Political Economy

Final exam

Solutions

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The exam lasts 120 minutes. Documents are not allowed. The use of a calculator or of any other electronic devices is not allowed.

> Exercise 1 is from a problem set by B. Olken. Exercise 2 is inspired from *Political Economics: Explaining Economic Policy*, by T. Persson and G. Tabellini.

Exercise 1 — 10 points

Let us consider a society populated by n citizens and a single bureaucrat who is in charge of producing a public good.

The bureaucrat can exert effort $e \in [0, 1]$ to produce the good. Effort e costs the bureaucrat $ce^2/2$. Effort is unobserved by citizens. The probability of the public good being produced is e. Each citizen gets utility $u(n)$ if it is produced and 0 otherwise.

A citizen is randomly chosen to be a monitor. She can pay a cost $\alpha m^2/2$ to try to observe whether the good was produced or not. The observation is successful with probability $m \in [0, 1]$. If she observes that the good has not been produced, the monitor pays a signaling cost s to inform other citizens. In that case, the bureaucrat gets punished and suffer a loss $p(n)$.

The timing of decisions is as follows: (i) the monitor announces m, (ii) the bureaucrat chooses e, (iii) the monitor tries to observe whether the public good was produced or not if $m > 0$, and (iv) payoffs are realized.

1. Determine e^*, the optimal production effort of the bureaucrat, m^*, the optimal monitoring effort of the monitor, and their equilibrium values. 3

> e^* is the solution of the bureaucrat's optimization program:
>
> $$\max_e -(1-e)mp(n) - \frac{c}{2}e^2,$$
>
> where we assume that the utility of the bureaucrat without punishment is 0. The first order condition gives:
>
> $$e^* = \frac{mp(n)}{c}.$$

m^* is the solution of the monitor's optimization program:

$$\max_m e^* u(n) - (1-e)ms - \frac{c\alpha}{2} m^2,$$

where e^* is given by the preceding expression. The associated first order condition gives:

$$m^* = \frac{p(n)u(n) - sc}{\alpha c - 2sp(n)}.$$

So, the equilibrium value of bureaucrat's effort is:

$$e^* = \frac{p(n)}{c} \frac{p(n)u(n) - sc}{\alpha c - 2sp(n)}.$$

2. Comment on how equilibrium e and m vary with α, s, $p(n)$, and $u(n)$. 2

Increasing the monitoring cost α or the signaling cost s decreases monitoring effort and logically decreases bureaucrat's effort as the latter has a lower probability to get caught shrinking. A positive change in $u(n)$ positively affects efforts as the monitor as more individual incentives to make sure the bureaucrat's makes efforts. Finally, increasing p pushes both efforts up as it makes detection more costly for the bureaucrat and the threat of detection more efficient for the monitor.

3. Assume $u(n)$ is constant and $p(n) = n$.

3.1. What kind of situation might be described by these assumptions? 1

The case where $u(n)$ is constant corresponds to a situation in which the individual valuation of the public good does not vary with the number of individuals that benefit from it. This can be the case in the presence of a pure public good, i.e. a public good that does not suffer congestion. Assuming that $p(n)$ grows with n means that the punishment will be larger in larger communities. This might be the case if the punishment take the form of physical aggression, but also if it consists in social stigma or exclusion.

3.2. How does the equilibrium situation change with n? 1

If n increases, both efforts will increase (see above how efforts vary with $p(n)$).

4. Assume $u(n) = 1/n$ and $p(n)$ is constant.

4.1. What kind of situation might be described by these assumptions? 1

This correspond to a case in which the public good is subject to congestion, i.e. consumption by one more individual decreases other individuals' utility. As for the assumption that $p(n)$ is constant, this correspond to a situation in which the punishment of the shrinking bureaucrat does not depend on n. An example could be the case of a fine to be paid.

4.2. How does the equilibrium situation change with n? 1

> If n increases, both efforts will decrease (see above how efforts vary with $u(n)$).

5. Comment. 1

> These two polar situations describe two opposite effects community size might have on collective action. On the one hand, a larger community may reinforce the monitor's power, what provides her with more incentives to make efforts (that will benefit the whole group) as her punishment technology is more efficient. On the other hand, a larger community may reduce the individual gain from the public good, what might discourage the monitor to act in everyone's interest. All in all, the total effect of an increase in n would depend on the relative size of effects, i.e., on how congestion and the punishment technology vary with it.

Exercise 2

5 points

Consider a probabilistic voting framework in which two parties compete to be elected. Each party $i = A$, B has the following indirect utility function:

$$w_i = -(q - q_i^*)^2,$$

where q is the implemented policy and q_i^* is party i bliss point. Let us assume that $q_A^* = 0$ and $q_B^* = 1$.

Parties announce platforms q_A and q_B that will be implemented should the party win the election. Both parties are uncertain about q_m, the policy preferred by the median voter. They assume that q_m is uniformly distributed between $\frac{1}{2} - a$ and $\frac{1}{2} + a$, where $a \in (0, 1)$. Let us define p_A as the probability that party A wins the election.

1. Write down a party's optimization problem and the associated first-order condition. Explain why platforms will be such that parties will never choose their bliss points and will never converge completely. 2

> Party's A optimization program is:
>
> $$\max_{q_A} -p_A(q_a)(q_A - q_A^*)^2 - (1 - p_A(q_A))(q_B - q_A^*)^2.$$
>
> Since $q_A^* = 0$, this can be rewritten as:
>
> $$\max_{q_A} -p_A(q_a)q_A^2 - (1 - p_A(q_A))q_B^2.$$
>
> The associated first order condition is:
>
> $$-\frac{\partial p_A(q_A)}{\partial q_A}(q_A^2 - q_B^2) - 2p_A(q_A)q_A = 0.$$
>
> It is clear from this expression that complete convergence, i.e. $q_A = q_B$, will not be an equilibrium. Indeed, complete convergence would imply that party have no incentives to modify their platform in order to get elected. Yet, they

would have incentives to change their platform to move closer from their bliss point. Similarly, would the parties choose their bliss point as platform, they would have incentives to change their platform to increase their chance of winning. So, choosing their bliss point is not an equilibrium either.

2. Briefly explain why p_A can be expressed as: 1

$$p_A = \mathbb{P}(q_m - q_A < q_B - q_m).$$

p_A is the probability that party A wins the election. This probability is equal to the probability that party A attracts more votes than party B This will occur if party A's platform is closer from q_m than party B platform. So, p_A can be expressed as:

$$p_A = \mathbb{P}(q_m - q_A < q_B - q_m).$$

3. Solve for the equilibrium policies under the assumption that the equilibrium is symmetric, i.e. $q_A = 1 - q_B$. 1

From the above expression, we can rewrite p_A as:

$$p_A = \mathbb{P}\left(q_m < \frac{q_B + q_A}{2}\right).$$

As q_m is uniformly distributed between $\frac{1}{2} - a$ and $\frac{1}{2} + a$, we get:

$$p_A = \frac{\frac{q_B+q_A}{2} - \frac{1}{2} + a}{\frac{1}{2} + a - \frac{1}{2} + a} = \frac{1}{2} + \frac{q_A + q_B - 1}{4a}.$$

So, we get:

$$\frac{\partial p_A}{\partial q_A} = \frac{1}{4a}.$$

Thus, we can rewrite the first-order condition as:

$$-\frac{1}{4a}(q_A^2 - q_B^2) - 2\left[\frac{1}{2} + \frac{q_A + q_B - 1}{4a}\right] q_A = 0.$$

Under the assumption that $q_A = 1 - q_B$, we get:

$$-\frac{1}{4a}(q_A^2 - (1 - q_A)^2) - q_A = 0.$$

So, we get:

$$q_A = \frac{1}{2 + 4a}.$$

And, logically:

$$q_B = 1 - \frac{1}{2 + 4a}.$$

4. Discuss how equilibrium platforms depend on the level of uncertainty as described by a. 1

> As a is close from 0, both parties announce $\frac{1}{2}$ as platform. When a increases, q_A decreases to 0 and q_B increases to 1. That is, parties propose platform that are closer to their respective bliss point. This evolution is due to the fact that the competition to win becomes less sharp as uncertainty grows.

Question 5 points

Discuss the role of leaders' time horizon in autocracies.

> The discussion of the role of leader's time horizon in autocracies can be organized in two parts. First, the distinction between a stationary and a roving bandit can be used to understand that leaders who expect to benefit longer from payoffs generated by a territory have higher incentives than others to undertake long-term policies that favor economic activity and, consequently, citizens' welfare.
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> Second, and in relation to the previous point, leaders with longer time horizon have stronger incentives than others to choose policies that are favorable to the population in order to avoid a revolution that would imply that they loose all expected future benefit from running the country.
>
> These approaches explain empirical evidence such as the fact that younger autocrats are more likely to undertake pro-growth policies than older ones, and that a suddenly higher threat of revolution might push leaders to quickly implement reforms that will make the population better off and, consequently, allow her to stay in power for some more years.