

Sample Final

You must answer all questions.

Question 1

Consider the market for Cobalt. The world price of Cobalt is currently \$10 per ton, and assume the US can buy whatever quantity of Cobalt they wanted at this price. The US demand for Cobalt is given by $Q_d = 100 - P$. The domestic supply function for Cobalt is given by $Q_s = P - 30$.

- a) Carefully graph the market for Cobalt. What is the equilibrium price? What is the equilibrium quantity? How much of this quantity comes from domestic sources? What is the consumer surplus? What is the producer surplus?
- b) Given the domestic supply function, what price would be necessary for domestic producers to supply 20 tons of Cobalt. If this price was in fact the equilibrium price, what would be the resulting consumer and producer surplus. How do these answers compare to those found in part a)?
- c) Consider once again the conditions that prevailed in part a). Suppose that the government estimates the vulnerability premium to be \$10 per ton. Discuss three options that the government has if it wants to implement a policy based on this analysis. In your answer be sure to define what the vulnerability premium is and also be sure to comment on its determinants. Using the equations above, show the implications of one of the three policy options.

Question 2

Suppose the marginal cost of recycling is $MCR = 2a$, where a is the fraction of aluminum cans recycled. Suppose that $MCD = (1-a)/2$ is the marginal cost of waste disposal of the cans.

- a) Given the above information, what fraction of cans would you expect to be recycled? What does this imply about the effective size of the aluminum endowment?
- b) Discuss the factors that influence whether your answer to part a) is socially efficient.
- c) Contrast the time profiles of price and quantity consumed for a resource that is recycled and one that is not recycled.

Question 3

Consider the market for natural gas. The total endowment of natural gas is 120 cubic tons. Demand in each period is the same and is given by: $p_t = 300 - q_t$, where $t = 1, 2$. The interest is 8%.

- a) If the marginal extraction cost is \$45 per ton, what is the dynamically efficient allocation?
- b) What is the marginal user cost of the allocation in period 1 dollars? What is the marginal user cost of the allocation in period 2 dollars?
- c) What is the price paid in period 1? What is the price paid in period 2? Demonstrate mathematically that the price rise between the two periods is less than the rate of interest.
- d) Suppose that a price ceiling is imposed that restricts the price to be no higher than \$200. What are the implications of the price ceiling for the allocation between the two periods?

Question 4

Tietenberg Chapter 13 problem 1 (from 7th edition and earlier)

Tietenberg Chapter 14 problem 1 (from 8th edition)