

Problem set 1

“due” 9/16/2009

Use the following information for problems 1-3

Green et al. (2005) estimate the supply and demand curves for California processed tomatoes. The supply function is $\ln(Q) = .2 + .55 \ln(p)$, where Q is the quantity of processing tomatoes in millions of tons per year and p is the price in dollars per ton. The demand function is $\ln(Q) = 2.6 - .2 \ln(p) + .15 \ln(p_t)$, where p_t is the price of tomato paste (which is what processing tomatoes are used to produce) in dollars per ton. Suppose that in 2002, $p_t = 110$.

Problem 1 (Supply and demand)

- What is the demand function for processing tomatoes, where the quantity is solely a function of the price of processing tomatoes?
- Solve for the equilibrium price and quantity of processing tomatoes (explain your calculations, and round to two digits after the decimal point).
- Sketch the supply and demand curves, and label the equilibrium and axes appropriately.

Problem 2 (Supply and demand II) Determine how the equilibrium price and quantity of processing tomatoes change if the price of tomato paste falls by 10%.

Problem 3 (Price controls) Suppose the government imposes a price floor on processing tomatoes at \$65 per ton. The government will buy as much as farmers want to sell at that price. Therefore, processing firms pay \$65. Determine how many tons firms buy and how many tons the government buys. What is the cost of this price support program to the government?

Problem 4 (Price gouging) After a major earthquake struck Los Angeles in January 1994, several stores raised the price of milk to over \$6 a gallon. The local authorities announced that they would investigate and that they would enforce a law prohibiting price increases of more than 10% during an emergency period. What is the likely effect of such a law?

Problem 5 (Elasticity and tax incidence)

Green et. al. estimate that the demand elasticity is -0.47 and the long-run supply elasticity is 12.0 for almonds. The corresponding elasticities are -0.68 and 0.73 for cotton, and -0.26 and 0.64 for processing tomatoes. If the government were to apply a per-unit tax to each of these commodities, what incidence would fall on consumers?

Problem 6 (per-unit taxes and elasticity)

Suppose the supply and demand curves for cigarettes, in millions of packs sold per month, are given by

$$Q^d = 11 - \frac{1}{5}p$$

$$Q^s = 2p$$

- Solve for equilibrium price and quantity.

- b. Solve for price elasticity of demand and supply at the equilibrium.
- c. Suppose the government imposes a \$1/pack tax on cigarettes, paid by buyers. Solve for the new equilibrium, making sure to note both the before-tax and after-tax prices. What portion of the tax is paid by consumers, and what portion by sellers?
- d. Would your answer to c. change were the tax paid by the sellers instead of the buyers?

Problem 7 (Supply, demand, and elasticity I)

According to Borjas (2003), immigration into the US increased the labor supply of working men by 11% between 1980 and 2000 and reduced the wage rate by 3.2%. From these data, can we make any inferences about the elasticity of supply or demand? Which of the two curves is likely to be relatively more elastic?

Problem 8 (Constant elasticity supply and demand curves)

- a. Prove that a demand curve given by $Q = Ap^\epsilon$ has elasticity ϵ at all points along the curve (hints: the curve Ap^ϵ has slope $\epsilon Ap^{\epsilon-1}$, and ϵ is probably a negative number).
- b. Prove that a supply curve of the form $Q = Bp^\eta$ has elasticity η at all points along the curve.