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Intro 100 at BMCC – Mid-Term Exam Answers

Part I – 40 points – Suppose that the US economy produces only two goods – food and tires – and that the production possibilities frontier exhibits increasing opportunity cost. Assume further that the US currently produces both food and tires.

Last month, Pres. Obama imposed high tariffs on imported Chinese tires. Answer the following questions using the assumption that the tire tariffs will cause the relative price of tires to rise in America, but will NOT affect the relative price of tires on world markets.

1. (10 points) Will the US economy produce more or less tires after the tariffs are imposed? Will the US economy produce more or less food? **Explain.**

The US will produce more tires and less food after the tariffs are imposed because the tariffs will increase the relative price of tires. Because the relative price of tires rises, there will be relatively more incentive to produce tires (and relatively less incentive to produce food).

2. (10 points) Given your answers to the previous question, do you think the tire tariffs will help or hurt American tire manufacturers? Will the tariffs help or hurt American producers of food? **Explain.**

Tire tariffs will help American tire manufacturers because the tariffs will increase the relative price of their product. Because the relative price of tires rises, one tire will be worth a greater quantity of food.

Tire tariffs will hurt American food producers because the tariffs will reduce the relative price of their product. Because the relative price of food falls, one bushel of food will be worth a smaller quantity of tires.

3. (20 points) Will Americans (as a whole) be able to purchase more tires and more food after the tariffs are imposed? **Explain** your answer in words and illustrate your answer with a diagram.

Americans (as a whole) will NOT be able to purchase more tires and more food after the tariffs are imposed. Instead they will have to purchase less of both goods.

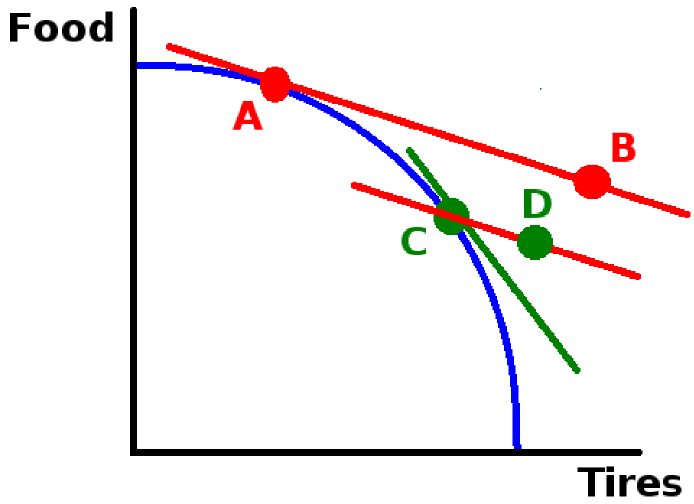
Because America was importing tires, we can safely assume that its opportunity cost of producing tires is higher than China's. In other words, China has a comparative advantage in the production of tires, while the United States has a comparative advantage in the production of food.

Because America has a comparative advantage in the production of food, it produces few tires and a lot of food (i.e. point A). America then trades the surplus food to China for tires, thus enabling Americans to consume more food and more tires than they could possibly produce on their own (i.e. point B).

Once the tariffs are imposed however, the relative price of tires will rise in America (i.e. as represented by the slope of the (steep) green line), thus encouraging Americans to produce more tires and less food (i.e. point C). Because less food will be produced, Americans will have less food to trade for tires, thus reducing Americans' consumption of both food and tires (i.e. point D).

The slope of the two red lines represents the world relative price of tires. Prior to the tariffs, America trades food for tires along the outer red line.

Since (by assumption) the tire tariffs will NOT affect the relative price of tires on world markets, tariffs will not affect the slope of the line along which America will trade (after tariffs are imposed). The tariffs will simply shift the line inward (in a parallel fashion).



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Part II – 30 points – Suppose that Americans could purchase all the tires they want on the world market for $100 per tire and at that price, they buy 75 million tires from American manufacturers and 50 million tires from Chinese manufacturers. For simplicity, assume that no other country produces tires.

Suppose further that – after Pres. Obama's tire tariffs have been imposed – the price of tires in the United States will rise to $135 per tire, Americans will purchase 100 million tires from American manufacturers and will not purchase any tires from Chinese manufacturers.

4. (10 points) Placing price on the vertical axis and quantity on the horizontal axis, graph the American demand curve, the American supply curve and the World supply curve.

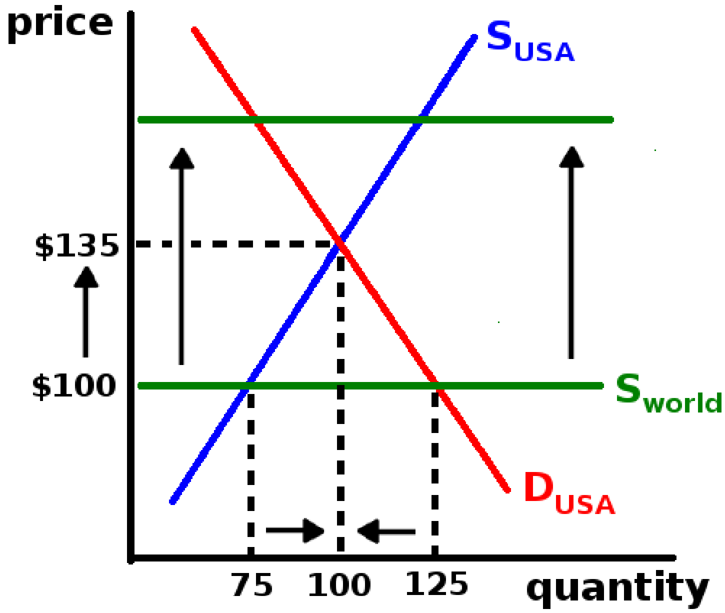
(see graph below)

5. (10 points) On the same graph, show the quantity of tires demanded by American consumers at the world market price (i.e. $100 per tire) and show the quantity of tires supplied by American tire manufacturers at that price.

At a price of $100 per tire, Americans manufacturers supply 75 million tires, while American consumers demand 125 million tires. The difference of 50 million tires is made up for by imports of Chinese tires.

6. (10 points) On the same graph, illustrate the effect that tariffs have on the price of tires in the United States, on the quantity of tires supplied by American tire manufacturers at the new price and on the quantity of tires purchased by American consumers at the new price.

At a price of $135 per tire, Americans manufacturers supply 100 million tires, while American consumers demand 100 million tires. The tariffs have pushed the price of Chinese tariffs so high that Americans do not purchase any Chinese tires at all.



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Part III – 30 points – Suppose there are many tire manufacturers in America and that they are all too small to affect the market price of tires. Once again, assume that Americans could purchase all the tires they want on the world market for $100 per tire, but after Pres. Obama's tire tariffs have been imposed, the price of tires in the United States will rise to $135 per tire.

Finally, assume that an American tire manufacturer faces the following cost functions:

$$MC = \frac{Q}{2000} \quad \text{and} \quad AC = \frac{Q}{4000}$$

7. (10 points) Prior to the imposition of the tariff, how many tires should the firm produce to maximize its profit? What would the firm's total profit be? **Show your work and/or explain your answer.**

Prior to the tariffs, the firm would produce 200,000 tires and its profit would be $10,000,000.

To maximize its profit, a firm produces output up to the point at which marginal revenue equals marginal cost. Since the market for tires is competitive (by assumption), the tire manufacturer's marginal revenue is equal to the price of the product (i.e. $100).

$$MR = MC \quad \Rightarrow \quad 100 = \frac{Q}{2000} \quad \Rightarrow \quad Q = 200{,}000$$

$$TR = p \cdot Q \quad \Rightarrow \quad TR = 100 \cdot 200{,}000 \quad \Rightarrow \quad TR = 20{,}000{,}000$$

$$TC = AC \cdot Q \quad \Rightarrow \quad TC = \frac{Q}{4000} \cdot Q \quad \Rightarrow \quad \frac{200{,}000}{4000} \cdot 200{,}000 \quad \Rightarrow \quad TC = 10{,}000{,}000$$

$$\Pi = TR - TC \quad \Rightarrow \quad \Pi = 20{,}000{,}000 - 10{,}000{,}000 \quad \Rightarrow \quad \Pi = 10{,}000{,}000$$

8. (10 points) After the tariffs are imposed, how many tires should the firm produce to maximize its profit? What would the firm's total profit be? **<u>Show your work and/or explain your answer</u>.**

After the tariffs are imposed, the firm would produce 270,000 tires and its profit would be $18,225,000.

$$MR = MC \quad \Rightarrow \quad 135 = \frac{Q}{2000} \quad \Rightarrow \quad Q = 270{,}000$$

$$TR = p \cdot Q \quad \Rightarrow \quad TR = 135 \cdot 270{,}000 \quad \Rightarrow \quad TR = 36{,}450{,}000$$

$$TC = AC \cdot Q \quad \Rightarrow \quad TC = \frac{Q}{4000} \cdot Q \quad \Rightarrow \quad \frac{270{,}000}{4000} \cdot 270{,}000 \quad \Rightarrow \quad TC = 18{,}225{,}000$$

$$\Pi = TR - TC \quad \Rightarrow \quad \Pi = 36{,}450{,}000 - 18{,}225{,}000 \quad \Rightarrow \quad \Pi = 18{,}225{,}000$$

9. (10 points) How will the tariffs affect the quantity of labor demanded by American tire manufacturers? **<u>Explain</u>.**

The quantity of labor demanded by American tire manufacturers would increase.

A profit maximizing firm hires labor up to the point where the marginal revenue produced by an additional unit of labor equals the marginal cost of an additional unit of labor.

If the labor market is perfectly competitive, then the firm faces a constant marginal cost of labor – i.e. the wage rate – and it hires labor up to the point at which the wage is just equal to the marginal revenue product of labor – i.e. $w = p \cdot MPL$

So when the price of tires increases, the marginal revenue product of labor increases (because each additional unit of labor would generate greater additional revenue) and the firm would want to hire more labor (so that it can produce more tires).