Final Exam – *Answers*
December 16, 2008

Answer in blue book. Use the point values as a guide to how extensively you should answer each question, and budget your time accordingly. The exam has a total of 60 points.

1. (8 points) In July of 2008, the Doha Round negotiations broke down. In two paragraphs, describe first the major issues that had divided the countries throughout the negotiations, and second the specific issue on which their failure to agree in July precipitated the breakdown.

Throughout the negotiations, the major issues were agricultural protection and subsidies in the US and EU, on the one hand, and high tariffs in developing countries on both agriculture and manufactured goods on the other. Developing countries wanted the US to reduce its agricultural subsidies, and the EU to reduce its agricultural tariffs, both in order to benefit developing-country farmers who suffered from low world prices for their products. In return, the developed countries insisted on greater market access into developing countries for their exports of agricultural and manufactured goods, as well as of services.

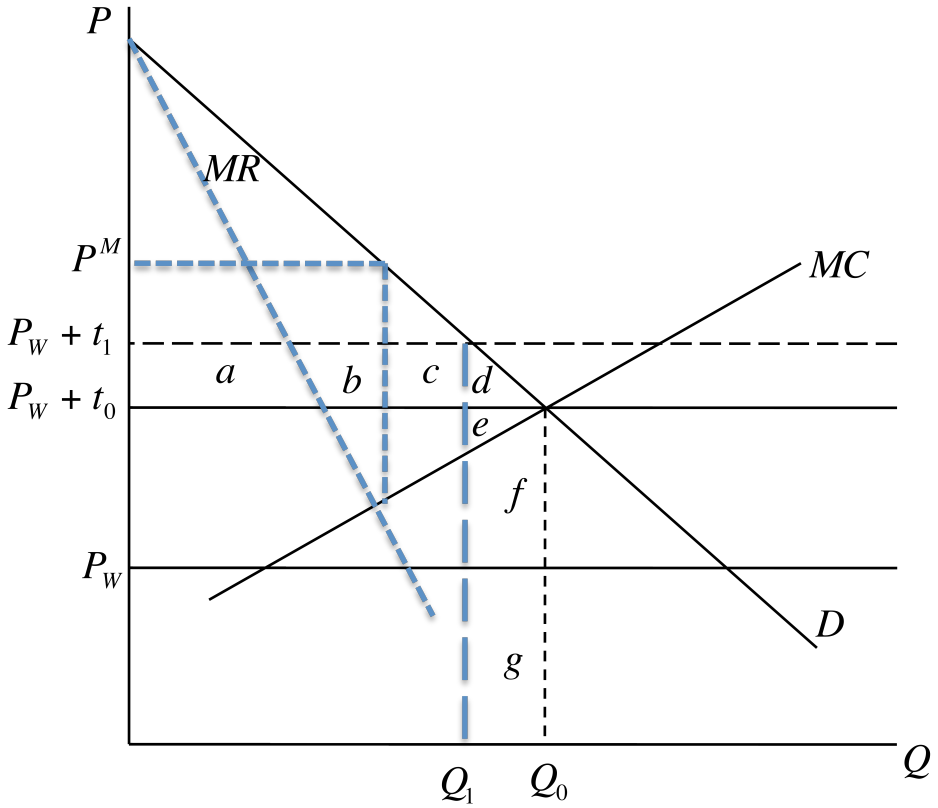
In July, however, the sticking point was the trigger for "special safeguards in agriculture." This was a provision that would allow developing countries to raise tariffs on agricultural imports to protect their farmers. The safeguards would be triggered by an increase in imports above a certain percentage, and the disagreement was over that percentage. The US wanted that to be over 40%, which would mean that imports would need to rise by that amount at least before the developing countries could raise tariffs. India and China, on the other hand, insisted that this trigger should be set much lower.

2. (9 points) In the figure below are shown domestic demand and domestic marginal cost in an industry of a small open economy that faces a world price P_W of this good. The marginal cost curve may represent that of a perfectly competitive industry with lots of domestic firms, in which case *MC* is the competitive supply curve. Or, in a different case, *MC* may be the marginal cost of a single firm, the only firm producing the good in the country. In both cases, initially the country is levying a tariff of t_0, the domestic price is $P_W + t_0$ which happens to be at the intersection of *D* and *MC*, and the country is thus both producing and consuming the quantity Q_0.

   Suppose now that the country increases its tariff to the level t_1 shown. Explain what happens, as a result, first (Case 1) under the assumption that there are a large number of competitive domestic firms with supply curve *MC*, and

second (Case 2) under the assumption that there is only a single domestic firm with marginal cost curve *MC*. Specifically, say what happens to

a. Domestic price
b. Domestic production
c. Domestic consumption
d. Producer welfare
e. Consumer welfare
f. Government revenue
g. Welfare of the country as a whole

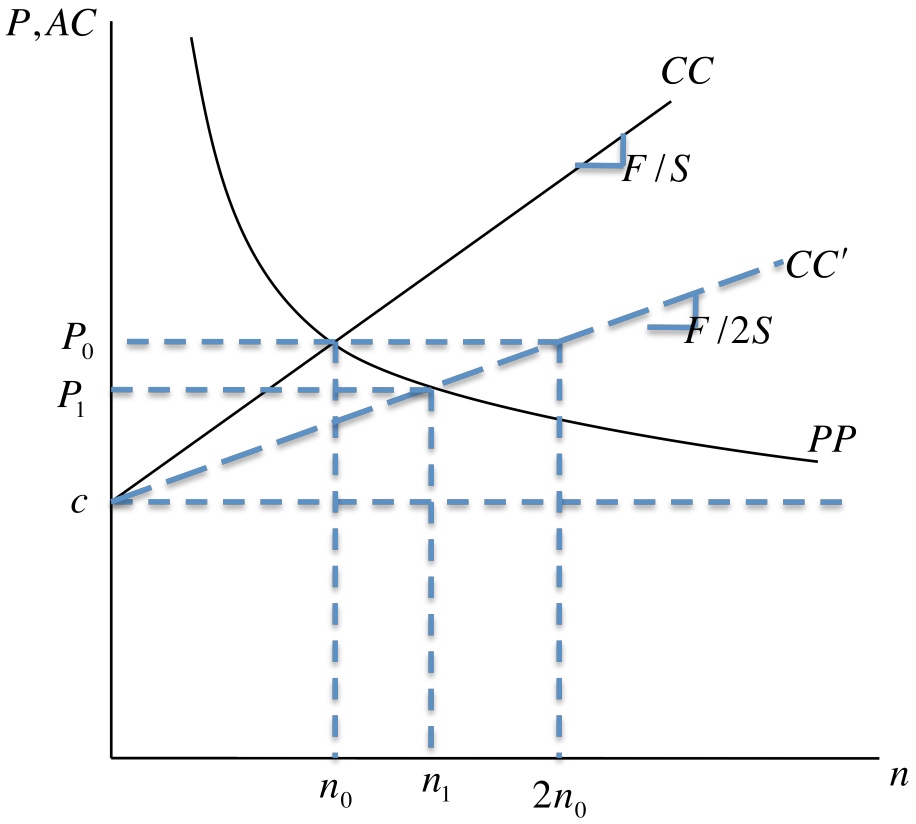


Case 1: Here nothing happens. Imports are already zero, so the fact that consumers would have to pay a higher price, $P_W + t_1$, in order to import can't discourage them any further. And the domestic price cannot rise above $P_W + t_0$, since if it did the competitive firms, supplying out to their supply curve MC, would produce more than is demanded and force price back down. Thus all of the listed variables remain unchanged.

Case 2: Here the tariff increase does make a difference, since it permits the single supplier to charge a price as high as $P_W + t_1$ without competition from imports. It cannot charge a price higher than that because then it would lose all sales to imports. And it does not want to charge a price lower than that since it is below the monopoly price shown as deriving from marginal revenue MR and marginal cost. Therefore, $P_W + t_1$ becomes the new domestic price. Thus, domestic price rises, quantities produced and consumed both fall to Q_1. Demanders lose

areas (a+b+c+d). The single producer gains revenue of (a+b+c) while losing revenue of (e+f+g) and gaining from a reduction in total cost of (f+g). Thus the firm has a net gain in profit of (a+b+c–e). There is no change in government revenue, since imports continue to be zero. Thus welfare of the country as a whole changes by –(a+b+c+d)+(a+b+c–d)= – (d+e).

3. (10 points) Use the monopolistic competition model (reminder: it's the model whose diagram appears below) to show what will happen…
   a. If two identical countries move from autarky to free trade
      i. To price;
      ii. To the number of firms from which consumers can buy; and
      iii. To the number of firms in each country.
   b. If, starting from free trade, there is a fall in the marginal cost of production (the same in each firm)
      i. To price;
      ii. To the number of firms.



The CC curve shows average cost

$$AC = n(F/S) + c$$

where n is the number of firms, F is fixed cost per firm, S is the size of the market, and c is marginal cost. Thus the CC curve has vertical intercept c and slope F/S.

The PP curve shows how the profit maximizing markup over marginal cost (and hence price) falls as the number of competitors increases:

$$P = (1/bn) + c$$

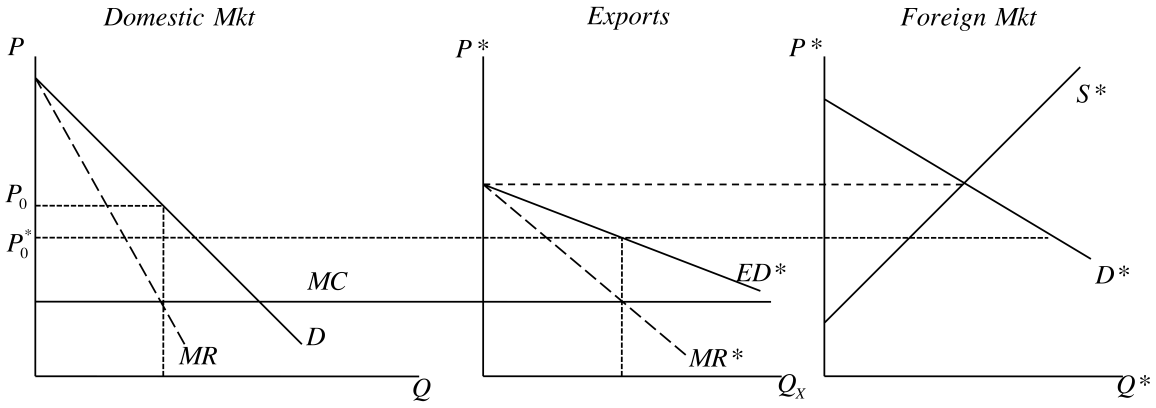
where b is the parameter of the demand function indicating how demand for a firm's product varies with its price relative to the average price of all firms.

Initial equilibrium in each of the identical countries in autarky is the intersection of CC and PP, thus price P_0 and number of firms n_0. When the two countries engage in free trade, the result is a world economy with twice the market each had before, thus 2S instead of S. This leaves the PP curve unchanged but rotates the CC curve to have half the slope it had before, therefore passing through the point $(2n_0,P_0)$ as shown. The new equilibrium intersection is therefore at the lower price P_1 and a number of firms, n_1, that is higher than each firm had in autarky, but lower than their combined autarky total $2n_1$. Thus there are more firms in the world than each country had before, and consumers get to choose among them all. But each country has fewer firms than before.

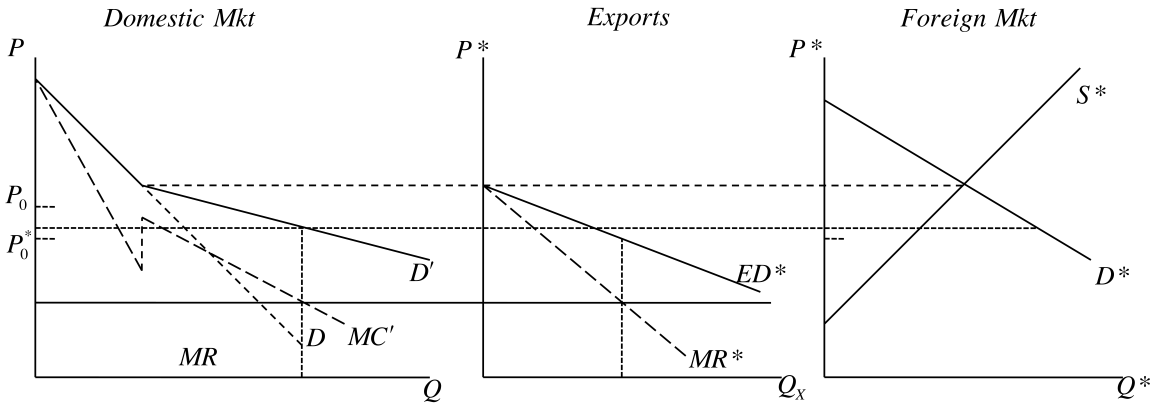
If now the marginal cost, c, falls in all firms, this shifts both the CC curve and the PP curve down by the same amount (the change in c). I don't bother to draw that, since it clearly reduces the equilibrium price by the amount of the fall in c, while leaving the number of firms unchanged.

4. (9 points) Consider a domestic monopoly that is protected by a very high tariff from competition from a competitive foreign market, so that it can charge one price in its home market and another abroad. Assume that the firm's marginal cost is constant and that all supply and demand curves are linear.

   a. Show an equilibrium in which the firm engages in dumping.



   b. If the firm were now confronted with an anti-dumping statute and it wished to avoid being subjected to an anti-dumping duty, how would it alter its behavior? Be sure to show a case in which it continues to serve both markets.



5. (24 points) Suppose you are the USITC trying to decide a safeguard case in the United States broom industry. You somehow know that supply elasticity of the US broom manufacturers (who are numerous and plausibly perfectly competitive) is +2.0, but you have been given two different estimates of the US elasticity of demand for brooms: –1.0 and –3.0. The world price of brooms has recently fallen from $5.00 to $4.00, at which price the industry is now producing 8.0 million brooms domestically and importing 72.0 million brooms. Assume that domestic and imported brooms are identical and, except where told otherwise, that these quantities are a negligible part of the world market for brooms.

   Answer the following questions, giving two answers to each if they depend upon the elasticity of demand, one for each of the two elasticities above. (If you have trouble with parts of the question, go ahead and answer other parts even if you need to make up answers to work with. I will then grade based on those made-up or incorrect answers.)

   a. Assuming that employment in the industry is proportional to output, by what percentage did employment recently drop?

      Price fell by 20%. With a supply elasticity of 2.0, output and thus employment would have dropped twice this, or 40%. This answer does not depend on the demand elasticity.

   b. What size *ad valorem* tariff should the ITC recommend if it wishes to restore employment to what it was before? How would your answer differ if you thought that US demand for brooms was a large part of the world market?

      It needs to raise the price back up to $5.00. If the small country assumption is valid, then a 25% tariff will add $1.00 to the $4.00 price of imports and achieve this result.

      If instead the large country assumption is needed, then a 25% tariff will raise the domestic price by less than this, as it will instead drive down the world price. Thus a tariff larger than 25% would be needed. None of this depends on the demand elasticity.

   c. Using the tariff you specified in the first part of (b), by what percentage does the demand for brooms decline as a result of the tariff? Also, by what percentage does the US demand for *imports* of brooms decline as a result of the tariff?

      The 25% tariff from part (b) will cause demand for brooms to fall by 25% if the demand elasticity is 1.0 and by 75% if the demand elasticity is 3.0. Demand at the $4.00 price was 80.0 million brooms (domestic

supply plus imports). So demand falls either by 20.0 million to 60.0 million, or by 60.0 million to 20.0 million.

At the same time, with the supply elasticity of 2.0, supply is increasing by twice 25%, from 8.0 to 12.0 million brooms. Thus imports fall from 72.00 million to either 60–12=48 or 20–12=8. That is, imports fall by either (72–48)/72 = 1/3 = 33.3% if the elasticity of demand for brooms is 1.0 or by (72–8)/72 = 8/9 = 88.9%

d. From your answer to part (c), what is the elasticity of demand for imports? How does it compare to the underlying elasticities of supply and demand, and why?

The demand elasticity for imports is the percent change in imports divided by the percent change in price, which is therefore either –.33/.25 = –1.33 (if the demand elasticity for brooms is 1.0) or –.889/.25 = –3.56 (if the demand elasticity for brooms is 3.0).

The elasticity of demand for imports in both cases is larger than either the elasticity of supply or the elasticity of demand. This is normal, since demand for imports is an excess demand. Thus the change in quantity is larger, being the sum of changes in supply and demand, while the initial quantity (what it is a percentage of) is smaller than the initial quantity demanded.

e. Again using the tariff from the first part of (b), calculate the change in consumer surplus due to the tariff. Explain why consumers are hurt less in one elasticity case than in the other.

The tariff causes price to rise by $1 and the quantity demanded to fall from 80 million to either 60 or 20 million. The loss of consumer surplus is $1×(80+60)/2 = $70 million or $1×(80+20)/2 = $50 million.

Consumers lose less when the elasticity is high, because they avoid more of the cost of the tariff by substituting away toward other goods.

f. What is the net welfare cost to the country of using this tariff? Again, explain why the country is hurt less in one elasticity case than in the other.

This is the dead weight loss due to the tariff, which is the two usual triangles whose bases are the changes in supply and demand and whose height is the $1 price increase. Thus the deadweight loss is either $1×(4+20)/2 = $12 million (with elasticity 1.0) or $1×(4+60)/2 = $32 million (with elasticity 3.0).

The loss is greater with the larger elasticity because it makes demand change more and thus increases the size of the demand distortion.

g. What policy, other than a tariff, could achieve the same restoration of broom-industry employment but at lower cost to the economy as a whole?

A 25% subsidy to production would cause the same increase in output and thus employment, but with a dead weight loss of only $1×4/2 = $2 million.

h. Discuss briefly two other policies, both of which appear at least to some degree in US law, by which this disruption to the broom industry might be dealt with.

Trade Adjustment Assistance provides supplemental unemployment compensation and assistance for training and relocation for trade-displaced workers. Wage insurance (called Alternative Trade Adjustment Assistance in US law) temporarily gives some trade-displaced workers a portion of any drop in wages when they take a new job. Both of these are viewed as preferable to a safeguards tariff, in that they help workers to adjust to the new situation rather than discouraging that adjustment, and they avoid the dead-weight losses from the other policies.