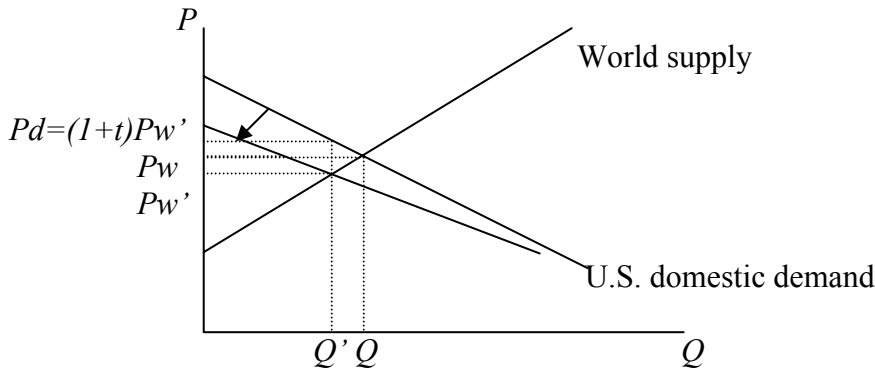


Answer for Homework 2

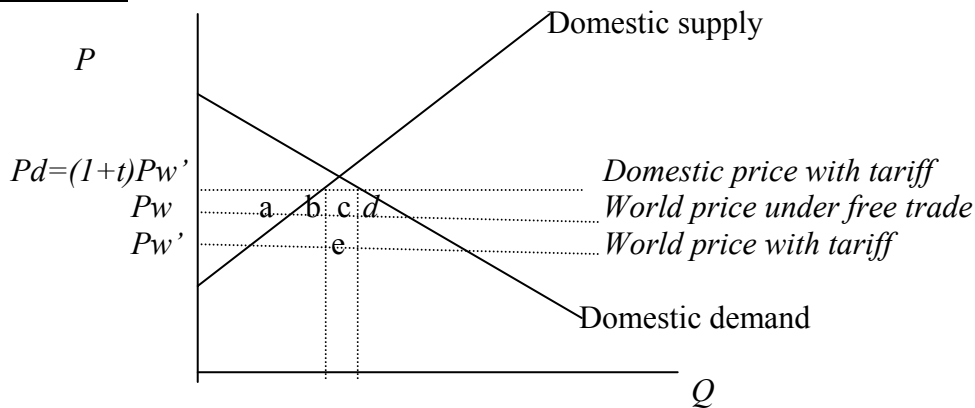
February 7, 2003

Problem 1.a



P_w and Q denote free trade world price and U.S. steel imports. The 30% tariff on imports of steel raises domestic prices of steel. Hence it reduces domestic demand and shifts the U.S. domestic demand schedule downward. Note that this is not a parallel shift, because the tariff is “ad valorem.” The new equilibrium import decreases to Q' . The domestic price of steel is P_d , and the new world price is P_w' . The gap between P_d and P_w' represents the size of tariff, which is 30% of P_w' . Since the U.S. is a large importer of steel, P_w' is lower than P_w .

Problem 1.b



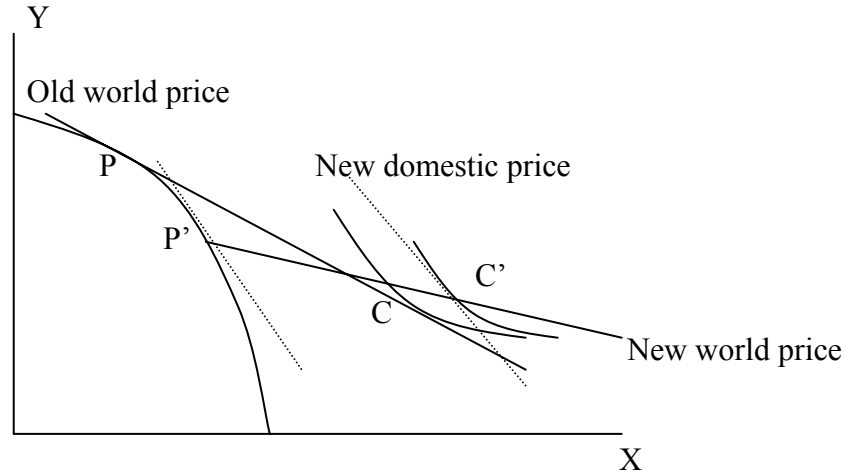
Domestic agent	Welfare change
1. Consumer	-a -b -c-d
2. Producer	a
3. Government	c+e
Net	-b-d+e

The size of area “e” is always non-negative. In fact, $e = 0$ if home country is a small country. If home is a large country, $e > 0$ if $t > 0$ and $e = 0$ if $t = 0$. To maximize welfare under tariff, i.e. to maximize “ $-b - d + e$ ”, it is optimal for the U.S. to set $t > 0$, so that $e > 0$.

Problem 1.c

The U.S. gains through the improvement of its terms-of-trade. In other words, the relative price of import good (X) falls in world market, as a result of tariff. The “new world price” line represents this change. The new consumption (C’) must lie on the new world price line, because it defines aggregate income and the national budget constraint of the U.S. (We implicitly assume that the U.S. government rebate tariff revenue back to its consumers.)

U.S. consumers, however, face “new domestic price”, which is higher (steeper) than before. The new domestic price defines the consumers’ budget constraint. Hence, C’ must be a point where the indifference curve is tangent to the new domestic price. The improvement in welfare is depicted by higher level of utility at the new consumption point (C’).



Problem 1.d

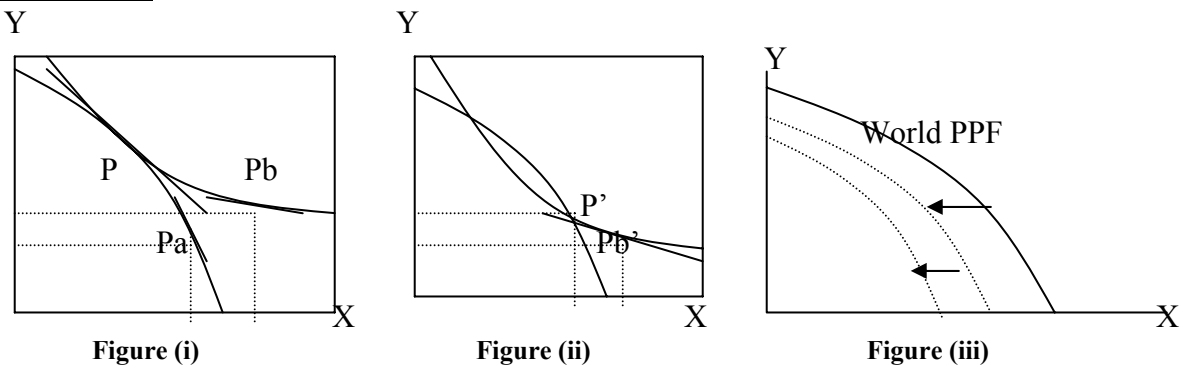


Figure (i) illustrates the production pattern under free trade. We can treat the other countries as the rest-of-the-world, or as one foreign country in the box diagram. The tangent point (P) of the two production possibility frontiers represents world production point.

Once the U.S. imposes tariff on the import good (X), its domestic price rises and as a result the U.S. production moves to Pa. At the same time, the U.S. lowers the world price of steel. To response to that, foreign country chooses to produce at Pb. The distance between Pa and Pb is the loss in world production of X and Y. Figure (i) in fact cannot represent the new world equilibrium, because the size of the box must exactly be equal to the quantity of world production. In other words, Pa and Pb must coincide, as shown by P’ in Figure (ii). The world as a whole is worse off due to the reduction in production of both X and Y. It is clear that the box in Figure (ii) is smaller than the one in Figure (i).

If foreign country retaliates by imposing tariff on its import good (Y), foreign production will

move along its PPF further to the right, to P_b' . Assuming that foreign country is small, the U.S. will continue to produce at P' . Again, the distance between P' and P_b' measures the loss of world production. The new world equilibrium must locate in an even smaller box. Of course, the loss of world production will become larger if foreign country is also large. In that case, the retaliation causes world price of Y (X) to fall (rise), and the U.S. will move its production point further to the right.

We can also illustrate the reduction of world production by using world PPF. In Figure (iii), the world PPF shift inwards. If foreign country retaliates by imposing tariff on imports as well, the world PPF will shrink further. Such inward shifts of world PPF illustrates that the world as a whole is always worse off, regardless of whether other countries retaliate.

Problem 2.a

$$\begin{aligned} \text{TR} &= \text{Total revenue} \\ &= P(Q)Q \\ &= [(P\text{-bar})+200/n - 200Q/S]Q \\ \rightarrow \text{MR} &= \underline{P\text{-bar} + 200/n - 400Q/S} \end{aligned}$$

Equilibrium condition:

$$\text{MR} = \text{MC};$$

Symmetry assumption:

$$P = P\text{-bar}$$

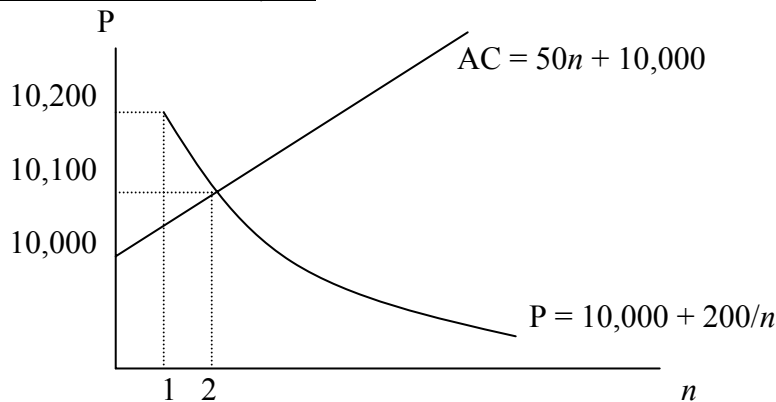
$$Q/S = 1/n$$

Combine equilibrium condition with the asymmetry assumption.

$$\begin{aligned} \text{MR} &= P - 200/n = 10,000 = \text{MC} \\ \rightarrow \underline{P} &= \underline{10,000 + 200/n} \end{aligned}$$

Problem 2.b

$$\begin{aligned} \text{AC} &= 100,000,000/Q + 10,000 \\ &= 100,000,000 n/2,000,000 + 10,000 \\ \rightarrow \underline{\text{AC}} &= \underline{50n + 10,000} \end{aligned}$$



As the number of firms increases, competition becomes intense and market share for one firm gets smaller. As a result, a firm has to produce with higher average cost. Also, a firm has less market power and has to set a lower price. Hence AC is increasing in n but P is decreasing in n .

Problem 2.c

$$P = AC \rightarrow 10,000 + 200/n = 50n + 10,000$$

$$\rightarrow \underline{n = 2}$$

$$\underline{P = 10,100}$$

Problem 2.d

$$AC = 100,000,000/Q + 10,000$$

$$= 100,000,000 n/(4(2,000,000)) + 10,000$$

$$= 25n/2 + 10,000$$

$$P = AC \rightarrow 10,000 + 200/n = 25n/2 + 10,000$$

$$\rightarrow \underline{n = 4}$$

$$\underline{P = 10,050}$$

Problem 2.e

1. The price of cars under free trade is lower than the autarky price.
2. The number of firms, or varieties of cars, is larger under free trade.

Problem 3.a

Type of RTAs	Internal trade in goods	Internal factor mobility	External tariffs	Economic policy
1. Free trade area	Free	No	Individual	Individual
2. Customs union	Free	No	Common	Individual
3. Common market	Free	Free	Common	Individual
4. Economic union	Free	Free	Common	Common

Problem 3.b

Type of RTAs	Number
1. Free trade area	120
2. Customs union	14
3. Common market	1
4. Economic union	0
5. Other	38
Total	173

Source: The Committee on Regional Trade Agreements, WTO.

Notes: (1) The numbers are current as of June 30, 2002.

(2) The European Union is considered a common market, although that was not documented by the Committee.

Problem 3.c

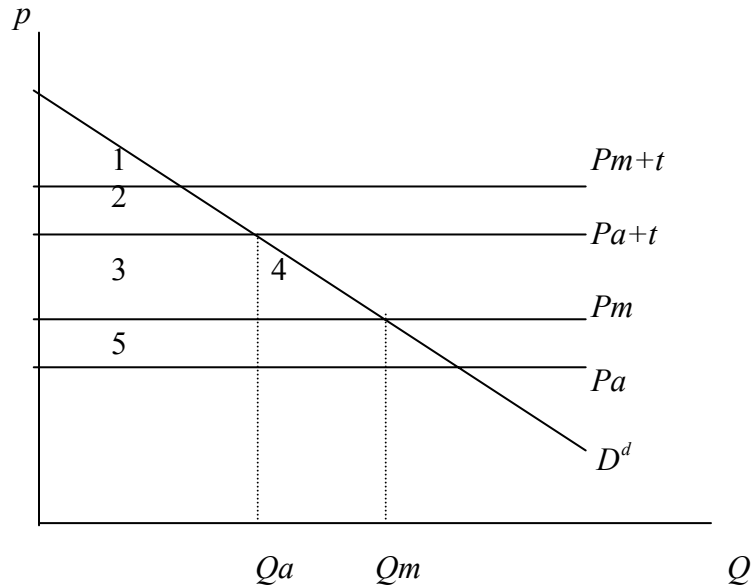
Trade creation vs. trade diversion

They are changes in national welfare generated by joining a PTA.

1. *Trade creation* is welfare gain resulting from an increase in volume of trade following a formation of a PTA.

2. *Trade diversion* is welfare loss resulting from switching trading partners to PTA members.

Example: The U.S. has formed NAFTA with Canada and Mexico. Suppose the diagram below represents the U.S. imports of oil. Let m denote Mexico and a denote Argentina. Before NAFTA, the U.S. would import oil from Argentina with the price P_{a+t} . Once NAFTA is formed, the U.S. does not impose tax on imports from Mexico and then the U.S. will choose to import oil from Mexico instead of Argentina. The effects of NAFTA on welfare are as follows.



	<i>Pre-NAFTA</i>	<i>Post-NAFTA</i>
Consumer surplus	area 1+2	area 1+2+3+4
Tariff revenue	area 3+5	zero

The aggregate welfare change is “4 – 5”. In fact, the area 4 is from an increase in the volume of import. Therefore it depicts “trade creation.” On the other hand, the area 5 constitutes “trade diversion” created by changing a trading partner.

Problem 3.d

1. PTAs can be a step toward global free trade by allowing more members to join existing PTAs. This is likely to happen when a country that is a member of many PTAs act as a mediator in expanding PTAs.
2. PTAs can also be a threat to global free trade when member countries act in an exclusive manner. A good example is the EU and NAFTA.