

14.03 Exam 2 Fall 2000

DO NOT OPEN THIS EXAM UNTIL TIME IS ANNOUNCED!

There are 80 points on this exam and you have 80 minutes to complete it. The points can be used as a guideline for how many minutes to spend on each problem. If you are uncertain of the answer to a problem, move on to the next problem and return to the question at the end of the exam, time permitting.

THE EXAM WILL END PROMPTLY AT NOON. WHEN TIME IS CALLED YOU MUST PUT DOWN YOUR PENCILS AND CLOSE YOUR EXAMS IMMEDIATELY. IN FAIRNESS TO ALL, IF YOU ARE SEEN WRITING AFTER TIME IS CALLED, WE WILL BE REQUIRED TO DOCK POINTS FROM YOUR EXAM.

Part I: 5 points each

True, False, or Uncertain AND WHY. You must explain your answer with one or two sentences and/or graphs. Answers without justification receive zero points. 5 points each.

1. Although the First Welfare Theorem demonstrates that a free market in equilibrium is Pareto efficient, the Second Welfare Theorem reveals that there is normally a tradeoff between equity and efficiency.
2. Consider an expected utility maximizer who is globally risk seeking (meaning, she is risk seeking at all wealth levels) with $U(\$0) = 0$. For this person, $2 \cdot U(\$500) < U(\$1,000)$. [A diagram is required.]
3. Consider an economy that produces two goods, A and B, using two inputs K and L. In the production of these goods, $MRTS_A = MRTS_B$. Among consumers in this economy, $MRS_i = MRS_j$. The operation of this economy is Pareto efficient.
4. Kane and Staiger found that small decreases in abortion availability reduced both abortions *and* births. Based on their analysis, we should expect that banning abortion altogether (for example, by overturning *Roe v. Wade*) would reduce births even further.

Part II: 15 points each

1. (This is not a math problem. Answer using principles of expected utility maximization.)

Consider a “nation” of two risk averse expected utility maximizers with identical utility functions. Each person has \$10,000. One person is perfectly healthy. The other person will contract a disease and must pay \$10,000 for a cure (there are no other psychic or monetary costs). Neither knows in advance who will stay healthy and who will get the disease. There is no insurance.

- a) Someone proposes a voluntary national health fund. Before finding out who gets sick, each person can choose to pay \$5,000 into the fund. Afterwards, the person who gets sick receives the money from the health fund, provided he paid into the fund beforehand. What is a person’s expected utility if he does not pay into the fund? What is a person’s expected utility if he does pay into the fund, assuming the other person pays in as well?
- b) Will people join the national health fund? What is the impact of the health fund on social welfare, i.e., the sum of individual utilities? What insurance principle is at work?
- c) A new genetic test is invented. At birth, each person finds out for free whether or not he will get sick. How will the genetic test impact the insurance fund from part (A)? What is the impact of the genetic test on social welfare? Explain.
- d) Someone proposes that the government *mandate* that every citizen must pay \$5,000 into the fund, regardless of his or her genetic test. What is the impact of the mandate on social welfare relative to part (B)? What insurance principle is at work? Explain.

2. (15 points)

The domestic demand for professional soccer balls is given by

$$Q = 5000 - 100P$$

where the price (P) is measured in dollars and quantity (Q) in units of professional soccer balls per year. The domestic supply curve for professional soccer balls is

$$Q = 100P - 1000.$$

- a) What is the domestic equilibrium in the professional soccer balls market?
- b) Now suppose that this market is opened to international competition, and professional soccer balls can be imported at a world price of \$20 per ball. What is the free trade equilibrium in this market? How many balls are imported per year? Draw a diagram describing the gain of total surplus from free trade relative to part (a).
- c) If the Government decided to impose a quota of 1500 professional soccer balls per year, what would the equilibrium price in the market be? What would the quantity of balls produced domestically be? Show the deadweight loss relative to free trade in a diagram.

Hint: For $P > 20$, the total supply of soccer balls, including imports, is $Q = 100P + 500$ (Note that this is only true for $P > 20$).

- d) Find the tariff per unit of imports that would give the same level of domestic demand for soccer balls as the quota in part (c). What would the quantity of balls imported and the quantity of balls produced domestically be?
- e) Give the ranking of the trade arrangements in parts (b), (c) and (d) in terms of the total domestic surplus. Remember to account for the domestic consumer surplus, the domestic producer surplus, and the Government revenue (No math is necessary to answer this question.)

Part III: 30 points

Suppose that a country (Home) has identical consumers with utility functions

$U(X, Y) = X^{1/3} Y^{2/3}$. The production possibility frontier (PPF) is given by $Y^2 + 4X^2 = 48$.

Another country (Foreign) has also identical consumers with utility functions

$U(X, Y) = X^{2/3} Y^{1/3}$. The PPF in Foreign is the same as in Home: $Y^2 + 4X^2 = 48$.

- a) Solve for the competitive equilibrium when each of the two countries is considered as a closed economy. That is find the consumption levels of X and Y and the price ratios prevailing in each of the two countries. Draw a qualitative diagram of the equilibrium in each of the two countries.
- b) In each of the two countries there is public debate on whether to start a trade relationship between Home and Foreign. The opponents of free trade argue that since the two economies are identical in terms of production technology, there will be no gains from trade. Do you agree with this argument? Briefly motivate your answer (you can refer to the diagram you drew for the previous answer).
- c) Now suppose that the free trade lobbies prevail, and the two economies are opened to international trade with each other. Suppose further that the price ratio P_x/P_y is set at a level R such that is intermediate between the closed-economy equilibrium price ratios in each country, which you have already determined. Find the quantities of X and Y that are produced in each country as a function of R . (Hint: the production technology is the same in the two countries and so is the price ratio.) Then find the quantities of X and Y that are consumed in each country as a function of R and the quantities produced. Draw a qualitative diagram of the trade equilibrium in each country.
- d) Now realize that since this is a general equilibrium model, the price ratio P_x/P_y is endogenously determined. Solve for the equilibrium level of R . (Hint: the total demand of a good has to be equal to the total supply of that good. By Walras' Law it is enough that you impose this condition for just one of the two goods.)