Legislative Bargaining with an endogenous status quo

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Warming up: political economy

- **Classic social choice:** benevolent planner
    - All means, ways and information to take us to the first-best
- **Public arena:** self-motivated individuals
- **Collective action:** problem of aggregating preferences
- To understand choices made in any society **within a political economy context** we have to understand the **the strategic interactions** of different economic and political agents
    - Dictatorship
    - Voting
    - Representative groups (elected – legislators – and special interest ones – lobbyists, protesters, etc)

Self-motivated politicians in a legislative

- **Public arena:** self-motivated individuals
- **Non-cooperative bargaining:** no binding contract can be imposed
  - Baron-Ferejohn Model (The American Political Science Review, 1989)
  - Application of Rubintein's model (Econometrica, 1982) – with open and closed agenda
- **Books**
  - Persson and Tabellini. Political economics: explaining economic policy. MIT press, 2002.
  - Hans. Axiomatic bargaining game theory. Vol. 9. Springer Science & Business Media, 2013.

Road Map

- Model: economics
- What a planner would do? Max problem, FOC and solution
- What politicians would do? Max problem, FOC, solution
    - Dictatorship of one group
    - Power alternation
    - Efficiency and equity
- What politicians would do **if they face an endogeous status quo (ESQ)**? Max problem, FOC and solution
    - ESQ as mandatory spending in real life
    - Efficiency and equity

Economics

- Two groups: blue (B) and red (R)
- $T = 2$
- They like a consumption good $c_{i,t}$ where $i \in \{B, R\}$ and $t = 1, 2$

$$u(c_{i,t}) = \ln(c_{i,t}) \tag{1}$$

- And there is one dollar to be spent

$$\mathcal{B} = \{(c_{B,t}, c_{R,t}) | c_{B,t} + c_{R,t} \leq 1\}, \forall t = 1, 2 \tag{RC}$$

Benchmark: planner

$$\max_{\{c_{B,t},c_{R,t}\}_1^2} \sum_{t=1}^{2} \beta^{t-1} \left(\pi \ln(c_{B,t}) + (1-\pi)\ln(c_{R,t})\right) \tag{FB}$$

$$\text{s.t.} \quad \begin{cases} c_{B,t} + c_{R,t} \leq 1, \ \forall t \\ c_{B,t}, c_{R,t} \geq 0 \end{cases}$$

Benchmark: FOC

$$\mathcal{L} = \sum_{t=1}^{2} \beta^{t-1} \left(\pi \ln(c_{B,t}) + (1-\pi) \ln(c_{R,t}) + \lambda_t \left(1 - c_{B,t} - c_{R,t}\right)\right)$$

$$[c_{B,1}] \quad \frac{\pi}{c_{B,t}} - \lambda_t \leq 0, \ \forall t = 1, 2 \tag{2}$$

$$\left[\frac{\pi}{c_{B,t}} - \lambda_t\right] c_{B,t} = 0$$

$$[c_{R,1}] \quad \frac{1-\pi}{c_{R,t}} - \lambda_t \leq 0, \ \forall t = 1, 2 \tag{3}$$

$$\left[\frac{1-\pi}{c_{R,t}} - \lambda_t\right] c_{R,t} = 0$$

- 2, 3 and RC are all the FOCs of this problem

Benchmark: solution

- RC binds since $u(.)$ is monotonically increasing in its argument
- By INADA conditions, no corner solution
- Equate marginal utilities across agents $\forall t = 1, 2$:

$$\frac{\pi}{c_{B,t}} = \frac{1-\pi}{c_{R,t}}$$

- Allocations $\forall t = 1, 2$:

$$c_{B,t} = \pi$$
$$c_{R,t} = 1 - \pi$$

Pareto Frontier

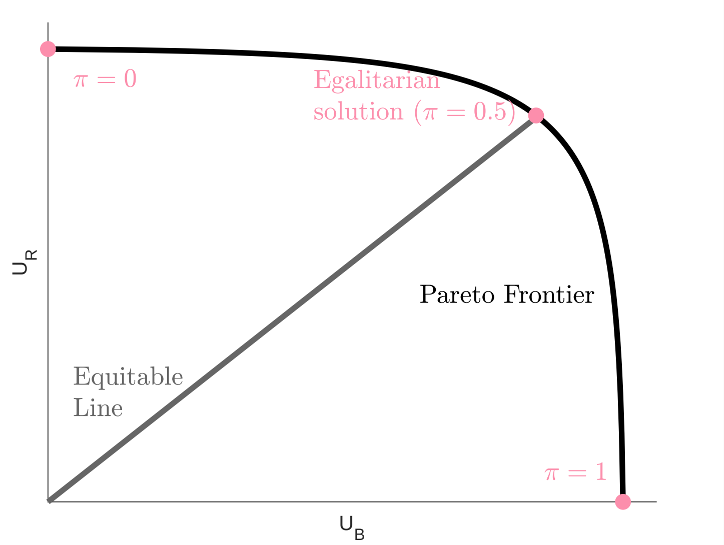

Figure 1: Pareto Frontier

Politicians

- But what if politicians are the ones making decisions for society?
- No binding contract can be designed
- Noncooperative bargaining

Dictatorship of B

- Let's assume B is in power today and tomorrow for sure

$$\max_{\{c_{B,t}, c_{R,t}\}_{t=1}^{2}} \sum_{t=1}^{2} \beta^{t-1} \ln(c_{B,t}) \qquad \text{(POL)}$$

$$\text{s.t.} \begin{cases} c_{B,t} + c_{R,t} \leq 1, \ \forall t \\ c_{B,t}, c_{R,t} \geq 0 \end{cases}$$

Politicians vs Planner

- Politicians

$$\max_{\{c_{B,t},c_{R,t}\}} \ln(c_{B,t})$$

$$\text{s.t.} \begin{cases} c_{B,t} + c_{R,t} \leq 1, \ \forall t \\ c_{B,t}, c_{R,t} \geq 0 \end{cases}$$

- Planner

$$\max_{\{c_{B,t},c_{R,t}\}} (\pi \ln(c_{B,t}) + (1-\pi)\ln(c_{R,t}))$$

$$\text{s.t.} \begin{cases} c_{B,t} + c_{R,t} \leq 1, \ \forall t \\ c_{B,t}, c_{R,t} \geq 0 \end{cases}$$

- Politician B ignores politician R

Politicians: FOC

$$\mathcal{L} = \ln(c_{B,t}) + \lambda\left(1 - c_{B,t} - c_{R,t}\right)$$

$$[c_{B,1}] \quad \frac{1}{c_{B,t}} - \lambda \leq 0,\ \forall t = 1, 2 \tag{4}$$

$$\left[\frac{1}{c_{B,t}} - \lambda\right] c_{B,t} = 0$$

$$[c_{R,1}] \quad - \lambda \leq 0,\ \forall t = 1, 2 \tag{5}$$

$$[-\lambda]\, c_{R,t} = 0$$

- 4, 5 and RC are all the FOCs of this problem

Politicians: solution

- $c_{R,t}$ doesn't enter in utility of $B \implies c_{R,t} = 0$
- Allocations $\forall t = 1, 2$:

$$c_{B,t} = 1$$
$$c_{R,t} = 0$$

- B will eat all resources available in the two periods
- Dictatorship of B is like planner with weight $\pi = 1$ – disregards R

Pareto Frontier

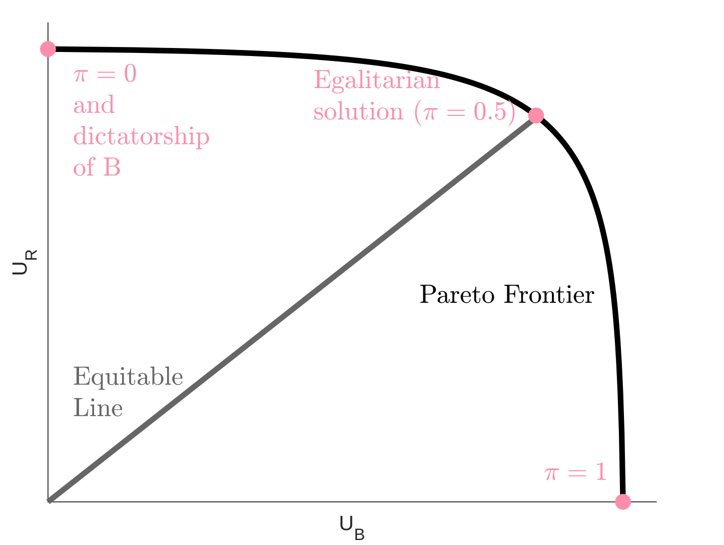

Figure 2: Is this solution Pareto Optimal?

Power fluctuation

- Solution is time and group invariant

$$c_{B,t} = 1$$
$$c_{R,t} = 0$$

- When in power eats all, when out, gets nothing
- We can write

$$c_{in,t} = 1$$
$$c_{out,t} = 0$$

- When power fluctuates, pretty bumpy consumption path

What if B only stays in power with probability p?

- Sequential game with a leader and a follower
- Stackelberg
- Solve it backwards

$t = 2$

- Let's assume $in \in \{B, R\}$ is in power at $t = 2$

$$\max_{\{c_{in,2}, c_{out,2}\}} \ln(c_{in,2}) \tag{T2}$$

$$\text{s.t.} \begin{cases} c_{in,2} + c_{out,2} \leq 1, \ \forall t \\ c_{in,2}, c_{out,2} \geq 0 \end{cases}$$

$t = 2$: FOC

$$\mathcal{L} = \ln(c_{in,2}) + \lambda\left(1 - c_{in,2} - c_{out,2}\right) \quad (6)$$

$$[c_{in,2}] \quad \frac{1}{c_{in,2}} - \lambda \leq 0$$

$$\left[\frac{1}{c_{in,2}} - \lambda\right] c_{in,2} = 0 \quad (7)$$

$$[c_{out,2}] \quad -\lambda \leq 0$$

$$[-\lambda]\, c_{out,2} = 0$$

- 6, 7 and RC are all the FOCs of this problem

$t = 2$: solutions

- Allocations $\forall t = 2$:

$$
\begin{aligned}
c_{in,2} &= 1 \\
c_{out,2} &= 0
\end{aligned}
$$

- Expected utility depend on politician being in power in the second period or not

$t = 1$

- Let's assume B is in power at $t = 1$

$$\max_{\{c_{B,1}, c_{R,1}\}} \ln(c_{B1}) + \beta \left(\underbrace{p \ln(c_{in,2})}_{\text{in power}} + \underbrace{(1-p)\ln(c_{out,2})}_{\text{out of power}} \right) \qquad \text{(T1)}$$

$$\text{s.t.} \quad \begin{cases} c_{B,1} + c_{R,1} \leq 1, \ \forall t \\ c_{B,1}, c_{R,1} \geq 0 \end{cases}$$

- Nothing changes: no dynamic variable
- Check by yourself building the $\mathcal{L}$ and the FOC
- $c_{B,1} = 1$ and $c_{R,1} = 0$

Pareto Frontier

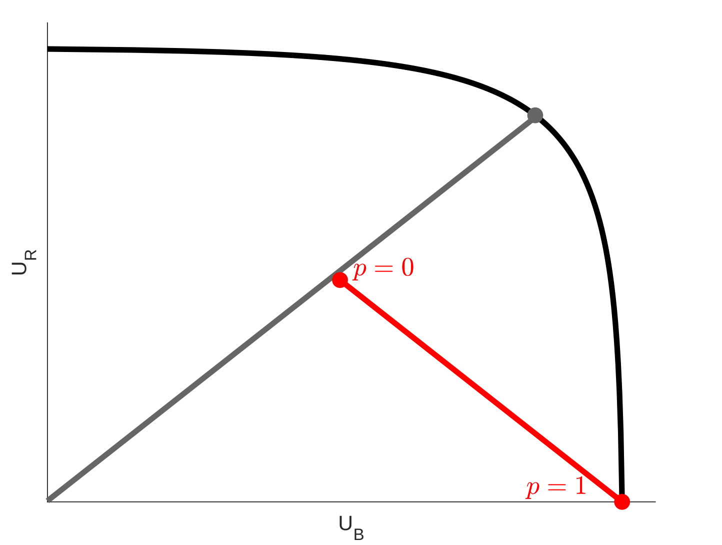

Figure 3: Are these solution Pareto Optimal?

How can we prevent this suboptimal solutions?

- What if in the second period, the politician in power cannot fully expropriate the out of power one?
- Modeling strategy: bargaining + endogenous status quo
- Let's go back to $t = 2$

$t = 2$

- Let's assume $in \in \{B, R\}$ is in power at $t = 2$
- But now *out* has to agree with $in's$ proposal
- Moreover, the reference point of *out* is yesterday's consumption
- Like in a legislative, right?

$$\max_{\{c_{in,2}, c_{out,2}\}} \ln(c_{in,2}) \tag{T2}$$

$$\text{s.t.} \begin{cases} c_{in,2} + c_{out,2} \leq 1, \ \forall t \\ \ln(c_{out,2}) \geq \ln(c_{out,1}) \\ c_{in,2}, c_{out,2} \geq 0 \end{cases} \tag{IRC}$$

- Note: $c_{out,1}$ can be B or R

$t = 2$: FOC

$$\mathcal{L} = \ln(c_{in,2}) + \lambda\left(1 - c_{in,2} - c_{out,2}\right) + \psi\left(\ln(c_{out,2}) - \ln(c_{out,1}\right)$$

$$[c_{in,2}] \quad \frac{1}{c_{in,2}} - \lambda \leq 0 \tag{8}$$

$$\left[\frac{1}{c_{in,2}} - \lambda\right] c_{in,2} = 0$$

$$[c_{out,2}] \quad \frac{\psi}{c_{out,2}} - \lambda \leq 0 \tag{9}$$

$$\left[\frac{\psi}{c_{out,2}} - \lambda\right] c_{out,2} = 0$$

- 8, 9,RC **and** IRC are all the FOCs of this problem

The IRC

- We have a new constraint: IRC
- The constraint itself represents the fact that the politician in power now cannot dictate all the decisions disregarding others
- But the fact that the reference point is yesterday's consumption, brings a whole dynamic to the game (we will see when $t = 1$)

$t = 2$: solutions

- Allocations for $t = 2$:

$$c_{in,2} = 1 - c_{out,1} = \mathcal{C}_{in}(c_{out,1})$$
$$c_{out,2} = c_{out,1} = \mathcal{C}_{out}(c_{out,1})$$

- The out of power politician may not being expropriated anymore
- Allocations at $t = 2$ are fuctions of the consumption of the previous period
- How that will change the problem at $t = 1$

$t = 1$

- Let's assume B is in power at $t = 1$
- If B remains in power, she will eat $1 - c_{R,1}$ tomorrow
- If B looses power, she has $c_{B,1}$ guaranteed

$$\max_{\{c_{B,1}, c_{R,1}\}} \ln(c_{B1}) + \beta \left(\underbrace{p \ln\left(1 - c_{R,1}\right)}_{\text{B in power}} + \underbrace{(1-p)\ln(c_{B,1})}_{\text{B out of power}} \right)$$

$$\text{s.t.} \begin{cases} c_{B,1} + c_{R,1} \leq 1, \ \forall t \\ \ln(c_{R1}) + \beta \left(\underbrace{p \ln\left(c_{R,1}\right)}_{\text{B in power}} + \underbrace{(1-p)\ln(1 - c_{B,1})}_{\text{B out of power}} \right) \geq \\ \ln(c_{R0}) + \beta \left(\underbrace{p \ln\left(c_{R,0}\right)}_{\text{B in power}} + \underbrace{(1-p)\ln(1 - c_{B,0})}_{\text{B out of power}} \right) \\ c_{B,1}, c_{R,1} \geq 0 \\ c_{B,0}, c_{R,0} \text{ given} \end{cases}$$

(IRC2)

$t = 1$: FOC

$$\mathcal{L} = \ln(c_{B1}) + \beta\left(p\ln\left(1 - c_{R,1}\right) + (1-p)\ln(c_{B,1})\right) + \lambda\left(1 - c_{B,1} - c_{R,1}\right) +$$
$$+ \psi(\ln(c_{R1}) + \beta\left(p\ln\left(c_{R,1}\right) + (1-p)\ln(1 - c_{B,1})\right) -$$
$$\ln(c_{R0}) + \beta\left(p\ln\left(c_{R,0}\right) + (1-p)\ln(1 - c_{B,0})\right)$$

$$[c_{B,1}] \quad \frac{1}{c_{B,1}} + \frac{\beta(1-p)}{c_{B,1}} - \frac{\psi\beta p}{1 - c_{B,1}} - \lambda \leq 0 \tag{10}$$
$$\left[\frac{1}{c_{B,1}} + \frac{\beta(1-p)}{c_{B,1}} - \frac{\psi\beta p}{1 - c_{B,1}} - \lambda\right] c_{B,2} = 0$$
$$[c_{R,1}] \quad \frac{\psi}{c_{R,1}} - \frac{\beta p}{1 - c_{R,1}} + \frac{\psi\beta p}{c_{R,1}} - \lambda \leq 0 \tag{11}$$
$$\left[\frac{\psi}{c_{R,1}} - \frac{\beta p}{1 - c_{R,1}} + \frac{\psi\beta p}{c_{R,1}} - \lambda\right] c_{B,2} = 0$$

- 10, 11,RC **and** IRC2 are all the FOCs of this problem

$t = 1$: solutions

$$c_{B,1} = 1 - c_{R,0} \tag{12}$$

$$c_{R,1} = c_{R,0} \tag{13}$$

- If $c_{R,0} > 0$, the leader cannot fully expropriate the follower

Pareto Frontier

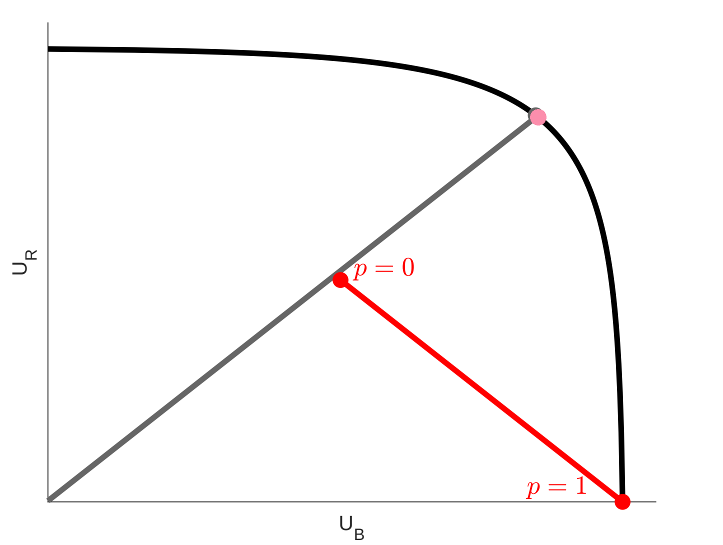

Figure 4: Are these solution Pareto Optimal? Case for $c_{B,0} = c_{R,0} = 0.5$

What if the world starts unfairly?

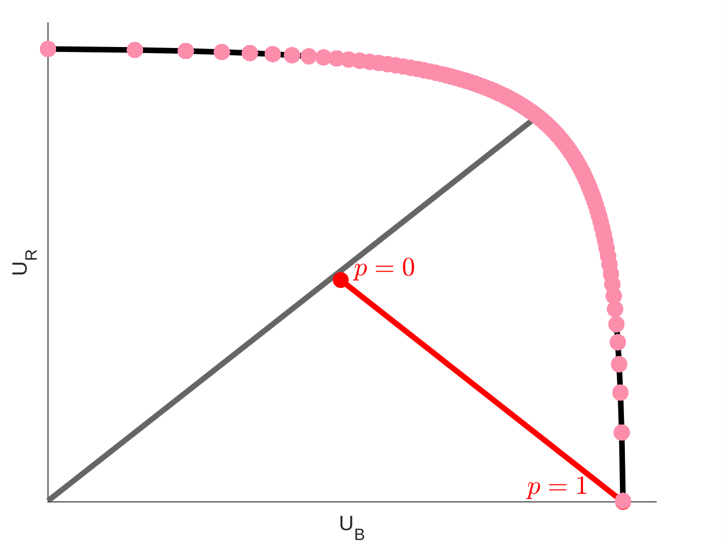

Figure 5: Are these solution Pareto Optimal? Case for all $c_{B,0} + c_{R,0} = 1$

Extensions

- What if the government provides public goods? Bargaining over Taxes and Entitlements (NBER WP, 27595, Laura Karpuska, Marina Azzimonti and Gabriel Mihalache)
    - What is better to be made mandatory?
    - Challenge of multidimensionality of space of goods
- What if budget faces shocks?
- What if the government issues debt? Mandatory spending will create incentives to more or less debt?
- What if we have more players?
- What if there are commitment problems related to the mandatory spending?