

**Econ 131**  
**Spring 2022**  
**Emmanuel Saez**

**Problem Set 3**

**DUE DATE: April 20, 11:59pm PST**

Student Name:

Student ID:

GSI Name:

- **You must submit your solutions using this template.**
- **Although you may work in groups**, each student must submit individual sets of solutions. You must note the names other students that you worked with. Write their names here:

## 1. Essay (6 points)

As discussed in class, the state of California is at the vanguard of efforts to decarbonize its economy. The following “almanac” summarizes these efforts: [https://www.energy.ca.gov/sites/default/files/2022-02/2021\\_EnergyAlmanac\\_ADA.pdf](https://www.energy.ca.gov/sites/default/files/2022-02/2021_EnergyAlmanac_ADA.pdf)

How do they compare with the economists’ prescription that the best remedy is to set a carbon tax equal to the marginal damage of carbon emissions and just let the free market work? As global warming is due to global emissions, does it make sense for a small jurisdiction such as California (at the global scale) to take unilateral bold steps to decarbonize?

## 2. True/False Statements (10 points)

Determine whether each statement is true, false, or uncertain and explain why. Answers with no explanation will receive no points.

- (a) Suppose that candidates X and Z run for president. Candidate X is elected president after winning 51% of the vote. Then once in office, he appoints more conservative members to the Supreme Court than candidate Z would have. This means that a majority of American voters preferred more conservative Supreme Court members. (Assume that everyone is fully informed about the candidates plans and the President does not need Senate approval to appoint Supreme Court members.)

- (b) There is no reason for the government to impose social distancing to fight the epidemic because private agents can create markets to price the corresponding externality.

(c) As CO<sub>2</sub> emissions create a classic externality, the only policy needed to solve the problem is a tax on carbon that would apply in all countries at the same rate and set equal to the marginal damage created by CO<sub>2</sub> emissions.

(d) The returns of education accrue primarily to the person receiving the education and hence the government should not be heavily involved in the provision of education.

(e) According to the Tiebout model, local public good provision is efficient and tailored to the tastes of local residents. Hence, it is better to have a fully decentralized government.

### 3. Externalities

A coal-fired power plant releases air pollution into the atmosphere for every unit of electricity produced. The inverse demand function for coal-fired electricity is  $P_d = 20 - \frac{1}{2}Q$ , which represents the marginal benefit curve where  $Q$  is the quantity consumed when consumers pay price  $P_d$ . The inverse supply curve for coal-fired electricity is  $P_s = 5 + Q$ , which represents the marginal private cost curve when the power plant produces  $Q$  units. The marginal damage from emissions is given by  $MD = 3.5Q$ , which describes the cost of greenhouse gas emissions and local air pollution when the industry generates  $Q$  units of coal-fired electricity.

a) Illustrate the market for the coal fired electricity with a supply/demand graph. Be sure to draw the curves for demand, supply, marginal damage, and social marginal cost.

b) What are the equilibrium price and quantity for coal fired electricity when there is no correction for the externality?

c) How much coal fired electricity should the market supply at the social optimum?

d) How large is the deadweight loss from the externality?

e) Is it possible for the government to achieve the social optimum by imposing a per-unit fee on emissions? If not, explain why it is not possible. If so, how large must the emission fee be if the market is to produce the socially efficient amount of coal fired electricity? Also, draw the firm's supply curve with the new emission fee on your graph.

#### 4. Public Goods

A home slightly south of campus has two residents: Arlen and Ben. All cleaning of the home is done solely through the individual efforts of the two residents, who, after eating and sleeping and socializing have **49** hours a week to devote to some combination of studying and cleaning. Arlen's utility over studying and cleaning is given by  $U_A = 20 \log S_A + 4 \log C$  and Ben's utility over studying and cleaning is given by  $U_B = 20 \log S_B + 5 \log C$ , where  $C$  is the total cleaning done in the apartment, given by the sum of each individual's contribution:  $C = C_A + C_B$ .

- a) How much time do Arlen and Ben each spend studying and cleaning?

b) What is the socially optimal amount of time that they should spend? If your answer differs from part a), why?