

**Problem Set #2**  
**PAI 897**  
**Professor David Popp**  
**Fall 2023**

**Solutions Available Wednesday, September 27**

1. Muse, the local art museum, is considering raising its admission fee by 10 percent. Muse last raised their fee three years ago. You have been asked to project whether the new admission fee increase will lead to an increase or decrease in revenues. For the analysis, you have been given data pertaining to the previous fee increase:

|                     | <b>before increase</b> | <b>after increase</b> |
|---------------------|------------------------|-----------------------|
| visitors per day:   | 2,000                  | 1,400                 |
| average price paid: | \$8.00                 | \$10.00               |

- a) Based on the figures provided, calculate the price elasticity of demand for visits to Muse.
- b) Based on your calculation above, would you expect revenues to increase or decrease if tolls increase by another 10 percent? Why?
2. The current entrance fee to Great Lakes State Park is \$12. At this price, the park has 960 visitors per day. To encourage more people to come to the park, the state is proposing lowering the entrance fee to \$10.
- a) Based on evidence from previous changes in the entrance fee, the price elasticity of demand for park visits at Great Lakes State Park is -1.25. Given this, how many visitors will come to the park if the entrance fee is reduced to \$10?
- b) Using a demand curve to illustrate key points, calculate the change in consumer surplus that occurs after the entrance fee reduction.
3. Suppose that after graduation you take a position in the Department of Health, Education, and Welfare. You are asked to show what will happen in the market for college education after the enactment of a new \$1,000 tax credit for college tuition. You are given the following information:
- 15.3 million students are enrolled in college, either at private or public institutions. (This does not include enrollments in graduate programs).
  - The average tuition paid by these students is \$5,192 per year.
  - Assume that, overall, colleges are operating near capacity, so the possibility of expanding enrollments is minimal.

Use a supply and demand diagram to show the initial equilibrium **and** the effect of the tax credit. Who is the major beneficiary of the tax credit – students or colleges? Explain intuitively why this is the case. How would your answer change if we did not assume that colleges are operating near capacity?

4. Facing a budget shortfall, the government of Utopia has asked you to consider the effect of two new tax proposals. Utopia currently has a national sales tax, but exempts basic food items, such as milk and bread, from the sales tax. The first proposal is to remove the sales tax exemption for basic food items. That is, this proposal would place a tax on items such as milk and bread. Opponents of such a plan argue that this is unfair. Instead, they proposed raising revenue by increasing tax rates on consumer electronics (e.g. smart phones, TVs, etc). Because these goods are luxuries, proponents argue that such a tax is the best way to raise revenues for the state.

You have been asked to consider the effect of each of these taxes. For purposes of the comparison, assume that a similar size tax is being considered for each good, and that roughly the same amount of each good is currently being sold.<sup>1</sup> You have been asked to determine the impact on the economy of each tax.

To illustrate the effect of these taxes, please draw a supply and demand diagram for each market. Show how the tax will affect each market. If necessary, you may exaggerate key assumptions to make your points clear. Using your diagram, answer the following questions:

- a) What is the incidence of each tax? Which tax is likely to raise consumer prices more? Why?
  - b) Which tax will raise more revenue? How do you know this? What assumptions are you making to get this answer?
  - c) Which tax has the greater deadweight loss? Why?
  - d) Based on this analysis, which tax would you recommend? Why?
5. Suppose that the demand for video game systems is given by  $P = 250 - 2Q$ . The supply video game systems is  $P = 10 + Q$ .
- a) Find the equilibrium price and quantity of the game systems.
  - b) Calculate the producer and consumer surplus associated with the equilibrium found in part (a). Illustrate on a graph.
  - c) Giving in to demands from the group Moms United, who feel children spend too much time playing video games, the government levies a \$30 tax on consumers of video game systems. Compute the quantity of game systems sold after the tax, the price paid by consumers, and the price received by producers. Illustrate on a graph.
  - d) Find the new producer and consumer surplus associated with your answer to part (c).
  - e) How much revenue does the government raise from the tax?
  - f) How does the sum of consumer surplus, producer surplus, and revenue after the tax (from (d) and (e)) compare to the sum of producer and consumer surplus found before the tax (your answer to (b))? What does the difference between the two represent?

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<sup>1</sup> While it certainly isn't realistic to assume that as many electronics are sold as gallons of milk, it is reasonable to assume that the same value of each is sold (e.g. \$1 million of each). This is sufficient to assume that equal tax rates *could potentially* raise the same amount of revenue.