# Lecture 12 Trade Policy Analysis: Subsidies

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Reference: Feenstra and Taylor, 2017, CH10.1-4 & 10.7 Export and Production Subsidies

I. Background: Reminiscent of earlier meetings, the Geneva gathering of the 152 members of the WTO in July 2008 was met with protests. The root of the recent objections was due to proposals to eliminate agricultural subsidies used in many countries such as South Korea, Japan, Europe, and the United States, which inflates the price of their crops while depressing the world prices. Proponents of the removal of the agricultural support consisted of exporters in land-rich developing countries, such as Brazil, India, and China that were hurt by the low prices. However, the current regimes of tariffs and subsidies benefit land-poor developing countries capable of importing the agricultural products at the lower prices. An agreement to remove agricultural export subsidies was finally approved in Nairobi, Kenya, during the WTO tariff negotiations in 2015.

| Issue | Decision Made in Hong Kong | Unresolved in Hong Kong |
|---|---|---|
| Agricultural export subsidies | Abolition by end of 2013, with a "substantial part" scrapped before 2011, and parallel elimination of indirect subsidies. | Must agree [on] value of indirect subsidies and detailed phase-out programs. |
| Domestic farm supports | Agreement to classify WTO members in three bands based on their level of domestic farm support (top—European Union, middle—United States and Japan, bottom—everyone else). | Must agree [on] size of subsidy reduction and rules to stop countries from shifting trade-distorting subsidies into categories sheltered from deep cuts. |
| Agricultural tariffs | Agreement on four tiers (different for rich and poor countries) and on a mechanism allowing poor nations to raise duties to counter import surges. | Must decide size of tariff cuts and number and treatment of "sensitive" and "special" products. |
| Cotton Agreement | Agreement to eliminate export subsidies in 2006 and grant unrestricted access for cotton exports from West African producers and other least developed countries (LDCs). | United States will have the "objective" of cutting its $4 billion subsidies to cotton growers further and faster than the still-to-be-agreed-upon overall reduction for domestic farm supports. |
| Industrial goods | Agreement on formula and on a "comparably high level of ambition" for tariff cuts in agriculture and industrial goods so rich nations do not demand more cuts than they give. | Must agree [on] key elements of formula, how much to cut, flexibilities for developing countries, and role of sectoral negotiations. |
| Services | Some negotiating guidelines for trade in services agreed upon . . . | The European Union is pressing for liberalization timing targets opposed by developing countries; poor nations want rich ones to accept more temporary service workers. |
| Development | Duty-free, quota-free access extended to 97% of product[s] . . . from least developed countries by 2008, allowing significant exclusions (e.g., U.S. textiles imports). More pledges of aid for trade. | Must agree [on] other measures to strengthen special treatment provisions for poor countries. |

1.  Elimination of agricultural export subsidies: it was agreed in the 2015 WTO meeting that developed countries would end subsidies immediately and developing countries had until 2018.
2.  Cotton subsidies. At the 2015 Nairobi meeting, it was finally agreed that cotton subsidies would cease immediately in the developed world and end by 2017 in developing countries.
3.  Elimination of indirect subsidies (food aid) and removal of domestic farm support
4.  Special safeguard mechanism for developing countries (if developed countries engage in export subsidies or any kind of indirect supports that result in unfair competitive advantages, developing nations have the right to implement special safeguard mechanisms such as import tariffs.)
5.  Industrial goods (cut tariff) and service trade (requested by the developed nations)
6.  A new goal of allowing 97% of the least developed countries (LDCs) to enter WTO markets as tariff- and duty-free was included in the Hong Kong discussions. (Textiles imported to the U.S. were excluded.)

II. Recap Demand and Supply Model for Subsidy

Subsidy payment can reduce the buyer's price below the seller's price. A subsidy can be thought of as a negative tax. If the subsidy is paid to the consumers, demand will increase. Market price will be higher but consumers actually pay less. If the subsidy is paid to the producers, supply will increase. Market price will be lower but producers receive subsidies. Like a tax, the benefit of a subsidy is split between buyers and sellers, depending on the relative elasticities of supply and demand.
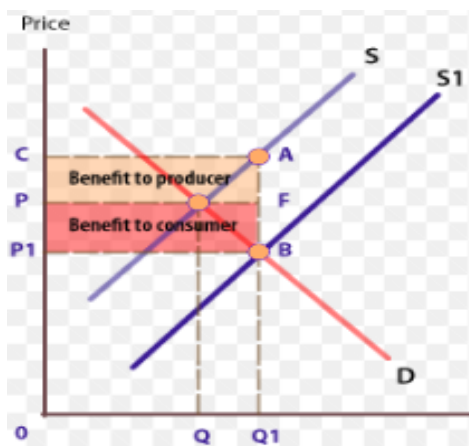


How does subsidy affect market equilibrium?

1.  Suppose government pays subsidy to the firms.
2.  Subsidy payment increases producers' incentive and reduces production cost.
3.  Supply curve shifts to the right.
4.  Market price will be lower and consumers pay less.
5.  Producers and consumers gains from the subsidy.
6.  However, the subsidy incurs a deadweight loss.
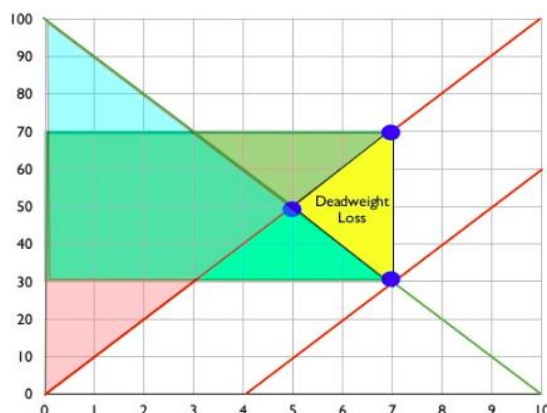


Calculating the deadweight loss of a subsidy.

1.  Government pays $280 in subsidy.
2.  Sellers increase surplus from $125 to $245. Buyers increase surplus from $125 to $245.
3.  Total market welfare increases from $250 to $490, a net increase of $240.
4.  The deadweight loss is $280-$240=$40.

III. Export Subsidies

An export subsidy is payment to firms for every unit exported (either a fixed amount or a fraction of the sales price). Governments give subsidies to encourage domestic firms to produce more in particular industries. Europe maintains a system of agricultural subsidies known as the Common Agricultural Policy (CAP). Other countries maintain similarly generous subsidies. For example, the United States pays cotton farmers to grow more cotton and subsidizes agribusiness and manufacturers to buy the American cotton.

1. Small country model
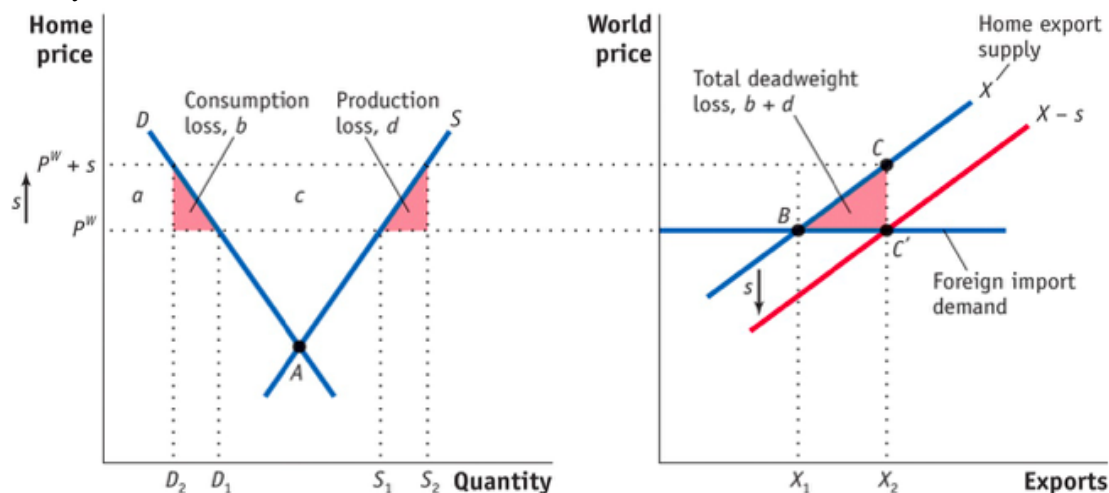


1)  Applying a subsidy of $s$ dollars per unit exported will increase the price that Home exporters receive from $P^W$ to $P^W + s$. As a result, the domestic price of the similar good will also rise by that amount.
2)  This price rise leads to an increase in Home quantity supplied from $S_1$ to $S_2$ and a decrease in Home quantity demanded from $D_1$ to $D_2$.
3)  Exports rise as a result of the subsidy, from $X_1$ to $X_2$. 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 $s$.
4)  Because exporters are allowed to export any amount at the subsidized price, the Home firms will not accept a price below $P^W + s$, so domestic price also rises to $P^W + s$. To prevent consumers from buying at lower world price, many subsidized agricultural products that are exported are also protected by an import tariff.
5)  PS: +a+b+c    CS: **-a-b**    GR: -(b+c+d)    Net home welfare: **-(b+d)**

2. Large country model

1)  With the allocation of an export subsidy in the amount of s dollars per ton, the price received by the sugar increases, which leads to an increase in the quantity supplied. The additional output coupled with the decrease in the quantity demanded increases the amount available for exports, as represented by the downward shift of the export supply curve in the amount of the subsidy.
2)  The intersection of the new Home export supply, X − s, with the Foreign import demand, M*, gives the new world price of P* and export quantity X2=S2-D2.
3)  Note that the post-subsidy world price, P*, is lower than the free-trade world price, PW. Defined as the ratio of export prices to import prices, the decrease in the world price means that the large Home country suffers a terms-of-trade loss due to the overproduction motivated by the export subsidy. Alternatively, the Foreign country experiences a terms-of-trade gain since it now faces a lower import price of sugar.
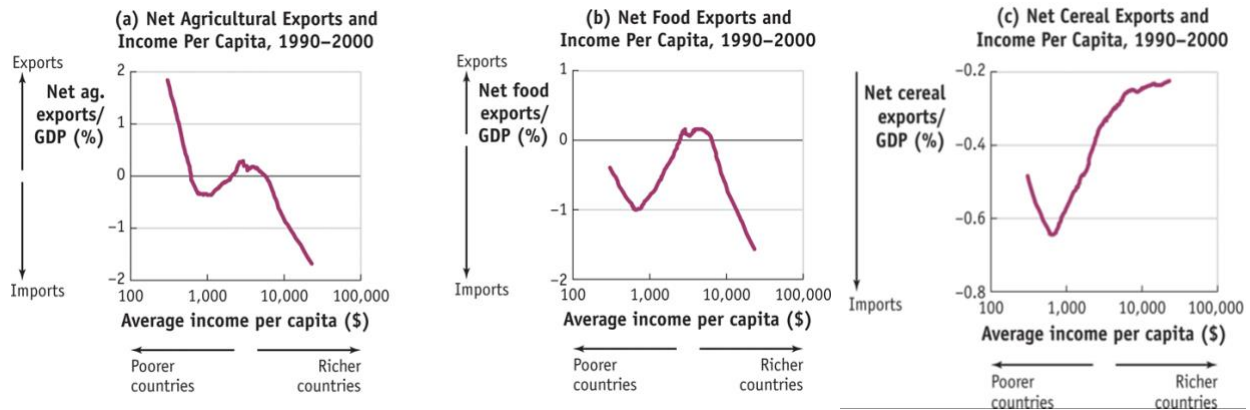
4) Home welfare: PS +a+b+c  CS -a-b  GR **-b-c-d-e**  Net welfare **-(b+d+e)**

5) Foreign and world welfare: overall, world welfare decreases due to the export subsidy because the losses of the *Home country (b + d + e) are not offset by the gains of the Foreign country (e').* The world deadweight loss measured by the area *(b + d + f).*

6) Therefore, relative to a small country, an export subsidy has a greater negative effect on a large exporter. Aside from the deadweight loss denoted by the triangle (b + d), the additional supply encouraged by the subsidy depresses the world price so that the large country has a terms-of-trade loss, which is denoted by area e. More specifically, the large country loses $P^W$ minus P* dollars on each unit exported. Home loses from the subsidy, while Foreign gains.
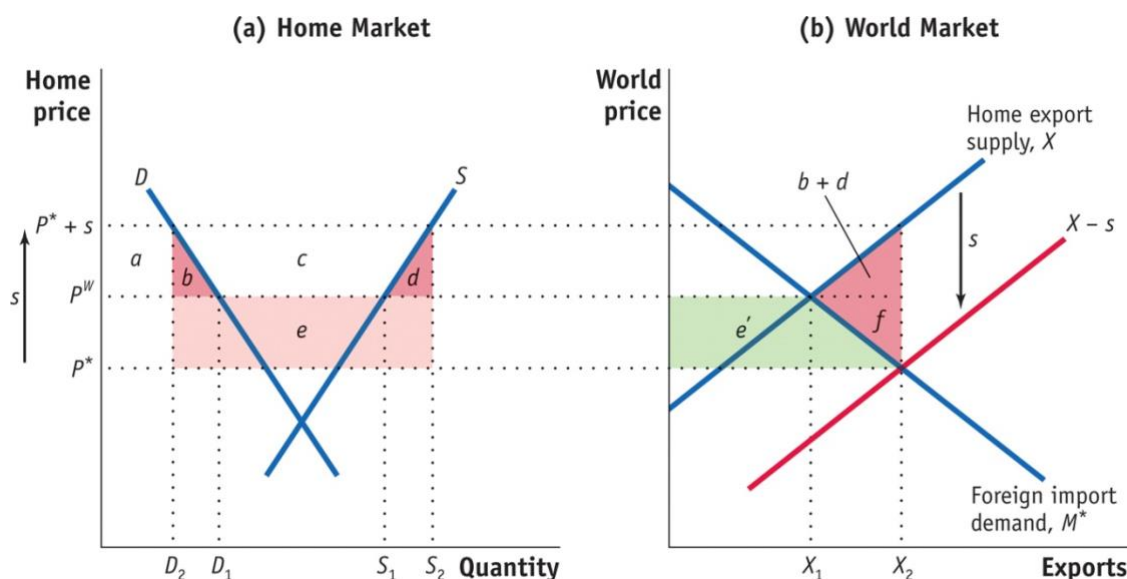


It may appear from this that a good strategic policy for a large country to aid poorer countries would be to engage in such export subsidies and send the excess production overseas as aid. It turns out that this is an inefficient way to aid poor countries because it alters the free-trade levels of production and consumption in both countries, resulting in deadweight losses of $(b + d + f)$. It is better to simply send the cash of Home's term-of-trade loss to the poor countries. Europe has done this and now the United States has agreed that it will do the same.

3. Gains and losses from subsidy elimination
   1) **Gains:** Current agricultural exporters without subsidy supports (land-rich developing countries such as Brazil, India, and China) will gain from the rise in world prices as agricultural subsidies by the industrialized countries−especially Europe and the United States−are eliminated.
   2) **Losses**: The food-importing countries, typically the poorer non-food-producing countries, will lose. This theoretical result is confirmed by several empirical studies.
   3) Agriculture, Food, and Cereal Exports: Panel (a) shows net agricultural exports graphed against countries' income per capita. The poorer countries export more agricultural products overall and would thus benefit from a rise in the prices due to the removal of subsidies. On the other hand, panel (b) shows that it is middle-income countries that export the most food. Panel (c) shows that poor countries are net importers of essential food items (cereals) such as corn, rice, and wheat and would be harmed by an increase in their world price.

(a) Net Agricultural Exports and Income Per Capita, 1990–2000

(b) Net Food Exports and Income Per Capita, 1990–2000

(c) Net Cereal Exports and Income Per Capita, 1990–2000

4) **Food Aid:** It is important that food aid be offered to countries that face an increase in prices due to elimination of export subsidies or due to natural catastrophes such as poor weather that leads to crop failure. For many reasons, the United States has moved in the direction of providing more food aid in the form of cash rather than agricultural commodities. The elimination of agricultural export subsidies, including indirect subsidies in the form of commodity exports, carries some risk to the livelihood of consumers in the poorest countries. Despite this, many observers remain skeptical that the funding will be forthcoming.

IV. Production Subsidies (to every unit produced not just exported)

The Hong Kong meeting of the WTO focused primarily on export subsidies in agriculture because these government supports have a greater impact on the world markets than other forms of domestic assistance, such as a production subsidy. The impact of a production subsidy is less severe because the government offers a certain dollar amount for each unit produced regardless of whether the final consumers are domestic or foreign. There are many ways a country can do this; for example, it could guarantee a minimum price to growers by substituting for any difference between the target and market rates. Or, as in the U.S. cotton industry, the government could also subsidize crop users to stimulate demand. To understand why there are less harmful effects of production subsidies as compared with direct export subsidies, we will examine the effect of the former, beginning with a small country.



(a) Home Market

(b) World Market
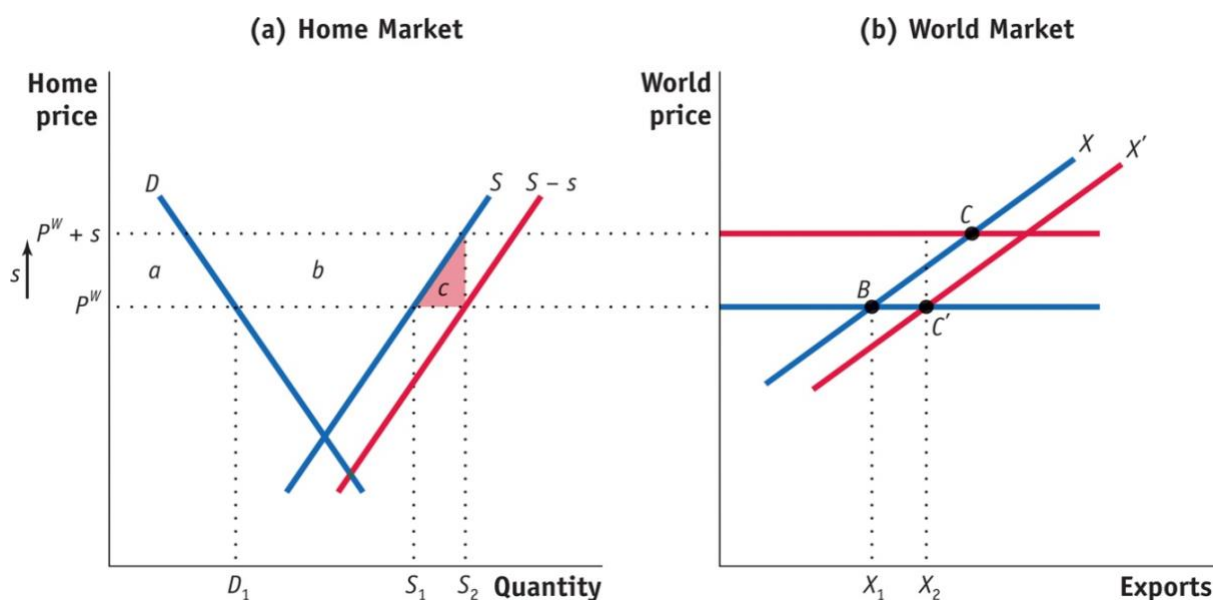
1. Small country
    1) Applying a production subsidy of $s$ dollars per unit produced will increase the price that Home firms receive from $P^W$ to $P^W + s$. This price rise leads to an increase in Home quantity supplied from $S_1$ to $S_2$. The consumer price at Home is NOT affected because the production subsidy does not distinguish between items sold at Home or exported (firms therefore continue to charge the world price at Home), so the quantity demanded stays at $D_1$. (In fact, it can drive down home and world prices in the large country case.)
    2) PS: +a+b   CS: 0   GS: -(a+b+c)   Home net welfare: -c
    3) The deadweight loss of the subsidy for a small country is the area $c$. In world market, exports rise as a result of the production subsidy, from $X_1 = S_1 - D_1$ to $X_2 = S_2 - D_1$, though the increase in exports is less than for the export subsidy $X_2 = S_2 - D_2$ because, for the production subsidy, quantity demanded does not change at Home.
    4) The deadweight loss is lower for the production subsidy (-c) makes it a better policy than the export subsidy (-b-d) to increase Home supply.
    5) Targeting principle: to achieve some objective, it is best to use the policy instrument that achieves the objective most directly. There are many examples of using a targeting principle in economics: Taxes on cigarettes and gasoline. To use an example from this book, it is better to provide trade adjustment assistance directly to those affected, than to impose a tariff or quota.

2. Large country
    1) With the export subsidy, the price for Home producers and consumers rose to $P^W + s$, so exports increased because of both the rise in quantity supplied and the drop in quantity demanded.
    2) Notice that the rise in the quantity of exports, from point B to C', due to the production subsidy ($S_2-S_1$) is less than the increase in the quantity of exports for the export subsidy ($S_2-S_1+D_1-D_2$), from point B to C.
    3) As a result, the export subsidy shifted the Home export supply curve down by exactly the amount s. In contrast, with a production subsidy, export rise only because Home quantity supplied increases so that export supply shifts down by an amount less than s. (Export subsidy only stimulates exports.)
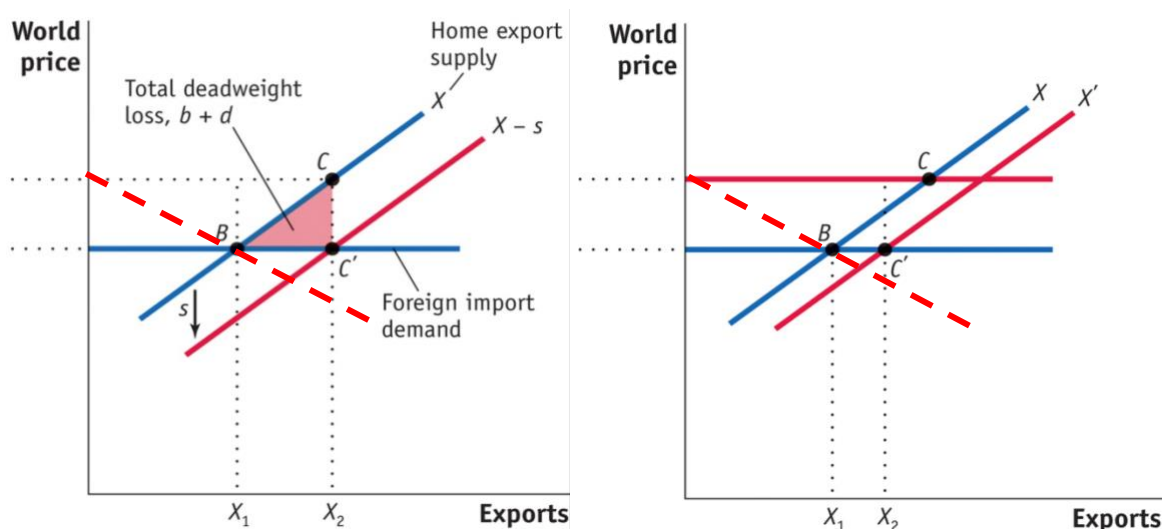


    4) Compared with large country export subsidy, world price drops less in the case of production subsidy. Why? Consider how export subsidy and production subsidy differ in affecting domestic consumption.

5) Compared with small country model, large country production subsidy results in less export. Why? Consider producer's incentive to export when world price drops (large coutnry) as supposed to constant world price (small country).

6) If we drew a downward-sloping Foreign import demand curve, then the increase in supply as a result of the production subsidy would lower the world price. But the drop in world price would be less than the drop that occurred with the export subsidy because the increase in exports under the production subsidy is less.

7) It follows that a production subsidy has a smaller net negative effect on Home, Foreign, and the world welfare compared with direct export subsidies. As such, production subsidy is of less concern to the WTO than other forms of domestic agricultural support.

3. High-technology export subsidies

1) It is common for countries to provide subsidies to their high-technology industries because governments believe that these subsidies can create a strategic advantage for their firms on international markets. Because these industries often have only a few global competitors, we use game theory (the study of strategic interactions) to determine how firms make their decisions under imperfect competition.

2) If a subsidy increases the profits to a firm by more than the subsidy cost, then it is worthwhile for a government to undertake the subsidy. As we have seen, though, subsidies are not always worthwhile unless they can induce the competing firm to exit the market altogether, which may not occur.

4. Subsidies to commercial aircraft

1) Boeing and Airbus have been receiving various types of subsidies from the United States and Europe, respectively, for many years. In the United States, the government supports include research and development (R&D) for military aircrafts that were later used in the development of the civilian versions. The assistance provided by the European government was directly used to fund R&D for new aircrafts. Both governments also indirectly helped their domestic producers by offering low-interest loans to aircraft purchasers.

2) 1992 Agreement In recognition of the costly nature of these strategic behaviors, the United States and European governments reached an agreement in 1992 to limit the use of subsidies. As shown in Table 10-2, the provisions of the agreement include limiting development subsidies to 33% of the total development costs for a new aircraft with the expectation that these costs will be repaid at the government rate. Indirect subsidies to the military divisions are limited to 4% of the company's annual sales and prohibit production subsidies and, in addition, limit the government from offering buyers low interest rates.

3) This agreement lowered subsidies from estimates of 7.5% to 12% of the cost of production and resulted in an increase in the price of aircraft. But, both countries benefited from the savings in the cost of subsidies and Boeing and Airbus benefited from the increase in price. However, governments and consumers of aircraft experienced welfare losses due to the increase in price.

V. Summary

1.  An export subsidy leads to a fall in welfare for a small exporting country facing a fixed world price. The drop in welfare is a deadweight loss and is composed of a consumption and production loss, similar to an import tariff for a small country.

2.  In the large-country case, an export subsidy lowers the price of that product in the rest of the world. The decrease in the export price is a terms-of-trade loss for the exporting country. Therefore, the welfare of the exporters decreases because of both the deadweight loss of the subsidy and the terms-of-trade loss. This is in contrast to the effects of an import tariff in the large-country case, which generates a terms-of-trade gain for the importing country.

3.  Export subsidies applied by a large country create a benefit for importing countries in the rest of the world, by lowering their import prices. Therefore, the removal of these subsidy programs has an adverse effect on those countries. In fact, many of the poorest countries are net food importers that will face higher prices as agricultural subsidies in the European Union and the United States are removed.

4.  Production subsidies to domestic producers also have the effect of increasing domestic production. However, consumers are unaffected by these subsidies. As a result, the deadweight loss of a production subsidy is less than that for an equal export subsidy, and the terms-of-trade loss is also smaller.

**Readings**

Europe threatens tariffs on American ketchup, cheese and fish over Boeing subsidies
https://www.cnn.com/2019/04/17/business/eu-us-tariffs-boeing/index.html

20190303 PIIE Trade Talks Episode 75: A US-China Farm Subsidy Fight at the WTO
https://piie.com/experts/peterson-perspectives/trade-talks-episode-75-us-china-farm-subsidy-fight-wto

Agricultural Subsidy Programs by Daniel A. Sumner
https://www.econlib.org/library/Enc/AgriculturalSubsidyPrograms.html