UNIVERSITY OF MARYLAND
Department of Economics

Economics 754 – Political Economy in Macroeconomics

Exercise 5

1. Consider three voters indexed by $i \in \{1, 2, 3\}$, each characterized by an intrinsic parameter α^i, where $\alpha^1 < \alpha^2 < \alpha^3$. Agent i derives a utility $W(q_j; \alpha^i)$ over policy q_j. Three possible policies $q_j \in \{q_1, q_2, q_3\}$ can be implemented. A policy is selected by simple majority rule.

a. The preferences of agent $i \in \{1, 2, 3\}$ are such that

$$W(q_1; \alpha^1) > W(q_3; \alpha^1) > W(q_2; \alpha^1)$$

$$W(q_2; \alpha^2) > W(q_1; \alpha^2) > W(q_3; \alpha^2)$$

$$W(q_3; \alpha^3) > W(q_2; \alpha^3) > W(q_1; \alpha^3)$$

Moreover, the agenda is open and agents vote sincerely. Prove that no Condorcet winner exists under majority rule. Discuss.

b. Suppose that agents have the same preferences as in (a) but agent 1 is the agenda setter. He selects two rounds in which all agents vote sincerely. What is the optimal agenda from the perspective of agent 1? Suppose now that agent 1 sets the agenda and agents 2 and 3 vote sincerely. Can agent 3 improve his welfare by voting strategically? Discuss.

c. Suppose that the agents have the following preferences:

$$W(q_1; \alpha^1) > W(q_2; \alpha^1) > W(q_3; \alpha^1)$$

$$W(q_2; \alpha^2) > W(q_1; \alpha^2) > W(q_3; \alpha^2)$$

$$W(q_3; \alpha^3) > W(q_2; \alpha^3) > W(q_1; \alpha^3)$$

with $q_1 < q_2 < q_3$. Is there a Condorcet winner? Explain.

d. Suppose that the preferences of agent 2 are such that:

$$W(q_2; \alpha^2) > W(q_1; \alpha^2) > W(q_3; \alpha^2)$$

with $q_1 < q_2 < q_3$. Construct the preferences (ordering) of agents 1 and 3 so that they verify the single-crossing property. Then show that the median voter is a Condorcet winner.

2. Consider a society inhabited by a continuum of citizens and normalize the size of the population to 1. Suppose that the preferences of agent i over a publicly provided good y and a privately provided good c^i are:

$$\omega^i = c^i + \alpha^i V(y),$$

where $V(.)$ is a concave, well-behaved function and α^i is an intrinsic parameter of agent i distributed according to $F(\cdot)$ with mean α. Assume, in addition, that all individuals have initial resources in private good $e^i = 1$ for all i. Suppose also that one unit of private good is required to produce one unit of public good. Last, suppose that to finance the production of the public good, the government raises a tax q on each individual so that agent $i's$ budget constraint is $c^i \leq 1 - q$.

a. What is the social optimum in this economy?

b. Compute each individual's policy preferences. What is the preferred policy $q(\alpha^i)$ of agent i?

c. Under majority rule, what is the selected policy? Compare this to the social optimum. When does the social optimum coincide with the equilibrium policy?

d. Suppose now that each agent's preferences are given by:

$$\omega^i = c^i + (\alpha^i - \hat{a})^2 V(y),$$

where $\hat{\alpha}$ is given value of α^i. Again, compute the social optimum as well as the policy preferences of individuals. Do we reach the same conclusions as in part c?

3. Consider the economy described in problem 2. More precisely, agent $i's$ preferences over a publicly provided good y and a privately provided good c^i is expressed by:

$$\omega^i = c^i + \alpha^i V(y),$$

where $V(\cdot)$ is a concave, well-behaved function and α^i is the intrinsic parameter of agent i that is drawn from distribution $F(\cdot)$ with mean α. Again, all individuals have initial resources only in the private good $e^i = 1$ for all i, and one unit of private good is required to produce one unit of public good. To finance the public-good production, the government raises a tax q on each individual so that agent $i's$ budget constraint is $c^i \leq 1 - q$.

a. Derive the policy preferences of each agent $W(q; \alpha^i)$ as well as the social optimum in this economy.

Suppose that two politicians $j = A, B$ select platforms q^A and q^B. Assume that each maximizes the expected value of some exogenous rent χ. Call n_j the vote share for politician j; then $j's$ probability of winning the election is $p_j = \Pr(n_j \geq \frac{1}{2})$ and his expected utility is then $p_j \chi$. Sequencing of actions is as follows. First, the two candidates announce their platforms simultaneously and noncooperatively. Then, elections are held. Last, the elected politician implements his announced policy.

b. Assume that $\alpha^i = \alpha$. Determine the candidates' probability of winning. What are the announced platforms and which one is implemented? Discuss.

c. Determine each candidate's probability of winning when agents are heterogeneous. What are the selected platforms in that case? Which one is implemented?

d. What are the model's economic predictions? Discuss.

4. Consider the same model as in problem 3 above, but assume that three factors affect voter $i's$ voting strategy: (1) the economic policy implemented, q, (2) his individual ideological bias $\widetilde{\pi}^i$ toward candidate B, and (3) the "popularity" η of politician B, that is, the propensity to vote for B independent of his policy or the voter's ideology. We assume that $\widetilde{\pi}^i$ is uniformly distributed on $\left[-\frac{1}{2\phi}, \frac{1}{2\phi}\right]$. Moreover, η is the same for all voters and is drawn from the uniform distribution on:

$$\left[-\frac{1}{2\psi}, \frac{1}{2\psi}\right].$$

The distributions are common knowledge, but only agent i observes his own parameter $\widetilde{\pi}^i$. Then, $i's$ preferences over the policy implemented by A are summarized by $W(q^A;\alpha^i)$, whereas the preferences over the policy implemented by politician B take the final form:

$$W(q^B, \alpha^i) + \widetilde{\pi}^i + \eta.$$

The timing is as follows: First, each voter observes $\widetilde{\pi}^i$, and politicians simultaneously and noncooperatively announce platforms q^A and q^B. Second, η is realized. Third, elections take place, and last, the announced policy is implemented.

a. Characterize the voter who is indifferent between voting for politician A and voting for politician B for given policies q^A and q^B. Suppose that $\alpha^i = \alpha$. Deduce candidate $A's$ vote share as well as his probability of winning.

b. Which platforms do the politicians select? Which one is implemented? Discuss.

c. Suppose that agents are heterogeneous. What does this imply for the equilibrium?

d. Discuss your results and compare them with the results obtained in problem 3.