Economics 433: Advanced International Trade
Fall, 2006

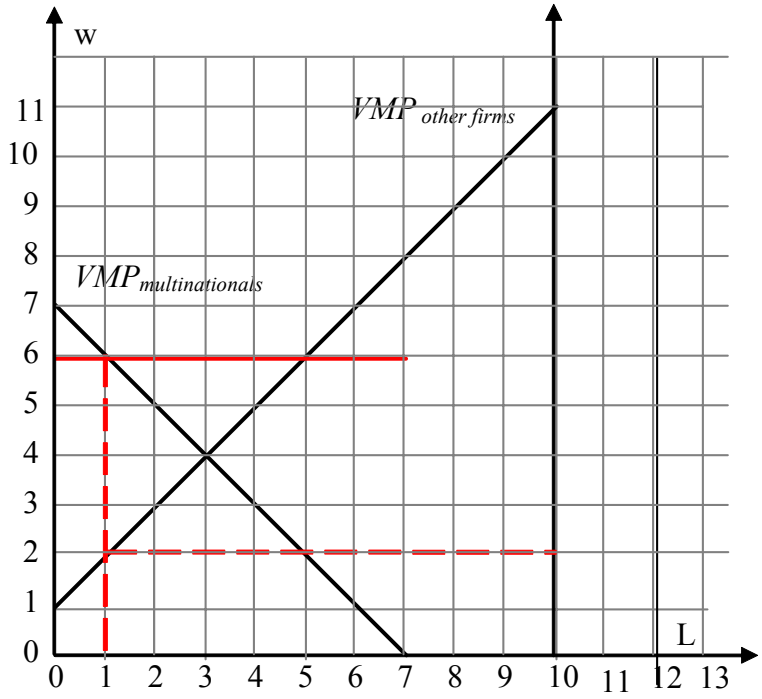
Problem Set 3

Due December 12, 2006

Please print this problem set out and work directly on it. If necessary, you may attach extra sheets. Where calculations are involved, please show your work.

Suggested answers

1. Multinationals have set up sweat shops in the country of Obreros in order to exploit the cheap labor there. Combined, their factories create the demand for labor schedule depicted below on the left. Demand for labor by locally-owned firms in Obreros is depicted on the right. There are a total of 10 workers in Obreros.



a) In the absence of any wage regulations, the wage paid by both types of firms will be ___**4**__ , and the multinationals' profits (producer surplus) from their sweatshops will be π __**4.5**_____ Employment at the multinational firms will be L_m __**3**__, and employment at the locally owned firms will be L_o __**7**__. If the capital stocks embodied in the multinational sweat shops are worth $K = 100$, then the return on these capital investments for the multinationals is π/K = __**0.045**___.

b) Now suppose activists force the multinationals to pay a wage rate of $w = 6$ and re-answer the questions posed in part (a) above. In doing so, let w denote the wage paid by locally-owned firms alone. Then w = __**2**__, π = __**1/2**___ L_m = __**1**__, L_o = __**9**__, π/K = _**0.005**__. (refer to dotted lines in the graph above)

c) If the multinationals leave the country in response to the minimum wage requirement, what wage rate will prevail? w = __**1**___.

2. Suppose the Krugman/Lucas model of growth characterizes the country of Malatarea, which produces agricultural (X) and industrial (Y) goods. One worker can produce h_x units of agricultural output or h_y units of industrial output. As experience accumulates in these sectors, output per worker levels grows according to: $\frac{\Delta h_x}{h_x} = 0.005 \cdot L_x$ and $\frac{\Delta h_y}{h_y} = 0.01 \cdot L_y$, where L_x is the number of workers employed in the agricultural sector and L_y is the number of workers employed in the industrial sector. There are always 10 workers in the country, and labor **markets** always clear, so $L_x + L_y = 10$.

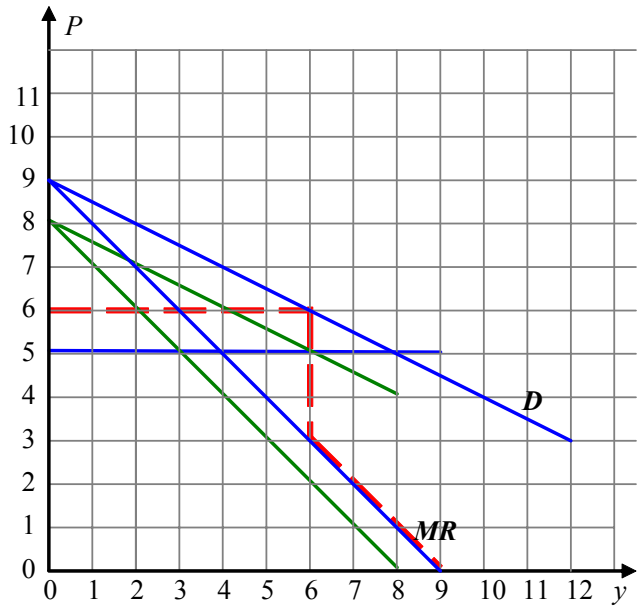
a) At the moment, Malatarea is closed to trade. Also, the productivity of labor in agriculture is $h_x = 3$ and the productivity of labor in industry is $h_y = 2$. What is the relative price of agricultural goods? $= \frac{P_x}{P_y}$ __**2/3**__. At these relative prices, consumers demand the same amount of agricultural goods and industrial goods (i.e., $Q_x^d = Q_y^d$). Given that production levels must match consumption levels in the absence of trade, how much labor is devoted to each sector? L_x = __**4**__ L_y = __**6**__. How fast is productivity growing in the agricultural sector? $\Delta h_x / h_x$ =__**0.02**___ How fact is productivity growing in the industrial sector? $\Delta h_y / h_y$ = __**0.06**__. Will the domestic relative price of agricultural goods be rising or falling over time? _rising_.

b) Under the autarky conditions described in part (a) above, what is the average rate of growth in labor productivity when $Q_x = Q_y$? _**0.044**__ (Note: The average rate of growth in labor productivity is $s_x \cdot \frac{\Delta h_x}{h_x} + (1 - s_x) \cdot \frac{\Delta h_y}{h_y}$, where $s_x = \frac{L_x}{L_x + L_y}$ is the share of labor force employed in the agricultural sector.) If the relative price of agricultural goods in world markets is $\frac{P_x^W}{P_y^W}$ = ½ , and if this country opens to trade, how much of each good will it produce? Q_x = _**0**_ Q_y = _**20**_. How much labor will be devoted to each sector? L_x = _**0**_ L_y = _**10**_. What will the average rate of growth in labor productivity be? _**0.10**__

c) Given your calculations in part (a) and (b), should Malatarea cut itself off from world trade? Defend your answer.

No, this would mean slowing down the growth rate *and* sacrificing the gains from trade.

3. The diagram below depicts the demand curve (*D*) and associated marginal revenue curve (*MR*) faced by a peanut grower who is a monopolist in his home market. The monopolist has a marginal cost of $5 per pound. Foreign producers are able to produce comparable peanuts at a price of $4 per pound.



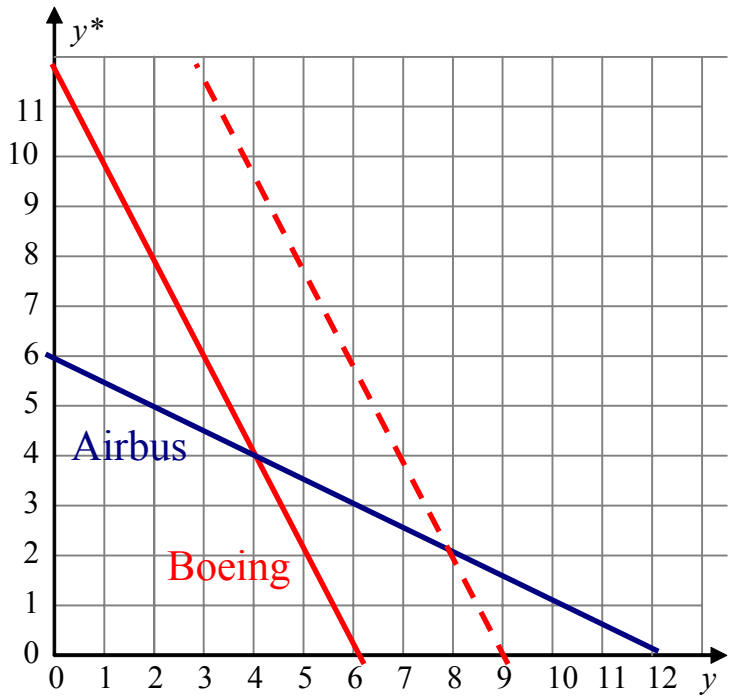
a) If foreign peanuts are strictly prohibited, what price and quantity of peanuts will prevail in the domestic market? P = __7_, Q = ___4__. What are the domestic peanut producer's profits? __8__

b) If peanuts are allowed into the country, but are subject to a 50 percent ad valorem tariff, what are the price, quantity and domestic producer's profits at the new equilibrium? P = ___6_, Q = ___6___. Profits = ___6__. What quantity of peanuts is imported? __0____ (You may assume that when foreign and domestic peanuts cost the same amount, domestic consumers buy the domestically produced peanuts out of loyalty.) Will the home producers prefer to shut down, continue operating, or not care? __**continue**__ (The new MR curve for the home producer is the red dotted line—refer to lecture 21.)

c) If peanuts are allowed into the country, but are subject to a quota of 2 pounds, what are the price, quantity and domestic producer's profits at the new equilibrium? P = _**6.5**_, Q = ____**3**__. Profits = __**4.5**__ How many pounds of peanuts are imported? ___**2**__ Will the home producer prefer to shut down, continue operating, or not care? _**continue**_. (When two pounds are imported, this takes 2 units of demand away from the domestic monopolist. Its new demand and MR curve are depicted in green above.)

d) Finally, if peanuts are allowed into the home market without any trade restrictions whatsoever (i.e., no quotas, no tariffs), what quantity of peanuts is imported? __**10**__ Will the home producers prefer to shut down, continue operating, or not care? _**shut down**_. (The home producer cannot match the price of imported peanuts and cover its own costs.)

4. Suppose operating costs at Boeing are given by the function $C = 8y$, where y is the number of Boeing planes produced per year. Similarly, let operating costs at Airbus be $C^* = 8y^*$, where y^* is the number of Airbus planes produced per period. Also, assume that Boeing planes and Airbus planes are perfect substitutes, so that the demand function for planes depends only on the total number of planes produced. More precisely, let the price consumers are willing to pay for $y + y^*$ planes be: $P = 20 - (y + y^*)$. Finally assume that Boeing and Airbus are Cournot competitors.



a) In the absence of trade barriers and other government interventions, what algebraic expressions describe the Boeing and Airbus reaction functions? Graph and labels this functions on the grid above.
$y = 6 - y^*/2$, $y^* = 6 - y/2$ (refer to lecture 21)

b) Using the reaction functions you derived in part a, and continuing to assume no government interventions, find the equilibrium quantities produced for Boeing and Airbus. $y =$ __4_____ $y^* =$ ___4_____ . Also find the equilibrium price $P=$____12____ .

c) Now suppose that the U.S. government provides Boeing with a production subsidy that reduces its operating costs from 8 per plane to 2 per plane. That is, net of the subsidy, Boeing's total operating costs become $C = 2y$. Depict the new Cournot equilibrium graphically above, using a dotted line to represent Boeing's new reaction function, and labeling it "subsidized Boeing." What are the new output levels and output price? $y =$ ___8_____ $y^* =$ ____2____ $P=$_____10___ .