14.773: Political Economy of Institutions and Development
Lecture 2: Economic Policy under Nondemocratic Institutions

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Introduction

- Let us start with the simplest setting for thinking about economic policy under nondemocratic institutions.
- To fix ideas, we will first abstract from:
  - Detailed modeling of economic interactions.
  - Accumulation of assets.
  - Power dynamics.
  - Political competition
  - Coalition building and collective action.
  - Beliefs, norms, communication, and their dynamics.
  - And really, mostly from what "institutions" do.
- We will reintroduce many of these later.

Simple Model of Elite Control

- Consider an infinite horizon economy populated by a continuum $1 + \theta_e + \theta_m$ of risk neutral agents, each with a 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:

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

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.

Environment

- Agents are in three groups.
  1. workers, mass 1, supplying labor inelastically.
  2. elite (denoted by e), total mass θ^e (set S^e); initially hold political power in this society and engage in entrepreneurial activities
  3. middle class (denoted by m), total mass θ^m (set S^m); engage in entrepreneurial activities
- Each member of the elite and middle class has access to production opportunities, represented by the production function

$$y_t^j = \frac{1}{1-\alpha}(A_t^j)^\alpha (k_t^j)^{1-\alpha}(l_t^j)^\alpha, \tag{2}$$

where k denotes capital and l labor.
- Capital is assumed to depreciate fully after use.
- Productivity of each elite agent is A^e in each period, and that of each middle class agent is A^m.
- In addition, natural resource rents R at each date.

Policies

- Taxes: activity-specific tax rates on production, $\tau^e \geq 0$ and $\tau^m \geq 0$.
- No other fiscal instruments to raise revenue. (in particular, no lump-sum non-distortionary taxes).
- The proceeds of taxes and revenues from natural resources can be redistributed as nonnegative lump-sum transfers targeted towards each group, $T^w \geq 0$, $T^m \geq 0$ and $T^e \geq 0$.
- $\phi \in [0,1]$ reduced form measure of "state capacity,"
- Government budget constraint:

$$T_t^w + \theta^m T_t^m + \theta^e T_t^e \leq \phi \int_{j \in S^e \cup S^m} \tau_t^j y_t^j dj + R. \tag{3}$$

Employment

- Maximum scale for each firm, so that

$$l_t^j \leq \lambda \text{ for all } j \text{ and } t.$$

- This prevents the most productive agents in the economy from employing the entire labor force.
- Market clearing:

$$\int_{j \in S^e \cup S^m} l_t^j dj \leq 1. \tag{4}$$

- Since $l_t^j \leq \lambda$, (4) implies that if

$$\theta^e + \theta^m \leq \frac{1}{\lambda}, \tag{ES}$$

there can never be full employment.

- Depending on whether Condition (ES) holds, there will be excess demand or excess supply of labor in this economy. Also assume

$$\theta^e \leq \frac{1}{\lambda} \text{ and } \theta^m \leq \frac{1}{\lambda}.$$

Economic Equilibrium

- An *economic equilibrium* is defined as a sequence of wages $\{w_t\}_{t=0,1,\ldots,\infty}$, and investment and employment levels for all producers, $\left\{\left[k_t^j, l_t^j\right]_{j\in S^e \cup S^m}\right\}_{t=0,1,\ldots,\infty}$ such that given $\{\tau_t^e, \tau_t^m\}_{t=0,1,\ldots,\infty}$ and $\{w_t\}_{t=0,1,\ldots,\infty}$, all producers choose their investment and employment optimally and the labor market clears.
- Each producer takes wages, w_t, as given, and maximizes

$$\max_{k_t^j, l_t^j} \frac{1-\tau_t^j}{1-\alpha}(A^j)^\alpha (k_t^j)^{1-\alpha}\left(l_t^j\right)^\alpha - w_t l_t^j - k_t^j.$$

- Solution:

$$k_t^j = (1-\tau_t^j)^{1/\alpha} A^j l_t^j, \text{ and} \tag{5}$$

$$l_t^j \begin{cases} = 0 & \text{if } w_t > \frac{\alpha}{1-\alpha}(1-\tau_t^j)^{1/\alpha} A^j \\ \in [0,\lambda] & \text{if } w_t = \frac{\alpha}{1-\alpha}(1-\tau_t^j)^{1/\alpha} A^j \\ = \lambda & \text{if } w_t < \frac{\alpha}{1-\alpha}(1-\tau_t^j)^{1/\alpha} A^j \end{cases}. \tag{6}$$

Comments

- $\alpha(1-\tau_t^j)^{1/\alpha}A^j / (1-\alpha)$ is the net marginal product of a worker employed by a producer of group j.
- If the wage is above this amount, this producer would not employ any workers, and if it is below, he or she would prefer to hire as many workers as possible (i.e., up to the maximum, λ).
- Potential distortion: producers invest in physical capital but only receive a fraction $(1-\tau_t^j)$ of the revenues.
- Therefore, taxes discourage investments, creating potential "inefficiencies"
- But are these Pareto inefficiencies?

Equilibrium Wages

- Combining (6) with (4), equilibrium wages are obtained as follows:
  (i) If Condition (ES) holds, there is excess supply of labor and $w_t = 0$.
  (ii) If Condition (ES) does not hold, then there is "excess demand" for labor and the equilibrium wage is

$$w_t = \min \left\langle \frac{\alpha}{1-\alpha}(1-\tau_t^e)^{1/\alpha} A^e, \frac{\alpha}{1-\alpha}(1-\tau_t^m)^{1/\alpha} A^m \right\rangle . \tag{7}$$

  Note that when Condition (ES) does not hold, the equilibrium wage is equal to the net productivity of one of the two groups of producers, so either the elite or the middle class will make zero profits in equilibrium.

Summary of Economic Equilibrium

- Finally, equilibrium level of aggregate output is

$$
\begin{aligned}
Y_t &= \frac{1}{1-\alpha}(1-\tau_t^e)^{(1-\alpha)/\alpha} A^e \int_{j\in S^e} l_t^j dj \\
&\quad + \frac{1}{1-\alpha}(1-\tau_t^m)^{(1-\alpha)/\alpha} A^m \int_{j\in S^m} l_t^j dj + R.
\end{aligned} \tag{8}
$$

Proposition: For a given sequence of taxes $\{\tau_t^e, \tau_t^m\}_{t=0,1,\ldots,\infty}$, the equilibrium takes the following form: if Condition (ES) holds, then $w_t = 0$, and if Condition (ES) does not hold, then w_t is given by (7). Given the wage sequence, factor demands are given by (5) and (6), and aggregate output is given by (8).

"Inefficient" Policies

- Let us now look at sources of inefficient policies under the dictatorship of the elite.
- Key distortionary policy, tax on the middle class
- Three reasons to use this tax:
  1. Revenue Extraction;
  2. Factor Price Manipulation;
  3. Political Consolidation.

Simplifying Assumptions

- Upper bound on taxation, so that

$$\tau_t^m \leq \bar{\tau} \text{ and } \tau_t^e \leq \bar{\tau},$$

  where $\bar{\tau} \leq 1$.
- *The timing of events within each period*
  1. taxes are set;
  2. investments are made.
- This removes an additional source of inefficiency related to the *holdup problem*.
- To start with, equilibrium concept: Markov Perfect Equilibria (MPE)—the elite set the tax rate today without commitment to future tax rates (but in the baseline model we start with this is equivalent to choosing the entire future sequences of tax rates).

Revenue Extraction

- To highlight this mechanism, suppose that Condition (ES) holds, so wages are constant at zero.
- This removes any effect of taxation on factor prices.
- In this case, from (6), we also have $l_t^j = \lambda$ for all producers.
- Also assume that $\phi > 0$ (for example, $\phi = 1$).
- Tax revenues to be distributed back to the elite

$$\text{Revenue}_t = \frac{\phi}{1-\alpha} \tau_t^m (1-\tau_t^m)^{(1-\alpha)/\alpha} A^m \lambda \theta^m + R. \tag{9}$$

- Clearly this is maximized at

$$\tau_t^m = \tau^{RE} \equiv \min \{\alpha, \bar{\tau}\} . \tag{10}$$

Revenue Extraction (continued)

- No intertemporal linkages

Proposition: Suppose Condition (ES) holds and $\phi > 0$, then the unique MPE features $\tau_t^m = \tau^{RE} \equiv \min\{\alpha, \bar{\tau}\}$ for all t.

- Taxing at the top of the Laffer curve
- High taxes distortionary, but fiscal policies are not used to harm the middle class.

Factor Price Manipulation

- To highlight this mechanism in the simplest possible way, let us first assume that $\phi = 0$ so that there are no direct benefits from taxation for the elite.
- There are indirect benefits, because of the effect of taxes on factor prices, which will be present as long as the equilibrium wage is positive.
- Suppose that Condition (ES) does not hold, so that equilibrium wage is given by (7).
- Therefore, choose taxes to minimize equilibrium wages.

Factor Price Manipulation (continued)

Proposition: Suppose Condition (ES) does not hold, and $\phi = 0$, then the unique MPE features $\tau_t^m = \tau^{FPM} \equiv \bar{\tau}$ for all t.

- Higher taxes in order to harm the middle class
- Because of competition in the labor market.
- *Implication:* factor price manipulation much more damaging to output.
- Naturally, $\phi = 0$ important

Combined Effects

- Now let us combine the two effects.
- Main results: the factor price manipulation effect will push the economy *beyond the peak* of the Laffer curve
- The elite's problem can be written as

$$\max_{\tau_t^m} \left[\frac{\alpha}{1-\alpha} A^e - w_t \right] l_t^e + \frac{1}{\theta^e} \left[\frac{\phi}{1-\alpha} \tau_t^m (1-\tau_t^m)^{(1-\alpha)/\alpha} A^m l_t^m \theta^m + R \right], \tag{11}$$

subject to (7) and

$$\theta^e l_t^e + \theta^m l_t^m = 1, \text{ and} \tag{12}$$

$$l_t^m = \lambda \text{ if } \quad (1-\tau_t^m)^{1/\alpha} A^m \geq A^e. \tag{13}$$

- Assume

$$A^e \geq \phi (1-\alpha)^{(1-\alpha)/\alpha} A^m \frac{\theta^m}{\theta^e}$$

so that the elite do not wish to stop producing altogether.

Combined Effects (continued)

- Then the equilibrium will be $w_t = \alpha(1-\tau_t^m)^{1/\alpha} A^m \ \tau_t^m / \ (1-\alpha)$, and the elite's problem simply boils down to choosing τ_t^m to maximize

$$\frac{1}{\theta^e}\left[\frac{\phi}{1-\alpha}\tau_t^m(1-\tau_t^m)^{(1-\alpha)/\alpha}A^m l^m \theta^m + R\right] - \frac{\alpha}{1-\alpha}(1-\tau_t^m)^{1/\alpha}A^m\lambda, \tag{14}$$

  where we have used the fact that all elite producers will employ λ employees, and from (12), $l_m = (1-\lambda\theta^e) / \theta^m$.
- The maximization of (14) gives

$$\frac{\tau_t^m}{1-\tau_t^m} = \kappa\left(\lambda, \theta^e, \alpha, \phi\right) \equiv \frac{\alpha}{1-\alpha}\left(1 + \frac{\lambda\theta^e}{\left(1-\lambda\theta^e\right)\phi}\right).$$

- τ_t^m is always less than 1, which is the desired tax rate in the case of pure factor price manipulation.
- But $\kappa\left(\lambda, \theta^e, \alpha, \phi\right)$ is also strictly greater than $\alpha / \ (1-\alpha)$, so that τ_t^m is always greater than α, the desired tax rate with pure revenue extraction.

Combined Effects (continued)

- In summary, combined effects lead to desired tax rate:

$$\tau_t^m = \tau^{COM} \equiv \min \left\{ \frac{\kappa\left(\lambda, \theta^e, \alpha, \phi\right)}{1 + \kappa\left(\lambda, \theta^e, \alpha, \phi\right)}, \bar{\tau} \right\}. \tag{15}$$

- *Comparative Statics:*
  1. ϕ reduces τ^{COM} because increased state capacity makes revenue extraction more important..
  2. θ^e increases τ^{COM} because revenue extraction becomes less important and factor price manipulation becomes more important.
  3. α increases taxes.

Proposition: Suppose Condition (ES) does not hold, and $\phi > 0$. Then the unique MPE features $\tau_t^m = \tau^{COM}$ as given by (15) for all t. Equilibrium taxes are increasing in θ^e and α and decreasing in ϕ.

Subgame Versus Markov Perfect Equilibria

- What happens if you look at subgame perfect equilibria?

Proposition: The MPEs characterized above are the unique SPEs.

- Why? Because unique best responses within each period, and no intertemporal linkages.
- More interestingly, this is because there is no "political failure".

Efficiency

- This is also the reason why all of the equilibria above are *Pareto optimal*.
- Importantly, there are potential Pareto improvements here—and these allocations are distorted, so they do not maximize social surplus.
- But it is impossible to make anybody better off without making somebody else worse off. In particular, workers/citizens and the middle class cannot be made better off without making the elite worse off.
- (This also suggests a clear reason why Pareto malady may not be the right concept in political economy settings. An allocation could still be Pareto optimal if there is an alternative in which Mobutu loses 1% of his utility and the rest of the population becomes much much better off).
- This will be different once we introduce competition over political power in a simple way (and much more in the next lectures).

Political Consolidation

- Same results if competition for political power other than in the labor market.
- Imagine that if the middle class become richer, then they are more likely to gain political power.
- Then:

Proposition: Consider the economy with political replacement. Suppose Condition (ES) holds and $\phi > 0$, then the unique MPE features $\tau_t^m = \tau^{PC} > \tau^{RE}$ for all t. This tax rate is increasing in R and ϕ.

- New result: tax rate is increasing in R and ϕ.
- This is because political stakes are higher.
- The "dark side" of state capacity.
- MPE is still the only SPE, but the equilibrium is no longer Pareto optimal. Why not?

Holdup

- Another dimension of political failures is introduced if investments are "long term" so that tax decisions are made partly after investments are sunk.
- Change the timing of events such that:
  1. individual producers undertake their investments;
  2. the elite set taxes.
- The elite will no longer take the discourage of taxes on investment into account in the MPE.
- Therefore

Proposition: With holdup, there is a unique MPE with $\tau_t^m = \tau^{HP} \equiv \bar{\tau}$ for all t.

- Now greater distortions and potential Pareto inefficiencies.

Subgame Perfect Equilibria

- Now imagine trigger-strategy equilibria.
- Suppose that Condition (ES) holds and $\phi > 0$, so that most preferred tax rate for the elite is $\tau^m = \alpha$.
- Suppose also that $\bar{\tau} = 1$.
- Consider the strategy profile where the elite set $\tau^m = \alpha$ at each date and the middle class choose investment levels according to this tax rate.
- If the elite ever set a higher tax rate, then the middle class expect $\tau^m = 1$ in all future dates, and choose zero production.

Subgame Perfect Equilibria (continued)

- With this strategy profile, the elite will raise

$$\frac{\phi}{(1-\beta)(1-\alpha)}\alpha(1-\alpha)^{(1-\alpha)/\alpha}A^m\lambda\theta^m \quad (16)$$

if they set α today.

- If, in contrast, they deviate at any point, the most profitable deviation for them is to set $\tau^m = 1$, and they will raise

$$\frac{\phi}{1-\alpha}(1-\alpha)^{(1-\alpha)/\alpha}A^m\lambda\theta^m. \quad (17)$$

- The trigger-strategy profile will be an equilibrium as long as (16) is greater than or equal to (17), which requires $\beta \geq 1-\alpha$. Therefore:

Proposition: Consider the holdup game, and suppose that Conditions (ES) hold and $\bar{\tau} = 1$. Then for $\beta \geq 1-\alpha$, there exists a subgame perfect equilibrium where $\tau_t^m = \alpha$ for all t.

Technology Adoption and Holdup

- Suppose now that taxes are set before investments, so the source of holdup above is absent.
- Instead, suppose that at time $t = 0$ before any economic decisions or policy choices are made, middle class agents can invest to increase their productivity.
- There is a cost $\Gamma\left(A^m\right)$ of investing in productivity A^m.
- Once investments in technology are made, the game proceeds as before.
- Since investments in technology are sunk after date $t = 0$, the equilibrium allocations are the same as in the results presented above.
- *Question:* if they could, the elite would prefer to commit to a tax rate sequence at time $t = 0$.

Technology Adoption: Factor Price Manipulation

Proposition: Consider the game with technology adoption and suppose that Condition (ES) does not hold, and $\phi = 0$, then the unique MPE and unique SPE feature $\tau_t^m = \tau^{FPM} \equiv \bar{\tau}$ for all t. Moreover, if the elite could commit to a tax sequence at time $t = 0$, then they would still choose $\tau_t^m = \tau^{FPM} \equiv \bar{\tau}$.

- Intuition: this is the case of pure factor price manipulation, so the only objective of the elite is to reduce the middle class' labor demand.
- Therefore, they have no interest in increasing the productivity of middle class producers.

Technology Adoption: Revenue Extraction

- Let us next consider the pure revenue extraction case with Condition (ES) satisfied.
- Once again, the MPE is identical to before with $\tau^m = \tau^{RE} \equiv \min \{\alpha, \bar{\tau}\}$.
- As a result, the first-order condition for an interior solution to the middle class producers' technology choice is:

$$\Gamma' (A^m) = \frac{1}{1-\beta} \frac{\alpha}{1-\alpha} (1-\tau^m)^{1/\alpha}. \tag{18}$$

- This is also the unique SPE, since no punishments are possible.
- But, if the elite could commit to a tax rate sequence at time $t = 0$, they would choose lower taxes in order to increase investment by the middle class and thus tax revenues.

Technology Adoption: Revenue Extraction (continued)

- To illustrate this, suppose that the elite can commit to a constant tax rate.
- Then, the optimization problem of the elite is to maximize tax revenues taking the relationship between taxes and technology as in (18) as given. In other words, they will solve:

$$\max \phi \tau^m (1 - \tau^m)^{(1-\alpha)/\alpha} A^m \lambda \theta^m / (1 - \alpha)$$

subject to (18).
- The first-order condition for an interior solution can be expressed as

$$A^m - \frac{1-\alpha}{\alpha} \frac{\tau^m}{1-\tau^m} A^m + \tau^m \frac{dA^m}{d\tau^m} = 0$$

where

$$\frac{dA^m}{d\tau^m} = -\frac{1}{1-\beta} \frac{1}{1-\alpha} \frac{(1-\tau^m)^{(1-\alpha)/\alpha}}{\Gamma''(A^m)} < 0$$

takes into account the effect of future taxes on technology choice at time $t = 0$.

Technology Adoption: Revenue Extraction (continued)

Proposition: Consider the game with technology adoption, and suppose that Condition (ES) holds and $\phi > 0$, then the unique political equilibrium features $\tau_t^m = \tau^{RE} \equiv \min\{\alpha, \bar{\tau}\}$ for all t. If the elite could commit to a tax policy at time $t = 0$, they would prefer to commit to $\tau^{TA} < \tau^{RE}$.

- Therefore, in contrast to the pure holdup problem where SPE could prevent the additional inefficiency (when $\beta \geq 1 - \alpha$), with the technology adoption game, the inefficiency survives the SPE.
- The reason is that, since middle class producers invest only once at the beginning, there is no possibility of using history-dependent punishment strategies.
- This illustrates the limits of implicit agreements to keep tax rates low.
- Such agreements not only require a high discount factor ($\beta \geq 1 - \alpha$), but also frequent investments by the middle class, so that there is a credible threat against the elite if they deviate from the promised policies.

Conclusion

- Distributional conflicts will lead to distortionary policies.
- The extent of distortions depends on whether groups in power wish to manipulate factor prices.
- Factor price manipulation could lead to higher taxes, insecure property rights, and barriers against technology adoption
- These equilibria not necessarily Pareto suboptimal—the set of instruments is restricted.
- However, Pareto inefficiencies arise when there are nontrivial dynamic interactions (as in holdup or technology adoption)
- Also note that simply changing the identity of the group in power may not improve the allocation of resources.
- Next lecture: modeling the economic side a little more in the context of one type of economic institution—labor coercion.