

Econ 131  
Spring 2019  
Emmanuel Saez

Problem Set 1

**DUE DATE: February 27**

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

Read the following recent New York Times article about taxing the rich. Write a short essay [the essay has to fit in the page below] explaining whether the Times article accurately reported on changes in inequality and tax progressivity over recent decades (the grade is not based on whether you agree or not with the article but how well you can put the arguments in perspective based on what you learned in class).

NY Times link:

<https://www.nytimes.com/2019/02/03/opinion/democrats-wealth-tax.html>

## 2. True/False Statements

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

- (a) The government should only intervene in the economy when there are market failures.

FALSE: For economists, there are 2 broad reasons of government interventions. One is market failure, the other is inequality. Only libertarians would view inequality as NOT a good reason for government taxes and transfers. Beyond economists, it is obvious that humans are social and function in groups (families, communities, states, etc.) Indeed, the structure of the economy is organized through laws, regulations, etc. which are part of the government.

- (b) The basic tax incidence model we saw in class is useless because empirical evidence contradicts it.

UNCERTAIN: We did review empirical evidence that contradicts the basic incidence model. Benzarti et al. (2017) shows evidence of asymmetric responses to VAT increases vs. decreases while the basic model predicts symmetric responses. Chetty et al. (2009) shows that tax salience matter for the incidence of US sales taxes while the basic model assumes consumers are fully informed about the post-tax price. Yet, even the model is contradicted by empirical evidence, it does not mean that it is necessary useless (no economic model I know of is immune to contradiction with data, the key is to assess whether the contradiction is serious enough to make the model useless or not).

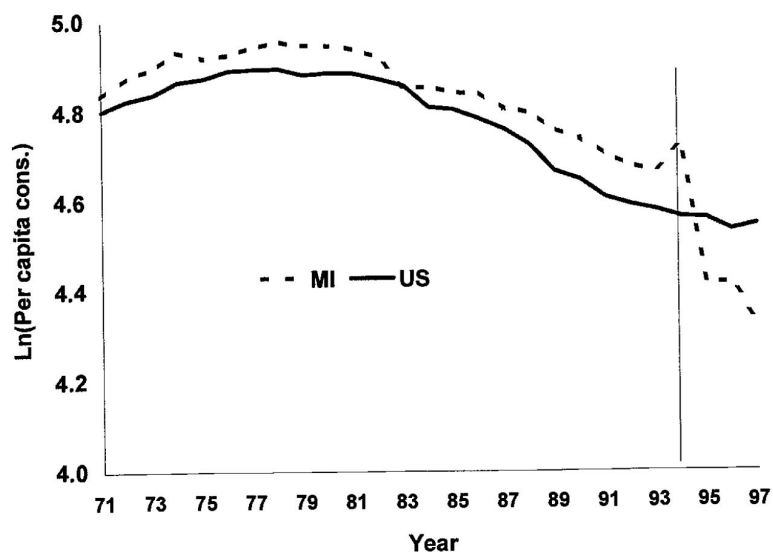
- (c) Pre-tax income inequality has increased in the United States since 1980 but government taxes and transfers have offset this increase.

FALSE: The charts we saw in class from Piketty-Saez-Zucman (2018) show a large increase in both pre-tax and post-tax inequality. Although it is true that post-tax inequality has increased by less than pre-tax inequality.

- (d) Suppose two individuals are out of work and receive the same means tested benefit of \$1000/month. One would be able to work while the other is not. Are they both equally deserving of support?

UNCERTAIN. It depends on the social justice criterion used. Under a utilitarian social welfare criterion, they are both equally deserving because they have the same income and hence same marginal utility. However, most people social justice principles do not follow utilitarianism. Saez and Stantcheva '16 show that in surveys, people will overwhelmingly find that the person not able to work is more deserving. That's why transfers to groups unable to work (the disabled or the elderly) are in practice much more generous than those deemed able to work.

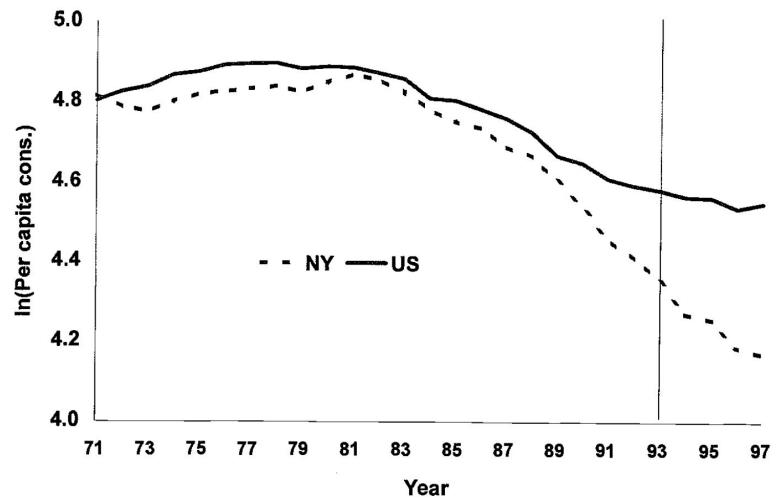
- (e) In 1994, Michigan raised taxes on cigarettes sold in Michigan. The graph below shows the evolution of log per capita consumption in Michigan (dashed line) and in the US overall (solid line). Based on what you know about the difference-in-difference methodology learned in class, do you find that this graph provides compelling evidence of an effect of cigarette taxation on consumption? (graph from Evans, Ringel, Stech "Tobacco Taxes and Public Policy to Discourage Smoking" *Tax Policy and the Economy, volume 13*)



TRUE: The graph shows a sharp drop in cigarette consumption right after the reform and the trends were parallel before. Hence, we can be quite confident that the DD estimate does pick up the effect of the tax increase.

- (f) In 1993, New York substantially raised taxes on cigarettes sold to consumers in New York. The graph below shows the evolution of log per capita consumption in New York (dashed line) and in the US overall (solid line). Based on what you know about the difference-in-difference methodology learned in class, do you find that this graph provides compelling

evidence of an effect of cigarette taxation on consumption? (graph from Evans, Ringel, Steh “Tobacco Taxes and Public Policy to Discourage Smoking” *Tax Policy and the Economy, volume 13*)



FALSE: The graph shows a faster drop in cigarette consumption in NY relative to the US but this widening gap starts 3-5 years BEFORE the cigarette tax increase in NY. This shows that the parallel trend assumption fails. Hence, we cannot be confident that the DD estimate that would deliver an effect is the causal consequence of the tax increase.

### 3. Incidence of taxation

Consider the following model for the soda market in Berkeley. Suppose the aggregate demand for soda in Berkeley is given by  $Q^D = 800 - 100P$  where  $P$  denotes the price and  $Q$  denotes the quantity of bottles of soda demanded. The aggregate supply for soda in Berkeley is given by  $Q^S = 300P$ .

- (a) Compute the soda market equilibrium. What are the equilibrium price and quantity?

Equating Supply and Demand:

$$300P = 800 - 100P$$

$$P^* = 2, Q^* = 600$$

- (b) Calculate the price elasticity of supply and the price elasticity of demand at the equilibrium. Compare the values and explain which side you would expect to face a higher incidence if a tax is levied on soda.

$$\varepsilon_D = \frac{p}{Q^D} \frac{dQ^D}{dp} = \frac{2}{600} \times (-100) = -0.33$$

$$\varepsilon_S = \frac{p}{Q^S} \frac{dQ^S}{dp} = \frac{2}{600} \times (300) = 1$$

Since in equilibrium consumers are more inelastic than producers we would expect them to bear a higher share of the tax burden.

- (c) Now suppose a tax of  $t = \$1$  is imposed on each soda that is purchased. Compute the soda market equilibrium with the tax. What are the equilibrium price and quantity?

Remember that it does not matter who bears the statutory incidence of the tax. We add the tax on the demand side and therefore find the before tax price (faced by the supplier).

$$300P = 800 - 100(P + 1)$$

$$400P = 800 - 100$$

$$P^S = 1.75, Q^* = 525$$

$$P^D = 1.75 + 1 = 2.75$$

The equilibrium quantity dropped to 525 sodas, the price producers face is now \$1.75 and the price consumers face is now \$2.75.

- (d) What is the incidence of the tax? Explain the intuition for the key factors that determine the incidence.

Out of the \$1 tax, \$0.75 is borne by consumers and \$0.25 by producers, therefore 75% is on the demand and 25% on the supply. As predicted, most of the incidence of the tax is on the more inelastic side of the market (demand) because that side of the market is less responsive to price changes.

- (e) Compute and graphically depict deadweight loss due to the tax (The graph doesn't have to be in scale, just make sure you write down the important information)

Deadweight loss is represented by a triangle. Its height is the tax of \$1 and its base is the distortion in the quantity exchanged:  $600 - 525 = 75$  units.

$$DWL = (75 \times 1)/2 = \$37.5$$

Now suppose that consumers are inattentive to the tax and demand is given by

$$Q^D = 800 - 100(P + \theta t)$$

where  $\theta = 1/2$ . Again, suppose that a tax of  $t = \$1$  is imposed on each soda that is purchased.

- (f) How can we interpret  $\theta$  ?

$\theta$  represents the inattentiveness of consumers. As Chetty et al. (2009) show, consumers don't fully internalize sales tax. The  $1/2$  coefficient implies that  $1/2$  of consumers are inattentive to the sales tax.

- (g) What are the new equilibrium price and quantity?

$$300P = 800 - 100[P + 1 \times 1/2]$$

$$400P = 750$$

$$P^S = 1.875, Q^* = 562.5$$

$$P^D = 1.875 + 2 = 2.875$$

- (h) Compute and graphically depict deadweight loss arising due to the tax. How does your answer compare to your answer from part (5)? Explain.

The height of the triangle is \$0.5 and the base is reduced in  $600 - 562.5 = 37.5$  units.

$$DWL = (37.5 \times 0.5)/2 = \$9.375$$

With  $1/2$  of consumers being inattentive to the tax, the demand curve faced by the supply is even less elastic than before. This results in a smaller distortion of quantity than we had under fully attentive consumers, and therefore the deadweight loss is smaller. Notice that the incidence of the tax was also affected: consumers now bear an even larger share of the incidence ( $0.875/1$ ) than producers ( $0.125/1$ ).