

ECO 352 – Spring 2010
International Trade
Problem Set 4 – Due April 8 in class

Question 1: (40 points)

Note: In your calculations in this question, you can use without proof the following mathematical result: Given any two numbers a and b with $a < b$, and the function $f(x) = (x - a)(b - x)$, the choice of x that maximizes $f(x)$ is $x = \frac{1}{2}(a + b)$.

The demand for automobiles in Freedonia is totally inelastic at 40 thousand cars per year. Domestic and imported autos are perfect substitutes in demand. Domestic producers of cars are small price-taking firms, and the domestic supply curve is given by $Q = p - 10$, where Q is the quantity measured in thousands of cars per year, and p is the price denominated in thousands of Bucks, the Freedonian unit of account.

Imported autos in Freedonia are supplied by a foreign monopolist, Imperial Motors. This firm's marginal cost of producing and delivering an auto to the Freedonian market is 10 thousand Bucks.

Freedonia and the rest of the world are segmented markets. Freedonian producers cannot export to the rest of the world. The pricing policy of Imperial Motors in the rest of the world (and that of any other auto producers who might be operating only in the rest of the world) is separate from the pricing policy in Freedonia, and stays the same for all situations considered below about taxes etc. in Freedonia.

The market structure in Freedonia is that of price leadership. Imperial Motors chooses the price; Freedonian producers and consumers make their quantity choices taking this price as given. Imperial Motors chooses the price to maximize its profit.

(a) (10 points) Write down the equation for Freedonia's import demand curve for autos. Under free trade, prove that the price that maximizes Imperial Motors' profit is $p = 30$. What is the resulting profit?

(b) (5 points) Now suppose Freedonia's government levies an import tax of t thousand Bucks per imported auto. Prove that Imperial Motors' response will be to raise the price it charges Freedonian consumers by $\frac{1}{2}t$.

(c) (5 points) Compute the expression for the Freedonian government's tax revenue as a function of t . Prove that the tax rate that maximizes the government's revenue is $t = 20$. What is the tax revenue?

(d) (10 points) Compare this policy to free trade. Calculate the loss of consumer surplus and the gain in domestic producer surplus in Freedonia, and the loss of profit to Imperial Motors. Express all numbers in Megabucks (millions of Bucks).

(e) (5 points) Calculate the overall welfare effect of the tax on (i) Freedonia, (ii) the rest of the world, (iii) the whole world.

(f) (5 points) Suggest other policies, which may include other kinds of taxes or quantitative controls, that would raise the same revenue for the Freedonian government while causing

smaller welfare costs to the private economy. You should explain the economic intuition for the superiority of your suggested policies, but you are not expected to perform any numerical calculations of the welfare difference between your suggested policies and the import tax.

Question 2: (60 points)

The United States (US) and the European Union (EU) are competing exporters of wheat in the world markets, and each is large enough to be able to affect the world price. The EU has started a program of export subsidies, which is cutting into the market share of the US. The US administration is considering an export subsidy of its own to counter the EU policy. You have been called in as an expert adviser.

Begin your analysis with the initial situation before the EU started its export subsidy program.

(a) (15 points) Draw three horizontally linked supply-demand diagrams. The diagram on the left should show the supply and demand curves for wheat in the US. The one on the right should show the EU export supply curve, and the import demand curve of the rest of the world (ROW), that is, all countries other than the US or EU. The middle diagram should show the US export supply curve, derived from the left panel, and the import demand curve of all non-US countries (ROW import minus EU export), derived from the right panel. (Any fine arts major who has strayed into this class will know that such a three-paneled picture is called a triptych.)

Now consider the situation where the EU has its subsidy program in place, but without any US policy response.

(b) (10 points) How does the EU export subsidy shift its export supply curve? In turn, how does that shift the import demand curve of non-US countries? What is the effect on the world price, and on production, consumption, producer surplus, consumer surplus, and aggregate welfare in the US?

(c) (5 points) Suppose that, behind the scenes of the supply-demand diagrams, production in the US proceeds as follows. Land is specific to wheat production, capital is specific to the rest of the economy, and labor is mobile between the two sectors. How is the effect of the EU subsidy reflected in the gains and losses of the owners of the three factors in the US?

Now take the EU subsidy as given. Suppose the US also implements an export subsidy, whose level is calculated to restore US wheat exports to the level that prevailed before the EU subsidy.

(d) (2 points) The US must accompany its export subsidy with a prohibition of imports of wheat (or a sufficiently high tariff that will eliminate imports). Why?

(e) (15 points) Show diagrammatically the effects of the US subsidy. You will find it convenient, in the triptych for answering this part, to show the US price on the vertical axis in the left panel, and the world price on the vertical axis in the middle panel. What will be the effect of the US export subsidy on the world price, and on the price, production, consumption, producer surplus, consumer surplus, government revenue, and aggregate welfare in the US? Given the assumptions in (c) above, who gains and who loses in the US from this subsidy?

(f) (8 points) In the light of this analysis, what is your advice to the US government concerning the export subsidy? Can you suggest better methods to counter the EU policy?

(g) (5 points) Would your advice differ if the industry in question were aircraft (Boeing versus Airbus) instead of wheat? Give only a brief intuitive argument here; we will examine such a situation in more analytic detail later.