

US is a small nation      US producers do not affect the world price  
 The foreign supply of goods to US perfectly elastic (horizontal), e.g. rice

US is a large nation      US producers do affect the world price  
 The foreign supply of good to US not perfectly elastic (slopes upward), e.g. computers

Consider a good, produced both domestically and abroad, but consumed only by US consumers. That is, the world supply to the US ( $S_{US}$ ) is the sum of both domestic production ( $S_D$ ) and foreign production ( $S_F$ ), but demand comes only from US consumers ( $D_{US}$ ).

The total supply to the US is the horizontal summation of the domestic supply and foreign supply. Look at each price, add up what the domestically suppliers would supply, and add the amount that the foreign suppliers would supply, and plot the point. This is how we get the total supply.

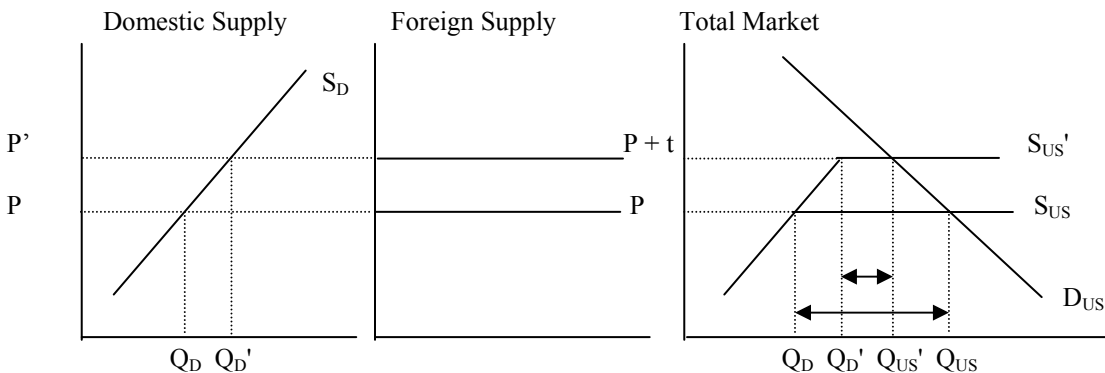
US is a small nation, tariff on foreign producers

Since the US is a small nation on the supply side (no matter what the US produces, the foreign suppliers are willing to supply any quantity of the good at the price  $P$ ), the foreign supply curve is horizontal at  $P$ .

Before the tariff: At any price below  $P$ , the only firms willing to supply the good are domestic firms. The world supply curve is the same as the domestic supply. At any price greater than or equal to  $P$ , the foreign suppliers are willing to supply any quantity. They flood the market with the good. Thus, at a price of  $P$ , the world supply is horizontal at  $P$ . (The world supply is kinked: upward sloping until  $Q_D$ , then is horizontal.)

We put a tariff on foreign suppliers. This means that if they wish to sell the good in the US, they must pay a tariff (tax) of  $t$  dollars per unit to the US government. Since the marginal cost of producing the unit is  $P$ , the foreign seller will now only sell the good in the US if the price they receive is  $P + t$ , since they must pay  $t$  to the US government. That is, the foreign supply curve shifts up by  $t$ .

After the tariff: At any price below  $P + t$ , the only firms willing to supply the good are the domestic firms. At a price of  $P + t$ , the foreign suppliers flood the market, and the world supply curve becomes horizontal. (The world supply is kinked: upward sloping until  $Q_D'$ , and then is horizontal.)



Results of imposing tariff

- (1) US consumption falls from  $Q_{US}$  to  $Q_{US}'$ .
- (2) because US price rises from  $P$  to  $P'$ .
- (3) Domestic production rises from  $Q_D$  to  $Q_D'$ .
- (4) Imports fall from  $(Q_{US} - Q_D)$  to  $(Q_{US}' - Q_D')$ . Notice the arrows above.  
 Or  $Q_{US} = Q_D + Q_F$ .  $Q_{US}$  is falling, and  $Q_D$  is rising, it must be the case that  $Q_F$  is falling.  
 (Consumption is falling, and domestic production is rising, it must be that foreign production (imports) is falling.

Winners: domestic producers. They get a higher price and produce more. That is, they have higher producer surplus (profits). Can you shade in the additional profits?

Losers: US consumers. They purchase fewer goods at a higher price, thus they have lower consumer surplus. Can you shade in the lost consumer surplus?

Indifferent: Foreign producers. They had zero producer surplus before, they have zero producer surplus after. It's a bit more complicated than this, but they don't really care.

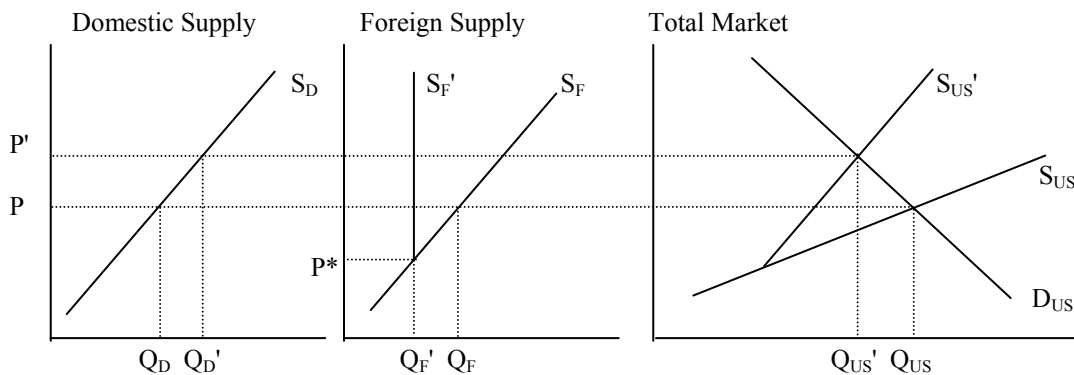
Quota - Large Nation

A quota is just a legal limit on the amount of goods we will allow the foreigners to sell in the U.S.

Here, the foreign suppliers are prohibited from selling more than  $Q_F'$  units. Thus, even if the price rises to a level such that the foreign suppliers would like to supply more than  $Q_F$ , they are restricted to supply only  $Q_F'$ . (This is called a binding quota. If I set a quota at say 7 quadrillion cars, the foreign producers would never reach the limit and hence the quota wouldn't affect anything, it would be non-binding. It is when the quota actually limits the amount of imports that makes it a binding quota.)

Before the quota: total supply to the US is the simple horizontal sum of  $S_D$  and  $S_F$ .

After the quota: below  $P^*$ , the supply curve is still the horizontal sum of  $S_D$  and  $S_F$ , because both domestic firms and foreign firms are producing. At any price above  $P^*$ , the foreign suppliers will want to supply more than  $Q_F'$ , but will be legally prohibited from doing so. They will supply  $Q_F'$ . The total supply curve will be domestic supply ( $S_D$ ) +  $Q_F'$ , or looking at it a different way,  $S_D$  shifted over by  $Q_F'$  units.



Results of imposing the quota

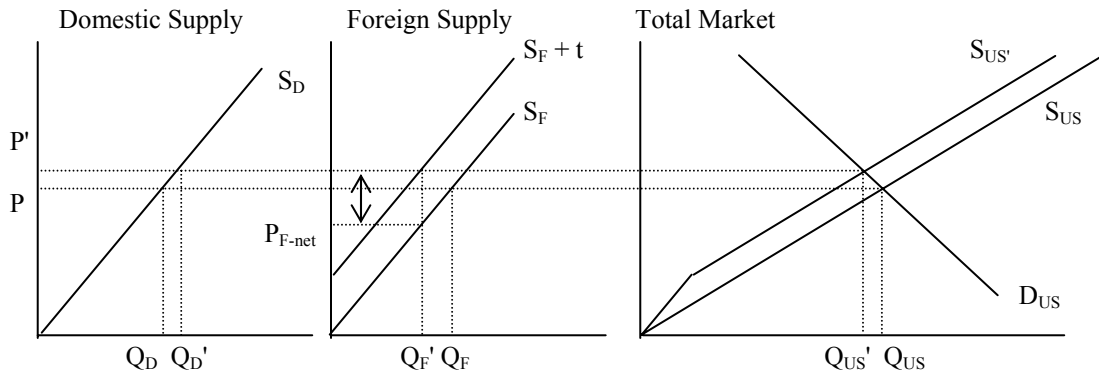
- (1) US consumption falls from  $Q_{US}$  to  $Q_{US}'$ .
- (2) because US price rises from  $P$  to  $P'$ .
- (3) Domestic production rises from  $Q_D$  to  $Q_D'$ .
- (4) Imports fall, from  $Q_F$  to  $Q_F'$ .

Winners: Domestic producers. They get a higher price and produce more, thus higher producer surplus. Can you shade in the extra profits?

Losers: US consumers. They purchase fewer goods at a higher price (lower consumer surplus). Can you shade this in?

Not sure - Foreign producers. They sell fewer units, but at a higher price. They lose a triangle of producers surplus (formed by  $P^*$ ,  $P$ ,  $Q_F$  and  $Q_F'$ ), but gain a square of producer surplus (between  $P$  and  $P'$  out to  $Q_F$ ). They get extra profits on the units they still get to sell, but sell fewer units.

US is a large nation, Tariff



Same set up as the small nation tariff, only this time, the foreign supply is upward sloping. When you draw this, be sure that the market supply curve does not shift up as much as the foreign supply curve does. This is true mathematically as a result of the horizontal summation of the foreign and domestic supply curves. If you don't believe me, come in and see me and I will show you why this is the case.

Results of imposing the quota

- (1) US consumption falls from  $Q_{US}$  to  $Q_{US}'$ .
- (2) Because US price rises from  $P$  to  $P'$ .
- (3) Domestic production rises from  $Q_D$  to  $Q_D'$ .
- (4) Imports fall from  $Q_F$  to  $Q_F'$ .

Winners: Domestic producers. They get a higher price and produce more, thus higher producer surplus.

Losers: US consumers. They purchase fewer goods at a higher price, thus lower consumer surplus.

Losers: Foreign producers. They receive  $P'$ , but must pay the government  $t$  per unit. Thus, the net price that they receive is  $P_{F-net}$  (which is just  $P' - t$ ). They also sell fewer units. Hence, they lose producer surplus.

Big picture

Notice that results 1-4 hold for all these cases. Consumers of the good upon which a quota or tariff is imposed (you) are losing (paying higher prices) at the expense of domestic producers of the good (who are enjoying higher profits). Producers who lobby politicians asking for quotas are trying to take money out of your pocket (and possibly foreign producer's pockets). Beware, unless you own a steel factory.

All of these situations result in an efficiency loss (dead weight loss), but these are often difficult to shade in.

Finer points on the comparison of all three cases. And what about tax revenue the govt. collects?

US is a small nation, tariff

- Price rises by full amount of tariff, thus
- US consumers bear the full burden of the tariff
- Tax revenue is collected (can you see how much in the picture?)
- Foreign producers still receive the same net price.

US is a large nation, quota

- Price rises
- No tax revenue is collected
- The effect on foreign producers is ambiguous. They may be worse or better off.

US is a large nation, tariff

- Price rises by less than full amount of the tariff, thus
- US consumers do not bear the full burden of the tariff
- Tax revenue is collected, some of which comes at the expense of
- Foreign producers, who are unambiguously worse off.

Even finer points on comparisons, with apologies for treading on microeconomic ground???

- The large nation tariff was preferable to the small nation tariff because US consumers do not pay the full burden of the tariff. In the large nation tariff case, the price consumers pay does not rise by the full amount of the tariff, while in the small nation case, the price does go up by the full amount of the tariff. While it might be a little unfair for me to say this, because we're really talking about two different goods, the point is that here we collect some tax revenue from the foreigners (instead of from just consumers) in the big nation case. So if we were going to put tariffs on something, I would prefer it be goods where the US is a big nation rather than the small nation.
- If we know the right sized tariff, an appropriate sized tariff and a quota could get the same effect on the quantities of foreign production and domestic production (Set the  $Q_F'$  of the quota = to the  $Q_F'$  from the tariff). However, in this case, we would prefer the tariff to the quota. In the tariff case, the government is collecting tax revenue. In the quota case there is no tax revenue. The amount that would have been collected as tax revenue will end up instead as higher profits for those foreign producers that were allowed to export their goods to the US (the box of producer surplus they gained).

Blah, blah, blah. Operationally, however, it may be difficult to know the right sized tariff. People who remember a lot of Micro may recall that determining the right size quota depends on determining the elasticity of demand. It may just be easier to slap on a tariff. What if suddenly demand shifts? Take Econ 314.