14.773 Political Economy Final

This is a two hour exam. Answer 3 of the following 5 questions. Credit will be given for well-reasoned verbal arguments even when there is no accompanying algebra.

Question 1

Consider the following one-period economy populated by a mass 1 of agents. A fraction \( \lambda \) all these agents are capitalists, each owning capital \( k \). The remainder have only human capital, with human capital distribution \( F(h) \). Output is produced in competitive markets, with aggregate production function

\[ Y = K^{1-\alpha} H^\alpha \]

Denote the market clearing rental price of capital by \( r \) and that of human capital by \( v \).

1. Suppose that agents vote over linear income taxe, \( t \). Because of tax distortions, total tax revenue is

\[ Tax = t \cdot \left( \lambda r k + (1 - \lambda) v \int h dF(h) \right) - C(t) \]

where \( C \) is strictly increasing and convex, with \( C'(0) = 0 \) and \( C'(1) = \infty \) (why are these conditions useful?). Tax revenues are redistributed lump sum. Find the ideal tax rate for each agent. Find conditions under which preferences are single peaked, and determine the equilibrium tax rate. How does the equilibrium tax rate change when \( k \) increases? How does it change when \( \lambda \) increases? Explain.

2. Suppose now that agents vote over capital and labor income taxes, \( t_k \) and \( t_h \), with corresponding costs \( C(t_k) \) and \( C(t_h) \). Determine ideal tax rates for each agent. Suppose that \( \lambda < 1/2 \). Does a voting equilibrium exist? Explain.

3. In this model with two taxes, now suppose that agents first vote over the capital income tax, and then taking the capital income tax as given, they vote on the labor income tax. Does a voting equilibrium exist? Explain. If an equilibrium exists, how does the equilibrium tax rate change when \( k \) increases? How does it change when \( \lambda \) increases? Explain why this would be different from the case with only one tax instrument?

Question 2

Consider an economy populated by \( \lambda \) rich agents who will initially hold power, and \( 1 - \lambda \) poor agents who are excluded from power, with \( \lambda < 1/2 \). All agents are infinitely lived and discount the future at the rate \( \beta \). Rich agents have income \( \theta > 1 \) and poor agents have income normalized to 1. In any given period, the decisive voter chooses the tax rate. Each rich agent can individually take his money to Miami, and in the process he loses a fraction \( \phi \) of his income. The poor can undertake a revolution, and if they do so, it all future periods, they take a fraction \( \mu_r \) of income of the rich (and the poor also keep their own income, and assume that the rich get 0 from then on). At the beginning of every period, the rich can also decide to extend the franchise to the poor, and this is irreversible.

1. First suppose that \( \mu_r = \mu^* < \phi \). Find the Markov perfect equilibrium (MPE) of this game.

2. What happens if \( \mu^* > \phi \)?
3. Now suppose that $\mu_t = \mu^t$ with probability $1 - q$, and $\mu_t = \mu^h > \mu^t$ with probability $q$. Show that there exists an MPE where the rich extend the franchise, and from there on, a poor agent sets that tax rate. Explain why extension of the franchise is useful for rich agents? Why couldn't the rich keep power and promise to set the same tax rate as the poor median voter? Is the assumption that the decision to extend the franchise is before the revolution decision important?

4. Does an increase in $\theta$ make the extension of the franchise more or less likely? Why? Is this a good prediction? How would you change this implication? Quickly outline a model with a repression technology which would do the trick.

5. Now imagine that “international capital flows” improve, thus $\phi$ falls. Does this make democratization more or less likely? Does it make democratization more or less likely when the rich have a repression technology?

Question 3

Consider the following regressions. In each case, explain the reasoning and criticize it. Feel free to elaborate as much as you like, in particular, giving suggestions of how you would improve on the empirical strategy.

1. A researcher wants to find out whether greater ethnic fragmentation leads to worse political decisions. For this reason, she runs a regression of the fraction of local government revenues in U.S. cities spent for education on an index of ethnic diversity in the city.

2. A researcher wants to find out whether common (British) law leads to better political outcomes. For this reason, he runs a regression of an index of corruption on a dummy for having common law rather than French civil law or German legal code.

3. Another researcher wants to answer the same question, and he runs regression of an index for corruption on a dummy for having common law, and instruments this using a dummy for having been a British colony.

4. A researcher wants to investigate the relationship between democracy and inequality, so he runs a regression of imperious measures of democracy on measures of inequality.

5. A researcher wants to investigate whether political instability in a country's neighbors has a negative effect on economic performance. So he runs a regression of log income on a variety of controls, an index of political instability in the country, and the average of the index of political instability among the country's neighbors.

6. A researcher wants to investigate the relationship between inequality and growth, so he runs a regression of growth on initial inequality using cross-sectional data. He also runs a panel regression of growth in a five-year period on inequality during the five-year period, as well as country fixed effects and time effects.

Question 4

The government wants to regulate the amount of pollution produced by firms. There is a pollution inspector who comes to a particular firm and checks the effluents. If the firm is clean, he has no chance of detecting any pollution. If it is not clean, the probability $p$ that he would detect some wrong-doing depends on how much time ($t$) he has spent on checking: $p = p(t), p' > 0, p'' < 0, p(0) > 0$. Checking is costly: Being checked for time $t$ costs the firm $C(t)$ and checking for time $t$ costs the inspector $V(t)$. Both cost functions are increasing and
Firms can reduce pollution by putting in effort: The probability that a particular firm is clean is $q$, if the firm incurs a cost $R(q)$, $R' > 0, R'' > 0$. The firm alone knows its own $q$ and no one knows whether it is clean until the inspector comes. After the inspector checks the state of the firm is common knowledge between them.

1. Suppose that the government makes the rule that a firm that is found to be polluting pays a fine of $F$. Write down the firm’s maximization problem for the choice of $q$, and show that $q$ is an increasing function of $F$ and $t$.

2. Next write down the social welfare function assuming everyone is risk neutral and that the social cost of a polluting firm is $W$. Further assume that the value of $t$ can be set by the government and enforced. Show that it would be optimal for the government to set $t = 0$, and choose a very large value of $F$. Discuss reasons why in reality we do not see such social policies.

**Question 5**

Do all three parts:

1. Explain in words why in Dixit’s model, increasing the number of principals weakens the agent’s incentives. Can you suggest some examples of real world phenomena where this reasoning may be relevant and if you cannot suggest any examples, explain why you think that the model does not fit the world.

2. Suggest some reasons why an increase in social heterogeneity might actually make collective action easier.

3. Suppose $\theta = 0$ & $\theta = 1$ are two states of the world and let $p_a$ and $p_b$ are $a$’s and $b$’s priors about the likelihood of state $\theta = 1$. Suppose $a$ got some information which made him increase his assessment to $p'_a > p_a$. $b$ know both $a$’s prior and his posterior and on the basis of the change in $a$’s probability assessment updates his own prior to $p'_b$. Assuming both $a$ and $b$ use Bayes rule, is it possible that $p'_b < p_a$ even though $p_b > p_a$? In view of your result how would you interpret the oft-heard claim that X used to left of the left and is now right of the right?