Public Affairs 856
Trade, Competition, and Governance in a Global Economy
Lecture 16
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Outline

1. Infant Industry protection
2. Export Subsidies in a Large Home Country
3. Production Subsidies
4. High-Technology Export Subsidies
5. “Made In China 2025”

Chapter 9, Section 5 Infant Industry Protection

- In the semiconductor industry, it is not unusual for firms to mimic the successful innovations of other firms, and benefit from a **knowledge spillover**.

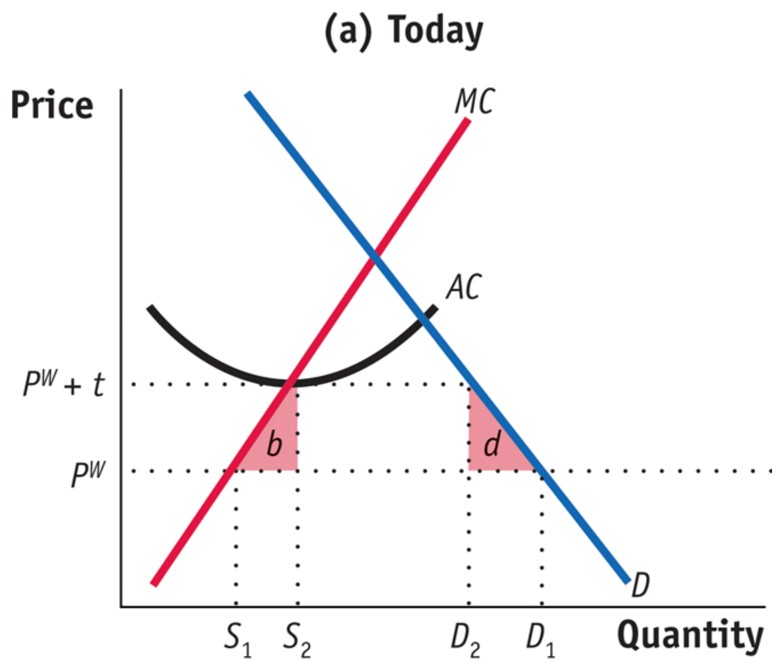
- As both of these cases show, the infant industry argument supporting tariffs or quotas depends on the existence of some form of **market failure**.

9.5 Infant Industry Protection

Free-Trade Equilibrium, Tariff Equilibrium

Equilibrium Today, Equilibrium in the Future, Effect of the Tariff on Welfare

FIGURE 9-10 (1 of 2) Infant Industry Protection



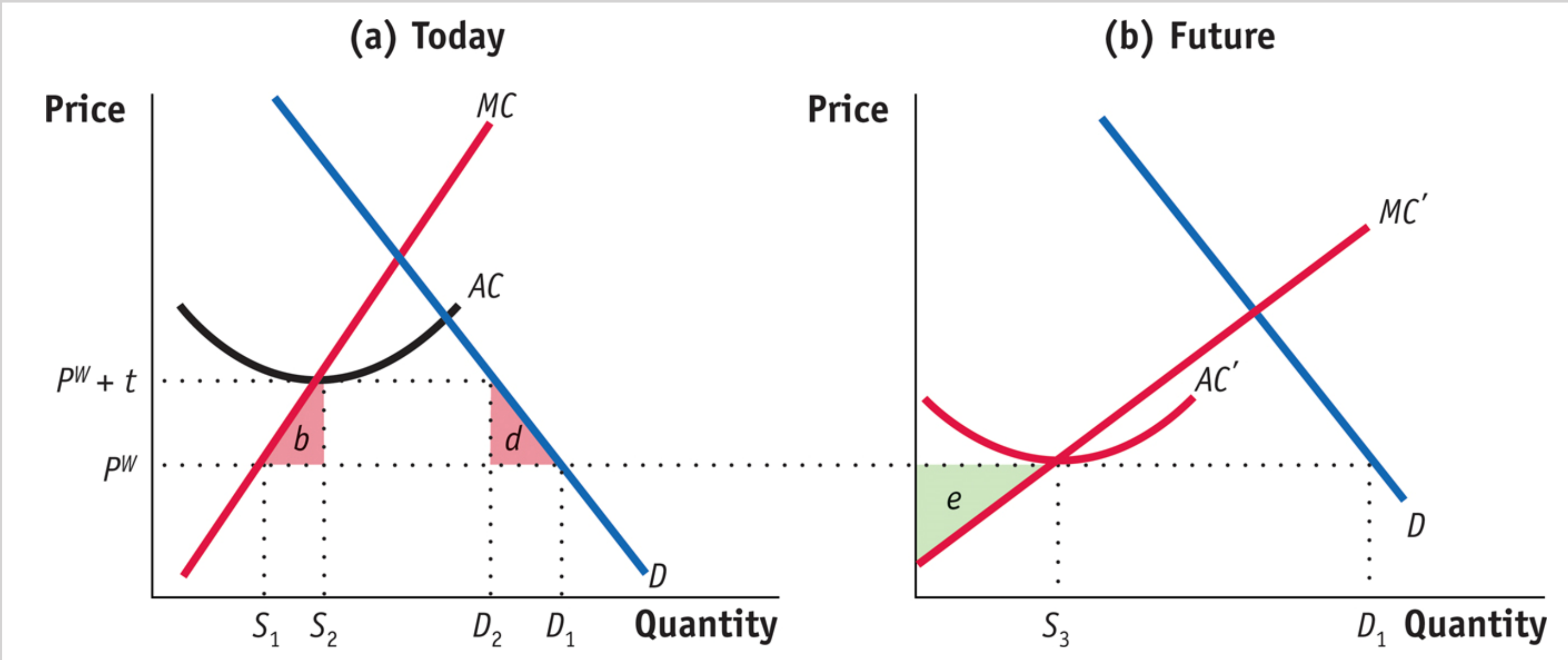
In the situation today (panel a), the industry would produce S_1, the quantity at which $MC = P^W$. Because P^W is less than average costs at S_1, the industry would incur losses at the world price of P^W and would be forced to shut down. A tariff increases the price from P^W to $P^W + t$, allowing the industry to produce at S_2 (and survive) with the net loss in welfare of $(b + d)$.

9.5 Infant Industry Protection

Free-Trade Equilibrium, Tariff Equilibrium

Equilibrium Today, Equilibrium in the Future, Effect of the Tariff on Welfare

FIGURE 9-10 (2 of 2) Infant Industry Protection (continued)



In panel (b), producing today allows the average cost curve to fall through learning to AC'. In the future, the firm can produce the quantity S_3 at the price P^W without tariff protection and earn producer surplus of *e*.

APPLICATION

Examples of Infant Industry Protection

Government Policies in the Solar Panel Industry

- In the United States, the government gives tax breaks and low interest loans or loan guarantees to companies that produce solar panels.
- One example of a loan guarantee was to the U.S. company Solyndra, which received a $535 million loan guarantee from the U.S. Department of Energy in 2009.
- But Solyndra subsequently went bankrupt in 2011, and President Obama was widely criticized for this loan guarantee.
- This example illustrates how difficult it is to know whether a company protected by some form of infant industry protection will actually become profitable in the future.

APPLICATION

Examples of Infant Industry Protection

Government Policies in the Solar Panel Industry

- China has also pursued policies to encourage the production of solar panels, and especially to encourage their export.

- These infant industry policies are successful if:

  1. the industry becomes profitable in the future, after the export subsidy is removed; and

  2. the deadweight loss of the subsidy is less than the future profits earned by the industry.

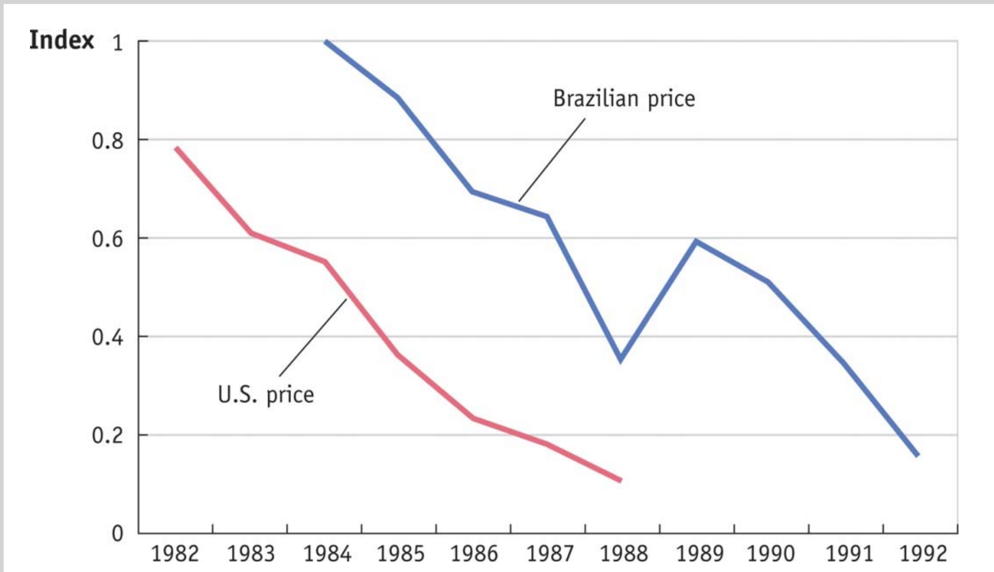
- In China, the extensive use of subsidies led to vast overcapacity in the industry, which in turn led to the bankruptcy of the key Chinese firm, Suntech Power Holdings, whose main subsidiary in Beijing went bankrupt in March 2013.

APPLICATION

Examples of Infant Industry Protection

Computers in Brazil

FIGURE 9-11 (1 of 2) Computer Prices in the United States and Brazil, 1982-1992



This diagram shows the effective price of computer power in the United States and Brazil. Both prices fell very rapidly due to technological improvements, but the drop in the U.S. price exceeded that of the Brazilian price.

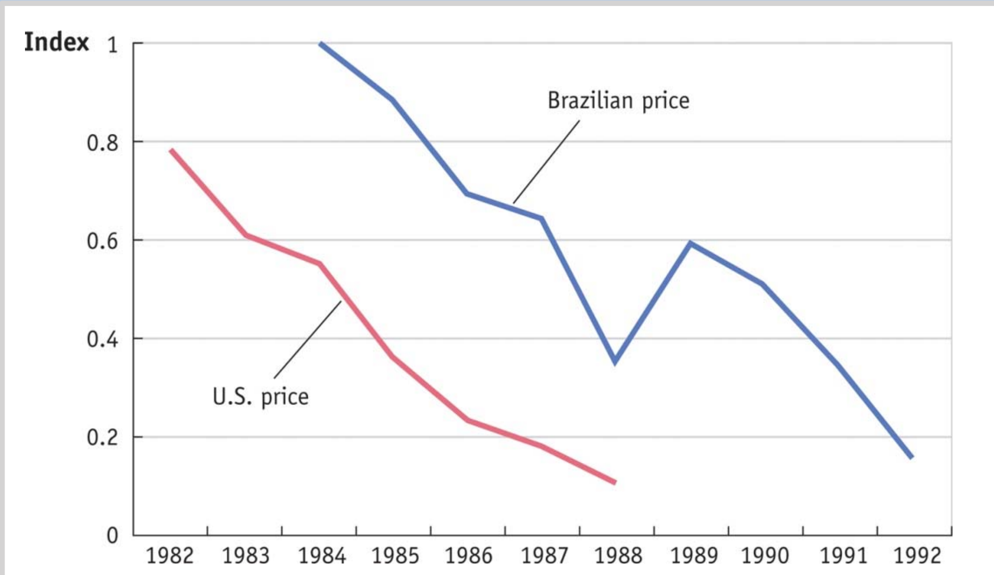
There are many cases in which infant industry protection has not been successful. One well-known case involves the computer industry in Brazil.

APPLICATION

Examples of Infant Industry Protection

Computers in Brazil

FIGURE 9-11 (2 of 2) Computer Prices in the United States and Brazil, 1982-1992



The difference between the two prices is a measure of the technology gap between Brazil and the United States in the production of personal computers.

Prices in Brazil The persistent gap between the prices in Brazil and the United States means that Brazil was never able to produce computers at competitive prices without tariff protection. This fact alone means that the infant industry protection was not successful.

APPLICATION

Examples of Infant Industry Protection

Protecting the Automobile Industry in China

In 2009 China overtook the United States as the largest automobile market in the world. Strong competition among foreign firms located in China, local producers, and import sales have resulted in new models and falling prices.

Production in China

- Beginning in the early 1980s, China permitted a number of joint ventures between foreign firms and local Chinese partners.
- Various regulations, combined with high tariff duties, helped at least some of the new joint ventures achieve success.

HEADLINES

Milestone for China Car Output

As of the publication of this article China was set to produce more cars than Europe for the first time in 2013. China was projected to produce 19.6 million cars and other light vehicles, such as trucks, compared to 18.3 million in Europe.

In 2012 China produced 17.8 million cars, which was more than a million cars behind Europe at 18.9 million cars.

The growth of automobile production in China has been remarkable. In 2013 China is projected to produce 10 times more cars than in 2000. Over this period China's share of global auto manufacturing has gone from 3.5% to 23.8%.

APPLICATION

Examples of Infant Industry Protection

Protecting the Automobile Industry in China

Cost to Consumers

Quotas have a particularly large impact on domestic prices when the Home firm is a monopoly. That situation applied to the sales of Volkswagen’s joint venture, in Shanghai, which enjoyed a local monopoly on the sales of its vehicles.

Gains to Producers

For the tariffs and quotas used in China to be justified as infant industry protection, they should lead to a large enough drop in future costs so that the protection is no longer needed.

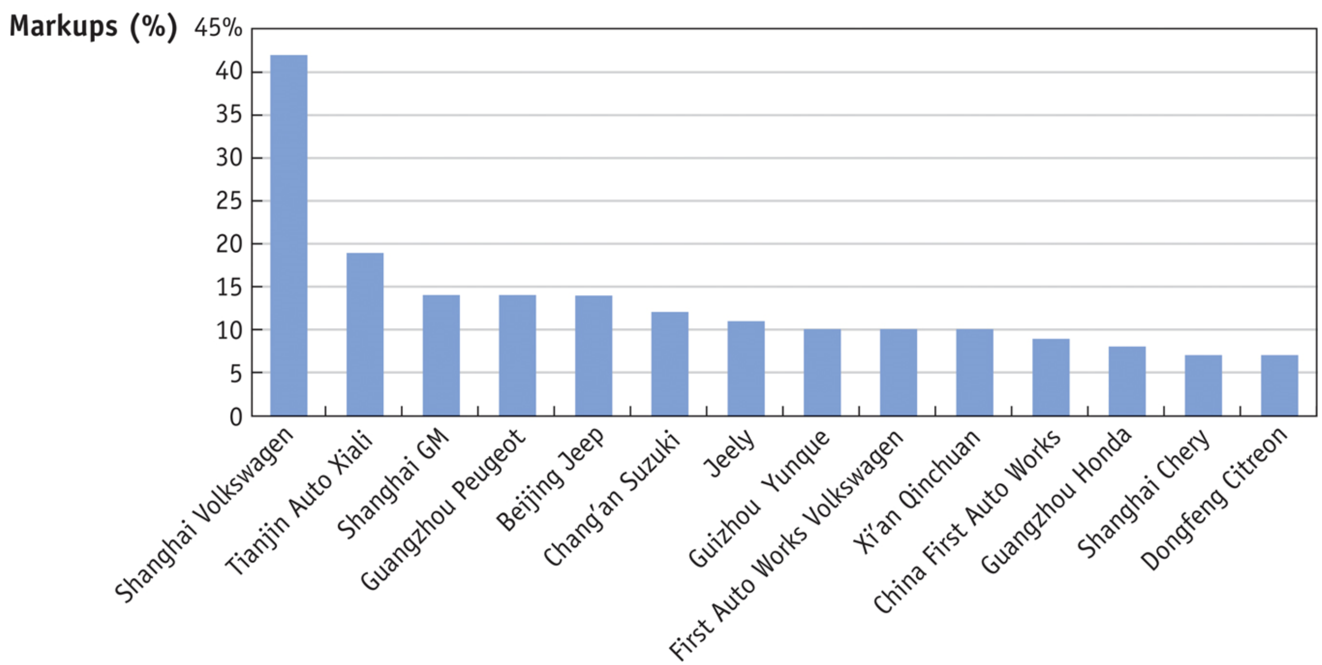
APPLICATION

Examples of Infant Industry Protection

Protecting the Automobile Industry in China

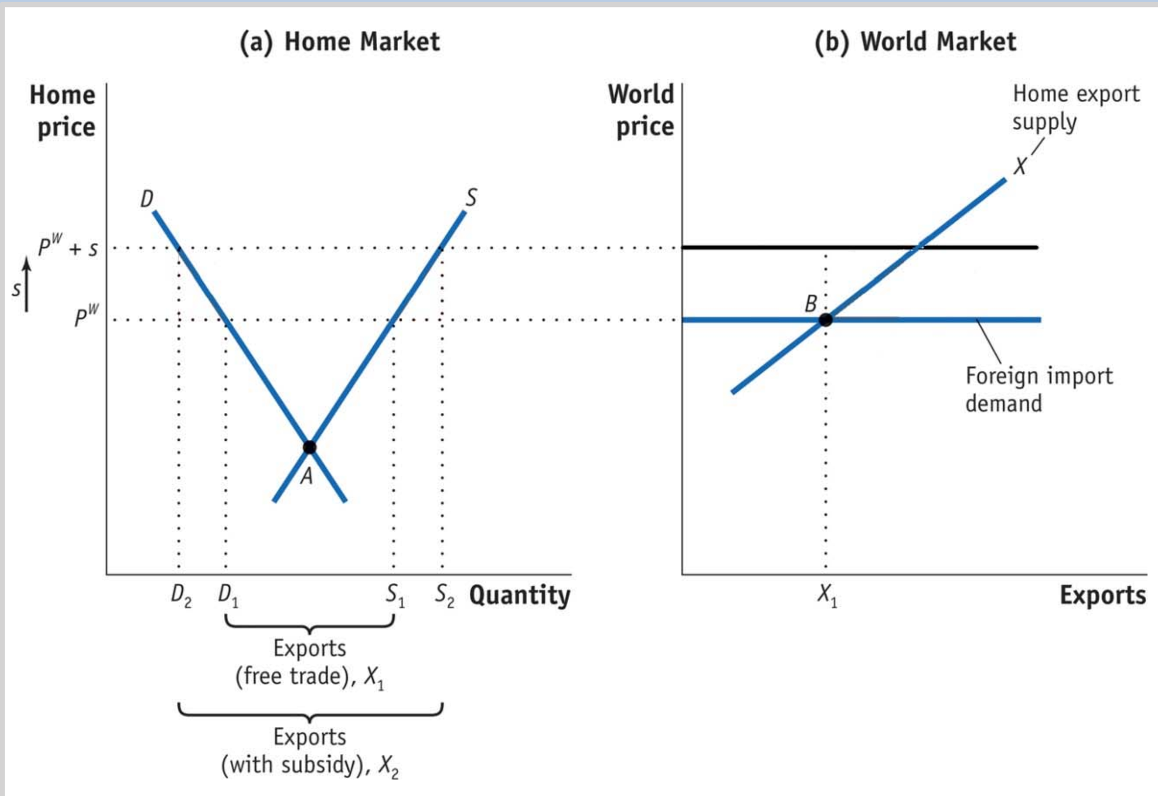
FIGURE 9-12

Automobile Markups by Firms in China, 1995-2001 This diagram shows the percentage markups (price over marginal cost) applied to automobiles sold in China from 1995 to 2001, by various producers. The highest markup was charged by Shanghai Volkswagen, which had a local monopoly in Shanghai.



Impact of an Export Subsidy

FIGURE 10-1 (1 of 2) Export Subsidy for a Small Country



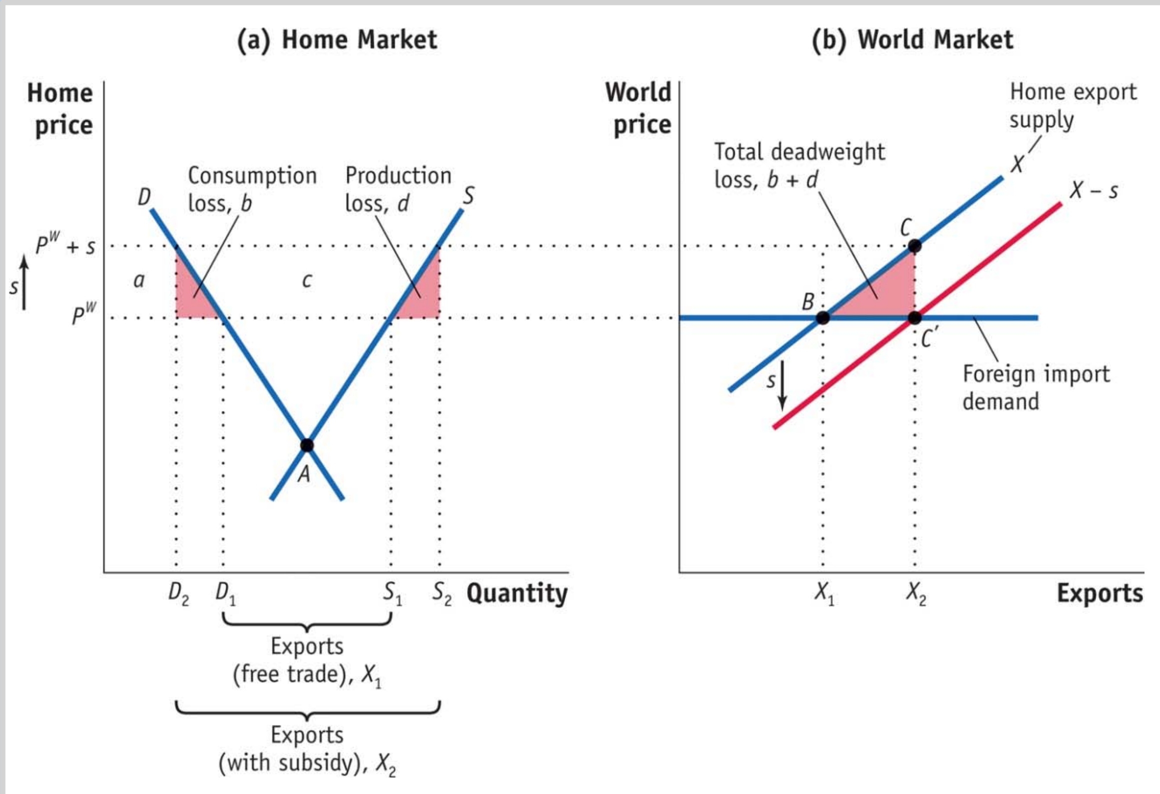
Applying a subsidy of s dollars per unit exported will increase the price that Home exporters receive from P^W to $P^W + s$.

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).

10.2 Export Subsidies in a Small Home Country

Impact of an Export Subsidy

FIGURE 10-1 (2 of 2) Export Subsidy for a Small Country (continued)



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*.

10.2 Export Subsidies in a Small Home Country

Impact of an Export Subsidy

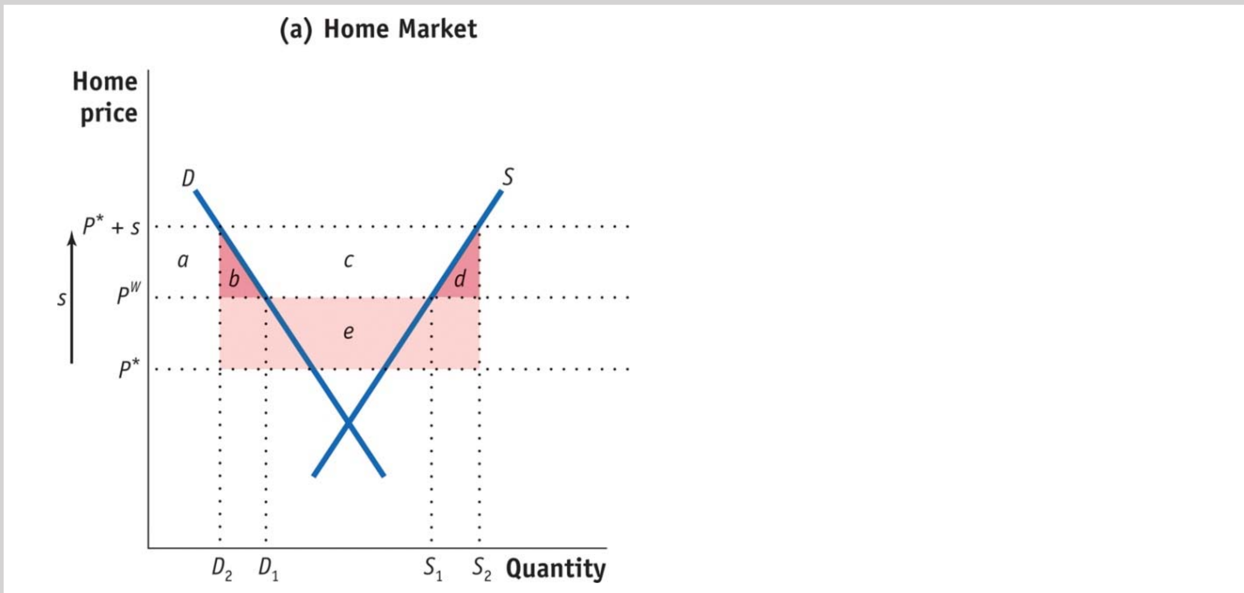
Impact of the Subsidy on Home Welfare

- The rise in Home price lowers consumer surplus by the amount $(a + b)$.
- The price increase raises producer surplus by the amount $(a + b + c)$.
- The export subsidy costs the government s per unit exported, shown by the area $(b + c + d)$.
- The triangle $(b + d)$ is the net loss or deadweight loss due to the subsidy in a small country.

10.3 Export Subsidies in a Large Home Country

Effect of the Subsidy

FIGURE 10-2 (1 of 2) Export Subsidy for a Large Country



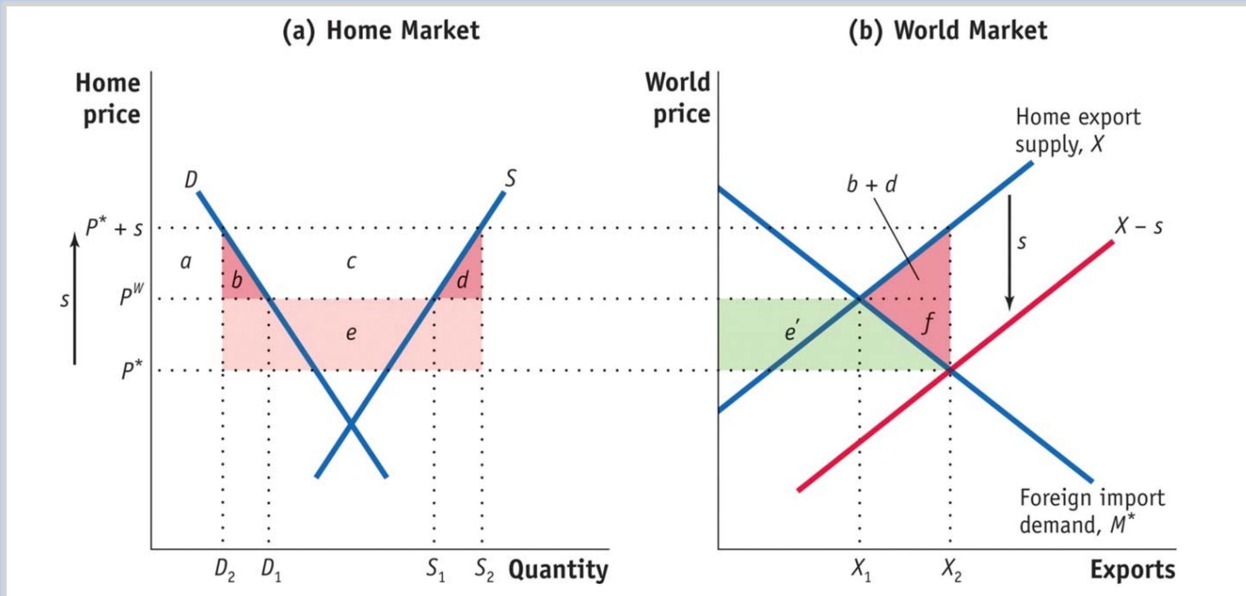
Panel (a) shows the effects of the subsidy at Home. The Home price increases from P^W to $P^* + s$, Home quantity demanded decreases from D_1 to D_2, and Home quantity supplied increases from S_1 to S_2.

The deadweight loss for Home is the area of triangle $(b + d)$, but Home also has a terms-of-trade loss of area e.

10.3 Export Subsidies in a Large Home Country

Effect of the Subsidy

FIGURE 10-2 (2 of 2) Export Subsidy for a Large Country (continued)



In the world market, the Home subsidy shifts out the export supply curve from X to $X - s$, 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

Home Welfare

- The increase in the Home price from P^W to $P^* + s$ reduces consumer surplus by the amount $(a + b)$ and increases producer surplus by the amount $(a + b + c)$.

- Due to the terms-of-trade effect, the revenue cost of the subsidy to the government is the area $(b + c + d + e)$, which equals $s \cdot X_2$. The net effect on welfare is $-(b + d + e)$,

Foreign and World Welfare

- While there is a terms-of-trade gain of e' for the foreign country there is still an overall deadweight loss for the world, measured by the area $(b + d + f)$.

10.4 Production Subsidies

Suppose the government provides a subsidy of *s* dollars for *every unit* that a Home firm produces. This is a **production subsidy** because it is a subsidy to every unit produced and not just to units that are exported.

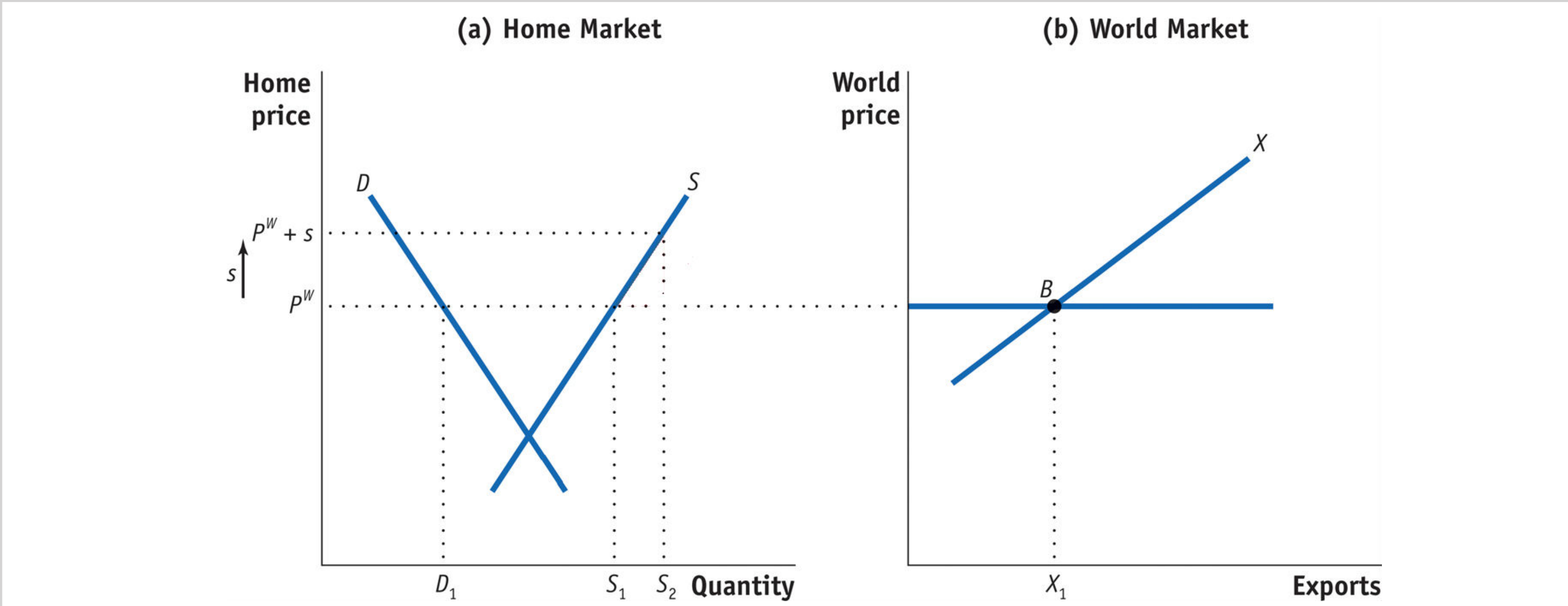
There are several ways that a government can implement such a subsidy.

- The government might guarantee a minimum price to the farmer, and make up the difference between the minimum price and any lower price for which the farmer sells.
- Alternatively, it might provide subsidies to users of the crop to purchase it, thus increasing demand and raising market prices; this would act like a subsidy to every unit produced.

10.4 Production Subsidies

Effect of a Production Subsidy in a Small Home Country

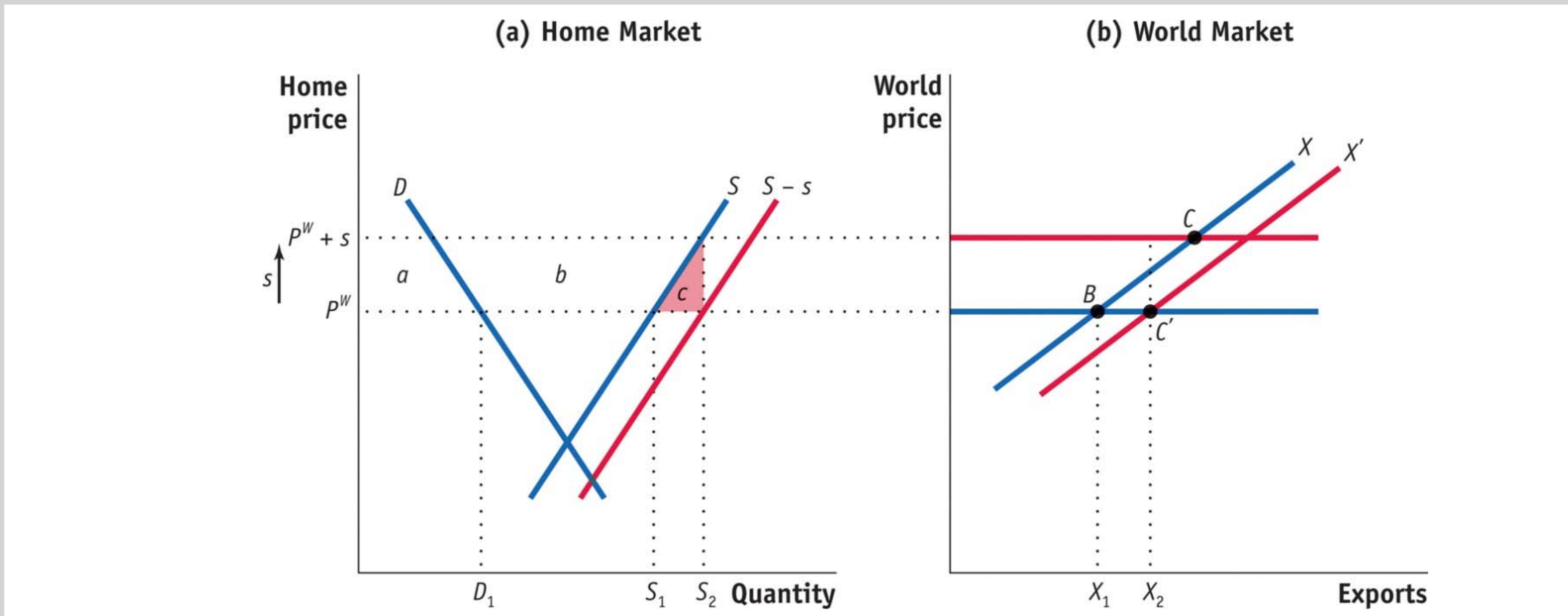
FIGURE 10-4 (1 of 2) Production Subsidy for a Small Country



In panel (a), 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.

Effect of a Production Subsidy in a Small Home Country

FIGURE 10-4 (2 of 2) Production Subsidy for a Small Country (continued)



The deadweight loss of the subsidy for a small country is the area *c*. In panel (b), exports rise as a result of the production subsidy, from X_1 to X_2, though the increase in exports is less than for the export subsidy because, for the production subsidy, quantity demanded does not change at Home.

10.4 Production Subsidies

Effect of a Production Subsidy in a Small Home Country

Targeting Principle

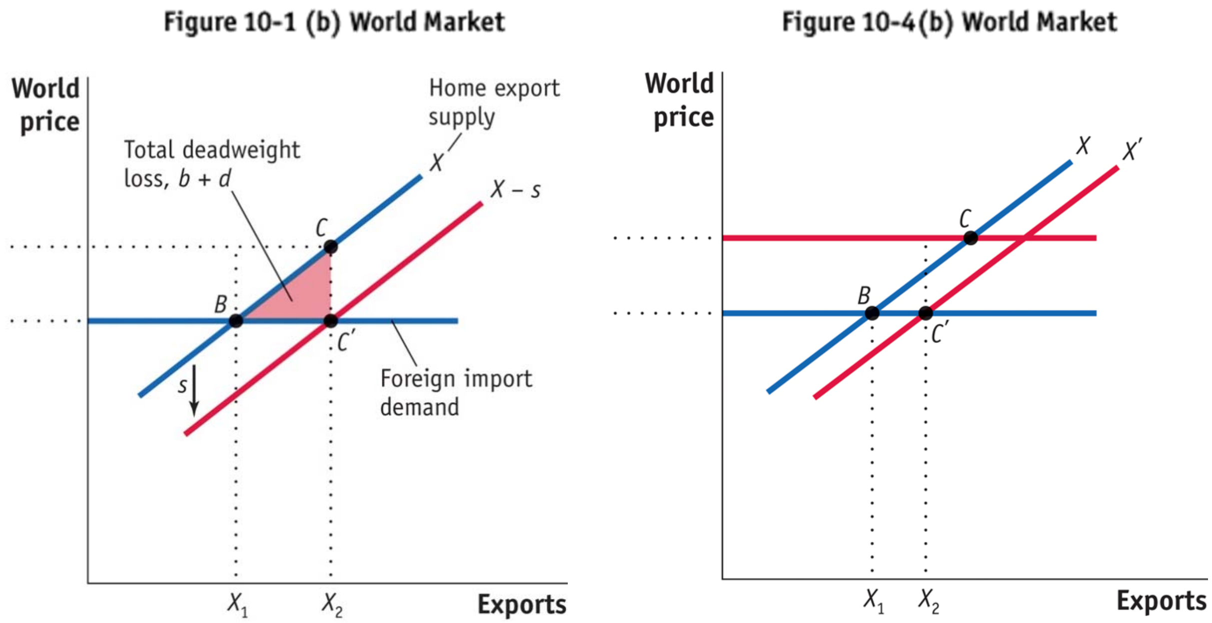
Our finding that the deadweight loss is lower for the production subsidy makes it a better policy than the export subsidy to increase Home supply. This finding is an example of the **targeting principle**: *to achieve some objective, it is best to use the policy instrument that achieves the objective 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 impost a tariff or quota.

10.4 Production Subsidies

Effect of a Production Subsidy in a Large Home Country



- Notice that the rise in the quantity of exports due to the production subsidy, from point *B* to *C*′ in Figure 10-4, is *less than* the increase in the quantity of exports for the export subsidy, from point *B* to *C*′ shown in Figure 10-1.

- 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.

10.4 Production Subsidies

Effect of a Production Subsidy in a Large Home Country

Figure 10-1 (b) World Market

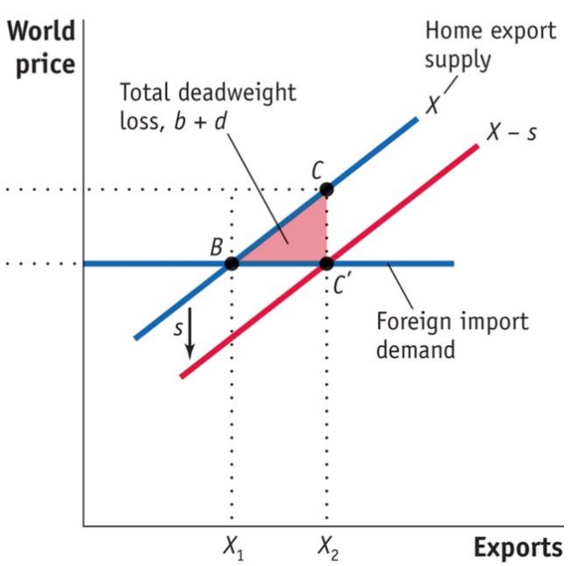
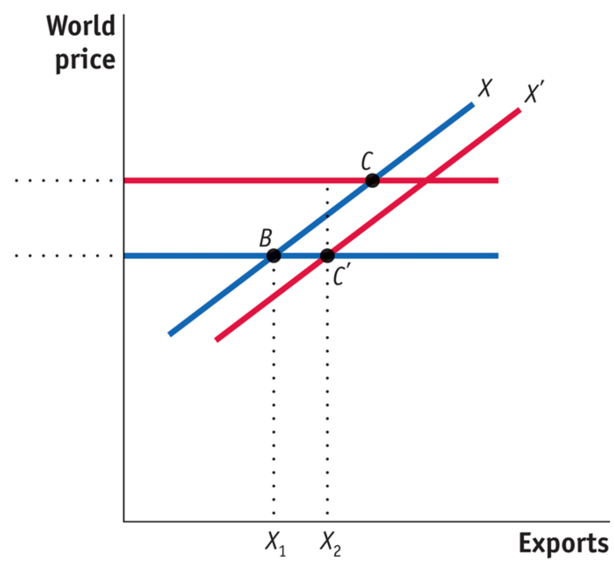


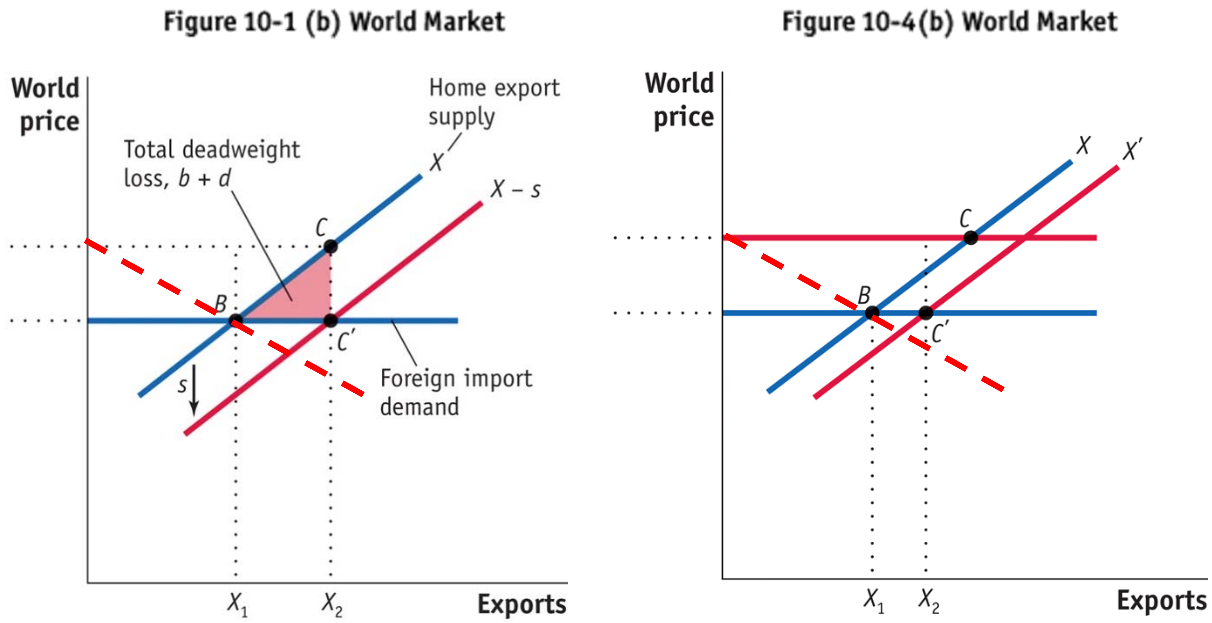
Figure 10-4(b) World Market



- As a result, the export subsidy shifted the Home export supply curve down by exactly the amount *s* in Figure 10-1.
- In contrast, with a production subsidy, exports rise only because Home quantity supplied increases so that export supply shifts down by an amount less than *s* in Figure 10-4.

10.4 Production Subsidies

Effect of a Production Subsidy in a Large Home Country



- If we drew a downward-sloping Foreign import demand curve in panel (b), then the increase in supply as a result of the production subsidy would lower the world price.

- But that 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.

5 Export Tariffs

Export and production subsidies are not the only policies that countries use to influence trade in certain products. Some countries apply export tariffs—which are taxes applied by the exporting country when a good leaves the country.

- We will look at how export tariffs affect the overall welfare of the exporting country, taking into account the effects on consumers, producers, and government revenue.
- We start with the case of a small exporting country, facing fixed world prices.
- Following that, we look at how the outcome differs when the country is large enough to affect world prices.

APPLICATION

Chinese Export Policies in Mineral Products

China uses a wide variety of export policies, including tariffs and quotas to its exports of mineral products.

- In 2009, the United States and other countries filed a case against China at the WTO, charging that the export tariffs and quotas that China applied on many industrial minerals distorted the pattern of international trade.
- While export restrictions of this type are banned under Article XI of the GATT, there is an exception stating that this rule does not apply to "*export prohibitions or restrictions temporarily applied to prevent or relieve critical shortages of foodstuffs or other products essential to the exporting contracting party*."

7 High-Technology Export Subsidies

Governments subsidize high-technology industries because they may create benefits that spill over to other firms in the economy.

That is, governments believe that high-tech industry produces a positive **externality**.

This argument for a subsidy is similar to the infant industry argument used to justify protective tariffs.

7 High-Technology Export Subsidies

"Strategic" Use of High-Tech Export Subsidies

- In addition to the spillover argument, governments and industries also argue that export subsidies might give a **strategic advantage** to export firms that are competing with a small number of rivals in international markets.

- To examine whether countries can use their subsidies strategically, we use the assumption of **imperfect competition**.

- Now we allow for two firms in the market, which is called a **duopoly**.

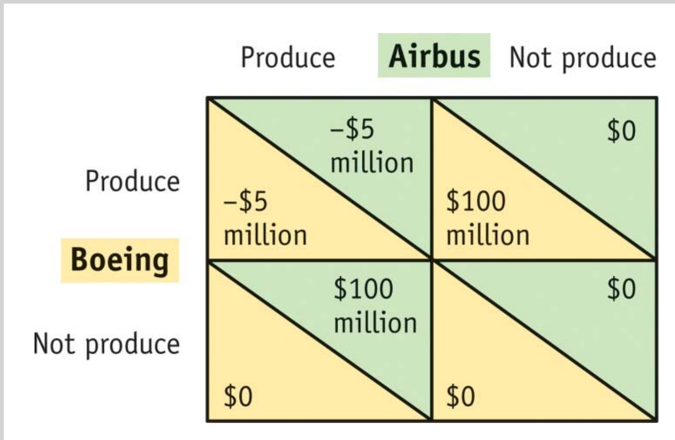
- To capture the strategic decision making of two firms, we use **game theory**, the modeling of strategic interactions (games) between firms as they choose actions that will maximize their returns.

7 High-Technology Export Subsidies

“Strategic” Use of High-Tech Export Subsidies

Payoff Matrix In Figure 10-8, we show a **payoff matrix** for Boeing and Airbus, each of which has to decide whether to produce the new aircraft.

FIGURE 10-8

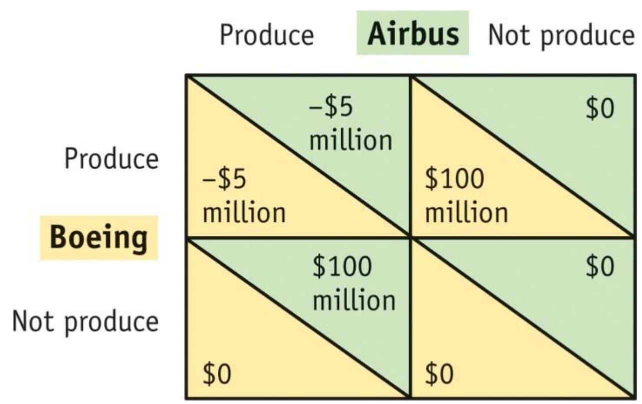


Payoff Matrix between Two Firms The lower-left number in each quadrant shows the profits of Boeing, and the upper-right number shows the profits of Airbus. Each firm must decide whether to produce a new type of aircraft. A Nash equilibrium occurs when each firm is making its best decision, given the action of the other. For this pattern of payoffs, there are two Nash equilibria, in the upper-right and lower-left quadrants, where one firm produces and the other does not.

Nash Equilibrium The idea of a **Nash equilibrium** is that each firm must make its own best decision, taking as given each possible action of the rival firm. When each firm is acting that way, the outcome of the game is a Nash equilibrium. The action of each player is the best possible response to the action of the other player.

“Strategic” Use of High-Tech Export Subsidies

FIGURE 10-8 (revisited)



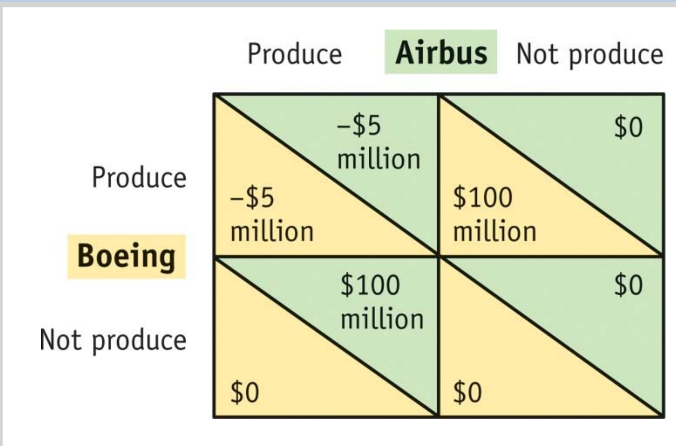
Best Strategy for Boeing If Airbus produces, then Boeing is better off *not* producing. This finding proves that having both firms produce is not a Nash equilibrium. Boeing would never stay in production, since it prefers to drop out of the market whenever Airbus produces.

Best Strategy for Airbus The decision illustrated in the lower-left quadrant, with Airbus producing and Boeing not producing, is a Nash equilibrium because each firm is making its best decision given what the other is doing.

7 High-Technology Export Subsidies

"Strategic" Use of High-Tech Export Subsidies

FIGURE 10-8 (revisited)



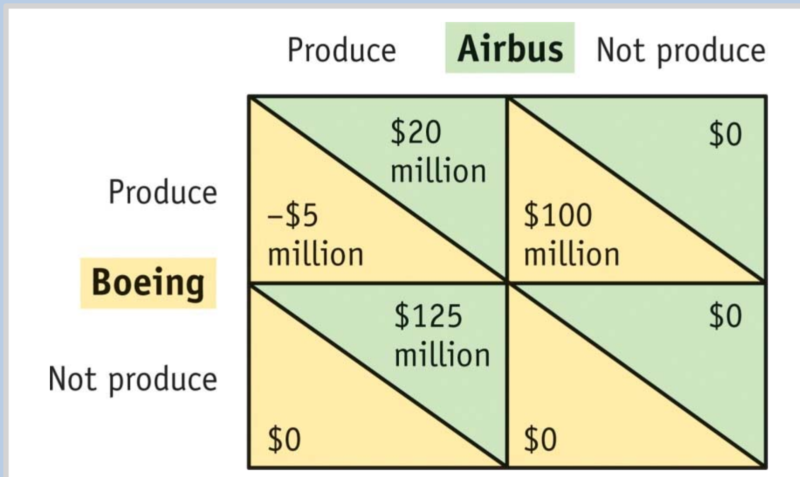
Multiple Equilibria The upper-right quadrant, with Boeing producing and Airbus not producing, is *also* a Nash equilibrium. When Boeing produces, then Airbus's best response is to not produce, and when Airbus does not produce, then Boeing's best response is to produce.

When there are two Nash equilibria, there must be some force from outside the model that determines in which equilibrium we are. An example of one such force is the **first mover advantage**, which means that one firm is able to decide whether or not to produce before the other firm.

7 High-Technology Export Subsidies

Effect of a Subsidy to Airbus

FIGURE 10-9



Payoff Matrix with Foreign Subsidy When the European governments provide a subsidy of $25 million to Airbus, its profits increase by that much when it produces a new aircraft. Now there is only one Nash equilibrium, in the lower-left quadrant, with Airbus producing but Boeing not producing. The profits for Airbus have increased from 0 to $125 million, while the subsidy cost only $25 million, so there is a net gain of $100 million in European welfare.

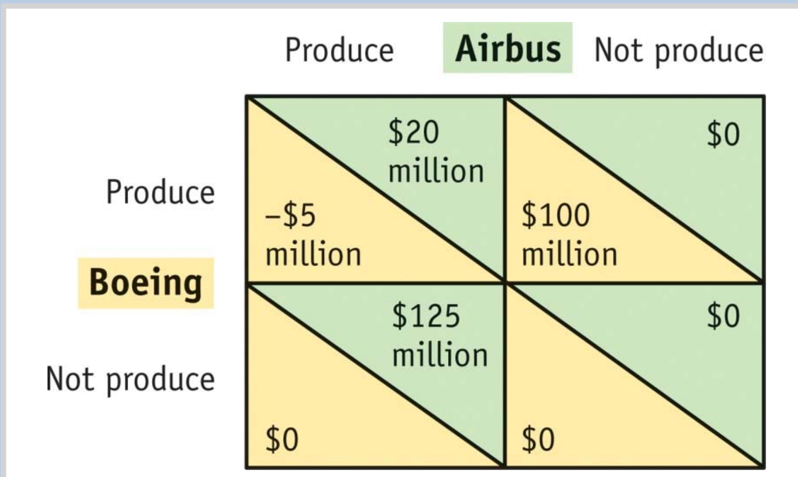
Best Strategy for Airbus With the subsidy, Airbus now earns $20 million by producing instead of losing $5 million.

Best Strategy for Boeing Boeing will want to drop out of the market. Once Boeing makes the decision not to produce, Airbus's decision doesn't change.

7 High-Technology Export Subsidies

Effect of a Subsidy to Airbus

FIGURE 10-9 (revisited)



Payoff Matrix with Foreign Subsidy When the European governments provide a subsidy of $25 million to Airbus, its profits increase by that much when it produces a new aircraft. Now there is only one Nash equilibrium, in the lower-left quadrant, with Airbus producing but Boeing not producing. The profits for Airbus have increased from 0 to $125 million, while the subsidy cost only $25 million, so there is a net gain of $100 million in European welfare.

Nash Equilibrium The lower-left quadrant is a unique Nash equilibrium: each firm is making its best decision, given the action of the other. It is the only Nash equilibrium.

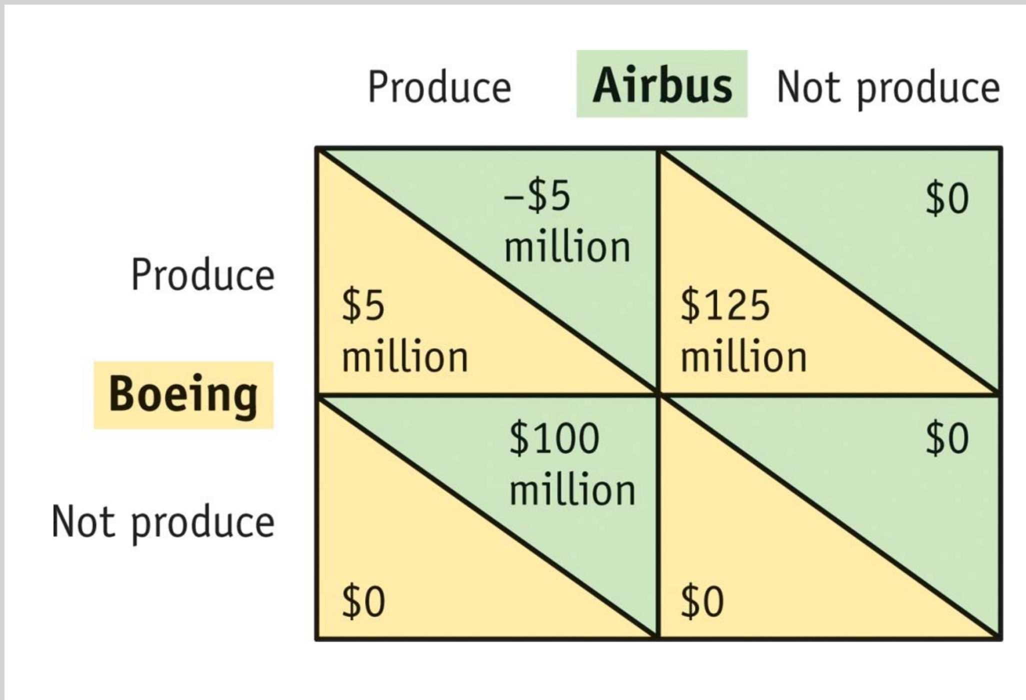
European Welfare

	Rise in producer surplus: + 125
	Fall in government revenue: − 25
	Net effect on European welfare: + 100

7 High-Technology Export Subsidies

Subsidy with Cost Advantage for Boeing

FIGURE 10-10 Another Payoff Matrix, with Boeing Cost Advantage



If Boeing has a cost advantage in the production of aircraft, the payoffs are as shown here.

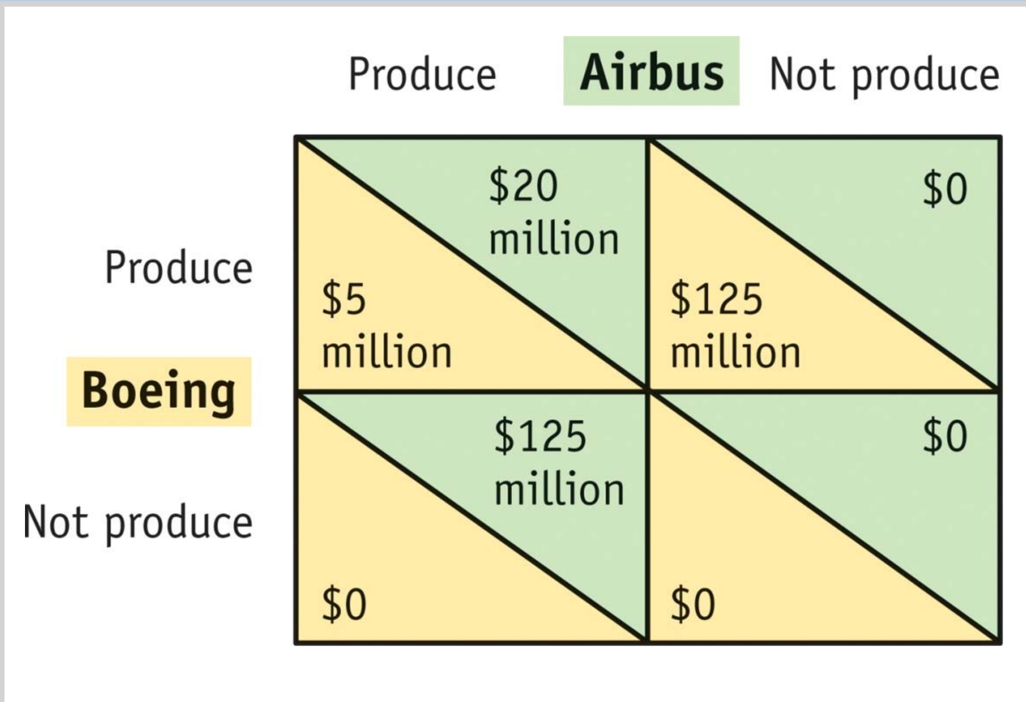
Boeing earns profits of $5 million when both firms are producing and profits of $125 million when Airbus does not produce.

Now there is only one Nash equilibrium, in the upper-right quadrant, where Boeing produces and Airbus does not.

7 High-Technology Export Subsidies

Subsidy with Cost Advantage for Boeing

FIGURE 10-11 Another Payoff Matrix with Foreign Subsidy



When the European governments provide a subsidy of $25 million to Airbus, its profits increase by that much when it produces. Now the only Nash equilibrium is in the upper-left quadrant, where both firms produce.

The profits for Airbus have increased from 0 to $20 million, but the subsidy costs $25 million, so there is a net loss of $5 million in European welfare

APPLICATION

Subsidies to Commercial Aircraft

Subsidies for the large commercial aircraft industry include:

1. indirect subsidies that arise in the production of civilian and military aircraft; direct subsidies for R&D,
2. and subsidies of the interest rates that aircraft buyers pay when they borrow money to purchase aircraft.

If both firms stay in the market and are subsidized by their governments, then it is unlikely that the subsidies are in the national interest of either the United States or the European Union; instead, the countries purchasing the aircraft gain because of the lower price, while the United States and Europe lose as a result of the costs of the subsidies.

“Made in China 2025”

- Released in 2015, Made in China 2025 is the government’s ten year plan to update China’s manufacturing base by rapidly developing ten high-tech industries.
- Electric cars, next-generation information technology (IT) and telecommunications, and advanced robotics and artificial intelligence.
- Other major sectors include agricultural technology; aerospace engineering; new synthetic materials; advanced electrical equipment; emerging bio-medicine; high-end rail infrastructure; and high-tech maritime engineering.

McBride, Chatzky, Council on Foreign Relations, May 13, 2019

Friction Points on MIC2025

- Setting explicit targets
- Providing direct subsidies
- Foreign investment and acquisitions
- Mobilizing state owned enterprises
- Forced transfer agreements

Friction Points on MIC2025

Setting explicit targets. Through both public goal setting and semi-official, backchannel coordination, China’s leadership encourages private and public firms to shape their decision-making around the plan’s priorities.

Friction Points on MIC2025

Providing direct subsidies. The government will increase direct support for the China 2025 industries through state funding, low interest loans, tax breaks, and other subsidies. The exact amount is unclear, but some outside estimates put the likely number in the hundreds of billions of dollars.

McBride, Chatzky, Council on Foreign Relations, May 13, 2019

Friction Points on MIC2025

Foreign investment and acquisitions. Chinese companies, both private and state-backed, have been encouraged to invest in foreign companies, notably semiconductor firms, to gain access to advanced technology. The value of Chinese acquisitions in the United States peaked in 2016 at over $45 billion.

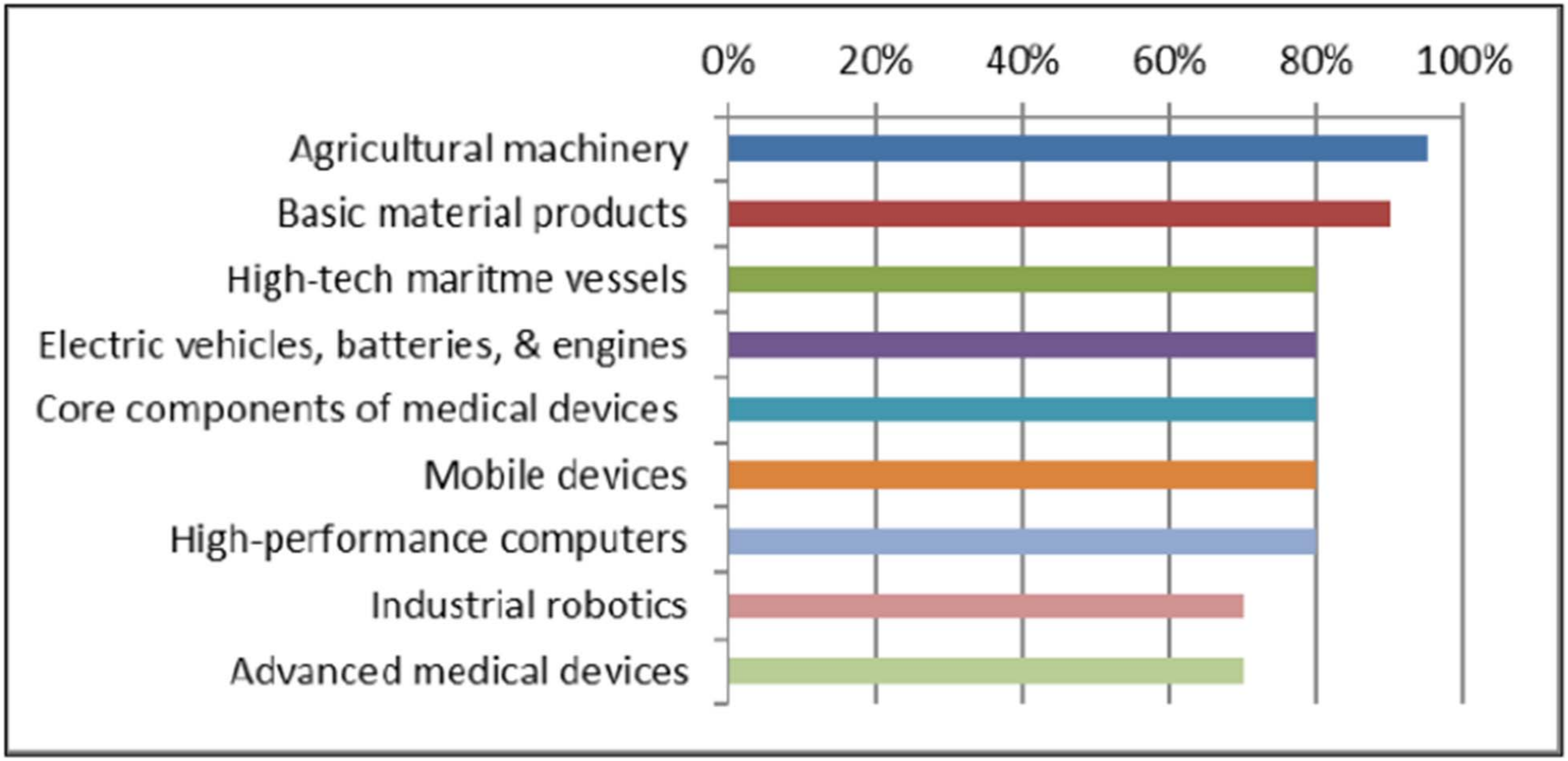
Friction Points on MIC2025

Mobilizing state-backed companies. Much of this investment comes from SOEs. SOEs still account for a third of gross domestic product (GDP) and an estimated two-thirds of China’s outbound investment. Huawei and ZTE are private, but subject to govt influence.

Friction Points on MIC2025

Forced transfer agreements. Foreign companies complain that to invest or do business in China, they must enter into joint ventures with Chinese firms under terms that require them to share sensitive intellectual property and advanced technological know-how.

Figure 1. Various MIC 2025 Domestic Content Goals



Source: U.S.-China Business Council.

Note: Dates for domestic content goals range from 2020 to 2030.