Export Subsidies

Export Subsidies in Competitive Markets

The exporting country loses, if it is a small country as in the top diagram and especially if it is a large country as in the bottom diagram.

The gain in producers’ surplus (area a) is less than the loss to the government from the cost of the subsidy (shown by the gap between the two supply curves multiplied times the quantity exported in the new equilibrium).

Export Subsidies in a Non-Competitive Market

1) Consider Cournot competition where each producer assumes the competitor’s output will remain constant. Market demand \( Q = q_1 + q_2 = 100 - 2P \) or \( P = 50 - \frac{1}{2}Q \). Both producers have identical & constant \( MC = 14 \) and no fixed costs. (By ignoring fixed costs, our arithmetic will be simpler, but to explain why there are only two firms in the industry, we often note that fixed costs create an effective barrier to entry.) A profit maximizing strategy is based on:

\[
\pi_1 = Pq_1 - MCq_1 = \left[50 - \frac{1}{2}(q_1 + q_2)\right]q_1 - 14q_1.
\]

We want to solve for output where \( MR = MC \), and differentiating firm #1’s profit function with respect to its output gives that solution as

\[
50 - q_1 - \frac{1}{2}q_2 - 14 = 0
\]

\[
q_1 = 36 - \frac{1}{2}q_2
\]

This condition represents the firm’s reaction function, where its choice of output depends upon what its competition produces; the firm’s choice maximizes its profits. Note if the second firm is identical, its reaction function will be

\[
36 - q_2 - \frac{1}{2}q_1 = 0
\]

and thus the intersection of the two reaction functions gives \( q_1 = q_2 = 24 \) or total quantity demanded, \( Q \), equal to 48. From the market demand curve we can solve for \( P \) and the profits of each firm

\[
P = 50 - \frac{1}{2}Q = 26, \text{ and } \pi_1 = 26 \cdot 24 - 14 \cdot 24 = 12 \cdot 24 = 288
\]

2) If firm #1 now came to anticipate the reaction of the other firm, rather than assume it would hold its output constant, what would that imply? Start with the same profit maximizing framework

\[
\pi_1 = \left[50 - \frac{1}{2}(q_1 + q_2)\right]q_1 - 14q_1
\]

but now substitute firm #2’s reaction function, \( q_2 = 36 - \frac{1}{2}q_1 \), into firm #1’s profit function
\[ [50 - \frac{1}{2}(q_1 + 36 - \frac{1}{2}q_1)]q_1 - 14q_1 \]
\[ = 18q_1 - \frac{1}{4} q_1^2 \]
Differentiating that expression gives firm #1’s optimal level of output as \( 18 - \frac{1}{2}q_1 = 0 \) so that \( q_1 = 36 \).

For firms #2 that means \( q_2 = 36 - \frac{1}{2}q_1 = 18 \)

With \( P = 50 - \frac{1}{2}Q = 50 - \frac{1}{2}(54) = 23 \)
\( \pi_1 = 23 \cdot 36 - 14 \cdot 36 = 324 \)
\( \pi_2 = 23 \cdot 18 - 14 \cdot 18 = 162 \)
Total profits have fallen, and each firm’s mark-up over cost has declined, but the leader’s profits have risen because firm #1’s output has risen.

3) Can a government intervene to help a firm claim these higher profits even if a firm cannot accurately anticipate its competitor’s response? Consider the case where the government of firm #1 offers the payment of a per unit subsidy = 9.
\( \pi_1 = [50 - \frac{1}{2}(q_1 + q_2)]q_1 - 14q_1 + 9q_1 \)
\[ = 45q_1 - \frac{1}{2}q_1^2 - \frac{1}{2} q_1q_2 , \text{ and therefore firm #1’s reaction function will be} \]
\[ = 45 - q_1 - \frac{1}{2}q_2 = 0. \]
The reaction function for firm #2 still is \( 36 - q_2 - \frac{1}{2}q_1 = 0. \)
These two reaction functions results in \( q_1 = 36 \) and \( q_2 = 18 \), with \( P = 50 - \frac{1}{2}Q = 23 \)

Government involvement shifts profits from firm #2 to firm #1 and the country as a whole gains. We now have \( \pi_1 = 23 \cdot 36 - 5 \cdot 36 = 828 - 180 = 648 \), which exceeds the initial level of profits ($288) by $360. Because the government spends $9\cdot36 = $324 to provide the subsidy, the net gain to the economy is $36. Such a gain in welfare represents one rationale for strategic trade policy and industry targeting. This justification is most applicable where there are large monopoly profits, high barriers to entry, and the potential to shift profits to the domestic producer. Note that the world gains from a greater output and lower prices. Should the WTO automatically rule against all subsidies?

4) What happens if both countries subsidize export? The two reaction functions are
\[ 45 - q_1 - \frac{1}{2}q_2 = 0 \text{ and } 45 - q_2 - \frac{1}{2}q_1 = 0, \text{ which gives } q_1 = q_2 = 30 \]
\[ P = 50 - \frac{1}{2}(30 + 30) = 20 \]
Profits for each firm equal ($20 - $5)30 = $450, which represents an increase of $162 (from $450-$288). But, each of the governments is now spending $9\cdot30 = $270 on subsidies. Thus, each country loses $108 if it consumes none of this good. The world as a whole still gains, however, because the reduction in monopoly power yields additional consumers’ surplus, compared to solution (1), of \( \frac{1}{2}(\$6)(48 + 60) = \$324 \), while doubling the loss to each country calculated above gives $108\cdot2 = $216.