(k_t) - \delta)(1 - \tau_t) + 1$$

Government Budget

Chamley $T_t + R_t b_t = (R_t^* - R_t)\, k_t + b_{t+1}$

Judd $T_t = (R_t^* - R_t)\, k_t$

$$c_t = f(k_t) + (1-\delta)k_t - R_t k_t$$

$$
\begin{aligned}
\max_{C_{-1},\{c_t,C_t,k_{t+1}\}} \sum_{t=0}^{\infty} \beta^t (u(c_t) + \gamma U(C_t)) \\
\text{s.t.}\quad & \beta U'(C_t)(C_t + k_{t+1}) = U'(C_{t-1})k_t \\
& c_t + C_t + k_{t+1} = f(k_t) + (1-\delta)k_t \\
& \beta^t U'(C_t)k_{t+1} \to 0.
\end{aligned}
$$

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$$\mu_0 = 0$$

$$\lambda_t = u'(c_t)$$

$$\mu_{t+1} = \mu_t \left(\frac{\sigma - 1}{\sigma \kappa_{t+1}} + 1 \right) + \frac{1}{\beta \sigma \kappa_{t+1} \upsilon_t} (1 - \gamma \upsilon_t)$$

$$\frac{u'(c_{t+1})}{u'(c_t)} (f'(k_{t+1}) + 1 - \delta) = \frac{1}{\beta} + \upsilon_t (\mu_{t+1} - \mu_t)$$

$\kappa_t \equiv k_t / C_{t-1}$ $\qquad$ $\upsilon_t \equiv U'(C_t)/u'(c_t)$

$$\max_{C_{-1},\{c_t,C_t,k_{t+1}\}} \sum_{t=0}^{\infty} \beta^t (u(c_t) + \gamma U(C_t))$$

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Judd result

$\kappa_t \equiv k_t / C_{t-1}$ $\upsilon_t \equiv U'(C_t)/u'(c_t)$

Judd Result

- **Theorem.** Assume allocation *and* multipliers converge, then the tax on capital is zero.

- Two questions...
  - convergence of multipliers?
  - convergence of allocation?

Log Utility

$$C_t = (1 - s)R_t k_t,$$
$$k_{t+1} = sR_t k_t.$$

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$$R^* = \frac{1}{\beta s}$$

$$R = 1/s$$

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high tax!

Log Utility

- Solution...
  - time consistent
  - converges to steady state at fast rate
- What went wrong with Judd's Theorem? Multipliers diverge
- Lansing (1999): "log is knife-edge case"

$\sigma > 1$ Case

$$\mu_0 = 0$$

$$\mu_{t+1} = \mu_t \left(\frac{\sigma - 1}{\sigma \kappa_{t+1}} + 1 \right) + \frac{1}{\beta \sigma \kappa_{t+1} \upsilon_t} (1 - \gamma \upsilon_t)$$

steady state

$$\mu(\sigma - 1) = -\frac{1}{\beta \upsilon} (1 - \gamma \upsilon) < 0$$

$\sigma > 1$ Case

$$\begin{cases} \mu_0 = 0 \\ \mu_{t+1} = \mu_t \left(\dfrac{\sigma - 1}{\sigma \kappa_{t+1}} + 1 \right) + \dfrac{1}{\beta \sigma \kappa_{t+1} \upsilon_t} (1 - \gamma \upsilon_t) \end{cases}$$

$\gamma = 0$

steady state

$$\mu(\sigma - 1) = -\frac{1}{\beta \upsilon} (1 - \gamma \upsilon) < 0$$

$$0 = \mu_0 \leq \mu_1 \leq \mu_2 \leq \cdots$$

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Proposition.
For $\sigma > 1$ and $\gamma = 0$ solution *cannot* converge to interior steady state.

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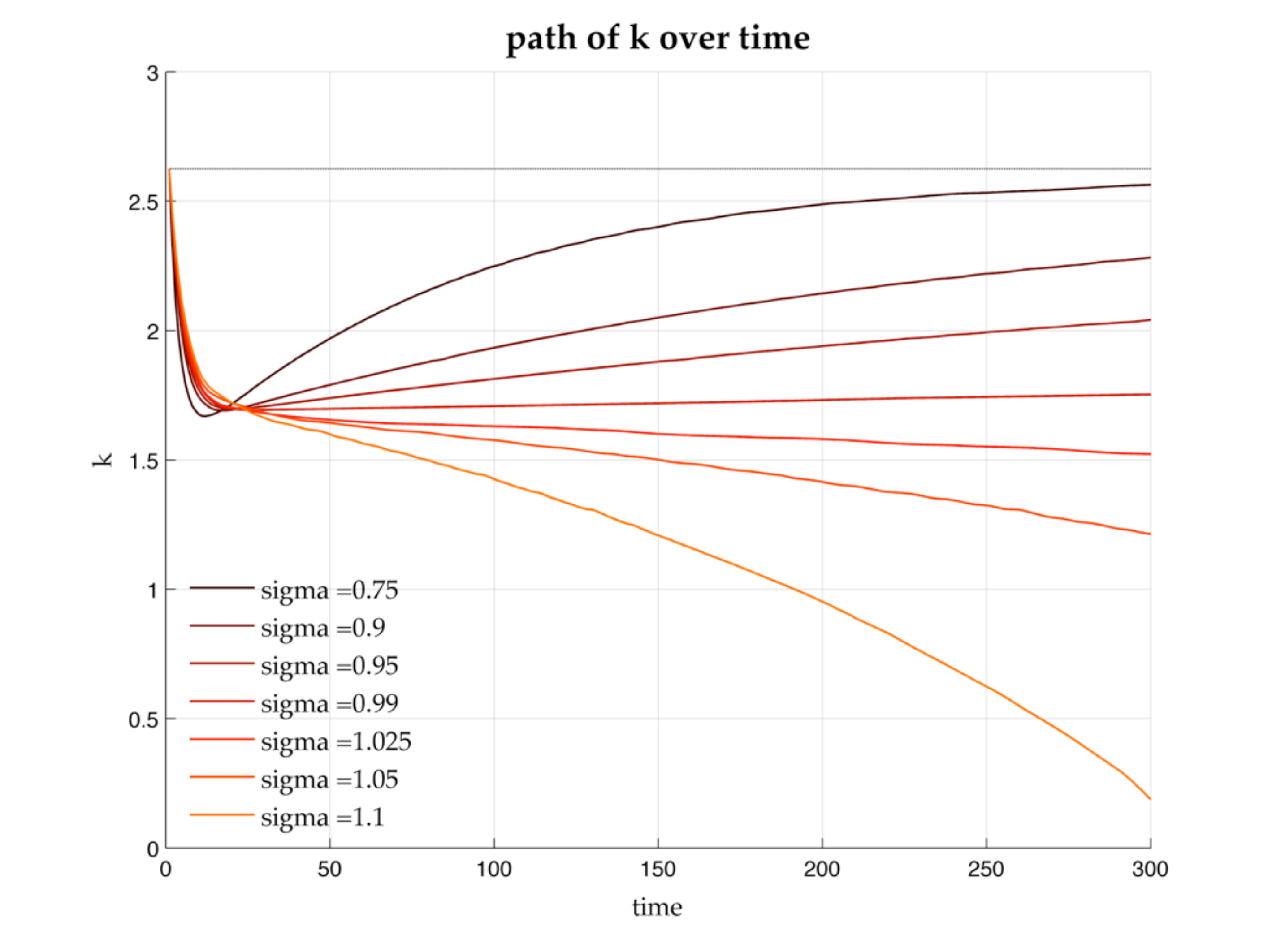
Bellman Equation

$$V(k, C_-) = \max_{(k, C_-)} \{u(c) + \gamma U(C) + \beta V(k', C)\}$$

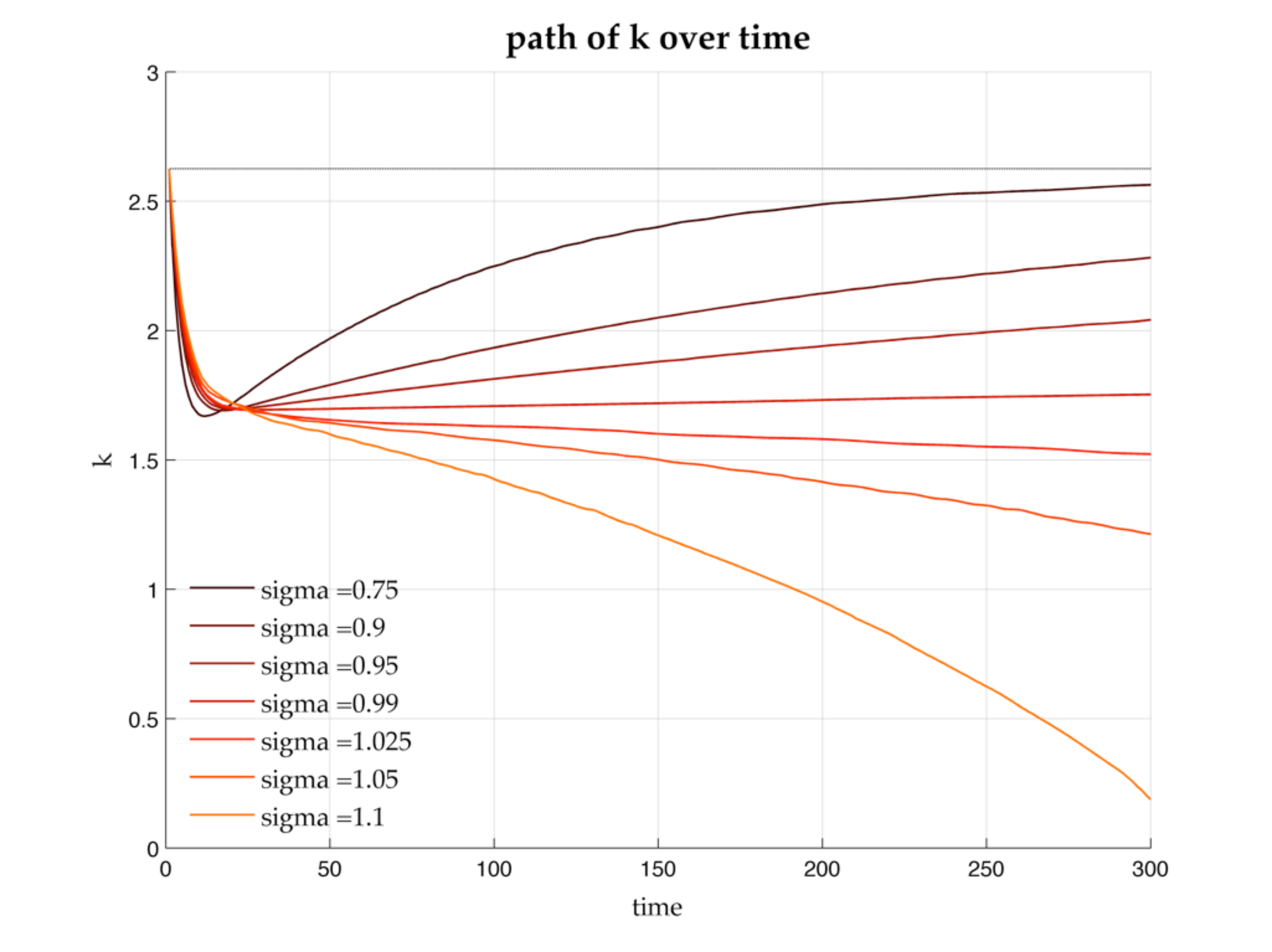
$$\beta U'(C)(C + k') = U'(C_-)k$$

$$c + C + k' = f(k) + (1 - \delta)k$$

$$c, C, k' \geq 0$$

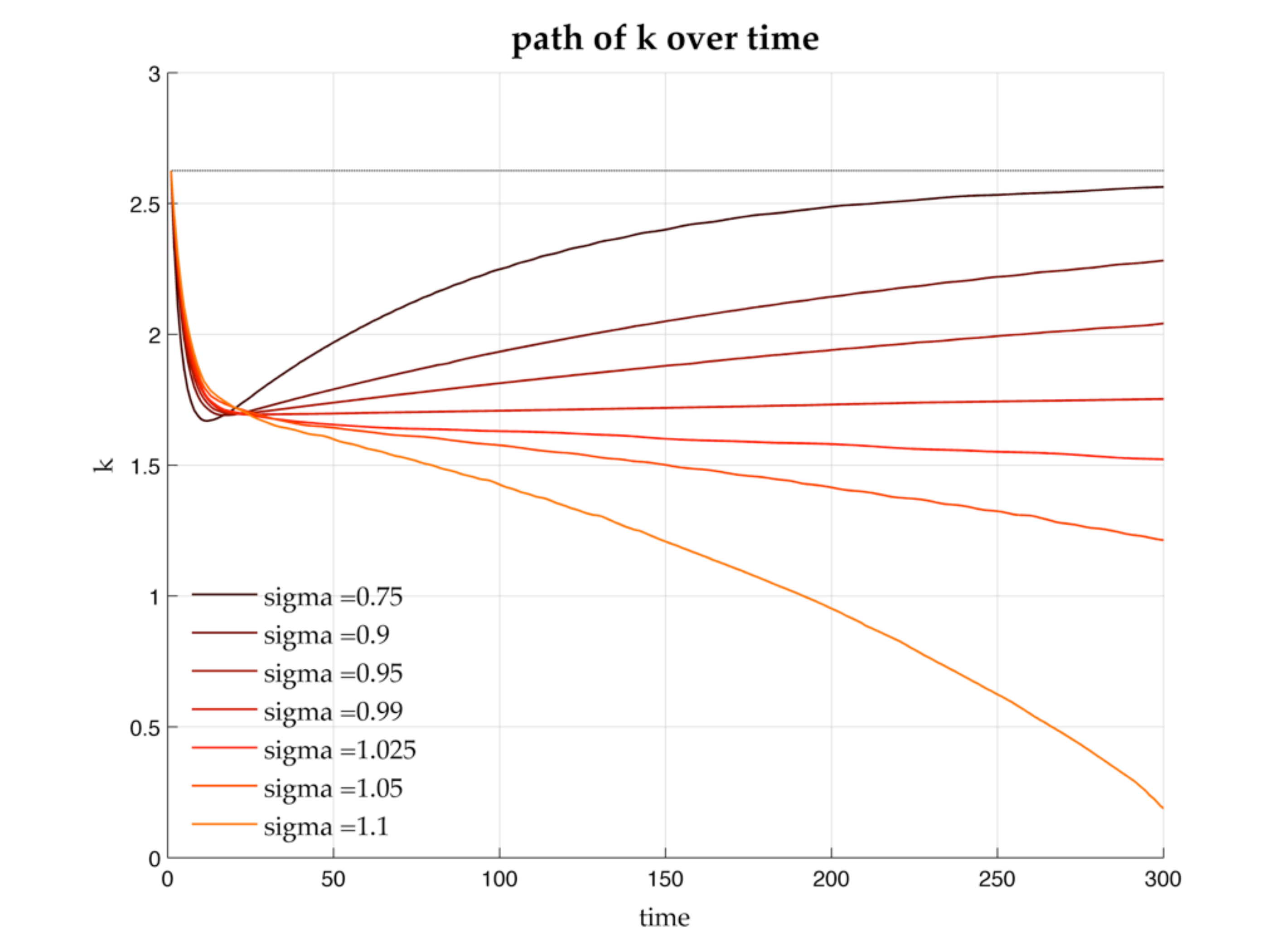


path of k over time
k
time
0
0.5
1
1.5
2
2.5
3
50
100
150
200
250
300
sigma =0.75
sigma =0.9
sigma =0.95
sigma =0.99
sigma =1.025
sigma =1.05
sigma =1.1



$\sigma > 1$
diverges

$\sigma < 1$
converge
slowly



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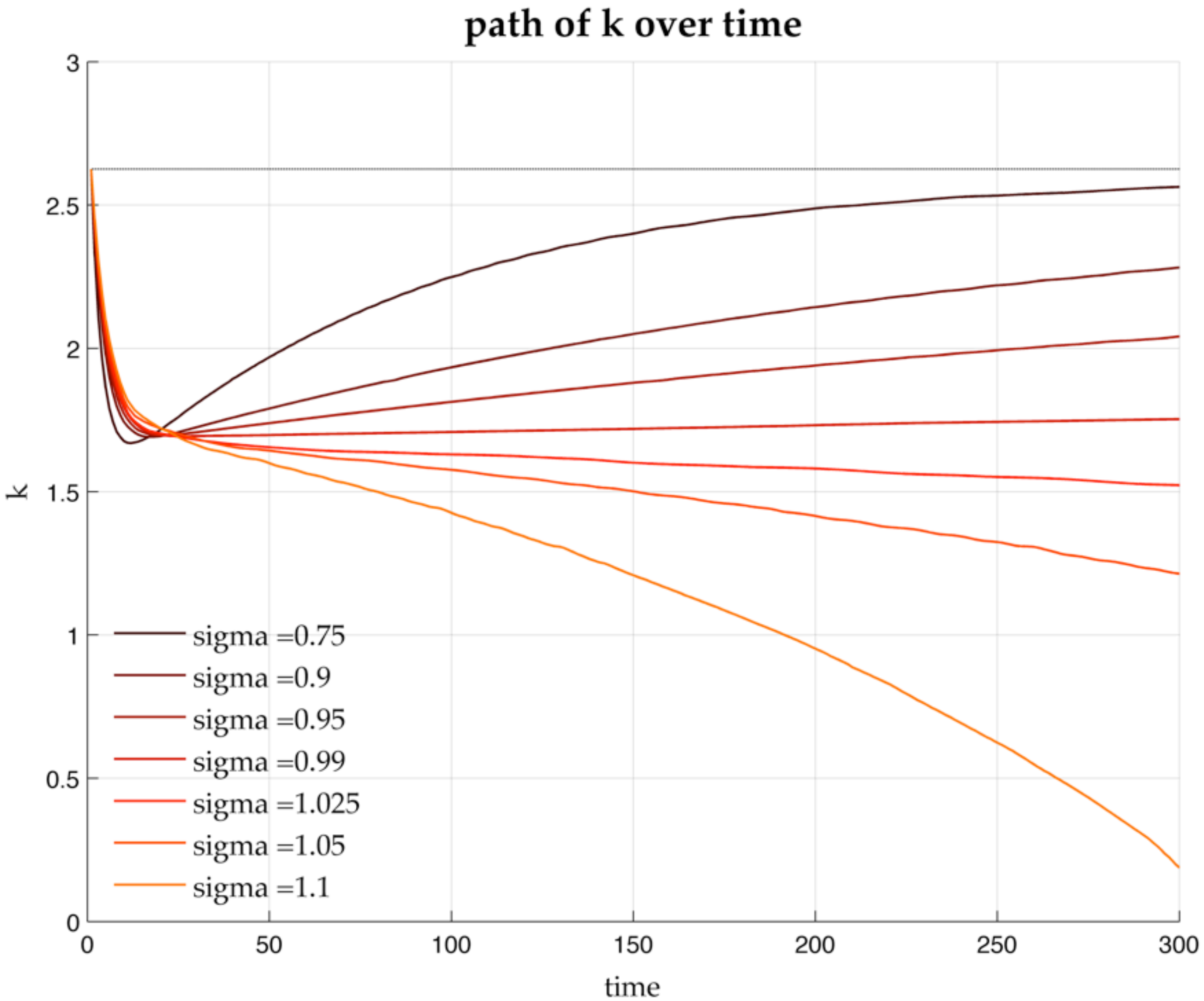
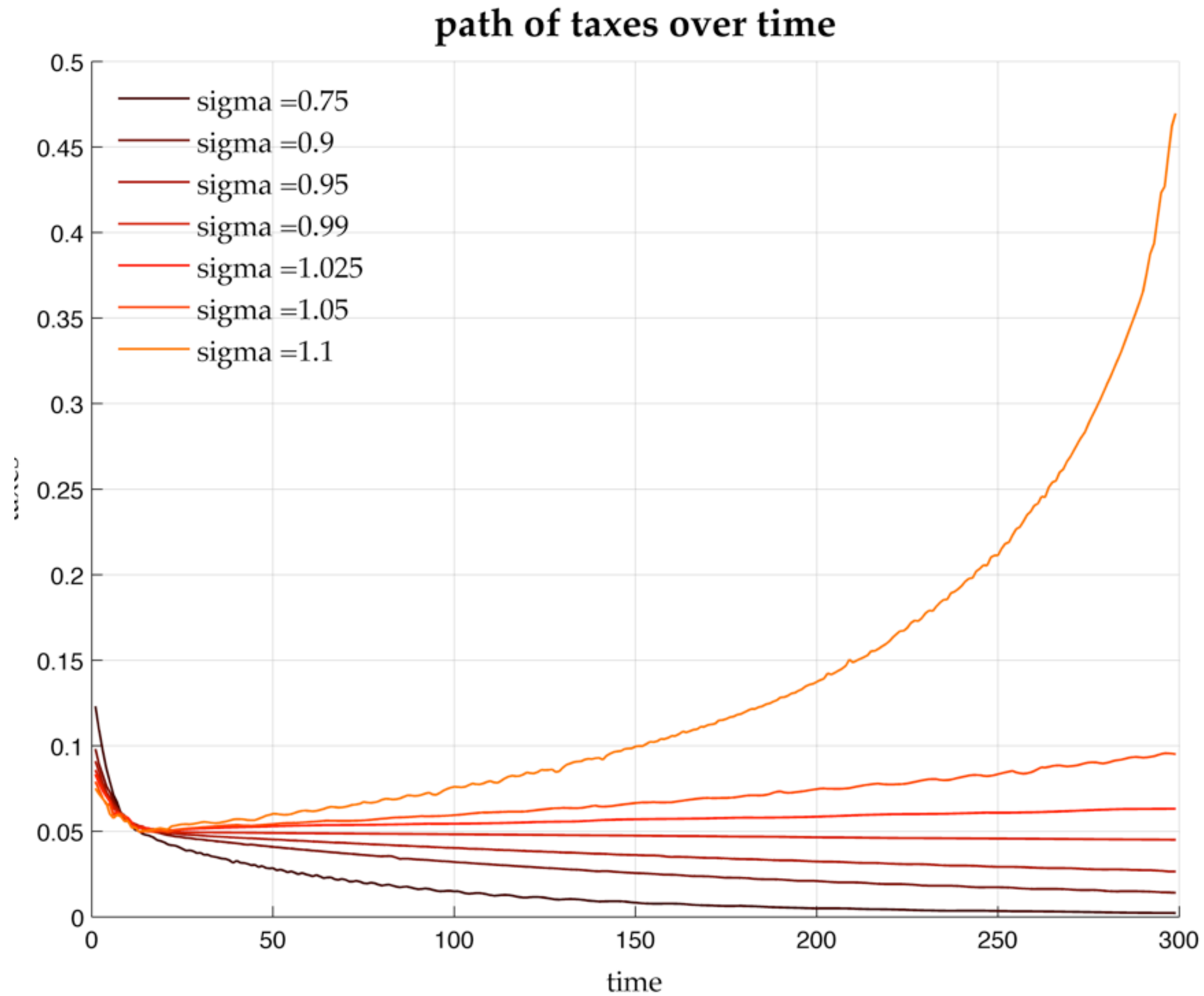
both spend time close to log steady state





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both spend time close to log
steady state

large taxes in both cases

rising for $\sigma > 1$

Intuition

- Solution path continuous in σ
- Log case not knife edge
- Divergence...
  - increase future taxes
  - ... increases current savings
- Convergence...
  - ... lower future taxes, increase current savings
- Note: future manipulation optimal because capital is taxed

Chamley

- Version with heterogeneity (Werning, 2007)
- Add bonds to previous model, two options...
  1. workers cannot save (or tax only at top)
  2. workers can save
- Optimum...
  - high tax rates in short run (ideal = expropriation)
  - government savings from revenue
- Reasonable?

Chamley

- Avoid first best: restrict taxation in short run
  - no expropriation
  - R_1 free
- Two problems with this approach...

Chamley

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  - R_1 free

- Two problems with this approach...

Proposition.
1. $\sigma > 1$ and $\gamma = 0$ first best with $R_1 = 0$
2. as period shrinks → first best, full expropriation

Chamley

- Alternative: maximum tax rate each period
- Chamley: maximum tax 100% of net return
  - tax rate binds only for finite time
  - zero thereafter!
- Here:
  - any bound $\bar{\tau} < 1$
  - workers cannot save

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Proposition.
For $\sigma > 1$ and low enough γ tax at upper bound forever

$$\bar{\tau} < 1 - \frac{K/k}{\sigma}$$

Chamley

- Without constraints...
    - large taxation
    - asset accumulation
    - realistic?
- With constraints...
    - positive steady state taxes

General Savings

$$k_{t+1} = S(R_t k_t; R_{t+1}, R_{t+2}, \dots)$$

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$$\begin{aligned}\max \sum_{t=0}^{\infty} \beta^t \left(u(c_t) + \gamma U(C_t)\right) \\ \text{s.t. } c_t &= f(k_t) + (1-\delta)k_t - R_t k_t \\ C_t &= R_t k_t - S_t \\ k_{t+1} &= S_t.\end{aligned}$$

steady state

$$k = S(kR; R, R, \ldots)$$

steady state

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$$\left(\epsilon_{S,\tau} \equiv \frac{R_\tau}{S}\frac{\partial S}{\partial R_\tau}\right)$$

$$\boxed{\frac{R^*}{R} - 1 = \left(\frac{1}{\beta} - RS_I\right)\frac{1}{RS_I + \sum_{\tau=1}^{\infty}\beta^{-\tau}\epsilon_{S,\tau}}}$$

steady state

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with CRRA $\epsilon_{S,\tau} = -\frac{\sigma - 1}{\sigma} \frac{1 - \beta}{\beta} \beta^\tau$ **sum diverges!**

steady state

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with CRRA $\epsilon_{S,\tau} = -\frac{\sigma-1}{\sigma}\frac{1-\beta}{\beta}\beta^\tau$ **sum diverges!**

- Chamley-Judd
  - does not assume infinite response of long run capital to permanent change in R (Koopmans/Uzawa)
  - infinite elasticity of NPV savings response to very distant R

Chamley-Judd

- Judd...
  - converges to zero slowly
  - may not converge to zero: constant or increasing tax rates
- Chamley...
  - high initial taxation and asset accumulation
  - binding top tax rate: long time or forever
- Case for zero taxation?
- Time inconsistency

r-g

- Judd applied to Piketty
  - linear technology: R and W
  - W grows at rate G=1+g
  - capitalists: log utility, constant savings
- Assume
  - $sR \geq 1$
  - workers: log utility
- How does tax vary with R and G?

r-g

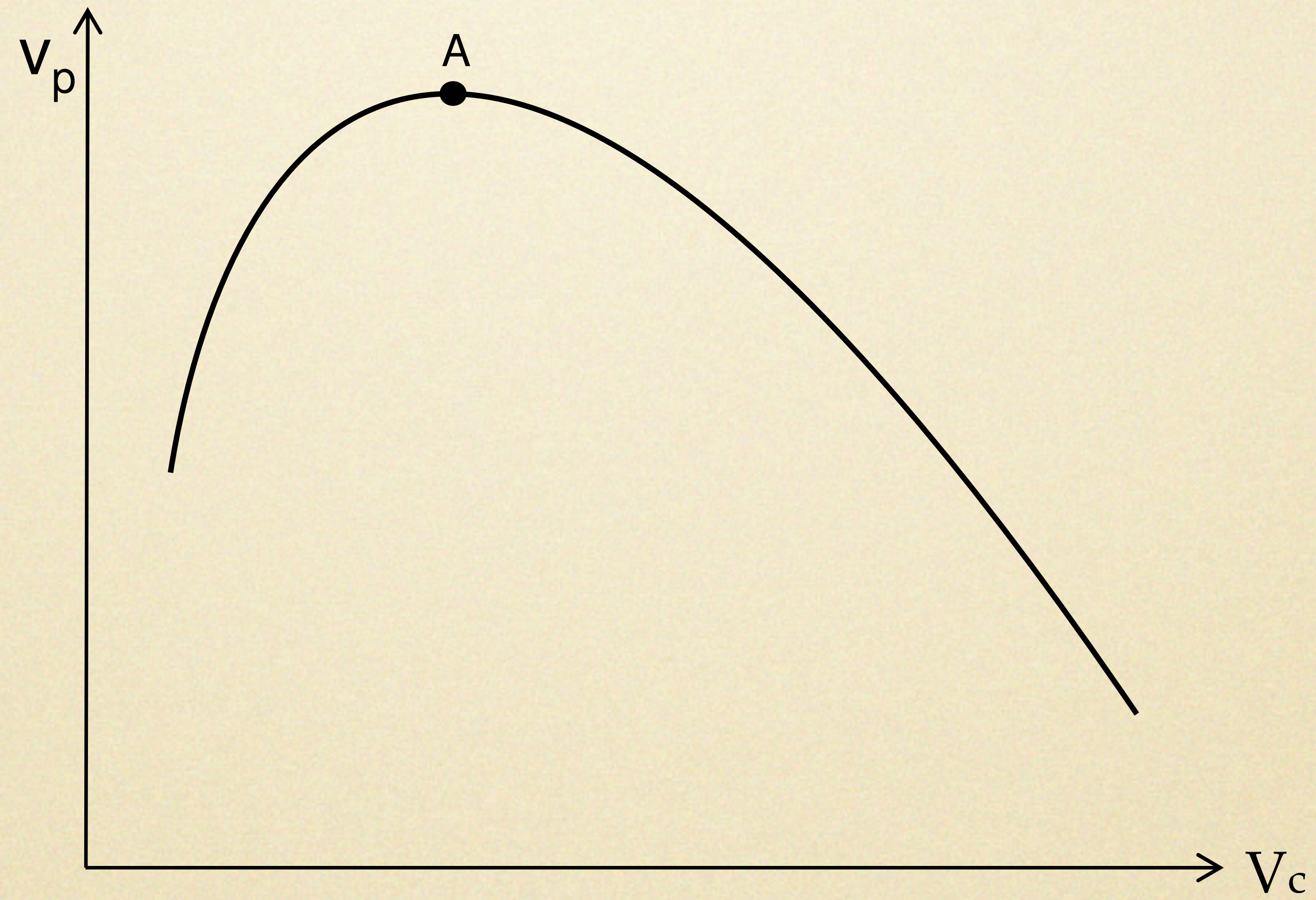
- If $\beta R s = G$ tax constant rate $1 - \beta$
- If $\beta R s > G$
  - tax converges to $1 - \beta$
  - long run tax independent of R, G, s
  - inequality not independent
- If $\beta R s < G$
  - tax rate above $1 - \beta$
  - eventually expropriates
  - inequality extinguished
- Overall: tax rate decreasing in R/G

New Money

New Money

- Non-inherited wealth, saved from labor earnings
- Should we tax it?
- New Money turns into Old Money...
  - inheritances...
  - ... same exact logic?
  - no, we can prepare for it

Weight on Future Generations?



- Vc = Utilitarian average, capture concern for equality (insurance behind veil?)
- Dynamic economy: with no weight, immiseration

Basic Model

- Farhi-Werning (2010)
- Parents

$$u(c_0) - h(n_0) + \beta u(c_1)$$

  - consume and work at t=0
  - child consumes at t=1
- Private information: productivity
- Observable
  - output and bequests (or consumption)
- Best tax systems? Trade-off
  - equality of opportunity for newborns
  - parents incentives

No Weight on Kids

- No weight on kids
- Atkinson-Stiglitz: <u>no tax on bequests!</u>
  - separable preferences
  - nonlinear tax on earnings
- Interpretation
  - nonlinear tax must be optimized
  - disagreements?

Weight on Kids

- Welfare function

$$\begin{aligned} W &= \mathbb{E}[v_0 + \alpha v_1] \\ &= \mathbb{E}[u(c_0) + (\beta + \alpha)u(c_1)] \end{aligned}$$

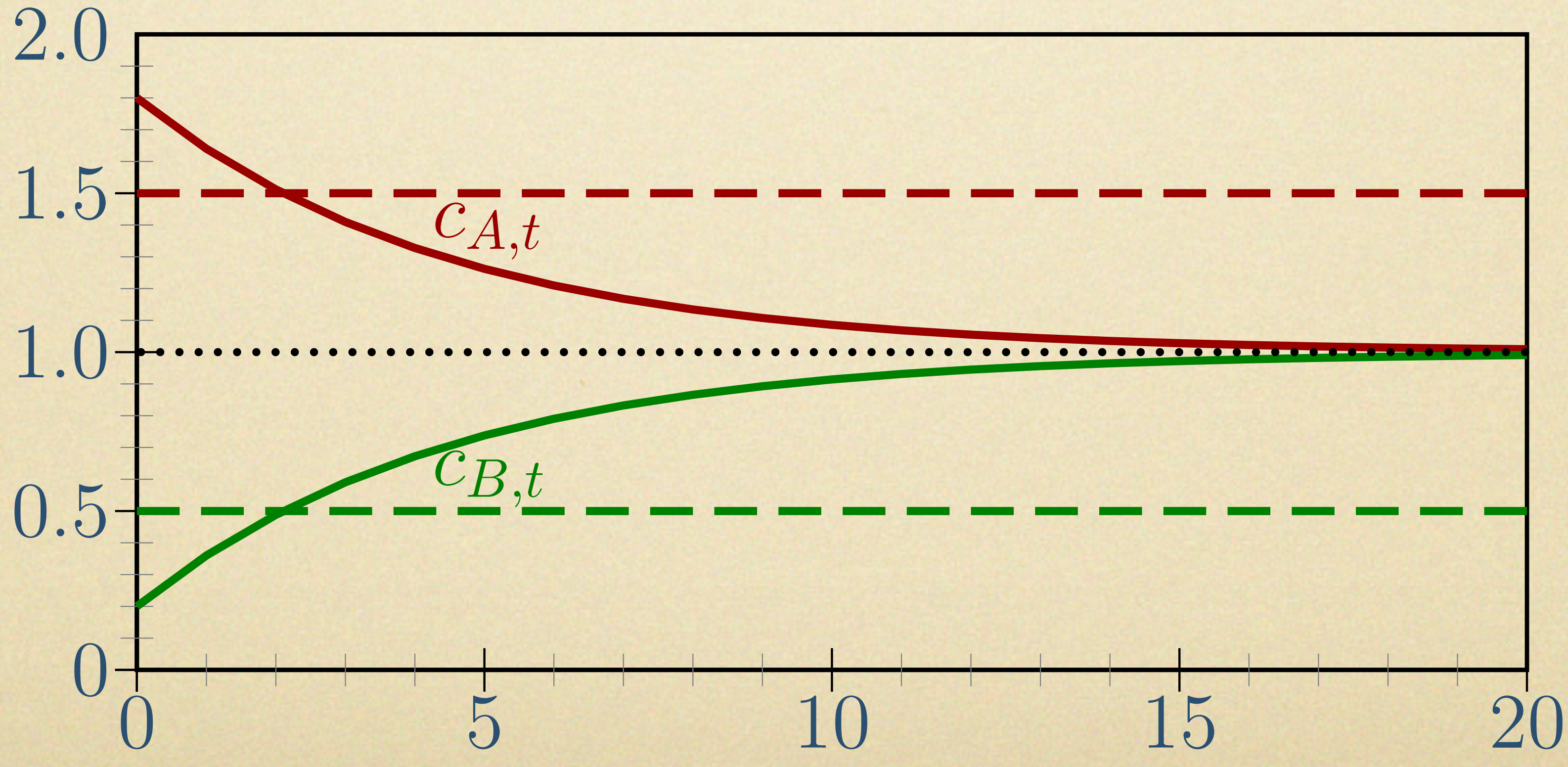
- Double counting? **Yes!** Phelan (2006)

Proposition.
If $\alpha > 0$ $\Rightarrow$ subsidy that falls with bequest

- Progressive tax...
  - marginal tax increasing
  - convex tax schedule T(b)

Weight on Kids

- Intuition...
  1. Pigouvian subsidy: but decreasing marginal utility, decreasing subsidy
  2. Progressive tax creates mean reversion, lowers inequality, raising welfare



Two Properties

- Two properties of optimum...
  - negative marginal tax
  - progressive
- Negative shadow taxes in reality? Yes
  - education and other investments in kids
  - no negative bequests allowed

Positive Taxes

- Assume marginal tax rates restricted arbitrarily to being nonnegative
- What is the optimum? Zero taxation? No.

Proposition. Suppose production F(K) is strictly concave

Nonnegative marginal taxes $\Rightarrow$ positive and increasing above some level

- Intuition: endowment case (F <u>infinitely</u> concave)

Two Perspectives

- Something missing in previous model
- Can we get a positive tax?

- Two perspectives...
  - For children, inheritances pure luck
    → tax and redistribute to level playing field
  - For parents → powerful argument against estate taxation

Mankiw Parable

"Consider the story of twin brothers. **Spendthrift Sam** and **Frugal Frank**. Each starts a dot-com after college and sells the business a few years later, accumulating a $10 million nest egg. **Sam then lives the high life**, enjoying expensive vacations and throwing lavish parties. **Frank lives more modestly.** He keeps his fortune invested in the economy, where it finances capital accumulation, new technologies, and economic growth. **He wants to leave most of his money to his children, grandchildren, nephews, and nieces.**

Ask yourself: **Which millionaire should pay higher taxes?** What principle of social justice says that Frank should be penalized for his frugality? None that I know of."

Basic Model

- Farhi-Werning (2012)
- Reconcile these two perspectives
- Estate taxation as balancing act
    - incentives for altruistic parents
    - equality of opportunity for newborns

Taste Shocks

- Altruism heterogeneity

$$(1-\theta)\log c_0 + \theta \log c_1$$

- Same income (abstract from labor)

- Children

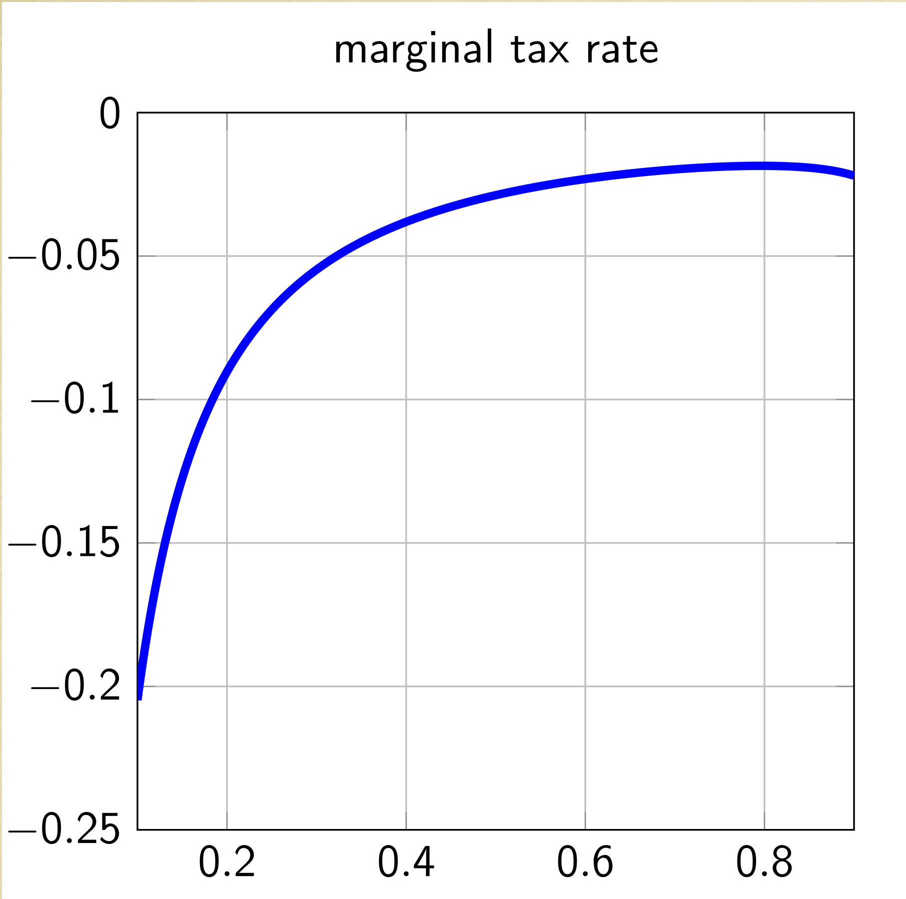
$$U^c(c_1)$$

- Welfare criterion

$$\int \left(\lambda_\theta U^p(c_0(\theta), c_1(\theta); \theta) + \alpha_\theta U^c(c_1(\theta))\right) f(\theta) d\theta$$

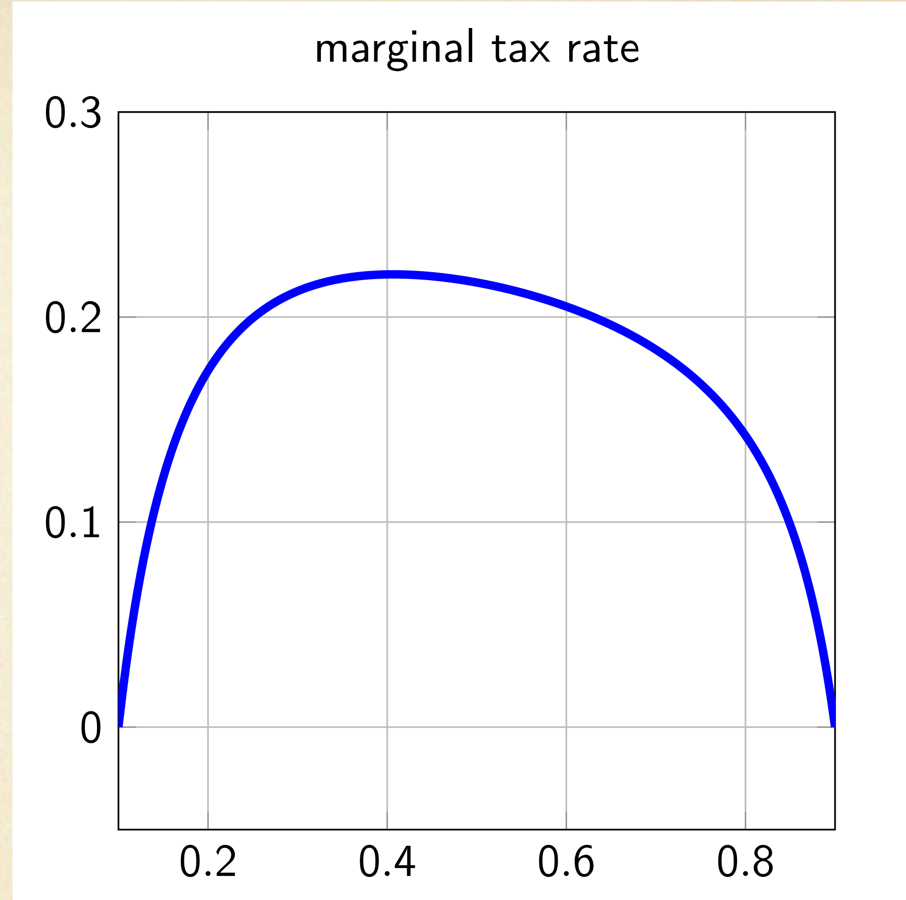
No Weight on Kids

- Positive constant $\alpha_\theta \geq 0$
  - exists λ_θ $\Rightarrow$ progressive subsidy
- Constant or decreasing $\alpha_\theta \geq 0$
  - tax rate higher at top than bottom
  - tax rate non-positive at top



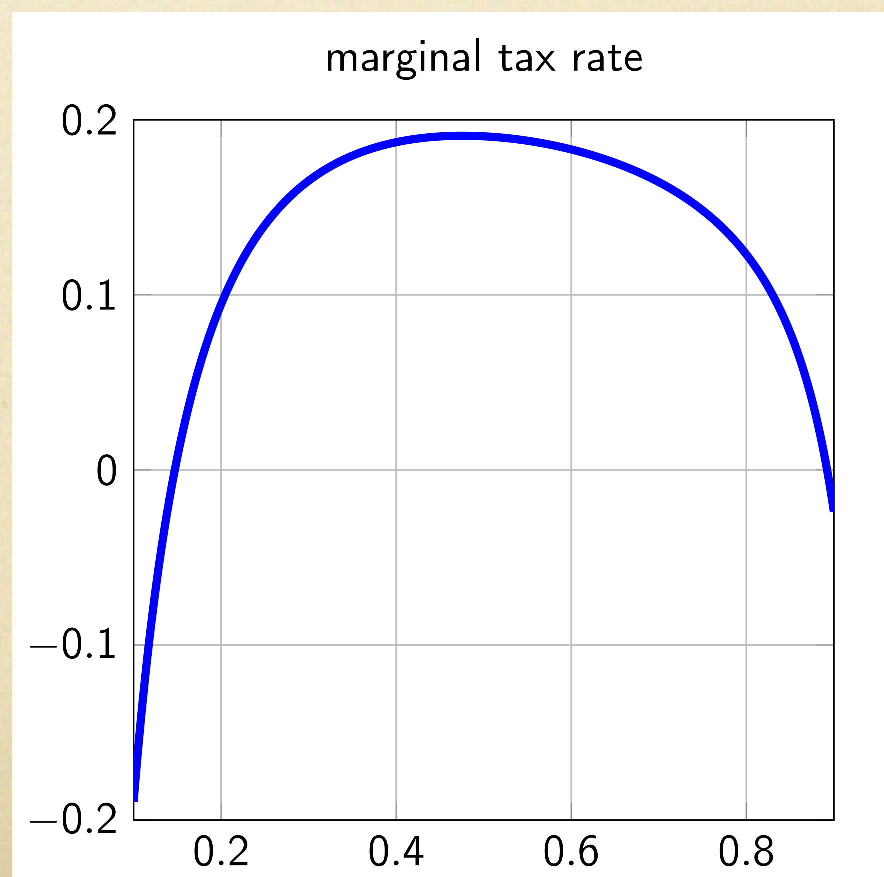
constant weights

λ_θ α_θ



$\alpha_\theta = 0$

λ_θ decreasing



$\alpha_\theta > 0$
constant

Rawlsian

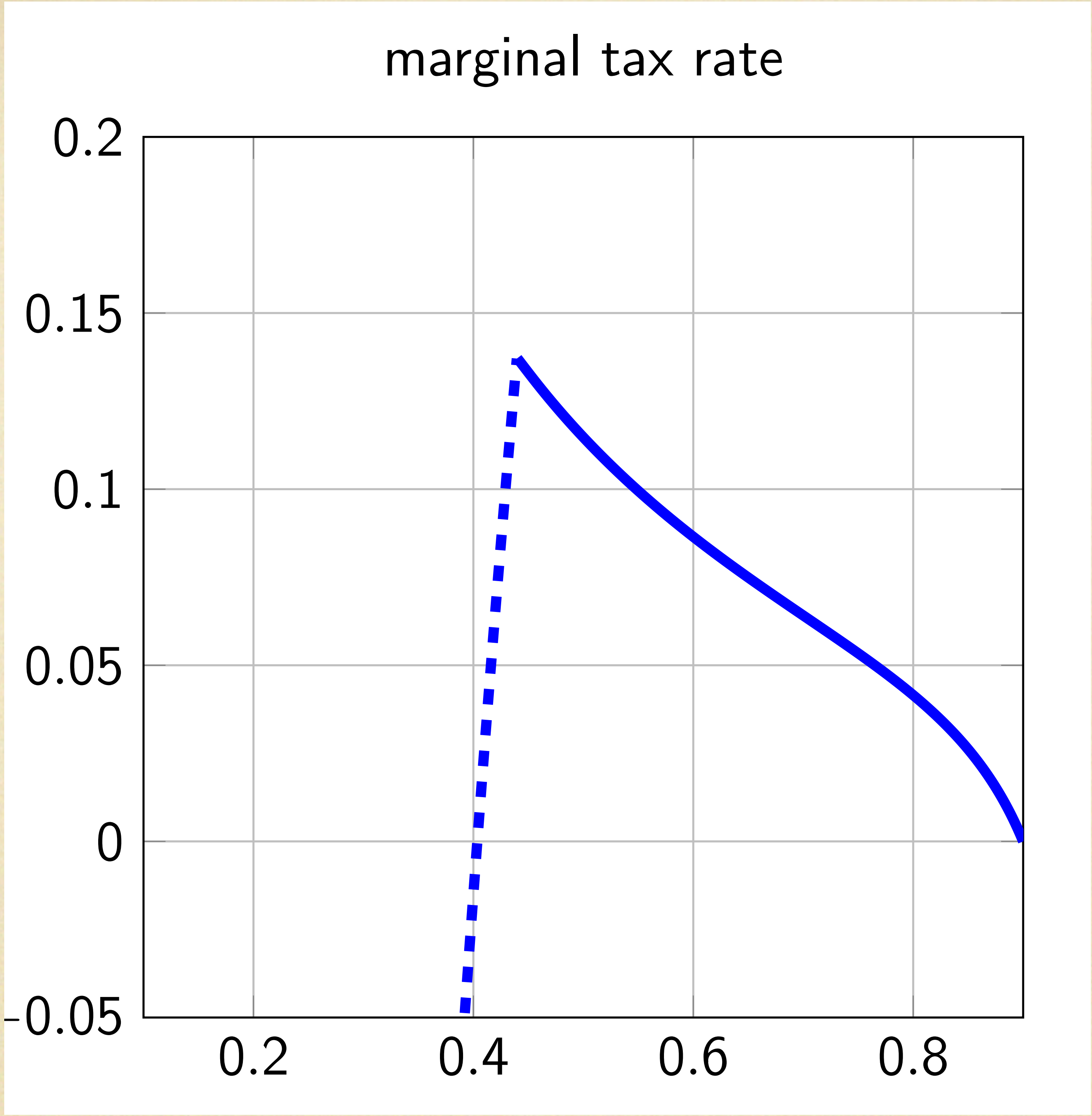
- Rawlsian constraint

$$U^c(c_1(\theta)) \geq \underline{u}$$

- Endogenously decreasing $\alpha_\theta > 0$

Proposition.
Constant λ_θ and Rawlsian on children
$\Rightarrow$ ban on debt, positive taxes

- Intuition
  - ban on debt, satisfy Rawlsian
  - hurt the bottom, need to undo $\Rightarrow$ tax at top



- Binding constraint: subsidy at bottom
- Zero weight on top kids: no subsidy

Take Away

- Can rationalize key features of actual estate tax policy
  - ban on negative bequests
  - positive tax on positive bequests
- Sensitive to welfare criterion
  - welfare function
  - cardinal normalization of utility
- Heterogenous altruism?

Political Economy

Old Money Again

- New money becomes Old Money...
  - ex ante: would <u>not</u> want to tax
  - ex post: temptation to tax and redistribute
- Limited commitment
  - no taxation may not be credible
  - fear of discontent leading to drastic reforms, rise of communism, Chavez?

Political Economy

- How to deal with time inconsistency from redistribution?
- What policies ex ante?

- Redistribution desire depends on inequality
- Inequality is a state variable
- Answer: influence it!

- Compassionate conservative?

Simple Model

- Farhi, Sleet, Werning, Yeltekin (2012)
- Two periods as before...

$$v_0 = u(c_0) - \theta h(n_0) + \beta u(c_1)$$

- No direct extra weight on future
- Ex post: reform unless

$$\int u(c_1) \geq u\left(\kappa \int c_1\right)$$

- Loss of resources κ

Positive Taxes

$$L = \int (u(c_0) + \beta u(c_1)) + \mu \left(\int u(c_1) - u(\kappa \int c_1) \right)$$

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subsidy

tax

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subsidy　　　　　　　　tax

Proposition.
Best credible policy: progressive tax, positive and negative

Intuition

- Intuition

$$\mathbb{E}u(c_1) \geq u(\kappa \mathbb{E}c_1)$$

- Power utility functions

$$\frac{\mathbb{CE}_u[c_1]}{\mathbb{E}[c_1]} \geq \hat{\kappa}$$

inequality measure

- Extra saving from...
  - poor: reduces inequality, subsidy
  - rich: increases inequality, tax

R vs G again

Political Economy

- Farhi Werning (2014)
- Parent and child

$$(1-\theta)\log(c_0)+\theta\log(c_1-e_1)$$

$$\log(c_1)$$

- Similar to warm glow
- Credibility constraint

$$\int \log(c_1) \geq \log\left(\int c_1\right) - \kappa$$

- Endowment growth: G = 1 + g

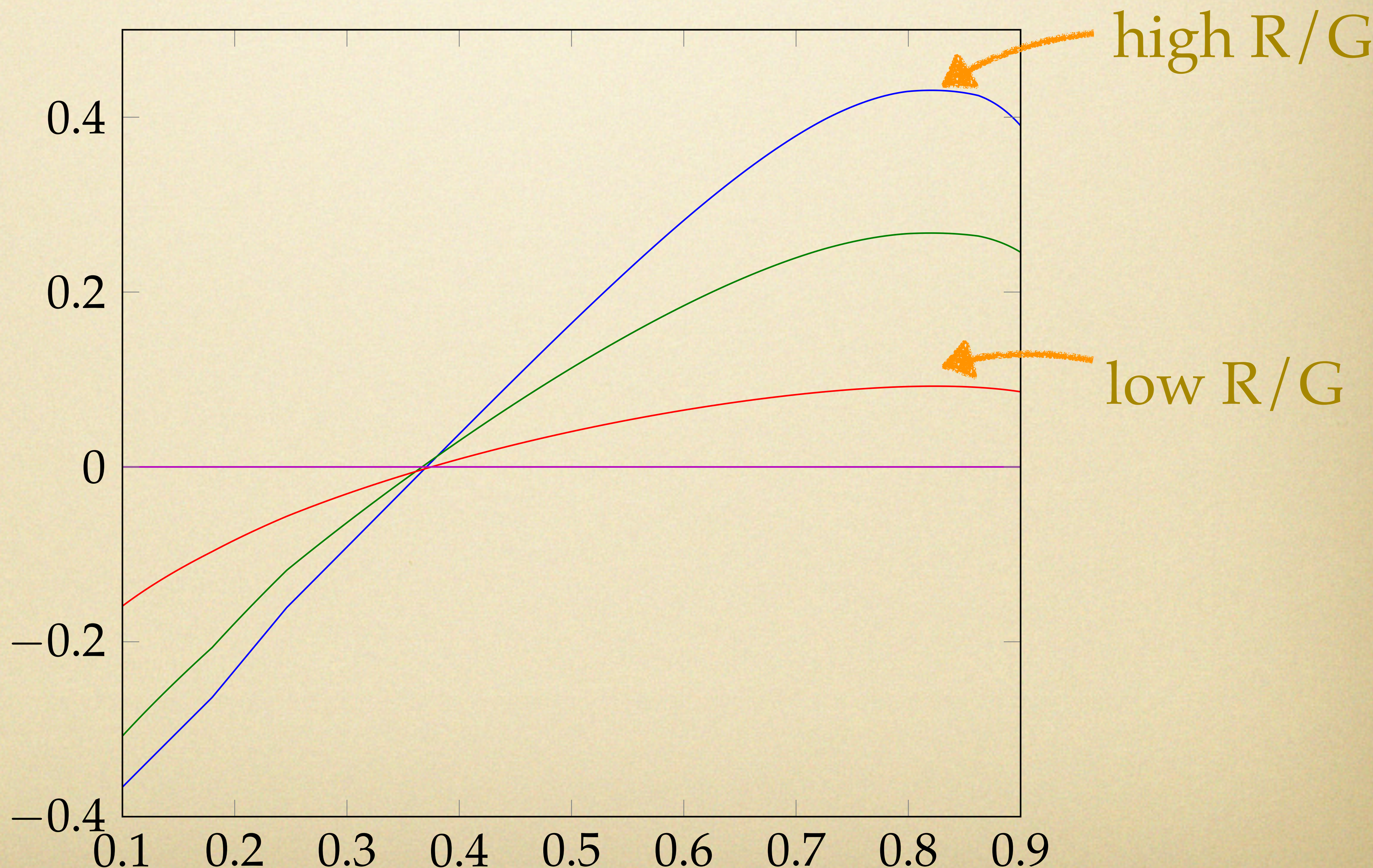
Linear Taxes

$$c_0(\theta) = (1-\theta)I$$

$$c_1(\theta) = \theta I \frac{R}{1+\tau} + e_1$$

Proposition. (Simple Taxes)
For low R/G credibility constraint not binding and optimum has no tax. For higher R/G credibility binds and tax increases in R/G.

Proposition. (Nonlinear Taxes)
Optimal taxes only depend on R and G through R/G.



Conclusions

- **Old Money**
  - commitment: may tax in long run
  - no commitment: greater problem?
- **New Money**
  - commitment: subsidize/tax inheritances, progressive
  - no commitment: progressive taxes
- **Role for r - g**
  - commitment: works other way
  - no commitment: more progressive