Midterm Exam - Answers
November 3, 2005

Answer in blue book. Use the point values as a guide to how extensively you should answer each question, and budget your time accordingly.

1. (8 points) A friend, upon learning that you are taking a course in international trade policy, has commented that he is very concerned about the large and growing US trade deficit. He suggests that the US should deal with this by levying an across-the-board tax on all imports. Will this work to reduce the trade deficit? Explain why or why not, including your reasoning and any conditions upon which the result may depend.

Ans: Since the trade deficit is the country’s expenditure minus income, a policy will succeed in reducing it only if it either reduces expenditure or increases income. In a more-or-less fully employed economy like the one we have today, it is hard to see how a tax on imports could cause either of these changes, so the answer seems to be that, No, it won’t work. (A different answer might be appropriate in a recession, when slack in the labor market means that by shifting demand from imports to domestic goods might expand aggregate demand and stimulate the economy, thus raising income. However, such a rise in income will increase expenditure as well, so the reduction in the trade deficit might be minimal.)

2. (12 points) What is the Most Favored Nation principle, and why is it useful in helping to move the world toward lower trade barriers? To what extent is it adhered to by the United States and other countries that are members of the World Trade Organization? Do departures from MFN mean that its intended role in fostering trade liberalization is not working?

Ans: The MFN principle says that a country should treat each trading partner (or member of the WTO) as well as it treats its most favored trading partner. Specifically, the tariff it charges on imports from any partner should equal the lowest tariff that it charges any partner.

The MFN principle is useful in moving toward trade liberalization since it means that if two countries negotiate an agreement to reduce tariffs on each other’s exports, they must extend those tariff reductions to all other WTO member countries. This allows multilateral liberalization to occur as a result of bilateral negotiations.

The US and other WTO members violate the MFN principle in lots of ways, each permitted as exceptions under the WTO rules. Most obviously, countries are permitted to form free trade areas in which they reduce their tariffs to zero within the FTA while keeping positive tariffs on countries outside their groups. And
countries are permitted to levy higher duties against imports that have been rule unfair due to dumping or subsidies. These exceptions do not undermine the mechanism by which negotiated tariff reductions other than FTAs, as in the Doha Round, automatically become multilateral, so no, they don’t undermine the process.

3. (25 points) Suppose that a small country with perfectly competitive markets is initially importing 300,000 pounds of cheese each year subject to a 30% tariff. It then restricts cheese imports further by imposing a quota that permits imports of only 180,000 pounds of cheese per year, while it continues also to levy the 30% tariff on these imports. Use supply and demand analysis to show the effects of this policy change on domestic and foreign people, firms, governments and countries as a whole, under each of the assumptions below about the administration of the quota. (Use either diagrams or equations, as you prefer, and indicate both the directions – gain, loss, or no change – and the sizes of the effects symbolically – that is, I’m not looking for numerical answers.)

Ans: The graph shows the situation. The small country faces the world price $P^W$. With a 30% tariff, its price is 30% above $P^W$, or 1.3 times $P^W$. Demand $D_1$ exceeds supply at that price, $S_1$, by the 300,000 pounds of imports. Government is collecting tariff revenue of $e+f+g$.

Now these imports are further restricted by a quota, reducing imports to 180,000. This requires that the domestic price rise to $P^Q$, at which demand exceeds supply by only the amount of the quota. In response to the price increase, supply expands to $S_2$, benefiting domestic suppliers by the increase in producer surplus, area $a$. Demand falls to $D_2$, reducing welfare of demanders by the loss of consumer surplus, area $a+b+c+d$. Government revenue from the tariff declines to area $f$, since the 30% tariff is now collected on fewer imports. Whoever gets the rights to import under this quota receives quota rents equal to the excess of $P^Q$ over what they must pay for imports inclusive of the tariff, $(1.3)P^W$. Thus the quota rent per unit is the amount marked $r$, and the total quota rent is area $c$. Because the country is small, foreign suppliers and demanders face an unchanged world price and their welfare is unaffected by the quota, except to the extent that they may receive the quota rents.
a. Import licenses are auctioned off in a competitive market.

*Ans:* If the import licenses are auctioned to a competitive market, their equilibrium price will equal the quota rent per unit, and the government will receive the total quota rent, area $c$, in addition to the tariff revenue. Foreign suppliers, demanders, and government are unaffected, since they continue to face the same price $P^W$. Thus, in addition to the effects mentioned above for suppliers and demanders, the implementation of the quota causes the domestic government to either gain or lose the amount $+c-(e+g)$.

- Domestic suppliers $+a$
- Domestic demanders $-(a+b+c+d)$
- Domestic government $+c-(e+g)$
- Domestic country $-(b+d+e+g)$

The foreign country is unaffected.

b. Import licenses are given free to domestic firms that were previously importing the cheese into the country.

*Ans:* The effect on the country is the same as in (a), since these importing firms are part of the country. But now they gain $+c$, while the government only loses $-(e+g)$.

c. Import licenses are given free to foreign firms that were previously exporting the cheese to the country.

*Ans:* Now area $c$ is lost to the importing country and accrues instead to the foreign, exporting firms.

- Domestic suppliers $+a$
- Domestic demanders $-(a+b+c+d)$
- Domestic government $-(e+g)$
- Domestic country $-(b+c+d+e+g)$
- Foreign exporters $+c$
- Foreign country $+c$

4. (15 points) Finland (this is true – see the Wall Street Journal November 1, 2005) requires that corn flakes breakfast cereal have added Vitamin D to make up for the sun deprivation of its Finnish people. Other countries (the Netherlands, according to WSJ) prohibit adding Vitamin D to cereals. Suppose that (from here on, I’m making this up – the reality is much more complicated) all other countries are like the Netherlands; that the market for cereal is perfectly competitive; and
that Vitamin D can be added to cereal that has been produced for the world market by some simple process that costs $0.02 per pound. Finland is a small country and takes as given the world price of cornflakes, which is $2.00 per pound. The Finns produce no corn flakes and they are currently (in the presence of the Vitamin D requirement) buying 400,000 pounds of corn flakes each year, which is the only breakfast cereal that they care to eat. Their elasticity of demand for cornflakes is 2.0.

a. Suppose that the EU declares the Finnish Vitamin D requirement to be illegal, so that it disappears. What will happen to Finland’s imports of corn flakes? (I want a number, here.)

Ans: The Finnish market for corn flakes appears as shown below. Initially, the Finns are purchasing cornflakes on the world market for $2.00 and adding Vitamin D at a cost of $0.02, so the price of cornflakes in Finland is $2.02. Since they do not produce, their demand is met entirely by imports, in the amount 400,000 pounds.

When the Vitamin D requirement is declared illegal, importers no longer incur the cost of meeting it and the price falls to the world price, $2.00. This 1% fall in price causes, with the demand elasticity of 2, the demand to rise by 2%, to 408,000. Thus imports rise from 400,000 to 408,000.

b. Discuss, and quantify to the extent you can, the welfare implications of removing the Finnish Vitamin D requirement.

Ans: Except for the claimed benefits of Vitamin D to the sun-starved Finnish population, the welfare effects here are pretty easy. There are no producers and therefore no change in producer surplus. Demanders gain
an increase in consumer surplus equal to $0.02 \times 400,000 + \frac{1}{2} 0.02 \times 8000 = $8080. That’s all there is, since the higher price due to the product standard was due to a real cost, and its elimination is not a loss.

However, this gain must be compared to whatever loss in Finnish health results from the removal of Vitamin D in their breakfast cereal. If the Finnish government was correct that this Vitamin D improved their health, and if that gain in health was worth the loss of consumer surplus that the standard entailed, then removal of the standard will be harmful.

5. (25 points) Show, briefly, how use of an export subsidy by a country affects its terms of trade and its welfare in each of the following models:

a. Small country, partial equilibrium

*Ans: An export subsidy of size $s$ gives exporters the amount $s$ above the world price (which is constant, since the country is small). Therefore the domestic price rises to $P^W + s$, as shown below.*

As a result demanders lose $-(a+b)$, suppliers gain $+(a+b+c)$, and government spends (loses) $-(b+c+d)$ on the subsidy. The net effect on the country’s welfare is a loss: $-(b+d)$. Since it is a small country, there is no effect on its terms of trade.

b. Large country, partial equilibrium

*Ans: Looking now at the market for the country’s export of the good, as a large country it faces downward-sloping demand. The export subsidy*
drives a wedge of size $s$ between the price the country’s exporters receive, which includes the subsidy, and the price that foreign demanders pay, which does not.

Since the world price falls as a result, this is a worsening of the country’s terms of trade.

The welfare of domestic suppliers and demanders combined rises by area $+(a+b)$. But the government spends, and thus loses, the much larger area: $-(a+b+c+d+e)$. So the country loses $-(c+d+e)$.

c. Large country, general equilibrium (the Standard Trade Model)

Ans: The graph below shows an initial free-trade equilibrium for a country in the standard trade model, exporting good $X$. Under free trade and before the subsidy, it produces at $S^0$ and consumes at $D^0$. The export subsidy would, if world prices did not change, move production to $S^1$ and consumption to $D^1$. 
However, that increases its relative supply of good X to the world market, shifting the world relative supply curve to the right. At the same time, since the export subsidy raises the domestic price of X to consumers as well, their relative demand falls, shifting world relative demand to the left. Both of these changes are shown in the world market diagram below, and they result in a fall in the world relative price of X. This is a worsening of the country’s terms of trade, and it causes further movement of production and consumption in the diagram above. Although production moves back toward where it was before the subsidy, the income effect of the worsened terms of trade reduces consumption of both goods still further, contributing to an even larger loss of welfare for the country. (Indifference curves through D^0, D^1, and D^2 would show this.)
6. (15 points) Use Krugman’s model of monopolistic competition (the model of Krugman-Obstfeld Chapter 6) to do the following. (There is no need to derive the model. Just use the equations and/or diagrams of the model directly, but be sure to define the terms and explain what you are doing.)

a. Show that if two identical countries open to free trade in a differentiated product, the price of that product will fall.

Ans: The Krugman model is captured by the following three equations:

\[ AC = c + n(F / S) \]  \hspace{1cm} (1)  
\[ p = c + 1/bn \]  \hspace{1cm} (2)  
\[ p = AC \]  \hspace{1cm} (3)  

where \(p\) is price, \(AC\) is average cost, \(n\) is the number of firms producing the differentiated product in the industry in an economy, \(S\) is a parameter measuring the size of the market, \(F\) is the fixed cost per firm, \(c\) is the marginal cost, and \(b\) is a parameter of the demand function representing sensitivity of demand to the firm’s price relative to the average industry price. The first two equations are graphed below as CC and PP.
respectively, and equilibrium occurs at their intersection.

With two identical economies, the solid (black) curves represent equilibrium in each of them in autarky. When they open to free trade, the two together become a single market, also autarkic in the sense that it does not trade with any rest of world, but its market is twice the size of the markets in the two countries individually. So market size doubles, from $S_1$ to $S_2$. This rotates the CC curves, from $CC_1$ to $CC_2$, and leads to the new equilibrium shown by the dashed (red) line with lower price and higher number of firms.

b. Explain in words why this result occurs.

Ans: The presence of a fixed cost means that average cost decreases in output, so part of the explanation is simply that the larger market permits each firm to produce a larger quantity, and this lowers cost and therefore price. But that doesn’t fully answer the question, since we need to know why each firm is able to expand its output.

If the initial firms in each market had all survived the opening of trade, then there would be $2n_1$ firms in the combined world market, and in equilibrium since they would share the market equally, each would continue to sell the output that they did before. However, with the larger number of firms, the demand faced by each of them is more elastic than before, and in their individual exercise of their monopoly power they each lower their price. So price falls below average cost, firms exit, and the
firms who survive each get a larger share of the market and produce a larger output.

c. Identify which of the three characteristic assumptions of the New Trade Theory are needed for this result, and explain why in each case.

Ans: All of them: Without increasing returns to scale (i.e., the presence of the fixed cost), average cost would not decline with output and in equilibrium price would remain unchanged. The CC curves would become the horizontal line at the level of marginal cost, c.

Without imperfect competition, equilibrium price would be equal to marginal cost, and therefore would be constant. It is only because imperfectly competitive firms set a price above marginal cost, and this markup can be reduced by the competitive pressures of trade, that price falls in this model. In the model, perfect competition would imply that the number of firms, n, is infinite, and equation (2) becomes p=c.

Without product differentiation the demand for any one firm’s product would be infinitely elastic at the level of the industry price, causing the markup to be zero if there are a large number of firms, and again, the markup couldn’t be reduced by trade. In the model, this would appear as the parameter b becoming infinite, and equation (2) again becomes p=c.