

# **Fiscal Capacity and Economic Development**

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## **What is development?**

- Not just raising income per capita
- Profound changes in economic organization
- A key aspect of this is increasing state effectiveness.

## State Building

"(T)he process of increasing the administrative, fiscal and institutional capacity of governments to interact constructively with their societies and to pursue public goals more effectively." Brautigam (2008)

- It is purposeful activity which is the product of history, geography, culture etc.
- Political institutions are an important reflection of this.

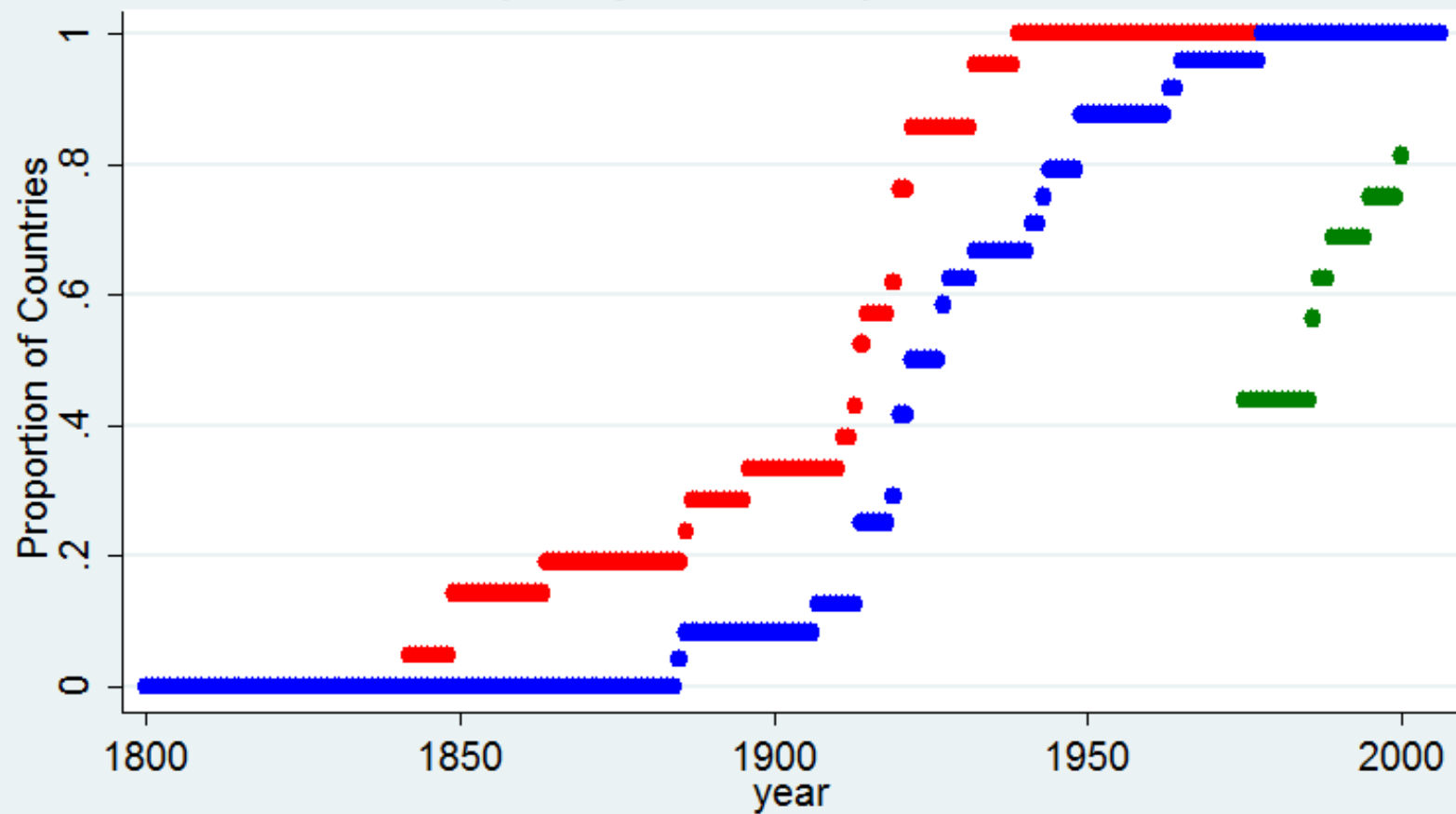
## State Building

- Two core aspects of state building:
  - effective legal systems
  - building fiscal structures
    - \* A symptom of this is the change in the level and composition of tax revenues

## This Talk

- Will discuss a political economy model of incentives to build fiscal capacity.
  - provides a simple way of contrasting the social planning outcome and the political forces
    - \* stability
    - \* cohesiveness
- Will apply this to thinking about the switch from trade to income taxes in the process of economic development.
- Will also discuss some of the evidence

### Fiscal capacity in a sample of 22 countries



- Income Tax
- Income Tax Withholding
- VAT (data since 1975)

## Background

- This talk is based on some joint papers with Torsten Persson
  - "The Origins of State Capacity: Property Rights, Taxation and Politics" AER September 2009
  - "State Capacity, Conflict and Development" Econometrica, January 2010.
  - "Weak States and Steady States: The Dynamics of Fiscal Capacity" (joint with Ethan Ilzetski) April 2010
  - "From Trade Taxes to Income Taxes: Theory and Evidence on Fiscal Capacity and Economic Development" April 2010

## Other Work/Big Picture

- Historians and sociologists: Brewer, Schumpeter, Tilly, Weber.
- Work on institutions particularly by Daron Acemoglu and Jim Robinson
- Dynamic political economy literature
  - Acemoglu, 2005, JME
  - Battaglini and Coate, 2008, AER.



## Basic Ideas I

- Economics
  - Policy is constrained by standard constraints
    - \* information and government budget constraint
  - But also by administrative constraints
    - \* enforcement and compliance
  - The latter can be influenced by investments which have long-term pay-offs.

## Example

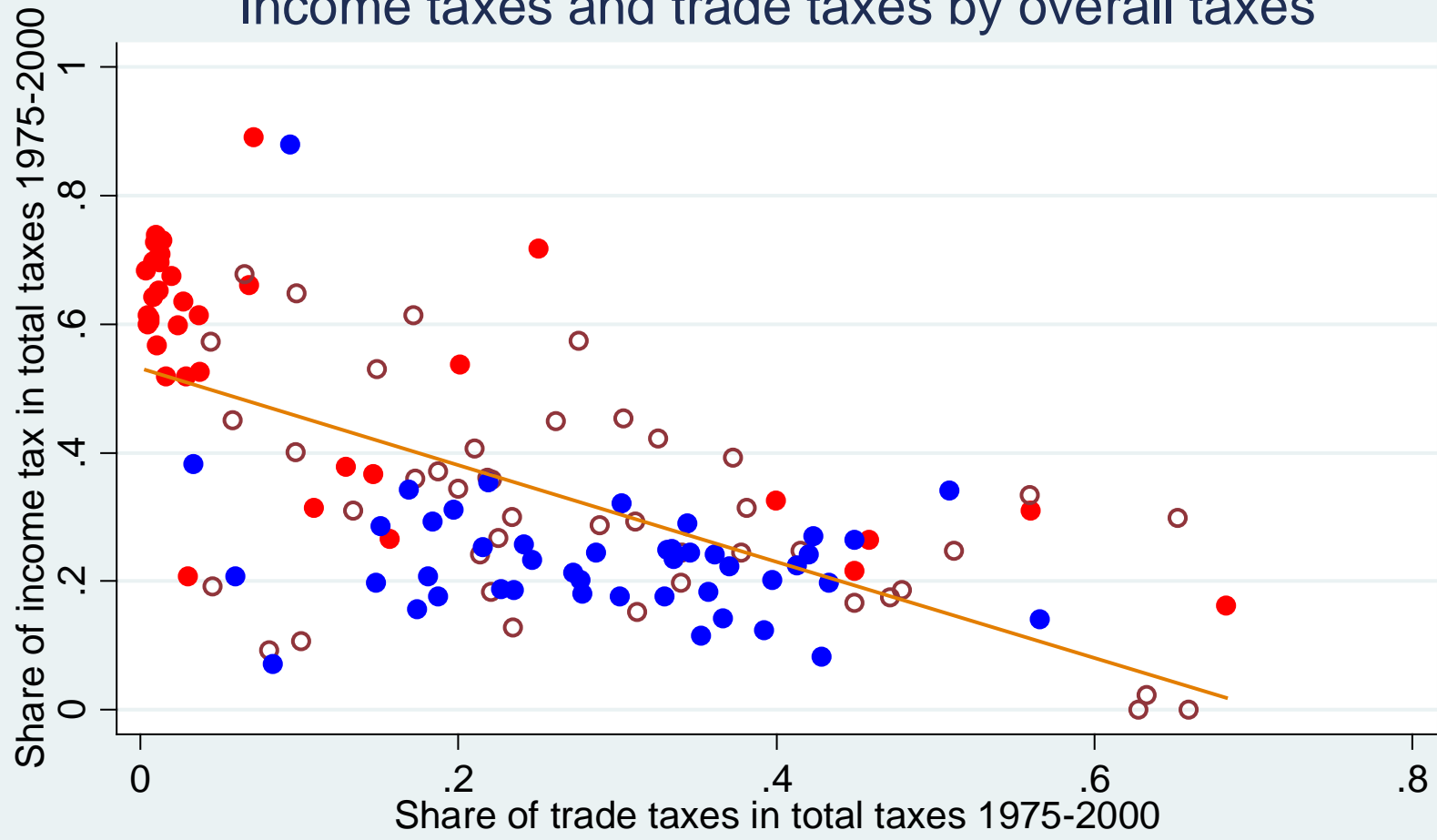
- Introducing an income tax requires setting up a system to measure income and to ensure compliance
- This is why income taxes tend to be more limited in low income countries.
- The following two charts illustrate this.

# Income taxes and trade taxes by GDP



- High income in 1980
- Mid income in 1980
- Low income in 1980
- Fitted values

# Income taxes and trade taxes by overall taxes



- Overall taxes > 25% of GDP
- Overall taxes < 15% of GDP
- Overall taxes 15-25% of GDP
- Fitted values

## Basic Ideas II

- Politics
  - Institutions, culture etc. influence how policy decisions are made
  - Static
    - \* how is a given pot of resources allocated?
  - Dynamic
    - \* how is political control transferred over time?

## Model Overview

- Each period a government chooses how much to spend on transfers and public goods financed by taxation.
- In period one the government can invest in state institutions which improve ability to raise an income tax (fiscal capacity).
- Institutions and existing state capacity constrain the government and affect the probability of turnover.
- Will work with some extreme simplifying assumptions to make the logic of the mechanism clear.

## Basics

- Infinite discrete time indexed by  $s = 0, 1, 2, \dots$
- Two equal-sized groups  $A$  and  $B$ 
  - At  $s$  one group is incumbent, denoted  $I_s \in \{A, B\}$  and the other group is in opposition,  $O_s \in \{A, B\}$
- In the next period, other group takes over,  $I_{s+1} \neq I_s$ , with exogenous probability  $\gamma$  – i.e., incumbent stays in power,  $I_{s+1} = I_s$ , with probability  $1 - \gamma$  so  $\gamma$  parametrizes political instability

## Preferences, public and private goods

- All individuals have equal endogenous per capita endowments  $\omega$ , which can be transformed one for one into private or public goods.

- Quasi-linear utility functions

$$u_s^J = \alpha V(g_s) + x_s^J, \quad J \in \{I, O\}$$

where  $x^J$  private consumption,  $g$  supply of public goods,  $V(g)$  increasing and concave

- $\alpha$  shifts the value of public goods – "war risk and defence"



## Fiscal capacity – economic institutions

- incumbent enters period  $s$  with  $\tau_s$  units of fiscal capacity which sets a maximum for income tax rate in  $s$ ,  $t_s \leq \tau_s$ 
  - $\tau_s$  depreciates at rate  $\delta$ , but it can be augmented in  $s$  (or scrapped) for  $s + 1$  by investment

$$\tau_{s+1} - (1 - \delta)\tau_s$$

at constant cost  $c$

- $\tau$  has technological upper bound at  $\bar{\tau}$

**Assumption 1:**  $\omega > 2c\delta$

## Political institutions

- Incumbents must give fixed share  $\sigma$  to opposition of any given unit of transfers to its own group

$$r_s^O \geq \sigma r_s^I$$

where  $\theta = \frac{\sigma}{1+\sigma} \in [0, \frac{1}{2}]$  represents more “inclusive”.

- institutions the closer is  $\theta$  to its maximum of  $\frac{1}{2}$  interpret as more checks & balances or better representation

## Policy in period $s$

- Incumbent  $I_s$  sets a budget  $\{t_s, g_s, r_s^O, r_s^I, \tau_{s+1}\}$  subject to

$$t_s \omega \geq g_s + c(\tau_{s+1} - (1 - \delta)\tau_s) + \frac{r_s^I + r_s^O}{2}$$

plus constraints on tax rate and transfers

- Private consumption of group  $J$  is

$$x_s^J = (1 - t_s)\omega + \beta^J [t_s \omega - g_s - c(\tau_{s+1} - (1 - \delta)\tau_s)]$$

where  $\beta^I = 2(1 - \theta)$  and  $\beta^O = 2\theta$ .

- $\beta^I \geq 1$  implies that  $I_s$  always sets  $t_s = \tau_s$

## Indirect utility and value functions

- Indirect utility of group  $J$  in  $s$

$$W(\tau_s, g_s, \tau_{s+1}, \beta^J) = \alpha V(g_s) + (1 - \tau_s)\omega + \beta^J [\tau_s\omega - g_s - c\tau_{s+1} - (1 - \delta)\tau_s]$$

- Markovian decision problem with value function  $U^I(\tau)$  recursively defined by

$$U^I(\tau) = \max_{\tau', g} \left[ W(\tau, g, \tau', 2(1 - \theta)) + (1 - \gamma)U^I(\tau') + \gamma U^O(\tau') \right]$$

subject to  $\omega\tau \geq g + c(\tau' - (1 - \delta)\tau)$   
and  $\tau' \leq \bar{\tau}$ .

where time index suppressed,  $\tau'$  denotes  $\tau$  in next period

## Equilibrium concept

- Let  $G(\tau)$  and  $T(\tau)$  be solution to  $I$ 's problem and define

$$U^O(\tau) = W(\tau, G(\tau), T(\tau), 2\theta) + \gamma U^I(T(\tau)) + (1 - \gamma) U^O(T(\tau))$$

- A **Differentiable Symmetric Markov Perfect Equilibrium** of the dynamic state capacity game is a set of functions  $U^I(\tau)$ ,  $U^O(\tau)$ ,  $G(\tau)$  and  $T(\tau)$ , with one point of non-differentiability where  $\omega\tau \geq g + c(\tau' - (1 - \delta)\tau)$  holds with equality
- Analyze the properties of  $G(\tau)$  and  $T(\tau)$ , and how they vary with parameters:  $\alpha, \theta, \delta, \omega$  and  $c$

## Characterizing Equilibrium

- Optimality conditions for  $g$  and  $\tau'$

$$\alpha V_g(g) = \lambda + 2(1 - \theta)$$

where  $\lambda$  is multiplier on non-negative transfer constraint i.e.,  $\lambda = 0$  when  $\omega\tau \geq g + c(\tau' - (1 - \delta)\tau)$  is not binding

$$c\alpha V_g(g) \leq (1 - \gamma) U_\tau^I(\tau') + \gamma U_\tau^O(\tau')$$

which holds with equality as long as  $\tau' \leq \bar{\tau}$  not binding

- This is the **state building** condition.

## Cutoffs and two regimes for fiscal capacity

- Maximal demand for public goods implicitly defined by

$$\alpha V_g(\hat{g}) = 2(1 - \theta)$$

when public goods equal in value to transfers towards incumbent's group

- Lindahl-Samuelson optimum when  $\theta = \frac{1}{2}$

- Corresponding cutoff point for fiscal capacity given parameters, we have unique value  $\hat{\tau}$  such that
  - $\tau < \hat{\tau}$  *common-interest* regime – no transfers paid, given investments in fiscal capacity, tax revenue used for public goods
  - $\tau \geq \hat{\tau}$  *redistributive* regime – public goods fixed at  $\hat{g}$ , given investments in fiscal capacity, tax revenue used for transfers



## Generalized Euler Equation – $\tau < \hat{\tau}$

- Equilibrium path of fiscal capacity in common-interest regime:

$$\begin{aligned} c\alpha V_g(g) &= \alpha V_g(g') [\omega + c(1 - \delta)] - \omega \\ &\quad - \{ (1 - \gamma) [\alpha V_g(g'') (\omega + c(1 - \delta)) - \omega - c\alpha V_g(g')] \\ &\quad + \gamma [\alpha V_g(g'') (\omega + c(1 - \delta)) - \omega - c\alpha V_g(g')] \} T_\tau(\tau') \end{aligned}$$

- LHS: opportunity cost of accumulating fiscal capacity
  
- RHS
  - 1st line: next period's net benefit of fiscal capacity
  
  - 2nd line: strategic effect on accumulation for two periods hence if incumbent holds on to power
  
  - 3rd line: strategic effect on accumulation for two periods hence if incumbent is replaced

## Generalized Euler Equation – $\tau < \hat{\tau}$

- Equilibrium path of fiscal capacity in redistributive regime

$$\begin{aligned} c\alpha V_g(g) = & 2(1-\theta)(1-\gamma)[\omega + c(1-\delta)] - \omega \\ & + 2\gamma\theta [\omega + c(1-\delta) - cT_\tau(\tau')] \\ & - \{(1-\gamma)[\alpha V_g(g'')(\omega + c(1-\delta)) - \omega - 2(1-\theta)c] \\ & + \gamma[\alpha V_g(g'')(\omega + c(1-\delta)) - \omega - 2\theta c]\} T_\tau(\tau') \end{aligned}$$

- LHS: opportunity cost of accumulation,  $V_g(g) = 2(1 - \theta)$
- RHS:
  - 1st-2nd lines: next period's net benefit of fiscal capacity given that higher revenue is spent on transfers by next incumbent
  - 3rd-4th lines: strategic effect on accumulation for two periods hence if incumbent holds on to power or is replaced
- Generally different from standard dynamic programming problem since need to know the properties of decision rule  $\tau' = T(\tau)$  over the entire state space

## Pigovian Benchmark ( $\theta = 1/2$ and $\gamma = 0$ )

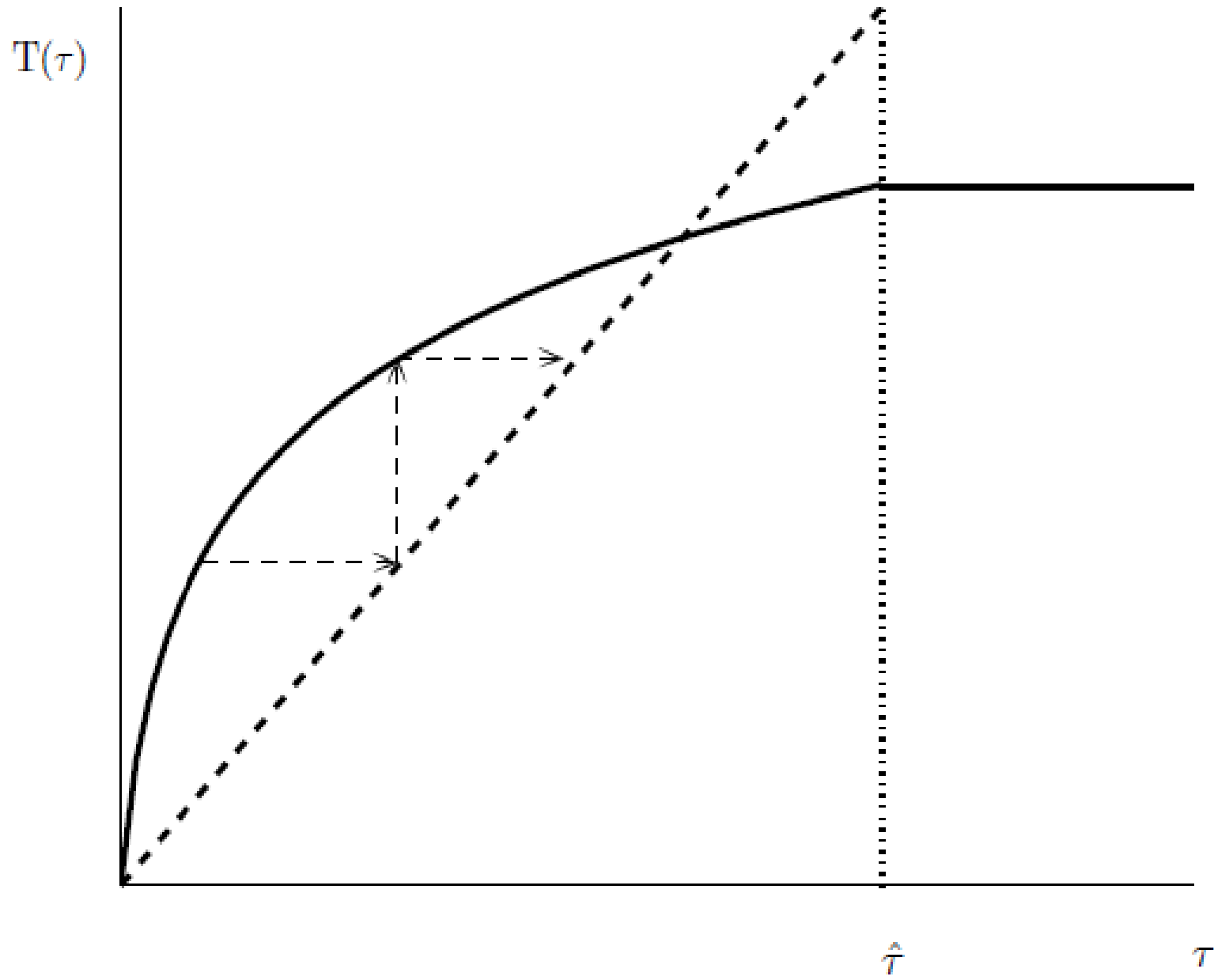
**Proposition 1** *An economy governed by a Pigovian planner has a unique steady state with public good provision and fiscal capacity*

$$\alpha V_g(g^*) = \frac{\omega}{\omega - c\delta} > 1 \quad \text{and} \quad \tau^* = \frac{g^*}{\omega - c\delta} < \hat{\tau} .$$

*This steady state is globally stable. The economy cannot be in the redistributive regime for any period  $s > 0$ : if  $\tau_0 > \hat{\tau}$ , the economy immediately jumps to  $\tau_1 \leq \hat{\tau}$ .*

## Properties and comparative statics of steady state

- Fewer public goods than Lindahl-Samuelson prescription
  - any level of public goods requires recurrent spending to maintain fiscal capacity necessary to fund it
- Cross-sectionally, level of public goods and fiscal capacity would be higher when  $\alpha$  is higher,  $\omega$  is higher, and  $c$  or  $\delta$  are lower.



## Political Equilibria

### Two key conditions

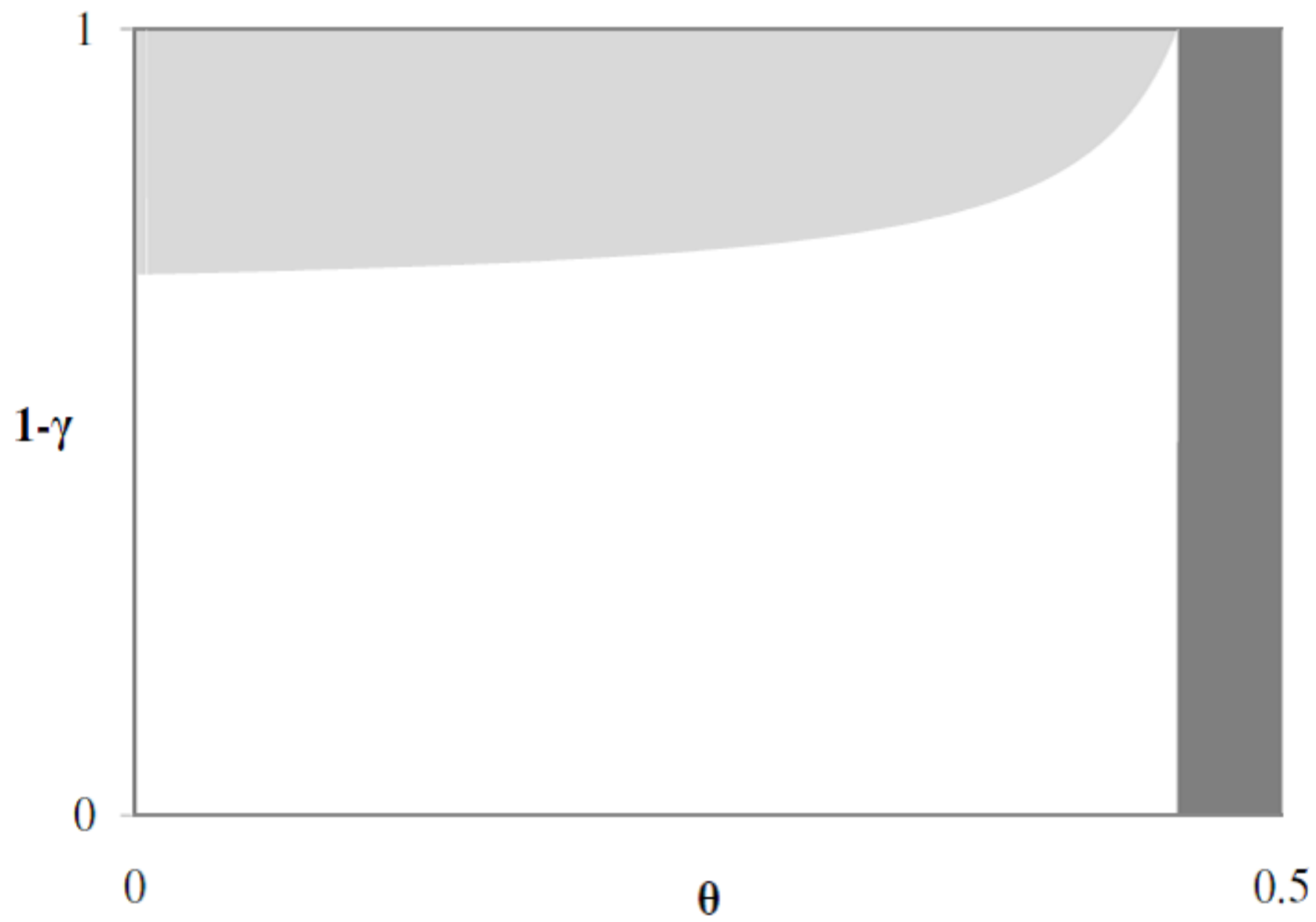
**The Cohesiveness Condition:**  $2(1 - \theta) \leq \frac{\omega}{\omega - c\delta}$

- will hold if  $\theta$  is close enough to  $\frac{1}{2}$  as  $\text{RHS} > 1$  and will fail for  $\theta$  close enough to zero by Assumption 1

**The Stability Condition:**  $(1 - \gamma)(1 - 2\theta) + \theta > \frac{(1 - \theta)c + \frac{\omega}{2}}{c(1 - \delta) + \omega}$

- will hold if  $\theta$  and/or  $\gamma$  is close enough to zero and will fail for high enough  $\gamma$





## Adjustment to common-interest steady state

**Proposition 2** *If the Cohesiveness Condition holds there is a unique common-interest steady state with  $\tau^C = \tau^*$  equal to the Pigovian benchmark in Proposition 1. This steady state is globally stable: an economy converges there from any level of state capacity and may remain in a redistributive regime for no longer than a single period.*

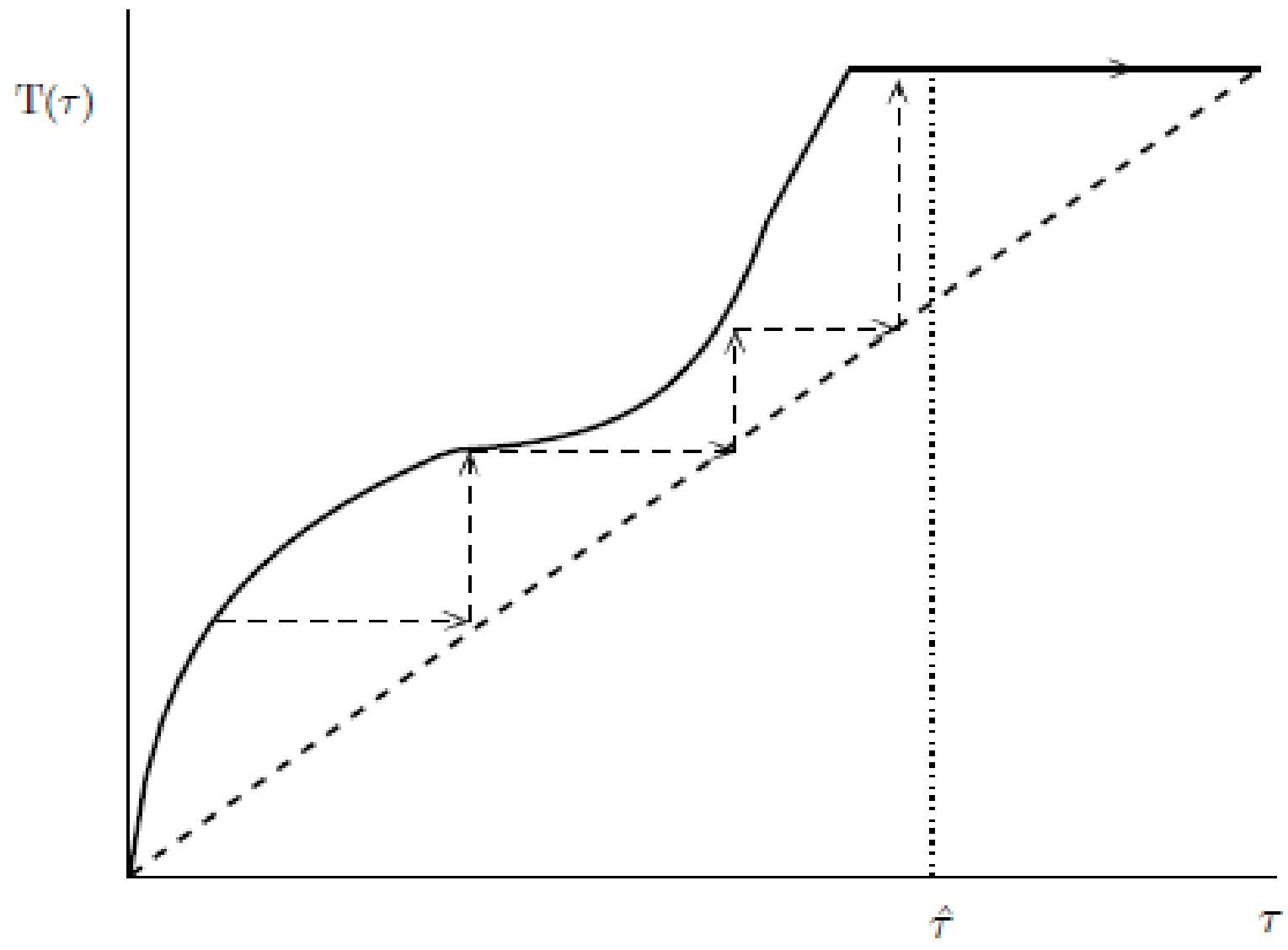
- Path identical to that of a Pigovian planner.
- Each incumbent correctly anticipates that future incumbents will act in common interest and therefore acts in that way herself
- Higher  $\alpha$  or  $\omega$  raise  $\tau^C$ , within the regime

## Adjustment to redistributive steady state

**Proposition 3** *If the Cohesiveness Condition fails and the Stability Condition holds, the unique steady state has maximum fiscal capacity  $\tau^R = \bar{\tau}$ . This steady state is globally stable.*

- Cannot sustain the planner's outcome as institutions are too weak.
- After  $\hat{\tau}$  is reached, the incumbent wants for state revenues for transfer purposes.
- More likely to be true when  $\gamma$  is low and  $\theta$  is low (like a predatory state)?

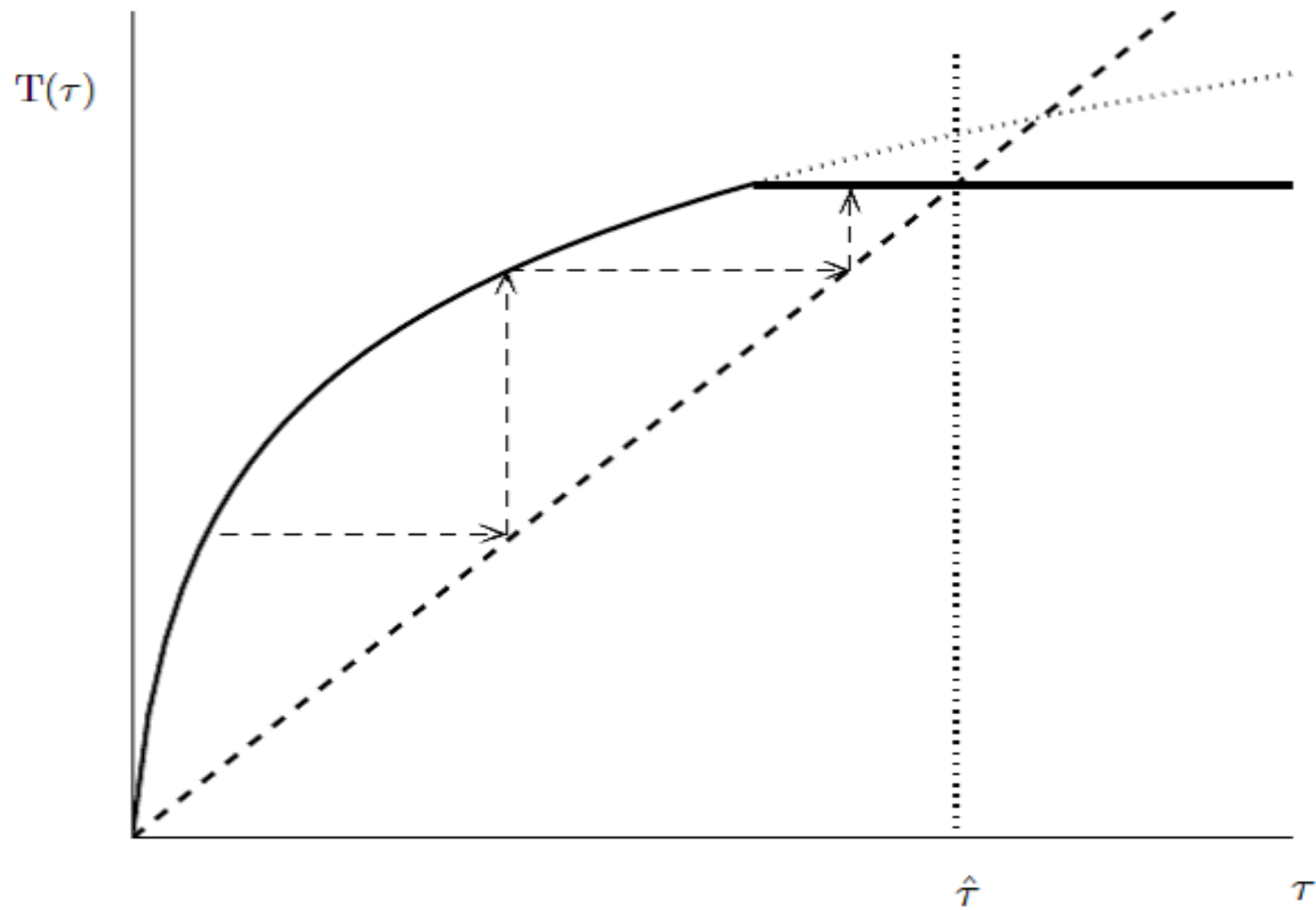
- Within the regime, lower  $\alpha$  or lower  $\theta$  will not shift overall fiscal capacity and taxation, but raise transfers at the expense of public goods



## Adjustment to weak state

**Proposition 4** *If neither the Cohesiveness nor the Stability Conditions holds, a unique, globally stable steady state exists at  $\tau^W = \hat{\tau}$ .*

- Thus, the model predicts fiscal underdevelopment
- Marginal fiscal capacity is used for redistribution and turnover is high
- Each incumbent correctly predicts that future incumbents will not build up fiscal capacity.



## Implications and Data

### Wars and fiscal capacity

- Interpret  $\alpha$  as measure of external war risk
  - $\alpha$  does not affect likelihood of the three regimes, but raises long-run  $\tau$  only in the common-interest (high  $\theta$ ) regime
  - war indeed raises fiscal capacity as Tilly hypothesized, provided political institutions are cohesive enough idea that we would see stronger states if more wars in Africa (Herbst, 2000) rings hollow in model, unless wars were to be accompanied by political reform (institutions with higher  $\theta$ )
  - weak state equilibrium might also explain why Latin America seems as an exception to the Tilly hypothesis (Centeno, 1997)



## Brief look at some correlations

- Fiscal capacity (IMF data):
  - total revenue raised as percent of GDP, average 1975-2000 difference of percentages of revenue raised by income taxes and by trade taxes, average 1975-2000
- Demand for public goods (COW data)
  - prevalence of war up to 1975, since 1816 (or independence)
- Cohesiveness of political institutions (Polity IV data)

- high constraints on executive up to 1975, since 1800 (or indep.)
- Political instability (Polity IV data)
  - competitive and broad-based executive recruitment up to 1975
- Income (PWT data) and controls level in 1975, also hold constant legal origins

## Table 1 Fiscal capacity and its determinants – Continuous RHS variables

	(1)	(2)	(3)	(4)
	Total tax revenue as a percent of GDP 1975-2000	Income-tax less trade-tax percentage of total revenue 1975-2000	Total tax revenue as a percent of GDP 1975-2000	Income-tax less trade-tax percentage of total revenue 1975-2000
Proportion of years in external conflict up to 1975	37.604*** (10.008)	98.249*** (35.374)	15.968 (10.241)	29.141 (26.007)
Proportion of years with non-competitive and narrow executive recruitment up to 1975	4.238 (2.736)	18.660** (8.717)	6.674*** (2.561)	23.998*** (8.828)
Proportion of years with high executive constraints to 1975	12.200*** (3.530)	44.934*** (10.453)	6.222** (2.851)	23.287** (9.636)
GDP per capita in in 1975			5.721*** (1.086)	19.984*** (2.973)
English Legal Origin	0.335 (2.200)	-1.888 (7.040)	4.317** (1.980)	12.987** (6.241)
Socialist Legal Origin	-8.892*** (1.824)	-8.490* (4.563)	0.904 (1.948)	24.423*** (5.620)
German Legal Origin	9.524** (4.225)	38.863*** (7.240)	4.393 (3.664)	22.036*** (5.177)
Scandinavian Legal Origin	21.376*** (4.594)	33.401*** (12.507)	15.301*** (3.743)	13.639 (9.764)
Observations	103	103	97	97
R-squared	0.525	0.439	0.657	0.651

Robust standard errors in parentheses: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%

## Table 2 Fiscal capacity and its determinants – Binary RHS variables and interactions

	(1) Total tax revenue as a percent of GDP 1975-2000	(2) Income-tax less trade-tax percentage of total revenue 1975-2000	(3) Total tax revenue as a percent of GDP 1975-2000	(4) Income-tax less trade-tax percentage of total revenue 1975-2000
Some external war before 1975	2.053 (1.660)	15.276*** (5.489)	-2.321 (1.686)	1.899 (5.488)
Some years with non-competitive and narrow executive recruitment up to 1975	0.388 (1.799)	6.428 (5.664)	2.260 (6.190)	21.627 (15.186)
Some high executive constraints before 1975	7.000*** (2.201)	17.3171** (7.082)	0.556* (3.499)	-5.502 (12.178)
High GDP per capita in 1975	6.427*** (1.869)	25.679*** (6.363)	3.586* (1.853)	16.600** (8.142)
Some War* Strong Executive constraints			7.765** (3.191)	22.378** (9.071)
Weak executive constraints* Non competitive and narrow executive recruitment			-2.268 (6.286)	-18.370 (16.357)
High GDP per capita* Strong executive constraints			5.925 (4.077)	22.083 (14.195)
Observations	97	97	97	97
R-squared	0.542	0.569	0.592	0.629

Robust standard errors in parentheses: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All specifications include indicators for legal origins.

## Trade Taxes to Income Taxes: The Composition of Fiscal Capacity

- Another striking fact about development of the state is the switch away from "easy to collect" taxes like tariffs
- Extend the model (sketch) to an open economy with a Ricardian structure and comparative advantage in one good
- The model is still recursive given our structure.
- Demand for imported good is  $(Q_s)^{-\varepsilon}$  where  $Q_s = P - \psi + z_s$  where  $z_s$  is a tariff.

- Optimal tariff now follows a Ramsey rule:

$$\frac{z_s^*}{P - \psi + z_s^*} = \left[ \frac{\lambda_s - 1}{\lambda_s} \right] \frac{1}{\varepsilon}$$

where  $\lambda_s = \max \{ \alpha V (G (\tau_s)), 2 (1 - \theta) \}$

- So tariff falls up to  $\hat{\tau}$  and then stays constant.
- The share of tariffs in tax revenues is:

$$\eta_s = \frac{z_s^* (P - \psi + z_s^*)^{-\varepsilon}}{z_s^* (P - \psi + z_s^*)^{-\varepsilon} + \tau_s \omega}$$

which declines over time until steady-state values are achieved.

- Predictions about the effect of  $\alpha, \theta, \gamma$  now carry over to the structure of fiscal capacity as well as the level.
- So we can see whether the predictions hold up for the composition of taxation as well as its level.
- Hence, we now run some regressions looking at the relationship between tax share bias and:

$$\frac{\tau_s \omega - z_s^* (P - \psi + z_s^*)^{-\varepsilon}}{\text{total revenue}}$$

**Table 2 Further results on tax mix – Binary RHS variables and interactions**

	(1) Income-tax less trade-tax share of revenue	(2) Log (income-tax less trade- tax share of revenue)	(3) Income-tax less trade-tax share of revenue	(4) Log (income-tax less trade- tax share of revenue)
Some external war pre 1975	0.110 (0.072)	0.974*** (0.340)		
Non-open executive recruitment pre 1975	0.142** (0.069)	0.639** (0.331)		
Weak executive constraints pre 1975	-0.284*** (0.067)	-1.470*** (0.346)		
Old State	0.199** (0.764)	1.112*** (0.344)	0.204*** (0.074)	1.154*** (0.324)
War*Strong Constraints			0.253*** (0.089)	2.018*** (0.418)
War*Weak Constraints			-0.049 (0.074)	-0.178 (0.324)
Non-open*Strong Constraints			-0.010 (0.015)	-0.587 (0.774)
Non-open*Weak Constraints			0.152** (0.069)	0.744*** (0.279)
Weak executive constraints before 1975			-0.174* (0.097)	-0.701* (0.413)
Observations	102	102	102	102
R-squared	0.462	0.577	0.512	0.672

Robust standard errors in parentheses: \* significant at 10%; \*\* significant at 5%; \*\*\* significant at 1%. All specifications include indicators for legal origins and the Frankel Romer openness measure (not reported).



## To Do and Related Work

- Integrate with efficiency enhancing government roles.
- Look at more of the historical data.
- Endogenize political institutions – state variables generate dynamic
  - requires more on the micro-foundations of politics.

## A Final Issue

- One idea that the model as set up does not address is the concept of legitimacy and its determinants.
- But a good deal of tax compliance is probably non-coercive.
- The current approach is silent on this and would likely require a somewhat different approach.

## Concluding Comments

- The dynamics of development involves understanding in part how state effectiveness develops.
- Today's presentation has studied on very specific part of this in detail.
- Analyzing dynamic models of economics and politics is a big challenge for the next generation of models and empirics.