14.773 Political Economy of Institutions and Development. Lecture 7: The Role of the State and Different Political Regimes

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Introduction

- So far, distortionary policies associated with "taxes" (broadly construed)
- They reduce the extent to which investors are residual claimants.
- Such property rights undoubtedly important.
- But is this the main channel through which political economy impacts economic interactions?

This Lecture

- Two caveats (hopefully empirically relevant)
  1. *Oligarchy versus democracy*: oligarchy protects the property rights of producers, but creates other (perhaps more dynamic) distortions
     - in particular, static versus dynamic distortions
  2. *The role of the state:* weak versus strong states
     - weak states that have limited ability to raise taxes may be worse for development

Simple Model of Elite Control

- Infinite horizon economy populated by a continuum 1 of risk neutral agents, with discount factor equal to $\beta < 1$.
- Unique non-storable final good denoted by y.
- The expected utility of agent j at time 0 is given by:

$$U_0^j = \mathbb{E}_0 \sum_{t=0}^{\infty} \beta^t c_t^j, \quad (1)$$

  where $c_t^j \in \mathbb{R}$ denotes the consumption of agent j at time t and $\mathbb{E}_t$ is the expectations operator conditional on information available at time t.
- Suppose that each individual dies with a small probability ε in every period, and a mass ε of new individuals are born (with the convention that after death there is zero utility and β is the discount factor inclusive of the probability of death).
- We will consider the limit of this economy with $\varepsilon \rightarrow 0$.

Occupations

- production workers versus capitalists/entrepreneurs.
- All agents have the same productivity as workers, their productivity in entrepreneurship differs.
- Agent j at time t has entrepreneurial talent/skills $a_t^j \in \{A^L, A^H\}$ with $A^L < A^H$.
- To become an entrepreneur, an agent needs to set up a firm, if he does not have an active firm already.
- Setting up a new firm may be costly because of entry barriers created by existing entrepreneurs.

States

- Each agent therefore starts period t with two state variables:
  - skill level $a_t^j \in \{A^H, A^L\}$
  - $s_t^j \in \{0, 1\}$ denoting whether the individual has an active firm.
- We refer to an agent with $s_t^j = 1$ as a member of the "elite," since he will have an advantage in becoming an entrepreneur (when there are entry barriers), and in an oligarchic society, he may be politically more influential than non-elite agents.

Decisions

- Within each period, each agent makes the following decisions:
  - an occupation choice $e_t^j \in \{0, 1\}$, and in addition if $e_t^j = 1$, i.e., if he becomes an entrepreneur,
  - investment, employment, and hiding decisions, k_t^j, l_t^j and h_t^j, where h_t^j denotes whether he decides to hide his output in order to avoid taxation (since the final good is not storable, the consumption decision is simply given by the budget constraint).
- Agents also make the policy choices in this society.
- Three policy choices:
  - a tax rate $\tau_t \in [0, 1]$ on output,
  - lump-sum transfers to all agents denoted by $T_t \in [0, \infty)$,
  - cost $B_t \in [0, \infty)$ to set up a new firm.

Production

- An entrepreneur with skill level a_t^j can produce

$$y_t^j = \frac{1}{1-\alpha}(a_t^j)^{\alpha}(k_t^j)^{1-\alpha}(l_t^j)^{\alpha} \quad (2)$$

- Suppose that all firms have to operate at the same size, λ, so

$$l_t^j = \lambda.$$

- Suppose also that the entrepreneur himself can work in his firm as one of the workers, which implies that the opportunity cost of becoming an entrepreneur is 0.

Profits

- Given a tax rate τ_t and a wage rate $w_t \geq 0$ and using the fact that $l_t^j = \lambda$, the net profits of an entrepreneur with talent a_t^j at time t are:

$$\pi\left(k_t^j \mid a_t^j, w_t, \tau_t\right) = \frac{1-\tau_t}{1-\alpha}(a_t^j)^\alpha (k_t^j)^{1-\alpha}\lambda^\alpha - w_t\lambda - k_t^j. \quad (3)$$

- If taxes are too high, he can choose to hide his output, $h_t^j = 1$. In this case, he avoids the tax, but loses a fraction $\delta < 1$ of his revenues, so his profits are:

$$\tilde{\pi}\left(k_t^j \mid a_t^j, w_t, \tau_t\right) = \frac{1-\delta}{1-\alpha}(a_t^j)^\alpha (k_t^j)^{1-\alpha}\lambda^\alpha - w_t\lambda - k_t^j.$$

- This implies that taxes are always constrained to be:

$$0 \leq \tau_t \leq \delta.$$

Profit Maximization

- The (instantaneous) gain from entrepreneurship for an agent of talent $z \in \{L, H\}$ as a function of the tax rate τ_t, and the wage rate, w_t, is:

$$\Pi^z(\tau_t, w_t) = \max_{k_t^j} \pi\left(k_t^j \mid a_t^j = A^z, w_t, \tau_t\right). \tag{4}$$

- Note that this is the *net gain* to entrepreneurship since the agent receives the wage rate w_t irrespective (either working for another entrepreneur when he is a worker, or working for himself—thus having to hire one less worker—when he is an entrepreneur).
- The gain to becoming an entrepreneur for an agent with $s_t^j = 0$ and ability $a_t^j = A^z$ is

$$\Pi^z(\tau_t, w_t) - B_t = \Pi^z(\tau_t, w_t) - \lambda b_t,$$

where $b_t \equiv B_t/\lambda$ is the cost imposed by the entry barriers.

Market Clearing

- Market clearing condition:

$$\int_0^1 e_t^j l_t^j dj = \int_{j \in \mathbf{S}_t^E} \lambda dj \leq 1, \tag{5}$$

where $\mathbf{S}_t^E$ is the set of entrepreneurs at time t.

Evolution of State Variables

- Law of motion of the vector $\left(s_t^j, a_t^j\right)$ given by

$$s_{t+1}^j = e_t^j, \tag{6}$$

with $s_0^j = 0$ for all j, and also $s_t^j = 0$ if an individual j is born at time t.

- And

$$a_{t+1}^j = \begin{cases} A^H & \text{with probability} & \sigma^H & \text{if } a_t^j = A^H \\ A^H & \text{with probability} & \sigma^L & \text{if } a_t^j = A^L \\ A^L & \text{with probability} & 1-\sigma^H & \text{if } a_t^j = A^H \\ A^L & \text{with probability} & 1-\sigma^L & \text{if } a_t^j = A^L \end{cases}, \tag{7}$$

where $\sigma^H, \sigma^L \in (0,1)$.

- Suppose that $\sigma^H \geq \sigma^L > 0$, so that skills are persistent and low skill is not an absorbing state.

Evolution of State Variables (continued)

- Fraction of high skill agents in the stationary distribution is

$$M \equiv \frac{\sigma^L}{1-\sigma^H+\sigma^L} \in (0,1).$$

- Suppose that

$$M\lambda > 1,$$

so that, without entry barriers, high-skill entrepreneurs generate more than sufficient demand to employ the entire labor supply.

Timing of Events

- Entrepreneurial talents/skills, $\left[a_t^j\right]$, are realized.
- The entry barrier for new entrepreneurs b_t is set.
- Agents make occupational choices, $\left[e_t^j\right]$, and entrepreneurs make investment decisions, $\left[k_t^j\right]$.
- The labor market clearing wage rate, w_t, is determined.
- The tax rate on entrepreneurs, τ_t, is set.
- Entrepreneurs make hiding decisions, $\left[h_t^j\right]$.

Policy Choices

- Entry barriers and taxes will be set by different agents in different political regimes.
- Taxes are set after the investment decisions, which can be motivated by potential commitment problems whereby entrepreneurs can be "held up" after they make their investments decision.
- Once these investments are sunk, it is in the interest of the workers to tax and redistribute entrepreneurial income.

Equilibrium Concept

- Focus on the Markov Perfect Equilibrium (MPE), where strategies are only a function of the payoff relevant states.
- For individual j the payoff relevant state at time t includes his own state $\left(s_t^j, a_t^j\right)$, and potentially the fraction of entrepreneurs that are high skill, denoted by μ_t, and defined as

$$\mu_t = \Pr\left(a_t^j = A^H \mid e_t^j = 1\right) = \Pr\left(a_t^j = A^H \mid j \in \mathbf{S}_t^E\right).$$

- $x_t^j = \left(e_t^j, k_t^j, , h_t^j\right)$: the vector of choices of agent j at time t,
- $x_t = \left[x_t^j\right]_{j\in[0,1]}$: the choices for all agents,
- $p_t = (b_t, \tau_t)$: vector of policies at time t.
- $\mathbf{p}^t = \{p_n\}_{n=t}^{\infty}$: the infinite sequence of policies from time t onwards,
- $\mathbf{w}^t$ and $\mathbf{x}^t$: sequences of wages and choices from t onwards.

Economic Equilibrium

- $s_0^j = 0$ for all j, and suppose $b_0 = 0$, so that in the initial period there are no entry barriers (since $s_0^j = 0$ for all j, any positive entry barrier would create waste, but would not affect who enters entrepreneurship).
- Since $l_t^j = \lambda$ for all $j \in \mathbf{S}_t^E$, profit-maximizing investments are given by:

$$k_t^j = (1 - \tau_t)^{1/\alpha} a_t^j \lambda. \tag{8}$$

- Investment increasing in the skill level of the entrepreneur, a_t^j, and decreasing in the tax rate, τ_t.
- Net current gain to entrepreneurship, as a function of entry barriers, taxes, equilibrium wages, for an agent of type $z \in \{L, H\}$ is then

$$\Pi^z(\tau_t, w_t) = \frac{\alpha}{1-\alpha}(1 - \tau_t)^{1/\alpha} A^z \lambda - w_t \lambda. \tag{9}$$

Value Functions

- Let us denote the value of an entrepreneur with skill level $z \in \{L, H\}$ as a function of the sequence of future policies and equilibrium wages, $(\mathbf{p}^t, \mathbf{w}^t)$, by $V^z(\mathbf{p}^t, \mathbf{w}^t)$, and the value of a worker of type z in the same situation by $W^z(\mathbf{p}^t, \mathbf{w}^t)$.
- Then,

$$W^z(\mathbf{p}^t, \mathbf{w}^t) = w_t + T_t + \beta CW^z(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}), \tag{10}$$

where

$$CW^z(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}) = \tag{11}$$

$$\sigma^z \max\left\{W^H(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}), V^H(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}) - \lambda b_{t+1}\right\}$$

$$+ (1 - \sigma^z) \max\left\{W^L(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}), V^L(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}) - \lambda b_{t+1}\right\}.$$

- Intuition: a worker of type z receives a wage income of w_t (independent of his skill), a transfer of T_t, and the continuation value $CW^z(\mathbf{p}^{t+1}, \mathbf{w}^{t+1})$.

Value Functions (continued)

- To understand this continuation value, note that the worker stays high skill with probability σ^z, and in this case, he can either choose to remain a worker, receiving value $W^H\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right)$, or decide to become an entrepreneur by incurring the entry cost λb_{t+1}, receiving the value of a high-skill entrepreneur, $V^H\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right)$.
- The max operator makes sure that he chooses whichever option gives higher value.
- With probability $1 - \sigma^z$, he transitions from high skill to low skill, and receives the corresponding values.

Value Functions (continued)

- For entrepreneurs:

$$V^z\left(\mathbf{p}^t,\mathbf{w}^t\right) = w_t + T_t + \Pi^z\left(\tau_t, w_t\right) + \beta CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), \tag{12}$$

where Π^z is given by (9) and

$$\begin{aligned} CV^z\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) &= \sigma^z \max\left\{W^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right\} \\ &+ \left(1-\sigma^z\right)\max\left\{W^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right), V^L\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right\} \end{aligned} \tag{13}$$

Value Functions (continued)

- Finally, let us define the *net value* of entrepreneurship as a function of an individual's skill a and ownership status, s,

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^z, s_t^j = s\right) = V^z\left(\mathbf{p}^t, \mathbf{w}^t\right) - W^z\left(\mathbf{p}^t, \mathbf{w}^t\right) \qquad - (1-s)\,\lambda b_t,$$

where the last term is the entry cost incurred by agents with $s = 0$.

- The max operators in (11) and (13) imply that if $NV > 0$ for an agent, then he prefers to become an entrepreneur.

Entrepreneurship Choices

- Straightforward to see that

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j, s_t^j = s\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^L, s_t^j = 1\right)$$

- In other words, the net value of entrepreneurship is highest for high-skill existing entrepreneurs, and lowest for low-skill workers. However, it is unclear ex ante whether

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right) > NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^L, s_t^j = 0\right)$$

or the other way round.

Entrepreneurship Choices (continued)

- Two different types of equilibria:
  1. *Entry equilibrium* where all entrepreneurs have $a_t^j = A^H$.
  2. *Sclerotic equilibrium* where agents with $s_t^j = 1$ become entrepreneurs irrespective of their productivity.
- An entry equilibrium requires the net value of entrepreneurship to be greater for a non-elite high skill agent than for a low-skill elite, i.e.,

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^H, s_t^j = 0\right) \geq NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^L, s_t^j = 1\right).$$

- Define w_t^H such that at this wage rate, $NV\left(\mathbf{p}^t, \left[w_t^H, \mathbf{w}^{t+1}\right] \mid a_t^j = A^H, s_t^j = 0\right) = 0$, that is,

$$\begin{aligned} w_t^H \equiv \max\{ & \frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^H - b_t \\ & + \frac{\beta\left(CV^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right) - CW^H\left(\mathbf{p}^{t+1},\mathbf{w}^{t+1}\right)\right)}{\lambda}; 0\}, \end{aligned} \tag{14}$$

Entrepreneurship Choices (continued)

- Similarly, let w_t^L be such that $NV\left(\mathbf{p}^t, \left[w_t^L, \mathbf{w}^{t+1}\right] \mid a_t^j = A^L, s_t^j = 1\right) = 0$, that is,

$$w_t^L \equiv \max\{\frac{\alpha}{1-\alpha}(1-\tau_t)^{1/\alpha} A^L + \frac{\beta\left(CV^L\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right) - CW^L\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right)\right)}{\lambda}; 0\}. \quad (15)$$

Entry Equilibrium

- Given these definitions, the condition for an entry equilibrium to exist at time t can simply be written as

$$w_t^H \geq w_t^L. \tag{16}$$

- A sclerotic equilibrium emerges, on the other hand, only if the converse of (16) holds.

Equilibrium Wages

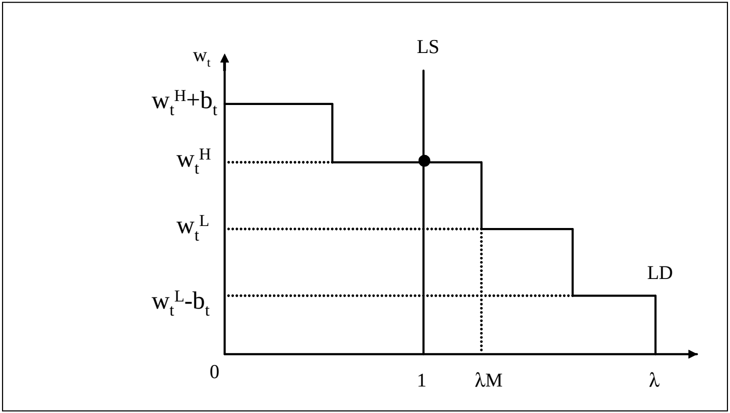
- In an entry equilibrium, i.e., when (16) holds, we must have that

$$NV\left(\mathbf{p}^t, \mathbf{w}^t \mid a_t^j = A^z, s_t^j = 0\right) = 0.$$

- Why?
- This implies that the equilibrium wage must be

$$w_t^e = w_t^H. \tag{17}$$

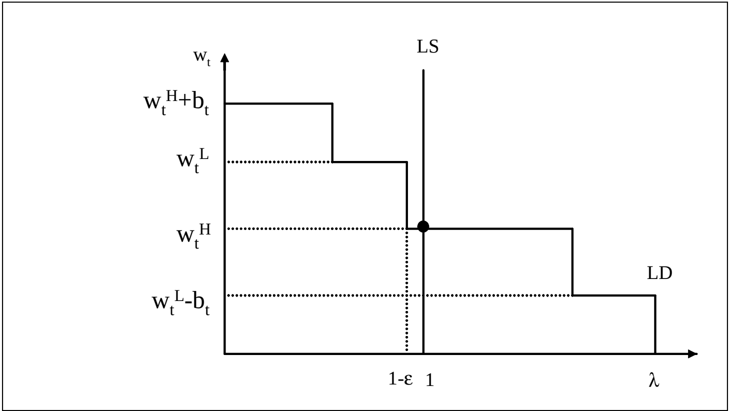
Entry Equilibrium (continued)



Labor supply and labor demand when (16) holds and there exists an entry equilibrium.

Sclerotic Equilibrium

- In this case, wages are still given by $w_t^e = w_t^H$ because of $\varepsilon > 0$.



Labor supply and labor demand when (16) does not hold and there exists a sclerotic equilibrium.

Composition of Entrepreneurs

- Law of motion of the fraction of entrepreneurs with high skills is

$$\mu_t = \begin{cases} \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1}) & \text{if (16) does not hold} \\ 1 & \text{if (16) holds} \end{cases} . \qquad (18)$$

starting with $\mu_0 = 1$.

Democratic Equilibrium

- In democracy, policies made by majoritarian voting.
- In MPE, after investments are made, the median voter, a worker, wishes through distribute as much as possible, thus

$$\tau_t = \delta.$$

- Moreover, entry barriers reduce wages (from (14)), thus

$$b_t = 0.$$

- Than in equilibrium:

$$V^H = W^H = W^L = W = \frac{w^D + T^D}{1 - \beta}, \tag{19}$$

where w^D is the equilibrium wage in democracy, and T^D is the level of transfers, given by δY^D.

Democratic Equilibrium (continued)

Proposition: A democratic equilibrium always features $\tau_t = \delta$ and $b_t = 0$. Moreover, we have $e_t^j = 1$ if and only if $a_t^j = A^H$, so $\mu_t = 1$. The equilibrium wage rate is given by

$$w_t^D = w^D \equiv \frac{\alpha}{1-\alpha}(1-\delta)^{1/\alpha} A^H, \tag{20}$$

and the aggregate output is

$$Y_t^D = Y^D \equiv \frac{1}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H. \tag{21}$$

- Aggregate output is constant over time
- Also perfect equality because the excess supply of high-skill entrepreneurs ensures that they receive no rents.

Oligarchy Equilibrium

- Policies are determined by majoritarian voting among the elite.
- At the time of voting over the entry barriers, b_t, the elite are those with $s_t = 1$, and at the time of voting over the taxes, τ_t, the elite are those with $e_t = 1$.
- Let us start with the taxation decision among those with $e_t = 1$.
- It can be proved that as long as

$$\lambda \geq \frac{1}{2}\frac{A^H}{A^L} + \frac{1}{2}, \tag{22}$$

then both high-skill and low-skill entrepreneurs prefer zero taxes, i.e., $\tau_t = 0$.
- Condition (22) requires the productivity gap between low and high-skill elites not to be so large that low-skill elites wish to tax profits in order to indirectly transfer resources from high-skill entrepreneurs to themselves.
- When condition (22) holds, the oligarchy will always choose $\tau_t = 0$.

Oligarchy Equilibrium (continued)

- Then anticipating this tax choice, at the stage of deciding the entry barriers, high-skill entrepreneurs would like to maximize $V^H\left(\left[b_t, 0, \mathbf{p}^{t+1}\right], \left[w_t, \mathbf{w}^{t+1}\right]\right)$, while low-skill entrepreneurs would like to maximize $V^L\left(\left[b_t, 0, \mathbf{p}^{t+1}\right], \left[w_t, \mathbf{w}^{t+1}\right]\right)$.
- Both of these are maximized by setting a level of the entry barrier that ensures the minimum level of equilibrium wages.
- Equilibrium wage, given in (17), will be minimized at $w_t^H = 0$, by choosing any

$$b_t \geq b_t^E \equiv \frac{\alpha}{1-\alpha} A^H + \beta \left(\frac{CV^H\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right) - CW^H\left(\mathbf{p}^{t+1}, \mathbf{w}^{t+1}\right)}{\lambda} \right). \tag{23}$$

- Without loss of any generality, set $b_t = b_t^E$.

Oligarchy Equilibrium (continued)

- Aggregate output in equilibrium is:

$$Y_t^E = \mu_t \frac{1}{1-\alpha} A^H + (1-\mu_t) \frac{1}{1-\alpha} A^L, \tag{24}$$

  where $\mu_t = \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1})$ as given by (18), with $\mu_0 = 1$.
- Since μ_t is a decreasing sequence converging to M, aggregate output Y_t^E is also decreasing over time with:

$$\lim_{t\to\infty} Y_t^E = Y_\infty^E \equiv \frac{1}{1-\alpha} \left(A^L + M(A^H - A^L) \right). \tag{25}$$

- The reason for this is that as time goes by, the comparative advantage of the members of the elite in entrepreneurship gradually disappears because of the imperfect correlation between ability over time.

Oligarchy Equilibrium (continued)

- Also high degree of (earnings) inequality.
  - Wages are equal to 0, while entrepreneurs earn positive profits

Proposition: Suppose that condition (22) holds. Then an oligarchic equilibrium features $\tau_t = 0$ and $b_t = b^E$, and the equilibrium is sclerotic, with equilibrium wages $w_t^e = 0$, and fraction of high-skill entrepreneurs $\mu_t = \sigma^H \mu_{t-1} + \sigma^L (1 - \mu_{t-1})$ starting with $\mu_0 = 1$. Aggregate output is given by (42) and decreases over time starting at $Y_0^E = \frac{1}{1-\alpha} A^H$ with $\lim_{t \to \infty} Y_t^E = Y_\infty^E$ as given by (25).

Comparison between Democracy and Oligarchy

- First, as long as $\delta > 0$, then

$$Y^D = \frac{1}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H < Y_0^E = \frac{1}{1-\alpha} A^H.$$

- Therefore, for all $\delta > 0$, oligarchy initially generates greater output than democracy, because it is protecting the property rights of entrepreneurs.
- However, the analysis also shows that Y_t^E declines over time, while Y^D is constant, the oligarchic economy may subsequently fall behind the democratic society.
- Whether it does so or not depends on whether Y^D is greater than Y_∞^E as given by (25).

Comparison between Democracy and Oligarchy (continued)

- This will be the case if $(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H / (1-\alpha) > \left(A^L + M(A^H - A^L)\right) / (1-\alpha)$, or if

$$(1-\delta)^{\frac{1-\alpha}{\alpha}} > \frac{A^L}{A^H} + M\left(1 - \frac{A^L}{A^H}\right). \tag{26}$$

- If condition (26) holds, then at some point the democratic society will overtake ("leapfrog") the oligarchic society.

Comparison between Democracy and Oligarchy (continued)

Proposition: Suppose that condition (22) holds. Then at $t = 0$, aggregate output is higher in an oligarchic society than in a democratic society, i.e., $Y_0^E > Y^D$. If (26) does not hold, then aggregate output in oligarchy is always higher than in democracy, i.e., $Y_t^E > Y^D$ for all t. If (26) holds, then there exists $t' \in N$ such that for $t \leq t'$, $Y_t^E \geq Y^D$ and for $t > t'$, $Y_t^E < Y^D$, so that the democratic society leapfrogs the oligarchic society. Leapfrogging is more likely when δ, A^L / A^H and M are low.

- Oligarchies are more likely to be relatively inefficient in the long run:
  - when δ is low, meaning that democracy is unable to pursue highly populist policies
  - when A^H is high relative to A^L, so that high-skill comparative advantage is important
  - M is low, so that a random selection of agents contains a small fraction of high-skill agents, making oligarchic sclerosis highly distortionary.

Comparison between Democracy and Oligarchy (continued)

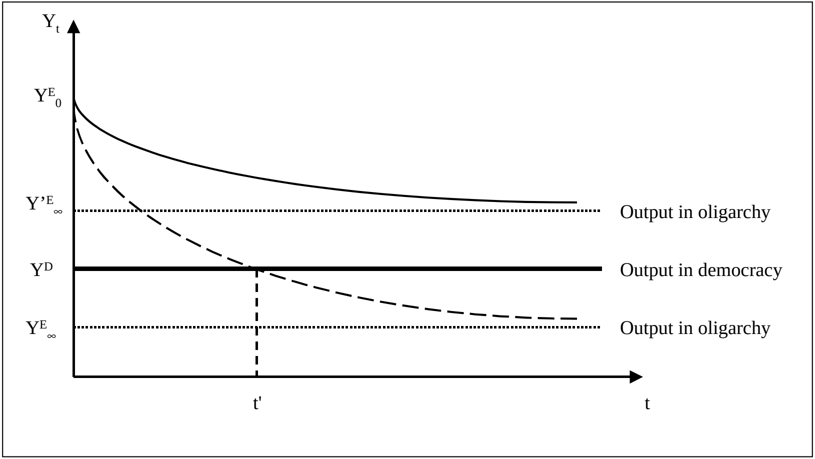


Figure 3: Comparison of aggregate output in democracy and oligarchy. The dashed curve depicts output in oligarchy when (26) holds, and the solid line when it does not.

Other Systems?

- Can other political systems do better?
- Yes, for example, delegate taxes to entrepreneurs and entry barriers to workers
- But, generally not feasible.
- Political power "indivisible": if the system is democratic, the party in power can also decides taxes.

New Technologies and Institutional Flexibility

- Democracies also more flexible.
- Suppose that at some date $t' > 0$, there is an unanticipated and exogenous arrival of a new technology, enabling entrepreneur j to produce:

$$y_t^j = \frac{1}{1-\alpha}(\psi \hat{a}_t^j)^\alpha (k_t^j)^{1-\alpha}(l_t^j)^\alpha,$$

  where $\psi > 1$ and $\hat{a}_t^j$ is the talent of this entrepreneur with the new technology.
- Suppose $l_t^j = \lambda$ for the new technology as well, entrepreneur j's output can be written as

$$\max\left\{\frac{1}{1-\alpha}(\psi \hat{a}_t^j)^\alpha (k_t^j)^{1-\alpha}\lambda^\alpha, \frac{1}{1-\alpha}(a_t^j)^\alpha (k_t^j)^{1-\alpha}\lambda^\alpha\right\}.$$

New Technologies and Institutional Flexibility (continued)

- Also to simplify the discussion, assume that the law of motion of $\hat{a}_t^j$ is similar to that of a_t^j, given by

$$\hat{a}_{t+1}^j = \begin{cases} A^H & \text{with probability} \quad \sigma^H \quad \text{if } \hat{a}_t^j = A^H \\ A^H & \text{with probability} \quad \sigma^L \quad \text{if } \hat{a}_t^j = A^L \\ A^L & \text{with probability } 1-\sigma^H \quad \text{if } \hat{a}_t^j = A^H \\ A^L & \text{with probability } 1-\sigma^L \quad \text{if } \hat{a}_t^j = A^L \end{cases} \tag{27}$$

- Comparative advantage shifts to a new set of entrepreneurs.

New Technologies and Institutional Flexibility (continued)

- Democracy will immediately switched to the new technology, thus

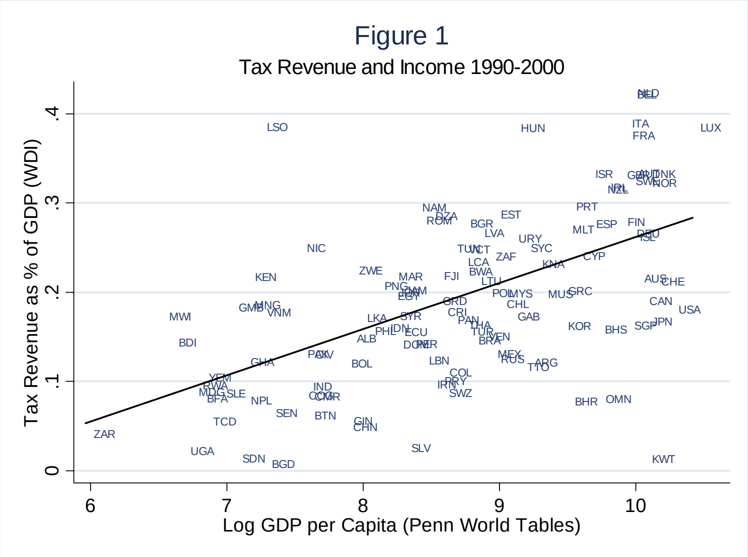
$$\hat{Y}^D \equiv \frac{\psi}{1-\alpha}(1-\delta)^{\frac{1-\alpha}{\alpha}} A^H.$$

- In contrast, switch to new technology will be delayed in oligarchy in oligarchy.

General Issues

- Tradition in political science: strength of the state and state capacity important for development
- Why?
- Not clear, but in practice, richer and institutionally stronger countries raise a higher fraction of GDP is tax revenue.
- Perhaps strength of the state related to public good provision?
- Strength of the state also related to limiting the ability of local strongman and local elites to pursue certain policies that may be growth-regarding.

Income and Taxes



Environment

- Time is discrete and indexed by t.
- There is a set of citizens, with mass normalized to 1, and a ruler.
- All agents discount the future with the discount factor β, and have the utility function

$$u_t = \sum_{j=0}^{\infty} \beta^j \left[c_{t+j} - e_{t+j} \right], \tag{28}$$

where c_{t+j} is consumption and e_{t+j} is investment (effort), and we assume that the ruler incurs no effort cost.
- Each citizen i has access to the following Cobb-Douglas production technology to produce the unique final good in this economy:

$$y_t^i = \frac{1}{1-\alpha} A_t^{\alpha} \left(e_t^i \right)^{1-\alpha}, \tag{29}$$

where A_t denotes the level of public goods (e.g., the state of the infrastructure, or the degree of law and contract enforcement between private citizens), at time t.

Environment (continued)

- The level of A_t will be determined by the investment of the ruler
  - a certain degree of state investment in public goods, the infrastructure or law-enforcement is necessary for production;
  - in fact, investment by the state is complementary to the investments of the citizens.
- The ruler sets a tax rate τ_t on income at time t.
- Each citizen can decide to hide a fraction z_t^i of his output, which is not taxable, but hiding output is costly, so a fraction δ of it is lost in the process.
- This formulation with an economic exit option for the citizens is a convenient, though reduced-form, starting point.
- Given a tax rate τ_t, the consumption of agent i is:

$$c_t^i \leq \left[(1 - \tau_t) \left(1 - z_t^i\right) + (1 - \delta) z_t^i \right] y_t^i, \tag{30}$$

  where tax revenues are

$$T_t = \tau_t \int \left(1 - z_t^i\right) y_t^i di. \tag{31}$$

Environment (continued)

- The ruler at time t decides how much to spend on A_{t+1}, with production function

$$A_{t+1} = \left[\frac{(1-\alpha)\,\phi}{\alpha} G_t \right]^{1/\phi} \tag{32}$$

  where G_t denotes government spending on public goods, and $\phi > 1$, so that there are decreasing returns in the investment technology of the ruler (a greater ϕ corresponds to greater decreasing returns).
- The term $\left[(1-\alpha)\,\phi/\alpha\right]^{1/\phi}$ is included as a convenient normalization.
- In addition, (32) implies full depreciation of A_t, which simplifies the analysis below.
- The consumption of the ruler is whatever is left over from tax revenues after his expenditure and transfers,

$$c_t^R = T_t - G_t.$$

Timing of Events

- The economy inherits A_t from government spending at time $t-1$.
- Citizens choose their investments, $\left\{e_t^i\right\}$.
- The ruler decides how much to spend on next period's public goods, G_t, and sets the tax rate τ_t.
- Citizens decide how much of their output to hide, $\left\{z_t^i\right\}$.

First-Best Allocation

- The first best allocation maximizes net output:
- Given by public goods investment

$$A_t = \beta^{1/(\phi-1)}$$

and

$$e_t^{fb} = \beta^{1/(\phi-1)} \text{ and } y_t^{fb} = \frac{1}{1-\alpha}\beta^{1/(\phi-1)}.$$

Markov Perfect Equilibrium

- Exit options:

$$z_t^i \begin{cases} = 1 & \text{if } \tau_t > \delta \\ \in [0,1] & \text{if } \tau_t = \delta \\ = 0 & \text{if } \tau_t < \delta \end{cases}. \tag{33}$$

  Given (33), the optimal tax rate for the ruler is

$$\tau_t = \delta. \tag{34}$$

- Next, investment decisions:

$$e_t^i = (1-\delta)^{1/\alpha} A_t. \tag{35}$$

- Substituting (34) and (35) into (31), the equilibrium tax revenue as a function of the level of infrastructure is

$$T(A_t) = \delta y_t = \frac{(1-\delta)^{(1-\alpha)/\alpha} \delta A_t}{1-\alpha}. \tag{36}$$

Markov Perfect Equilibrium (continued)

- The ruler will choose public investment, G_t to maximize his net present value, written recursively as:

$$V(A_t) = \max_{A_{t+1}} \left\{ T(A_t) - \frac{\alpha}{(1-\alpha)\phi} A_{t+1}^{\phi} + \beta V(A_{t+1}) \right\} \quad (37)$$

- First-order condition for the ruler:

$$\frac{\alpha}{1-\alpha} A_{t+1}^{\phi-1} = \beta V'(A_{t+1}). \quad (38)$$

- The marginal cost of greater investment in infrastructure for next period must be equal to to the greater value that will follow from this.
- The envelope condition:

$$V'(A_t) = T'(A_t) = \frac{(1-\delta)^{(1-\alpha)/\alpha}\delta}{1-\alpha}. \quad (39)$$

- The value of better infrastructure for the ruler is the additional tax revenue that this will generate, which is given by the expression in (39).

Markov Perfect Equilibrium (continued)

- Equilibrium actions of the ruler are:

$$A_{t+1} = A[\delta] \equiv \left(\frac{\beta (1-\delta)^{\frac{1-\alpha}{\alpha}} \delta}{\alpha} \right)^{\frac{1}{\phi - 1}} \text{ and } G_t = \frac{\alpha}{(1-\alpha)\phi} (A[\delta])^{\phi}, \tag{40}$$

- And therefore:

$$V^*(A_t) = \frac{(1-\delta)^{(1-\alpha)/\alpha} \delta A_t}{1-\alpha} + \frac{\beta(\phi - 1)(1-\delta)^{(1-\alpha)/\alpha} \delta}{(1-\beta)(1-\alpha)\phi} A[\delta]. \tag{41}$$

Markov Perfect Equilibrium (continued)

- Summarizing:

Proposition: There exists a unique MPE where, for all t, $\tau_t(A_t) = \delta$, $G(A_t)$ is given by (40), and, for all i and t, $z^i(A_t) = 0$ and $e^i(A_t)$ is given by (35). The equilibrium level of aggregate output is:

$$Y_t = \frac{1}{1-\alpha}(1-\delta)^{(1-\alpha)/\alpha} A[\delta]$$

for all $t > 0$ and

$$Y_0(A_0) = \frac{1}{1-\alpha}(1-\delta)^{(1-\alpha)/\alpha} A_0.$$

Second Best

- What is the level of δ—economic strength of the state—that maximizes output.
- Considered a problem

$$\max_{\delta} Y_t(\delta) = \frac{1}{1-\alpha}(1-\delta)^{(1-\alpha)/\alpha} A[\delta], \tag{42}$$

where $A[\delta]$ is given by (40).

- The output maximizing level of the economic power of the state, denoted δ^*, is

$$\delta^* = \frac{\alpha}{\phi(1-\alpha)+\alpha}. \tag{43}$$

Second Best (continued)

- If the economic power of the state is greater than δ^*, then the state is too powerful, and taxes are too high relative to the output-maximizing benchmark.
  - This corresponds to the standard case that the political economy literature has focused on.
- In contrast, if the economic power of the state is less than δ^*, then the state is not powerful enough for there to be sufficient rents in the future to entice the ruler to invest in public goods (or in the infrastructure, law-enforcement etc.).
- This corresponds to the case of "weak states".
  - With only limited power of the state to raise taxes in the future, the ruler has no interest in increasing the future productive capacity of the economy.

Political Power of the State

- Do the same insights applied to the political power of the state?
- Generally yes,

Extended Environment

- Citizens decide replacement: $R_t \in \{0, 1\}$.
- After replacement, the existing ruler receives 0 utility, and citizens reclaim a fraction η of the tax revenue and redistribute it to themselves as a lump sum transfer, S_t.
- Replacement is costly: the cost of replacing the current ruler with a new ruler equal to $\theta_t A_t$, where θ_t is a nonnegative random variable with a continuous distribution function $\tilde{F}_\lambda$, with (finite) density $\tilde{f}_\lambda$.
- Assume that

$$\frac{\tilde{f}_\lambda(x)}{1 - \tilde{F}_\lambda(x)} \text{ is nondecreasing in } x \text{ and } \tilde{F}_\lambda(0) < 1, \qquad \text{(A1)}$$

which is the standard monotone hazard (or log concavity) assumption.

Timing of Events

- The economy inherits A_t from government spending at time $t-1$.
- Citizens choose their investments, $\left\{e_t^i\right\}$.
- The ruler decides how much to spend on next period's public goods, G_t, and sets the tax rate τ_t.
- Citizens decide how much of their output to hide, $\left\{z_t^i\right\}$.
- θ_t is realized.

Citizens choose R_t. If $R_t = 1$, the current ruler is replaced and the tax revenue is redistributed to the citizens as a lump-sum subsidy $S_t = \eta T_t$.

Markov Perfect Equilibrium

- Suppose
$$\delta \in (\delta^*, \alpha), \tag{A2}$$
where δ^* is given by (43).
- This assumption ensures that taxes are always less than the value α that maximizes ruler utility, and also allows the potential for excessively high taxes (i.e., $\tau > \delta^*$).
- Citizens will replace the ruler, i.e., $R_t = 1$, whenever
$$\theta_t < \frac{\eta T_t}{A_t}. \tag{44}$$
- Therefore, the probability that the ruler will be replaced is $\tilde{F}_\lambda (\eta T_t / A_t)$.

Markov Perfect Equilibrium (continued)

- To simplify the notation, define

$$\mathcal{T}(\tau_t) = \frac{(1-\tau_t)^{(1-\alpha)/\alpha}\,\tau_t}{1-\alpha}. \tag{45}$$

- Also parameterize $\tilde{F}_\lambda(x/\eta) = \lambda F(x)$ for some continuous distribution function F with (finite) density f. Then

$$\begin{aligned} V(A_t) &= \\ \max_{\tau_t \in [0,\delta], A_{t+1}} & \left\{ (1-\lambda F(\mathcal{T}(\tau_t))) \left(\mathcal{T}(\tau_t) A_t - \frac{\alpha}{\phi(1-\alpha)} A_{t+1}^{\phi} \right) \right. \\ & \left. + \beta (1-\lambda F(\mathcal{T}(\tau_t))) V(A_{t+1}) \right\}. \end{aligned} \tag{46}$$

- Now the ruler's maximization problem involves two choices, τ_t and A_{t+1}, since taxes are no longer automatically equal to the maximum, δ.

Markov Perfect Equilibrium (continued)

- In this choice, the ruler takes into account that a higher tax rate will increase the probability of replacement.
- The first-order condition with respect to τ_t yields:

$$\frac{\partial \mathcal{T}(\tau_t)}{\partial \tau_t} \times [(1 - \lambda F(\mathcal{T}(\tau_t))) - \lambda f(\mathcal{T}(\tau_t)) \left(\mathcal{T}(\tau_t) - \frac{G_t}{A_t} + \beta \frac{V(A_{t+1})}{A_t} \right)] \geq 0, \tag{47}$$

  and $\tau_t \leq \delta$ with complementary slackness
- The envelope condition is now

$$V'(A_{t+1}) = (1 - \lambda F(\mathcal{T}(\tau_{t+1}))) \mathcal{T}(\tau_{t+1}). \tag{48}$$

- It only differs from the corresponding condition above, (39), because with probability $\lambda F(\mathcal{T}(\tau_{t+1}))$, the ruler will be replaced and will not enjoy the increase in future tax revenues.

Markov Perfect Equilibrium (continued)

- Using this, the first-order condition with respect to A_{t+1} implies that in an interior equilibrium:

$$A_{t+1} = A\left[\tau_{t+1}\right] \equiv \left(\alpha^{-1}\beta\left(1-\lambda F\left(\mathcal{T}\left(\tau_{t+1}\right)\right)\right)\left(1-\tau_{t+1}\right)^{\frac{1-\alpha}{\alpha}}\tau_{t+1}\right)^{\frac{1}{\phi-1}}$$

- The optimal value of A_{t+1} for the ruler depends on τ_{t+1} since, from the envelope condition, (48), the benefits from a higher level of public good are related to future taxes.
- Also suppose:

$$\left(1-\frac{\beta}{\phi}\left(1-\lambda F\left(0\right)\right)\right)^{2}-\left(\phi-1\right)\frac{\beta}{\phi}\left(1-\lambda F\left(0\right)\right)>0. \qquad \text{(A3)}$$

- This assumption requires $\beta\left(1-\lambda F\left(0\right)\right)$ not to be too large, and can be satisfied either if β is not too close to 1 or if $\lambda F\left(0\right)$ is not equal to zero.

Markov Perfect Equilibrium (continued)

- Then we have:

Proposition: Suppose (A1), (A2) and (A3) hold. Then, in the endogenous replacement game of this section, there exists a unique steady-state MPE. In this equilibrium, there exists $\lambda^* \in (0, \infty)$ such that output is maximized when $\lambda = \lambda^*$.

Markov Perfect Equilibrium (continued)

- Similar to the case of the economic power of the state, there is an optimal level of the political power of the state.
- Intuitively, when $\lambda < \lambda^*$, the state is too powerful and taxes are too high and citizens' investments are too low.
- When $\lambda > \lambda^*$, the state is too weak and taxes and public investments are too low.
- The intuition is also related to the earlier result.
- When the state is excessively powerful, i.e., $\lambda < \lambda^*$, citizens expect high taxes and choose very low levels of investment (effort).
- In contrast, when $\lambda > \lambda^*$, the state is excessively weak and there is the reverse holdup problem; high taxes will encourage citizens to replace the ruler, and anticipating this, the ruler has little incentive to invest in public goods, because he will not be able to recoup the costs of current investment in public goods with future revenues.

Consensually Strong States

- Neither the analysis of the economic or the political power of the state generate a pattern in which better institutional controls lead to greater government spending.
- But comparison of OECD to Africa might suggest such a pattern.
- Why would this be the case?
- One possibility: go beyond MPE
- Consensually Strong States: citizens have low costs of replacing governments, a new look at SPE, where if the government does not follow citizens' wishes, it is replaced.
- Consensually Strong States can generate the pattern of greater public good provision in situations of better controls on government.

Conclusions

- Perspective on property rights important.
- Political failures are often associated with weak property rights, expropriation and corruption, leading to low returns.
- But, there are other, richer political economy interactions important in understanding the development process
- This lecture: two examples,
  1. Entry barriers protecting oligarchies
  2. Power of the state in political equilibrium, interacting with public good provision.