meeting, importing countries wanted a "special safeguard mechanism" that could be applied to all other agricultural products. Under this mechanism, tariffs could be temporarily raised whenever imports suddenly rose or their prices suddenly fell. This provision was agreed to 10 years later, at the 2015 Nairobi meeting, when the developing countries won the right to impose such a special safeguard mechanism (see the **Headlines** article).

Issues Involving Trade in Industrial Goods and Services Other issues were also discussed in Hong Kong, as listed in Table 10-1. To achieve further cuts in the tariffs on industrial goods, there was agreement in principle to use some formula for the cuts, but the exact nature of that formula was left for future negotiation. There was also a goal to open trade in service sectors, which would benefit the industrial countries and their large service industries. The developing countries are expected to make some future offers to open their markets to trade in services, but in return they will expect wealthy countries to accept a greater number of temporary immigrant workers in their service sectors.

Finally, there was a goal to allow 97% of imported products from the world's 50 least-developed countries (LDCs) to enter WTO member markets tariff free and duty free. The United States already allows duty-free and tariff-free access for 83% of products from those 50 countries, and under this new goal, the United States would extend that access to nearly all products. Omitted from this goal, however, are textile imports into the United States from LDCs because the United States wants to protect its domestic textile producers from low-priced imports from countries such as Bangladesh and Cambodia. This is not surprising, given our discussion of the United States' sensitivity to low-cost imports in the clothing and textiles industries, as illustrated by the history of quotas on clothing imports (see Chapter 8).

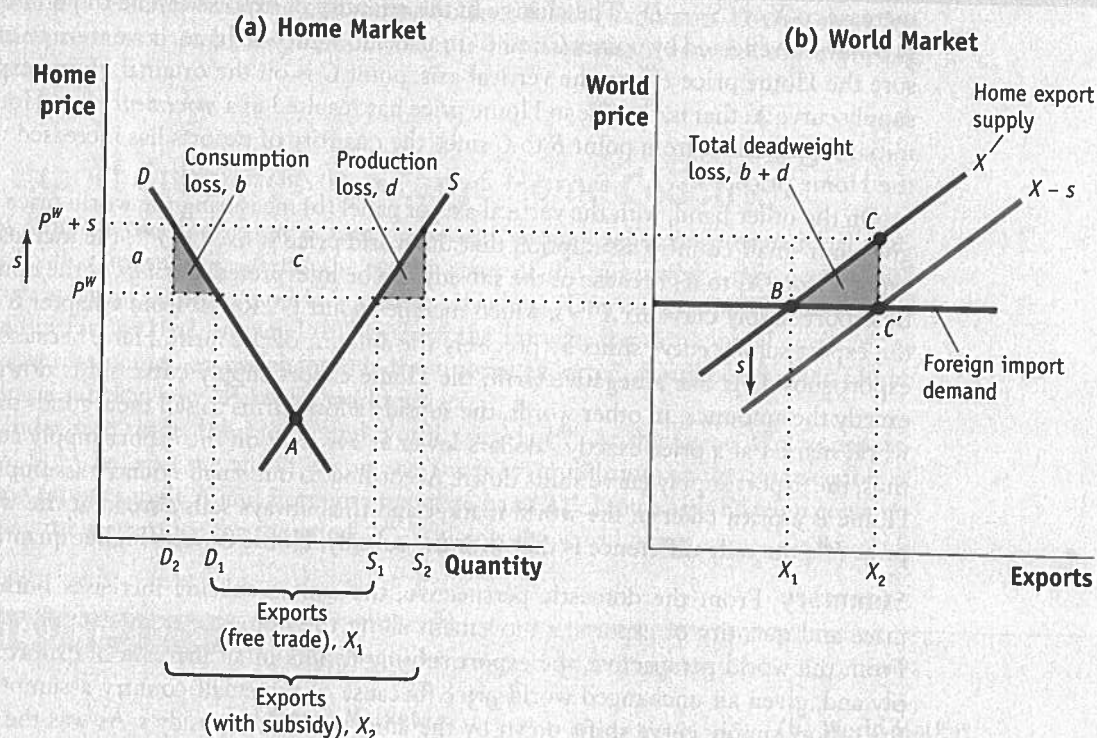# 2 Export Subsidies in a Small Home Country

Having seen the importance of agricultural subsidies at the WTO meetings, we now describe the effect of export subsidies on prices, exports, and welfare. We begin with a small country called Home that faces a fixed world price for its exports. Following that, we see how the outcomes differ when Home is large enough to affect world prices.

Consider a small country exporting sugar. The Home no-trade equilibrium is at point A in Figure 10-1. With free trade, Home faces the world price of sugar P^W. In panel (a) of Figure 10-1, the quantity supplied in Home at that price is S_1 and the quantity demanded is D_1 tons of sugar. Because quantity demanded is less than quantity supplied, the Home country exports $X_1 = S_1 - D_1$ tons under free trade. That quantity of exports is shown as point B in panel (b) corresponding to the free-trade price of P^W. By determining the level of exports at other prices, we can trace out the Home export supply curve X.

Impact of an Export Subsidy

Now suppose that because the government wishes to boost the exports of the domestic sugar producers, each ton of sugar exported receives a subsidy of s dollars from the government. Panel (a) of Figure 10-1 traces the effect of this subsidy on the domestic economy. With an export subsidy of s dollars per ton, exporters will receive $P^W + s$

FIGURE 10-1

(a) Home Market

Home price

Consumption loss, b Production loss, d

D S

$P^W + s$

s

a c

P^W

A

D_2 D_1 S_1 S_2 **Quantity**

Exports (free trade), X_1

Exports (with subsidy), X_2

(b) World Market

World price

Home export supply

Total deadweight loss, $b + d$

X

$X - s$

C

B

C'

s

Foreign import demand

X_1 X_2 **Exports**

Export Subsidy for a Small Country Applying a subsidy of s dollars per unit exported will increase the price that Home exporters receive from P^W to $P^W + s$. As a result, the domestic price of the similar good will also rise by that amount. This price rise leads to an increase in Home quantity supplied from S_1 to S_2 and a decrease in Home quantity demanded from D_1 to D_2, in panel (a). Exports rise as a result of the subsidy, from X_1 to X_2 in panel (b). The Home export supply curve shifts down by exactly the amount of the subsidy since the marginal cost of a unit of exports decreases by exactly s. As in the case of a tariff, the deadweight loss as a result of the subsidy is the triangle ($b + d$), the sum of consumer loss b and producer loss d.

for each ton exported rather than the lower free-trade price P^W. Because they are allowed to export any amount they want at the subsidized price, the Home firms will not accept a price less than $P^W + s$ for their domestic sales: if the domestic price was less than $P^W + s$, the firms would just export all their sugar at the higher price. Thus, the domestic price for sugar must rise to $P^W + s$ so that it equals the export price received by Home firms.

Notice that with the domestic sugar price rising to $P^W + s$, Home consumers could in principle *import* sugar at the price of P^W rather than buy it from local firms. To prevent imports from coming into the country, we assume that the Home government has imposed an import tariff equal to (or higher than) the amount of the export subsidy. This is a realistic assumption. Many subsidized agricultural products that are exported are also protected by an import tariff to prevent consumers from buying at lower world prices. We see that the combined effect of the export subsidy and import tariff is to raise the price paid by Home consumers and received by Home firms.

With the price rising to $P^W + s$, the quantity supplied in Home increases to S_2, while the quantity demanded falls to D_2 in panel (a). Therefore, Home exports increase to $X_2 = S_2 - D_2$. The change in the quantity of exports can be thought of in two ways as reflected by points C and C' in panel (b). On one hand, if we were to measure the Home price P^W on the vertical axis, point C is on the original Home export supply curve X: that is, the rise in Home price has resulted in a *movement along* Home's initial supply curve from point B to C since the quantity of exports has increased with the Home price.

On the other hand, with the vertical axis of panel (b) measuring the world price and given our small-country assumption that the world price is fixed at P^W, the increase in exports from X_1 to X_2 because of the subsidy can be interpreted as a *shift* of the domestic export supply curve to $X - s$, which includes point C'. Recall from Chapter 8 that the export supply curve shifts by precisely the amount of the tariff. Here, because the export subsidy is like a negative tariff, the Home export supply curve shifts down by exactly the amount s. In other words, the subsidy allows firms to sell their goods to the world market at a price exactly s dollars lower *at any point* on the export supply curve; thus, the export supply curve shifts down. According to our small-country assumption, Home is a price taker in the world market and thus always sells abroad at the world price P^W; the only difference is that with the subsidy, Home exports higher quantities.

Summary From the domestic perspective, the export subsidy increases both the price and quantity of exports, a movement along the domestic export supply curve. From the world perspective, the export subsidy results in an increase in export supply and, given an unchanged world price (because of the small-country assumption), the export supply curve shifts down by the amount of the subsidy s. As was the case with a tariff, the subsidy has driven a wedge between what domestic exporters receive ($P^W + s$ at point C) and what importers abroad pay (P^W at point C').

Impact of the Subsidy on Home Welfare Our next step is to determine the impact of the subsidy on the welfare of the exporting country. The rise in Home price lowers consumer surplus by the amount $(a + b)$ in panel (a). That is the area between the two prices (P^W and $P^W + s$) and underneath the demand curve D. On the other hand, the price increase raises producer surplus by the amount $(a + b + c)$, the area between the two prices (P^W and $P^W + s$), and above the supply curve S. Finally, we need to determine the effect on government revenue. The export subsidy costs the government s per unit exported, or $s \cdot X_2$ in total. That revenue cost is shown by the area $(b + c + d)$.

Adding up the impact on consumers, producers, and government revenue, the overall impact of the export subsidy is

Fall in consumer surplus:	$-(a + b)$
Rise in producer surplus:	$+(a + b + c)$
Fall in government revenue:	$-(b + c + d)$
Net effect on Home welfare:	$-(b + d)$

The triangle $(b + d)$ in panel (b) is the net loss or **deadweight loss** due to the subsidy in a small country. The result that an export subsidy leads to a deadweight loss for the exporter is similar to the result that a tariff leads to a deadweight loss for an importing country. As with a tariff, the areas b and d can be given precise interpretations. The triangle d equals the increase in marginal costs for the extra units produced because of the subsidy and can be interpreted as the **production loss** or the
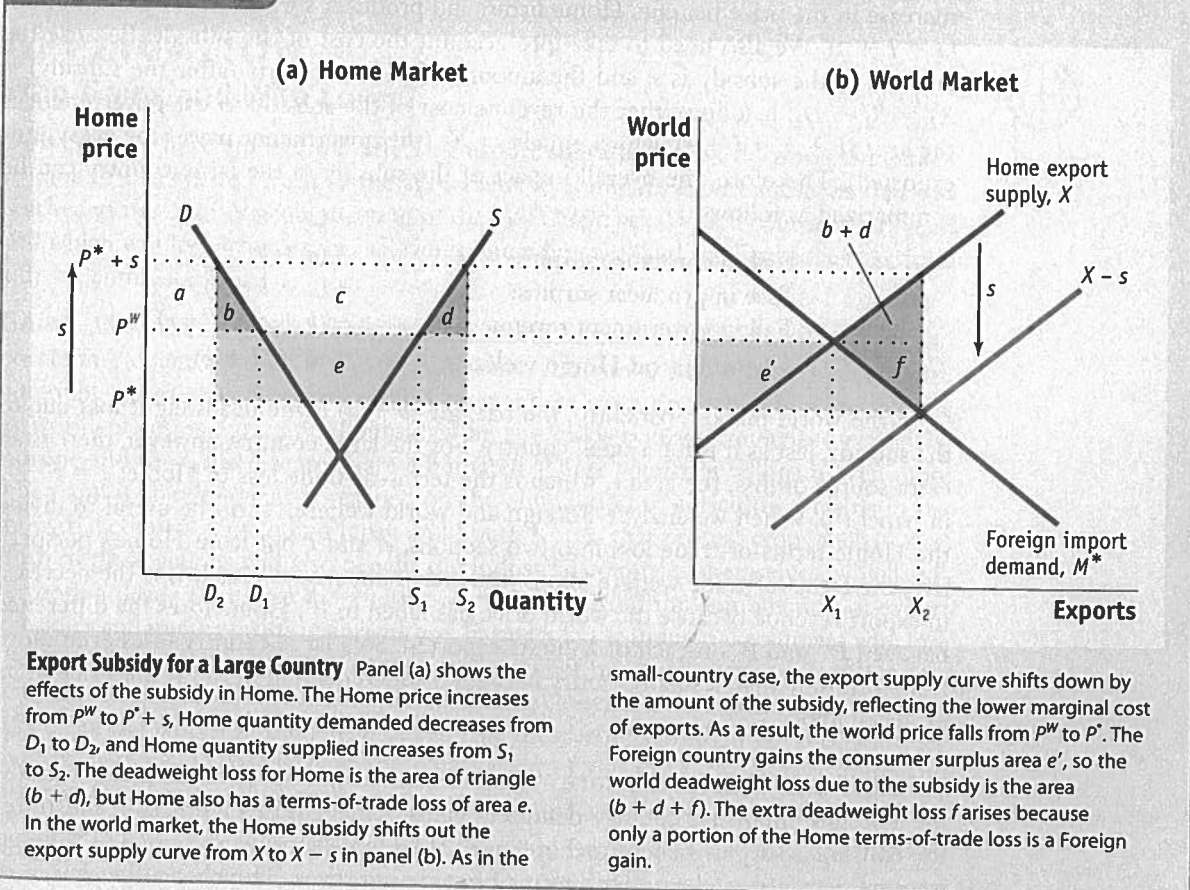
efficiency loss for the economy. The area of the triangle b can be interpreted as the drop in consumer surplus for those individuals no longer consuming the units between D_1 and D_2, which we call the **consumption loss** for the economy. The combination of the production and consumption losses is the deadweight loss for the exporting country.

3 Export Subsidies in a Large Home Country

Now suppose that the Home country is a large enough seller on international markets so that its subsidy affects the world price of the sugar (e.g., this occurs with European sugar subsidies and U.S. cotton subsidies). This large-country case is illustrated in Figure 10-2. In panel (b), we draw the Foreign import demand curve M^* as downward-sloping because changes in the amount exported, as will occur when Home applies a subsidy, now affect the world price.

Under free trade, the Home and world price is P^W. At this price, Home exports $X_1 = S_1 - D_1$, and the world export market is in equilibrium at the intersection of Home export supply X and Foreign import demand M^*. Home and Foreign consumers pay the same price for the good, P^W, which is the world price.

FIGURE 10-2

Export Subsidy for a Large Country Panel (a) shows the effects of the subsidy in Home. The Home price increases from P^W to $P^* + s$, Home quantity demanded decreases from D_1 to D_2, and Home quantity supplied increases from S_1 to S_2. The deadweight loss for Home is the area of triangle $(b + d)$, but Home also has a terms-of-trade loss of area e. In the world market, the Home subsidy shifts out the export supply curve from X to $X - s$ in panel (b). As in the small-country case, the export supply curve shifts down by the amount of the subsidy, reflecting the lower marginal cost of exports. As a result, the world price falls from P^W to P^*. The Foreign country gains the consumer surplus area e', so the world deadweight loss due to the subsidy is the area $(b + d + f)$. The extra deadweight loss f arises because only a portion of the Home terms-of-trade loss is a Foreign gain.

Effect of the Subsidy

Suppose that Home applies a subsidy of s dollars per ton of sugar exported. As we found for the small country, a subsidy to Home export production is shown as a downward shift of the Home export supply curve in panel (b) by the amount s; the vertical distance between the original export supply curve X and the new export supply curve $X - s$ is precisely the amount of the subsidy s. The new intersection of Home export supply, $X - s$, and Foreign import demand M^* corresponds to a new world price of P^*, decreased from the free-trade world price P^W, and a Home price $P^* + s$, increased from the free-trade price P^W. Furthermore, the equilibrium with the subsidy now occurs at the export quantity X_2 in panel (b), increased from X_1.

In Chapter 2, we defined the **terms of trade** for a country as the ratio of export prices to import prices. Generally, a fall in the terms of trade indicates a loss for a country because it is either receiving less for exports or paying more for imports. We have found that with the export subsidy, Foreign consumers pay a lower price for Home exports, which is therefore a fall in the Home terms of trade but a gain in the Foreign terms of trade. We should expect, therefore, that the Home country will suffer an overall loss because of the subsidy but that Foreign consumers will gain. To confirm these effects, let's investigate the impact of the subsidy on Home and Foreign welfare.

Home Welfare In panel (a) of Figure 10-2, the increase in the Home price from P^W to $P^* + s$ reduces consumer surplus by the amount $(a + b)$. In addition, the increase in the price benefits Home firms, and producer surplus rises by the amount $(a + b + c)$. We also need to take into account the cost of the subsidy. Because the amount of the subsidy is s, and the amount of Home exports (after the subsidy) is $X_2 = S_2 - D_2$, it follows that the revenue cost of the subsidy to the government is the area $(b + c + d + e)$, which equals $s \cdot X_2$ (the government pays s for every unit exported). Therefore, the overall impact of the subsidy in the large country can be summarized as follows:

Fall in consumer surplus:	$-(a + b)$
Rise in producer surplus:	$+(a + b + c)$
Fall in government revenue:	$-(b + c + d + e)$
Net effect on Home welfare:	$-(b + d + e)$

In the world market, panel (b), the triangle $(b + d)$ is the deadweight loss due to the subsidy, just as it is for a small country. For the large country, however, there is an extra source of loss, the area e, which is the terms-of-trade loss to Home: $e = e' + f$ in panel (b). When we analyze Foreign and world welfare, it will be useful to divide the Home terms-of-trade loss into two sections, e' and f, but from Home's perspective, the terms-of-trade welfare loss is just their sum, area e. This loss is the decrease in export revenue because the world price has fallen to P^*; Home loses the difference between P^W and P^* on each of X_2 units exported. So a large country loses even more from a subsidy than a small country because of the reduction in the world price of its exported good.

Foreign and World Welfare While Home definitely loses from the subsidy, the Foreign importing country definitely gains. Panel (b) of Figure 10-2 illustrates the consumer surplus benefit to Foreign of the Home subsidy; the price of Foreign imports decreases and Foreign's terms of trade improves. The change in consumer

surplus for Foreign is area e', the area below its import demand curve M^* and between the free-trade world price P^W and the new world price (with subsidy) P^*.

When we combine the total Home consumption and production losses $(b + d)$ plus the Home terms-of-trade loss e, and subtract the Foreign terms-of-trade gain e', there is an overall deadweight loss for the world, which is measured by the area $(b + d + f)$ in panel (b). The area f is the additional world deadweight loss due to the subsidy, which arises because the terms-of-trade loss in Home is not completely offset by a terms-of-trade gain in Foreign.

Because there is a transfer of terms of trade from Home to Foreign, the export subsidy might seem like a good policy tool for large wealthy countries seeking to give aid to poorer countries. However, this turns out not to be the case. The deadweight loss f means that using the export subsidy to increase Home production and send the excess exported goods overseas (as was the case for food aid, discussed earlier as an example of an indirect subsidy) is an inefficient way to transfer gains from trade among countries. It would be more efficient to simply give cash aid in the amount of the Home terms-of-trade loss to poor importers, a policy approach that, because it does not change the free-trade levels of production and consumption in either country, would avoid the deadweight loss $(b + d + f)$ associated with the subsidy. This argument is made by the European countries, which, several years ago, eliminated transfers of food as a form of aid and switched to cash payments. The United States has now agreed to make the same policy change, as discussed in the following application.

APPLICATION
Who Gains and Who Loses?

Now that we have studied the effect of export subsidies on world prices and trade volume in theory, we return to the agreement to eliminate export subsidies that was reached at the 2015 Nairobi meeting of the WTO and ask: Which countries will gain and which will lose when export subsidies (including the "indirect" subsidies like food aid) are eliminated?

Gains The obvious gainers from this action will be current agricultural exporters in developing countries such as Brazil, Argentina, Indonesia, and Thailand, along with potential exporters such as India and China. These countries will gain from the rise in world prices as agricultural subsidies by the industrialized countries—especially Europe and the United States—are eliminated. These countries will gain even more when and if an agreement is reached on the elimination of agricultural tariffs in the industrial countries, including Japan and South Korea, that protect crops such as rice. Both of these actions will also benefit the industrial countries themselves, which suffer both a deadweight loss *and* a terms-of-trade loss from the combination of export subsidies and import tariffs in agriculture. Farmers in the industrial countries who lose the subsidies will be worse off, and the government might choose to offset that loss with some type of adjustment assistance. In the United States and Europe, however, it is often the largest farmers who benefit the most from subsidy programs, and they may be better able to adjust to the elimination of subsidies (through switching to other crops) than small farmers.

Losses Which countries will lose from the elimination of export subsidies? To the extent that the elimination of export subsidies leads to higher world prices, as we