

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

Lecture 11-12

2/26-3/2/2020

(rev 3/3/2020)

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Import Tariffs and Quotas Under Perfect Competition

- 1. A Brief History of the World Trade Organization**
- 2. The Gains from Trade**
- 3. Import Tariffs for a Small Country**
- 4. Import Tariffs for a Large Country**
- 5. Trump Tariffs of 2017-19**
- 6. Import Quotas**

1 A Brief History of the World Trade Organization

- After World War II, the Allied countries met to discuss issues such as high trade barriers and unstable exchange rates.
- In 1947 the General Agreement on Tariffs and Trade (GATT) was established to reduce barriers to trade between nations.
- Some of the GATT's main provisions are as follows:
 1. A nation must extend the same tariffs to all trading partners that are WTO members.
 2. Tariffs may be imposed in response to unfair trade practices such as **dumping**.

Recall that “dumping” is defined as the sale of export goods at a price less than that charged at home, or at a price less than costs of production and shipping.

1 A Brief History of the World Trade Organization

Some of the GATT's main provisions are as follows:

3. Countries should not limit the quantity of goods and services that they import.
4. Countries should declare export subsidies provided to particular firms, sectors, or industries. Article XVI deals with export subsidies, and states that countries should notify each other of the extent of subsidies and discuss the possibility of eliminating them.
5. Countries can temporarily raise tariffs for certain products. Article XIX, called the **safeguard provision** or the **escape clause**, is our focus in this chapter.

1 A Brief History of the World Trade Organization

Some of the GATT's main provisions are as follows:

6. Regional trade agreements are permitted under Article XXIV of the GATT. The GATT recognizes the ability of blocs of countries to form two types of regional trade agreements:

- (i) **free-trade areas**, in which a group of countries voluntarily agree to remove trade barriers between themselves, and
- (ii) **customs unions**, which are free-trade areas in which the countries also adopt identical tariffs between themselves and the rest of the world.

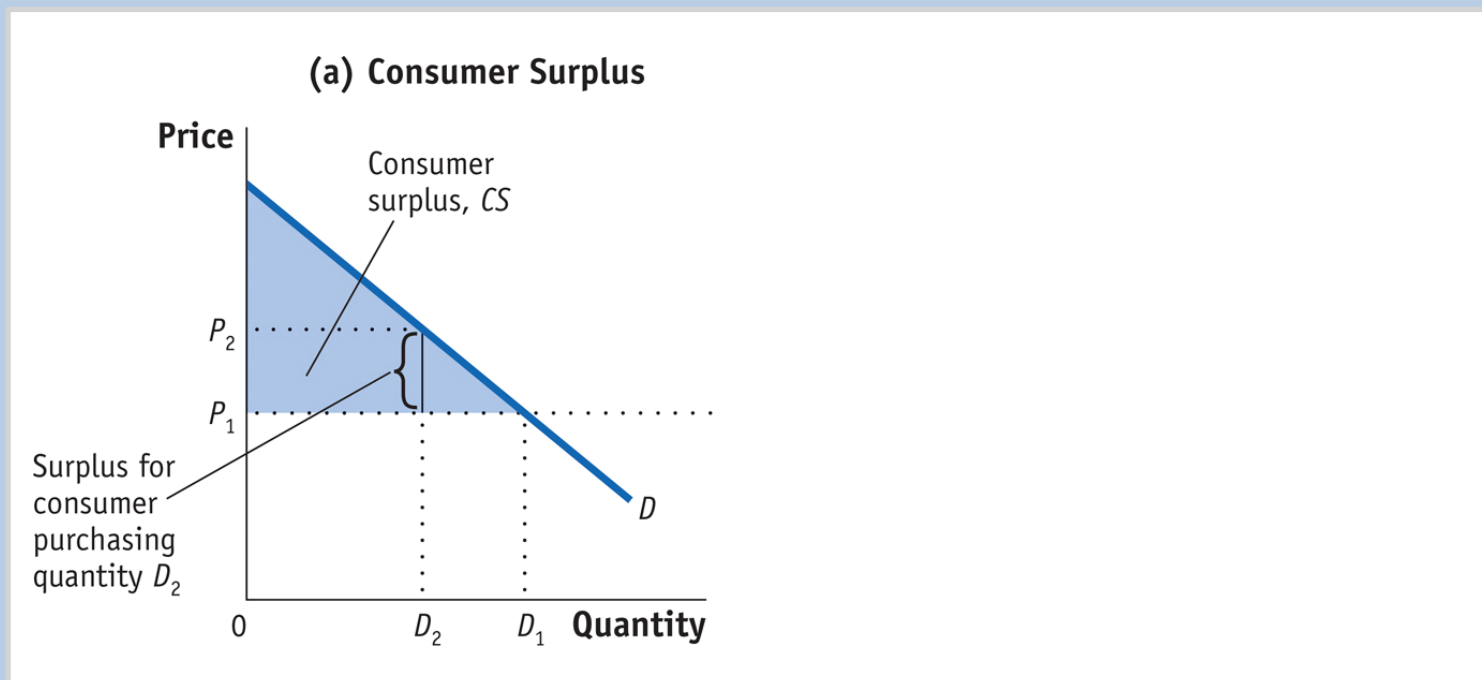
Key Provisions of the GATT

Article I	General Most-Favoured-Nation Treatment
Article VI	Anti-Dumping and Countervailing Duties
Article XI	General Elimination of Quantitative Restrictions
Article XVI	Subsidies
Article XIX	Emergency Action on Imports of Particular Products
Article XXIV	Territorial Application—Frontier Traffic—Customs Unions and Free-Trade Areas

2 The Gains from Trade

Consumer and Producer Surplus

FIGURE 8-1 (1 of 2) Consumer and Producer Surplus

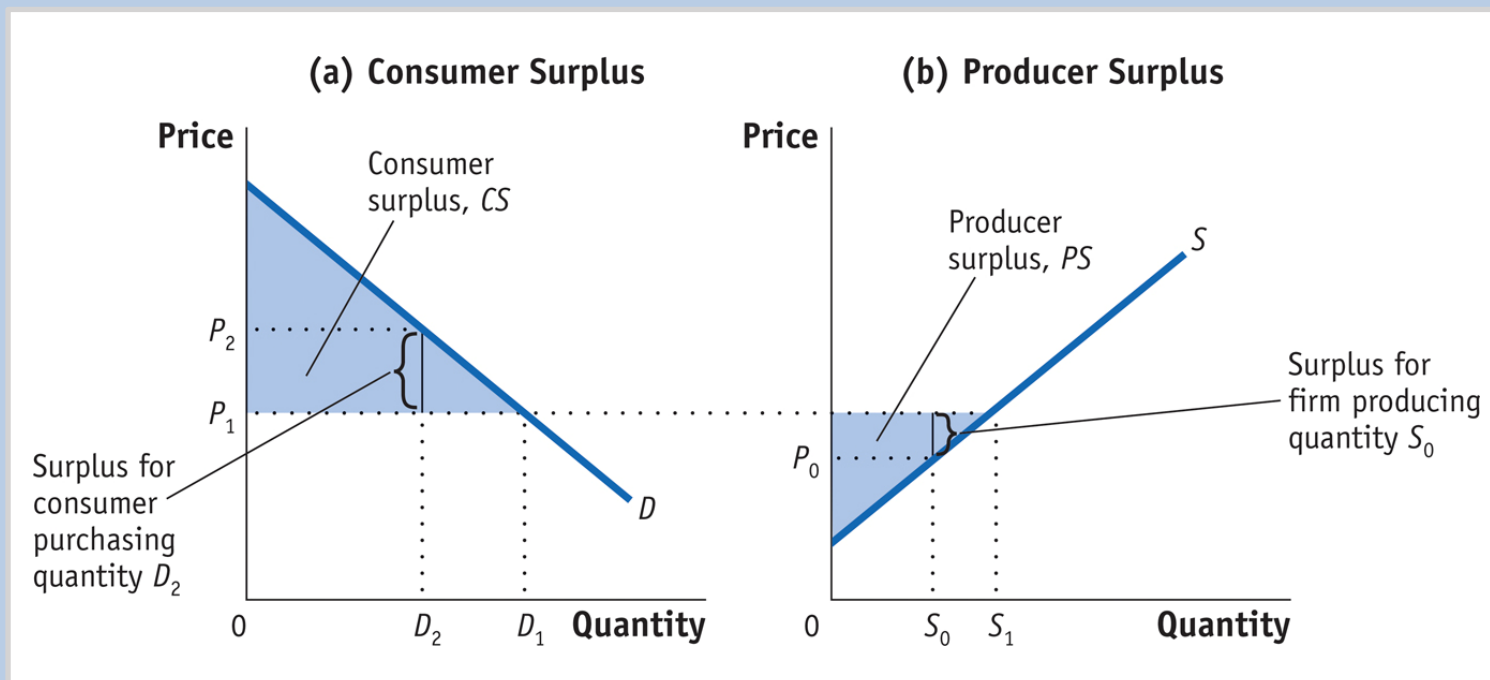


In panel (a), the **consumer surplus** from purchasing quantity D_1 at price P_1 is the area below the demand curve and above that price. The consumer who purchases D_2 is willing to pay price P_2 but has to pay only P_1 . The difference is the consumer surplus and represents the satisfaction of consumers over and above the amount paid.

2 The Gains from Trade

Consumer and Producer Surplus

FIGURE 8-1 (2 of 2) Consumer and Producer Surplus (continued)



In panel (b), the **producer surplus** from supplying the quantity S_1 at the price P_1 is the area above the supply curve and below that price. The supplier who supplies unit S_0 has marginal costs of P_0 but sells it for P_1 . The difference is the producer surplus and represents the return to fixed factors of production in the industry.

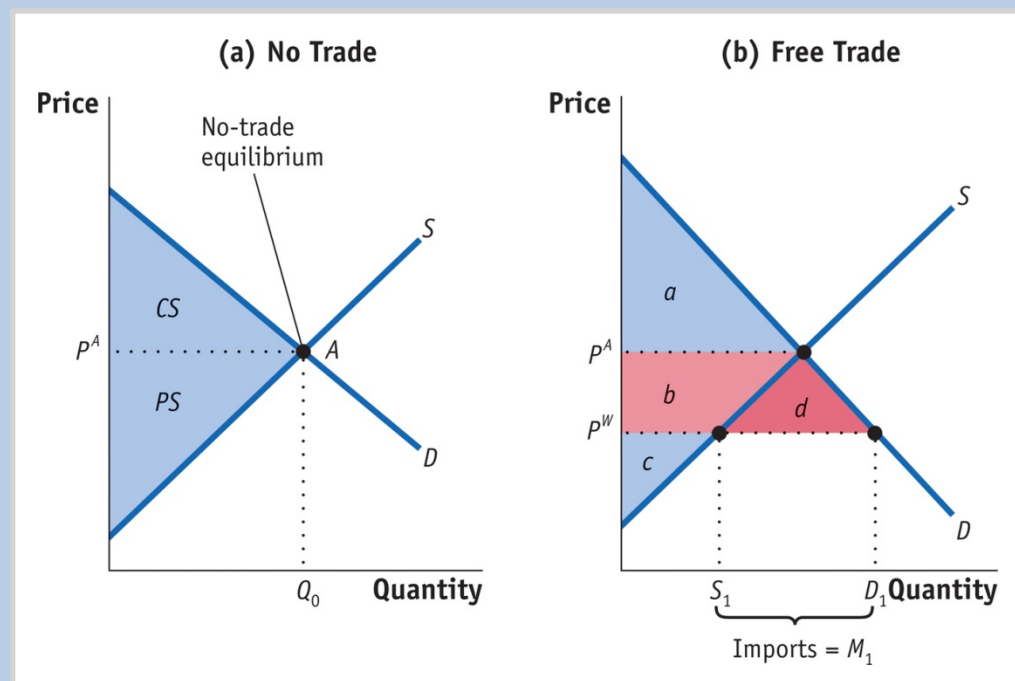
2 The Gains from Trade

Home Welfare

No Trade, Free Trade for a Small Country, Gains from Trade

A small country is small in comparison with all the other countries, buying and selling this product.

FIGURE 8-2



The Gains from Free Trade at Home

With Home demand of D and supply of S , the no-trade equilibrium is at point A, at the price P^A producing Q_0 .

With trade, the world price is P^W , so quantity demanded increases to D_1 and quantity supplied falls to S_1 . Since quantity demanded exceeds quantity supplied, Home imports $D_1 - S_1$.

Consumer surplus increases by the area $(b + d)$, and producer surplus falls by area b .

The gains from trade are measured by area d .

Rise in consumer surplus: $+(b + d)$

Fall in producer surplus: $-b$

Net effect on Home welfare: $+d$

Slide 9

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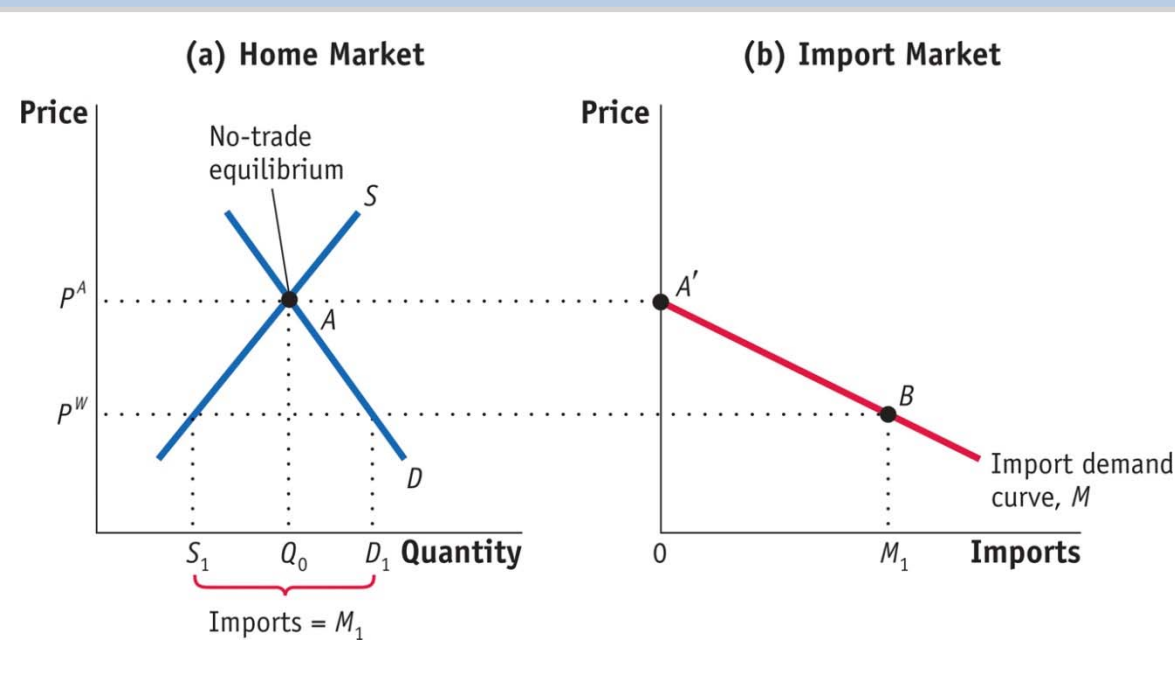
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JNB, 7/14/2014

2 The Gains from Trade

Home Import Demand Curve

FIGURE 8-3



The **import demand curve** shows the relationship between the world price of a good and the quantity of imports demanded by Home consumers.

Home Import Demand With Home demand of D and supply of S , the no-trade equilibrium is at point A , with the price P^A and import quantity Q_0 .

Import demand at this price is zero, as shown by the point A' in panel (b).

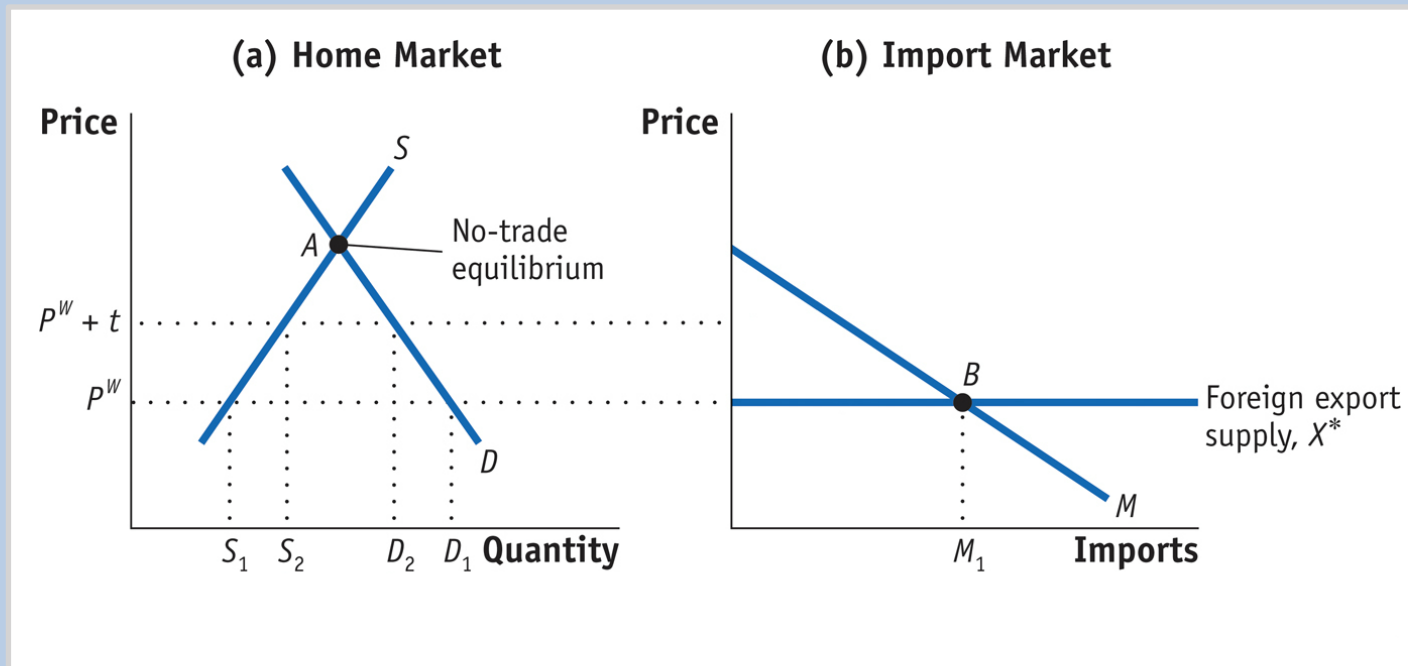
At a lower world price of P^W , import demand is $M_1 = D_1 - S_1$, as shown by point B .

Joining up all points between A' and B , we obtain the import demand curve, M .

3 Import Tariffs for a Small Country

Free Trade for a Small Country and Effect of the Tariff

FIGURE 8-4 (1 of 2) Tariff for a Small Country

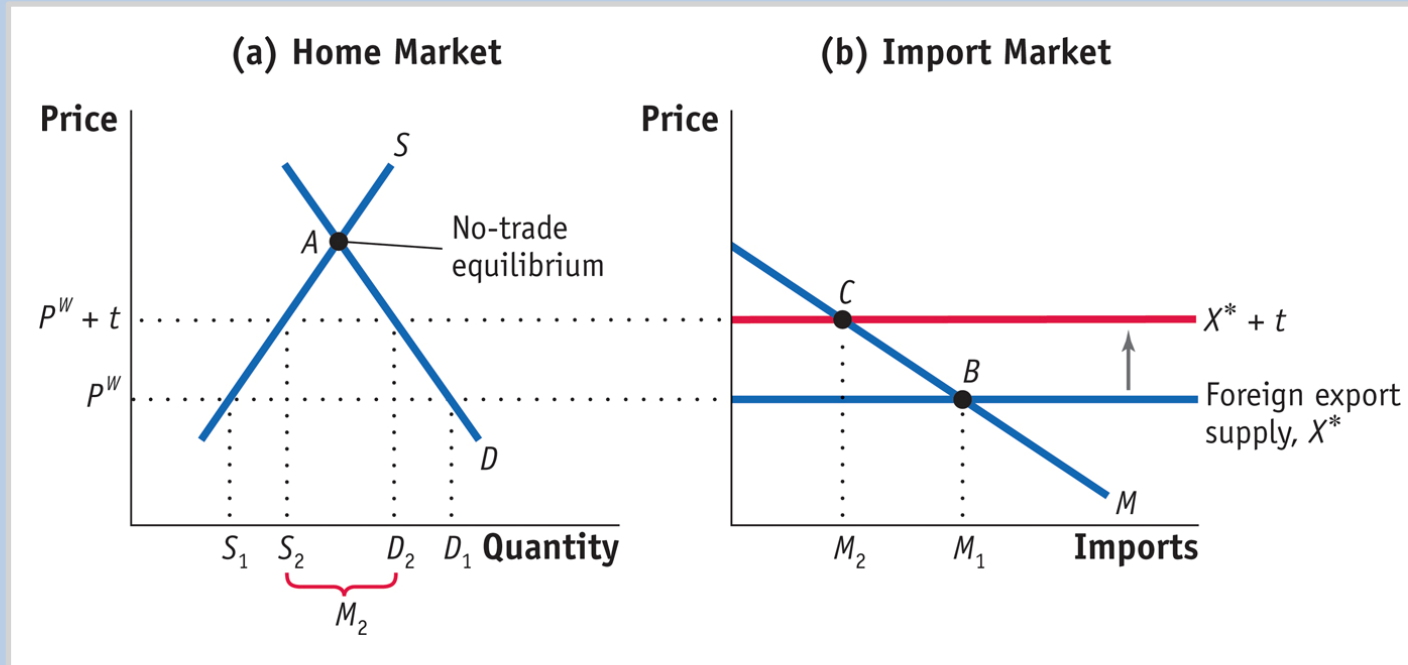


Applying a tariff of t dollars will increase the import price from P^W to $P^W + t$. The domestic price of that good also rises to $P^W + t$. This price rise leads to an increase in Home supply from S_1 to S_2 , and a decrease in Home demand from D_1 to D_2 , in panel (a).

3 Import Tariffs for a Small Country

Free Trade for a Small Country and Effect of the Tariff

FIGURE 8-4 (2 of 2) Tariff for a Small Country (continued)

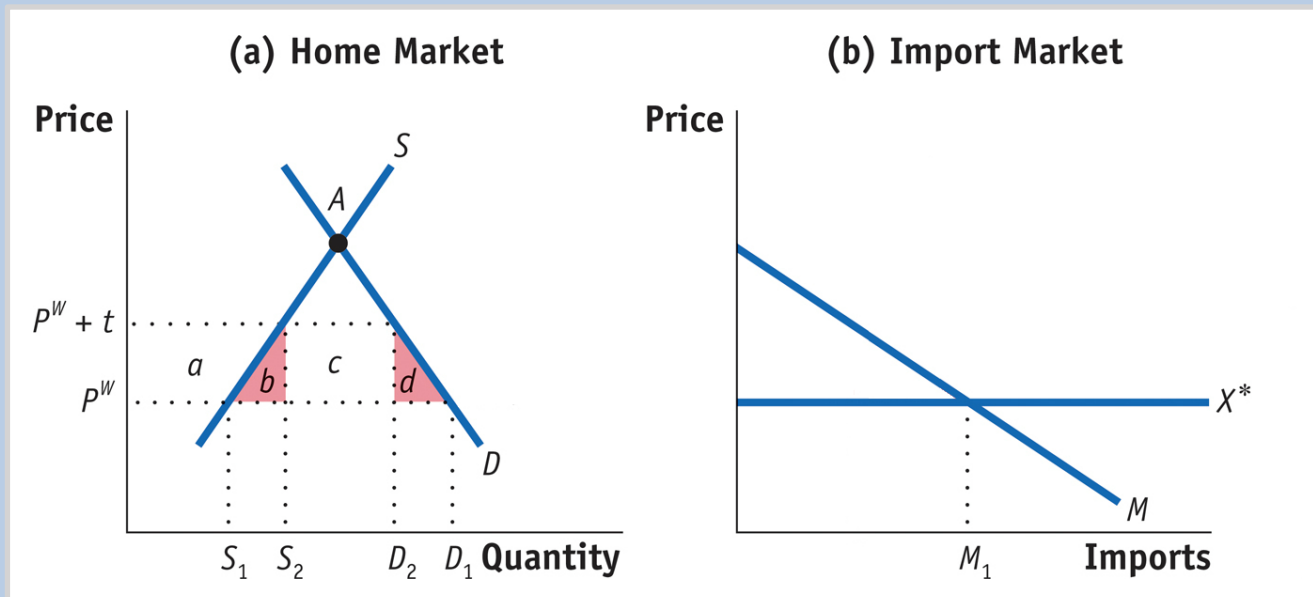


Imports fall due to the tariff, from M_1 to M_2 in panel (b). As a result, the equilibrium shifts from point B to C .

3 Import Tariffs for a Small Country

Effect of the Tariff on Consumer Surplus, Producer Surplus, Government Revenue; Overall Effect of the Tariff on Welfare; Production Loss; Consumption Loss

FIGURE 8-5 (1 of 2) Effect of Tariff on Welfare

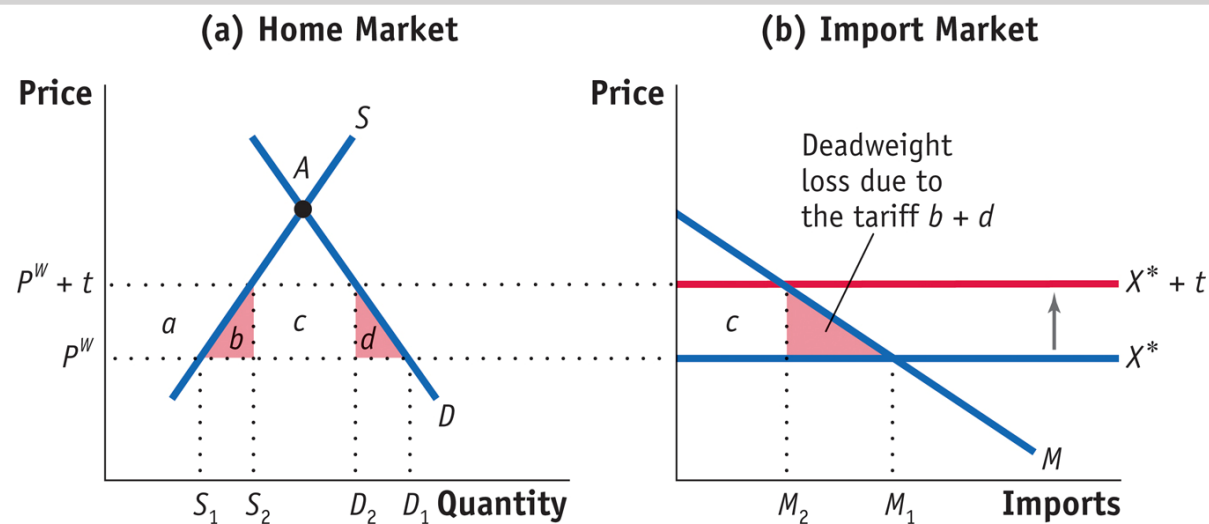


The tariff increases the price from P^W to $P^W + t$. As a result, consumer surplus falls by $(a + b + c + d)$. Producer surplus rises by area a , and government revenue increases by the area c .

3 Import Tariffs for a Small Country

Effect of the Tariff on Consumer Surplus, Producer Surplus, Government Revenue; Overall Effect of the Tariff on Welfare; Production Loss; Consumption Loss

FIGURE 8-5 (2 of 2) Effect of Tariff on Welfare (continued)



Therefore, the net loss in welfare, the **deadweight loss** to Home, is $(b + d)$, which is measured by the two triangles b and d in panel (a) or the single (combined) triangle $b + d$ in panel (b).

The triangle $(b + d)$ is a deadweight loss, or a loss that is not offset by a gain elsewhere in the economy.

Fall in consumer surplus: $-(a + b + c + d)$

Rise in producer surplus: $+a$

Rise in government revenue: $+c$

Net effect on Home welfare: $-(b + d)$

3 Import Tariffs for a Small Country

Effect of Tariff on Consumer Surplus, Producer Surplus, Government Revenue; Overall Effect of the Tariff on Welfare

The deadweight loss, triangles $(b + d)$, have the following interpretation:

- The triangle b equals the increase in marginal costs for the extra units produced and can be interpreted as the **production loss** (or the *efficiency loss*) due to producing at marginal cost above the world price.
- The triangle d can be interpreted as the drop in consumer surplus for those individuals who are no longer able to consume the units between D_1 and D_2 because of the higher price. We refer to this drop in consumer surplus as the **consumption loss** for the economy.

3 Import Tariffs for a Small Country

Why and How Are Tariffs Applied?

- If a small country suffers a loss when it imposes a tariff, why do so many have tariffs as part of their trade policies?
- One answer is that a developing country does not have any other source of government revenue. Import tariffs are “easy to collect.”
- A second reason is politics. The benefits to producers (and their workers) are typically more concentrated on specific firms and states than the costs to consumers, which are spread nationwide.

SIDE BAR

Safeguard Tariffs

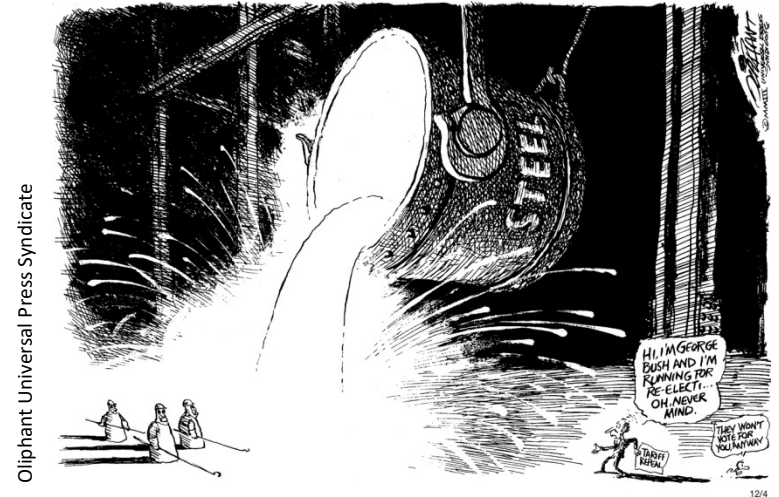
The U.S. Trade Act of 1974, as amended, describes conditions under which tariffs can be applied in the United States, and it mirrors the provisions of the GATT and WTO.

- Section 201 allows the U.S. to impose safeguard tariffs if imports are a “substantial cause of serious injury, or the threat thereof, to the domestic industry.” Where the term “substantial cause” means a cause which is *important and not less than any other cause*.
 - Section 421 allows the U.S. to impose safeguard tariffs on China if imports from China “cause or threaten to cause market disruption to the domestic producers.”
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APPLICATION

U.S. Tariffs on Steel and Tires

Deadweight Loss Due to the Steel Tariff



$$DWL = \frac{1}{2} \cdot t \cdot \Delta M$$

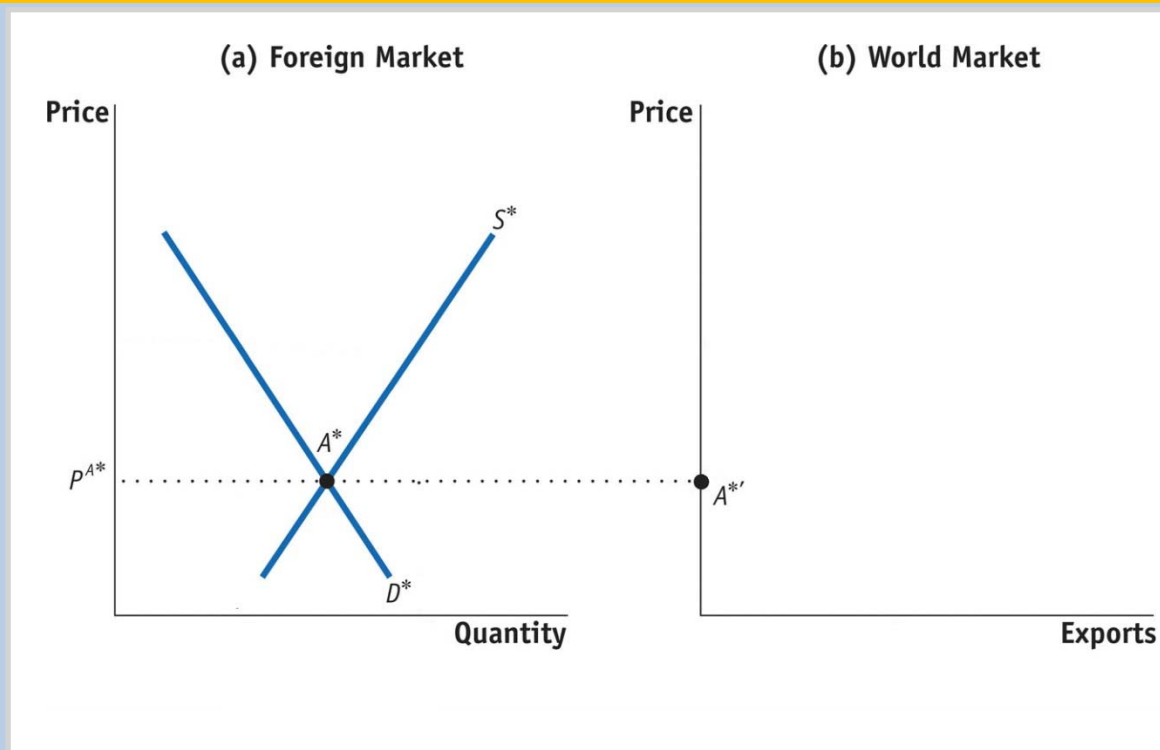
The deadweight loss relative to the value of imports equals:

$$\frac{DWL}{P^W \cdot M} = \frac{1}{2} \cdot \frac{t \cdot \Delta M}{P^W \cdot M} = \frac{1}{2} \cdot \left(\frac{t}{P^W} \right) \cdot \% \Delta M$$

4 Import Tariffs for a Large Country

Foreign Export Supply

FIGURE 8-8 (1 of 3) Foreign Export Supply



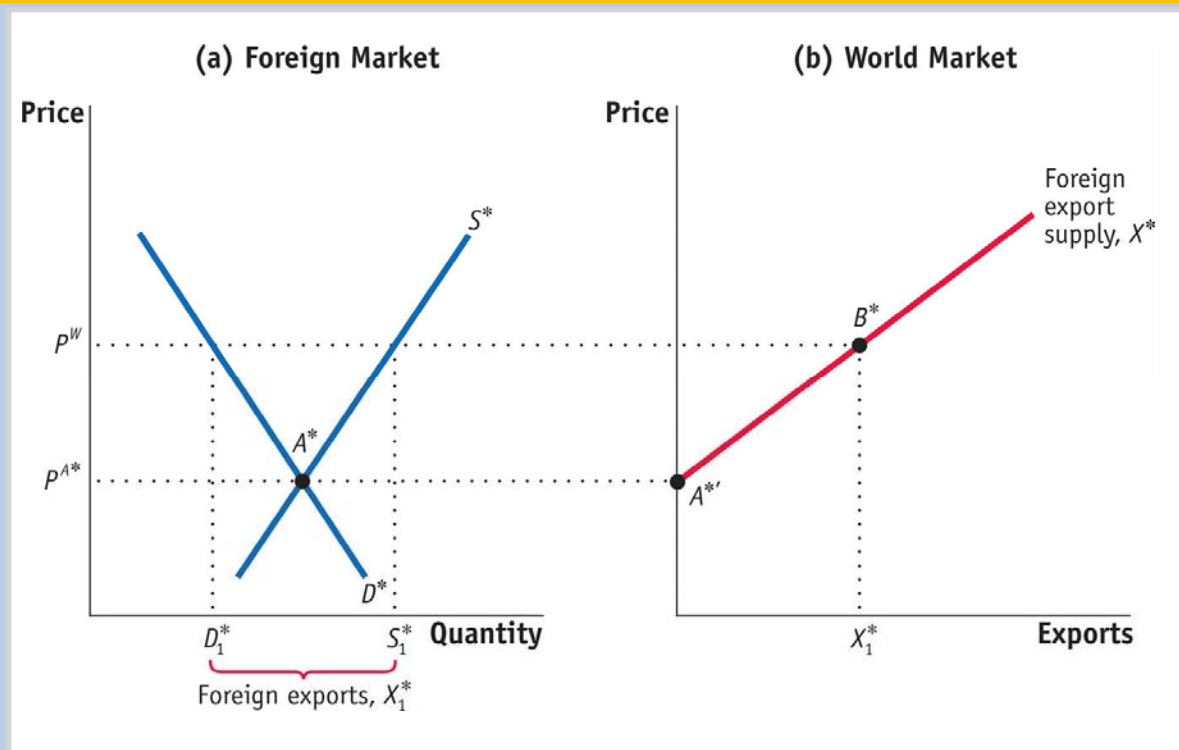
In panel (a), with Foreign demand of D^* and Foreign supply of S^* , the no-trade equilibrium in Foreign is at point A^* , with the price of P^{A^*} .

At this price, the Foreign market is in equilibrium and Foreign exports are zero—point A^* in panel (a) and point $A^{*'}$ in panel (b), respectively.

4 Import Tariffs for a Large Country

Foreign Export Supply

FIGURE 8-8 (2 of 3) Foreign Export Supply (continued)

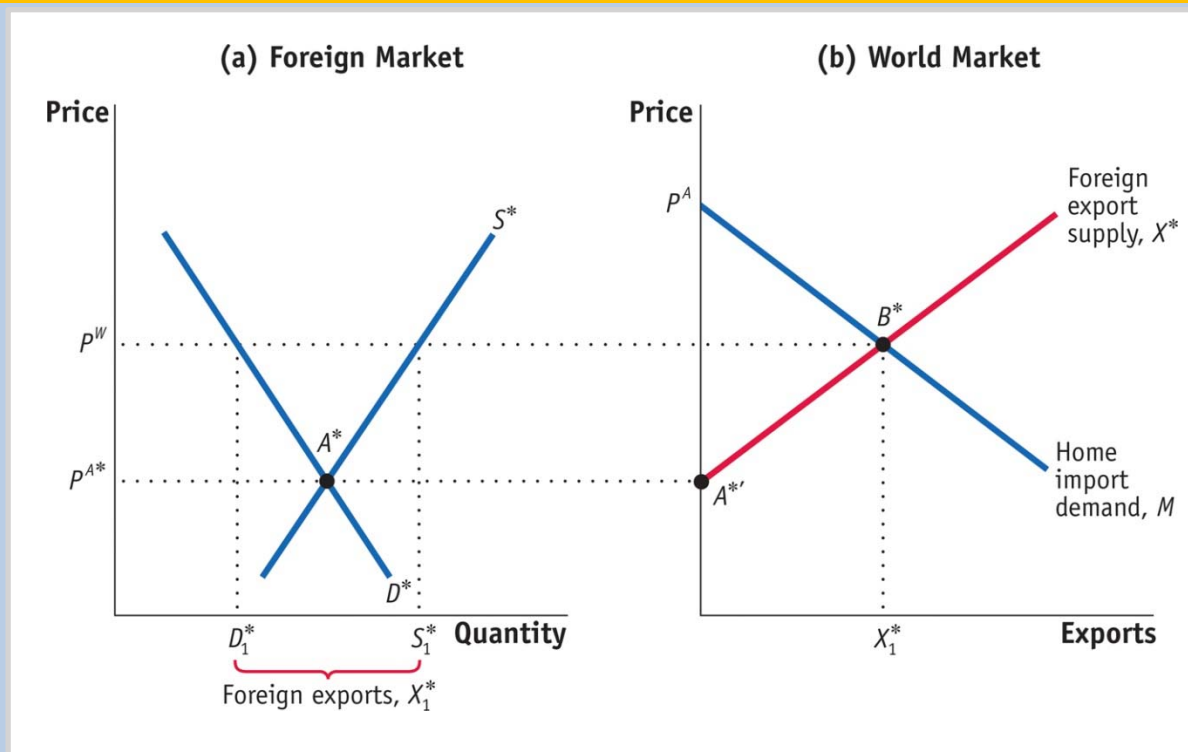


When the world price, P^W , is higher than Foreign's no-trade price, the quantity supplied by Foreign, S_1^* , exceeds the quantity demanded by Foreign, D_1^* , and Foreign exports $X_1^* = S_1^* - D_1^*$. In panel (b), joining up points $A^{*'}$ and B^* , we obtain the upward-sloping export supply curve X^* .

4 Import Tariffs for a Large Country

Foreign Export Supply

FIGURE 8-8 (3 of 3) Foreign Export Supply (continued)



With the Home import demand of M , the world equilibrium is at point B^* , with the price P^W .

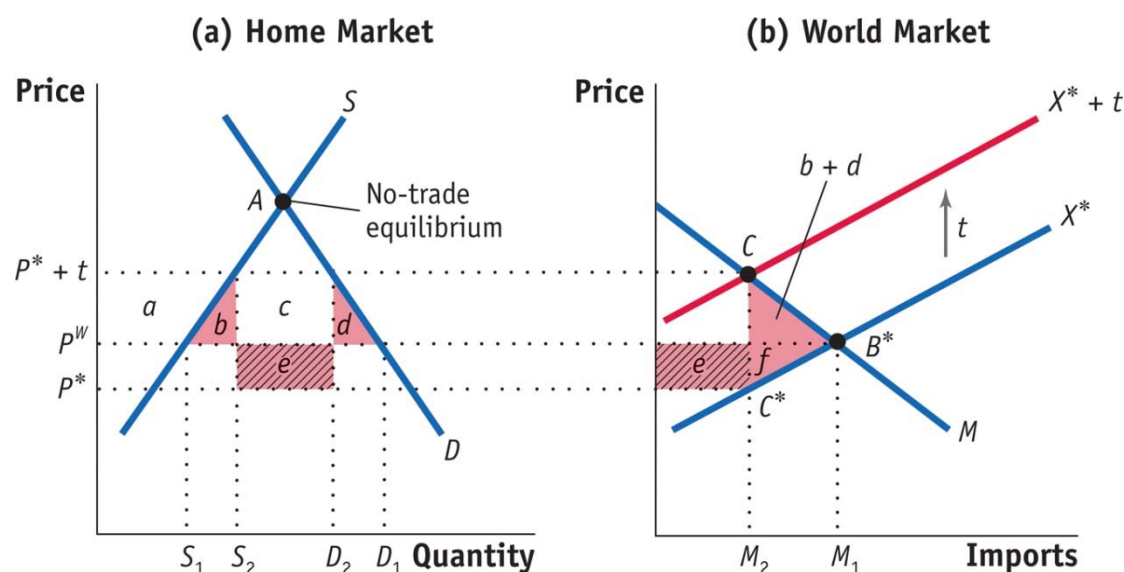
4 Import Tariffs for a Large Country

Effect of the Tariff

Terms of Trade, Home Welfare, Foreign and World Welfare

The **terms of trade** for a country as the ratio of export prices to import prices.

FIGURE 8-9



Fall in consumer surplus: $-(a + b + c + d)$

Rise in producer surplus: $+a$

Rise in government revenue: $+(c + e)$

Net effect on Home welfare: $e - (b + d)$

Tariff for a Large Country

The tariff shifts up the export supply curve from X^* to $X^* + t$.

As a result, the Home price increases from P^W to $P^* + t$, and the Foreign price falls from P^W to P^* .

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

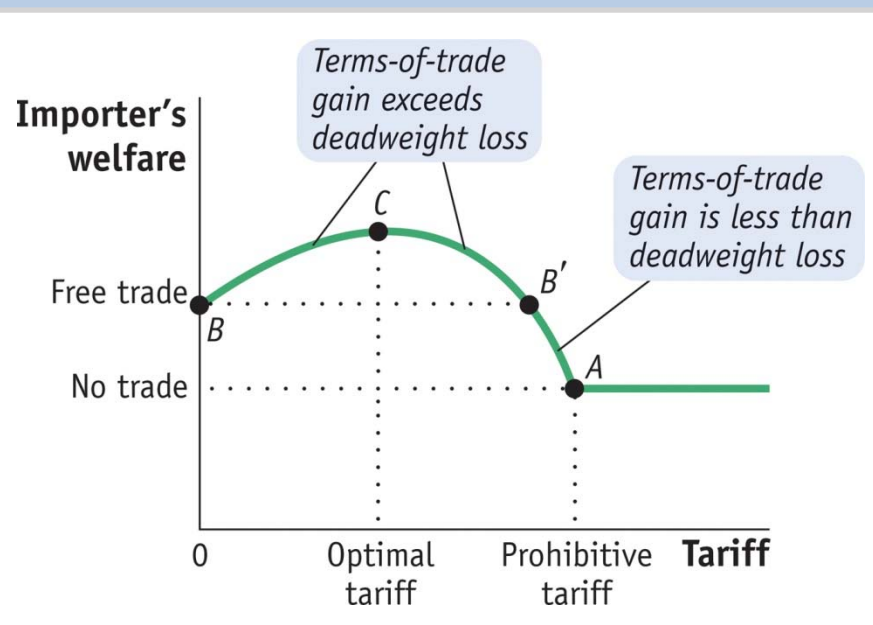
Foreign loses the area $(e + f)$, so the net loss in world welfare is the triangle $(b + d + f)$. Area e is a measure of the terms-of-trade gain for the importer.

4 Import Tariffs for a Large Country

Foreign Export Supply

Optimal Tariff for a Large Importing Country

FIGURE 8-10



Optimal Tariff Formula The formula depends on the elasticity of Foreign export supply, which we call E_X^* :

$$\text{Optimal tariff} = \frac{1}{E_X^*}$$

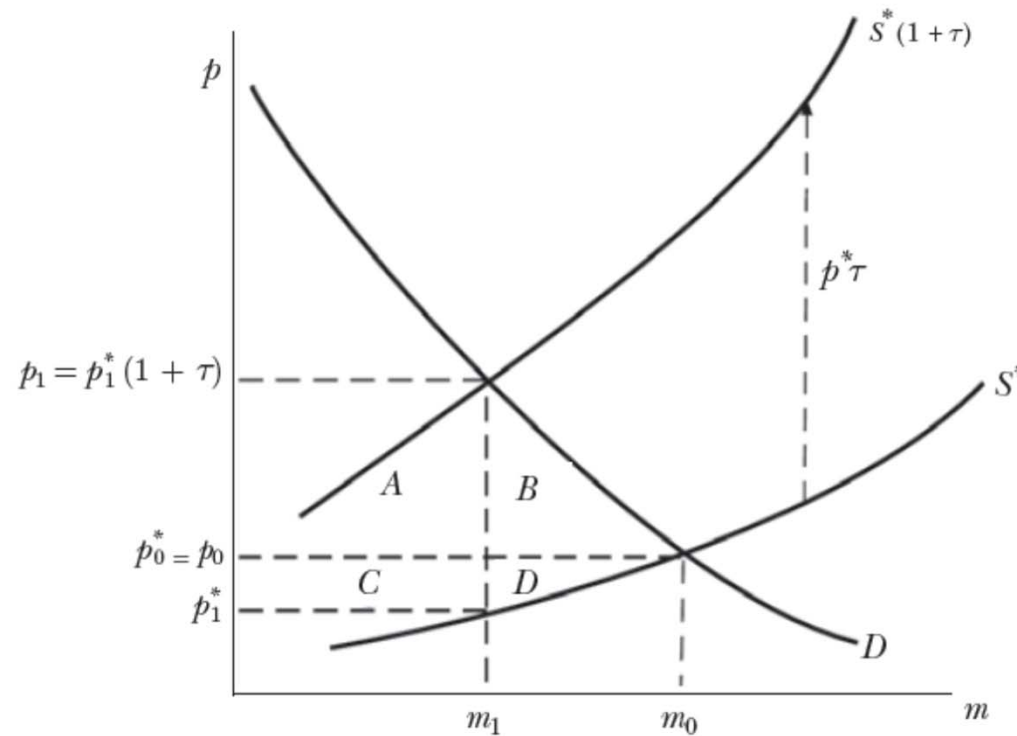
Tariffs and Welfare for a Large Country

For a large importing country, a tariff initially increases the importer's welfare because the terms-of-trade gain exceeds the deadweight loss. So the importer's welfare rises from point B . Welfare continues to rise until the tariff is at its optimal level (point C). After that, welfare falls. If the tariff is too large (greater than at B'), then welfare will fall below the free-trade level. For a prohibitive tariff, with no imports at all, the importer's welfare will be at the no-trade level, at point A .

Empirical Estimates of Trump Tariffs, 2017-2020

Figure 1

Impact of a Tariff on Prices



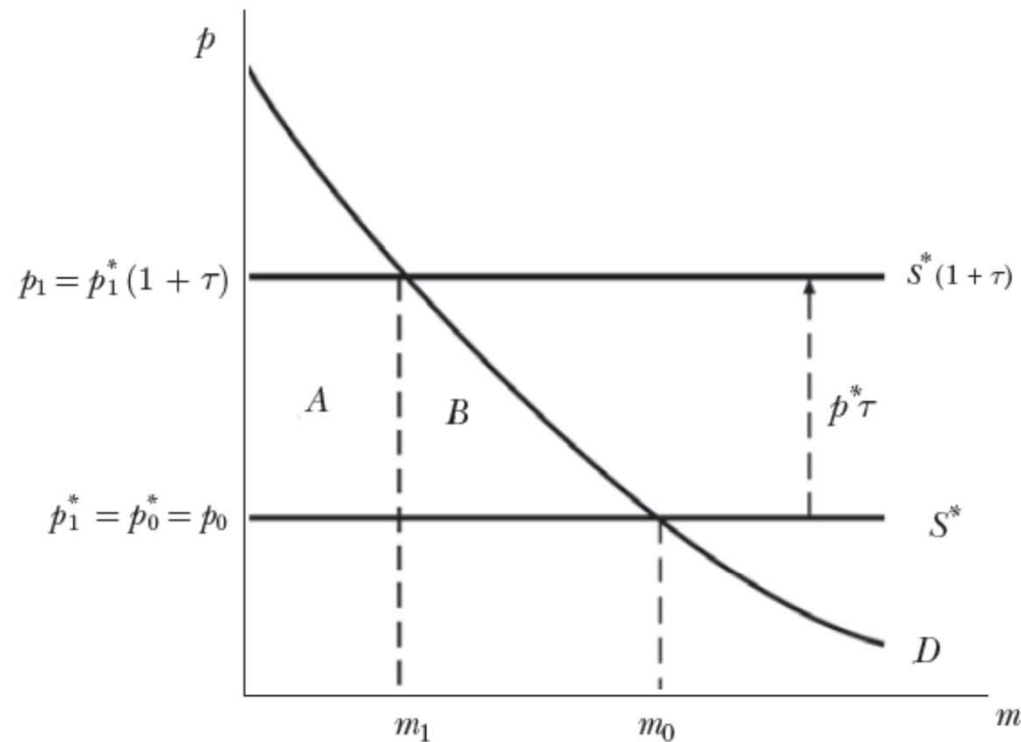
Source: Authors.

Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

Empirical Estimates of Trump Tariffs, 2017-2019

Figure 2

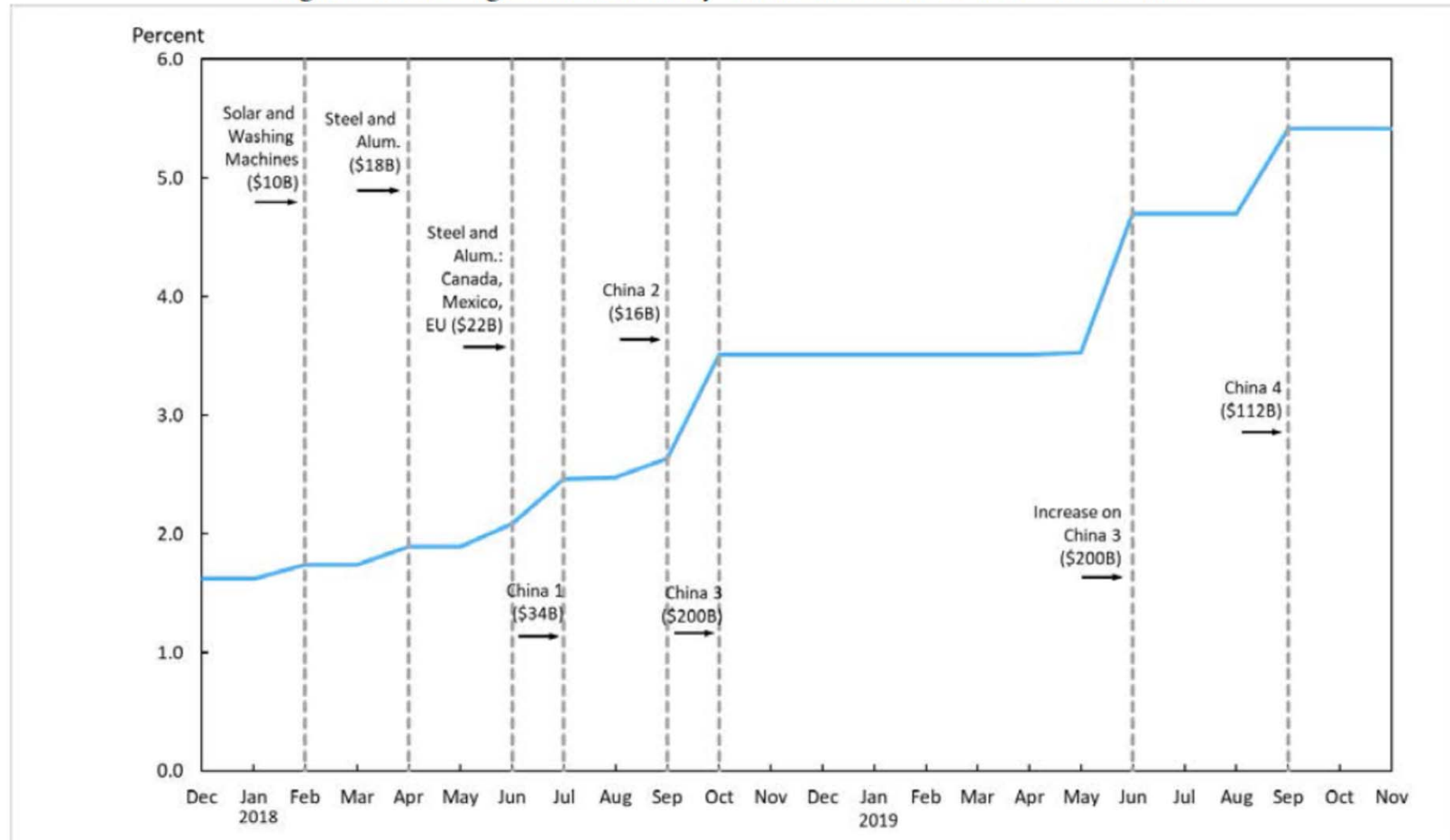
Impact of a Tariff on Prices with Perfectly Elastic Export Supply



Source: Authors.

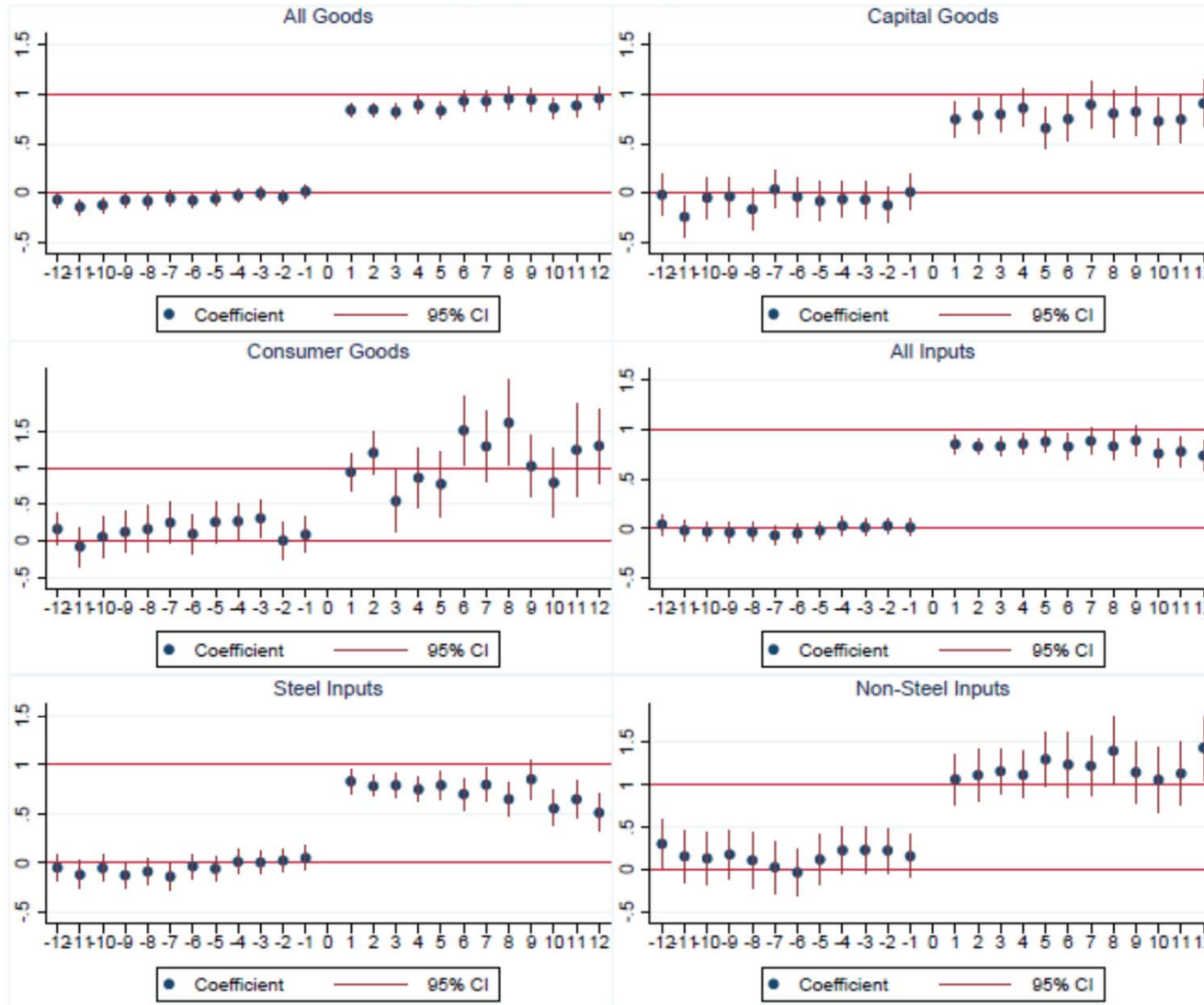
Note: Horizontal axis shows the quantity of imports; vertical axis displays the price of the good; D corresponds to the import demand curve; S^* represents the export supply curve.

Figure 1: Average U.S. Tariffs by Wave of the 2018-2019 Trade War



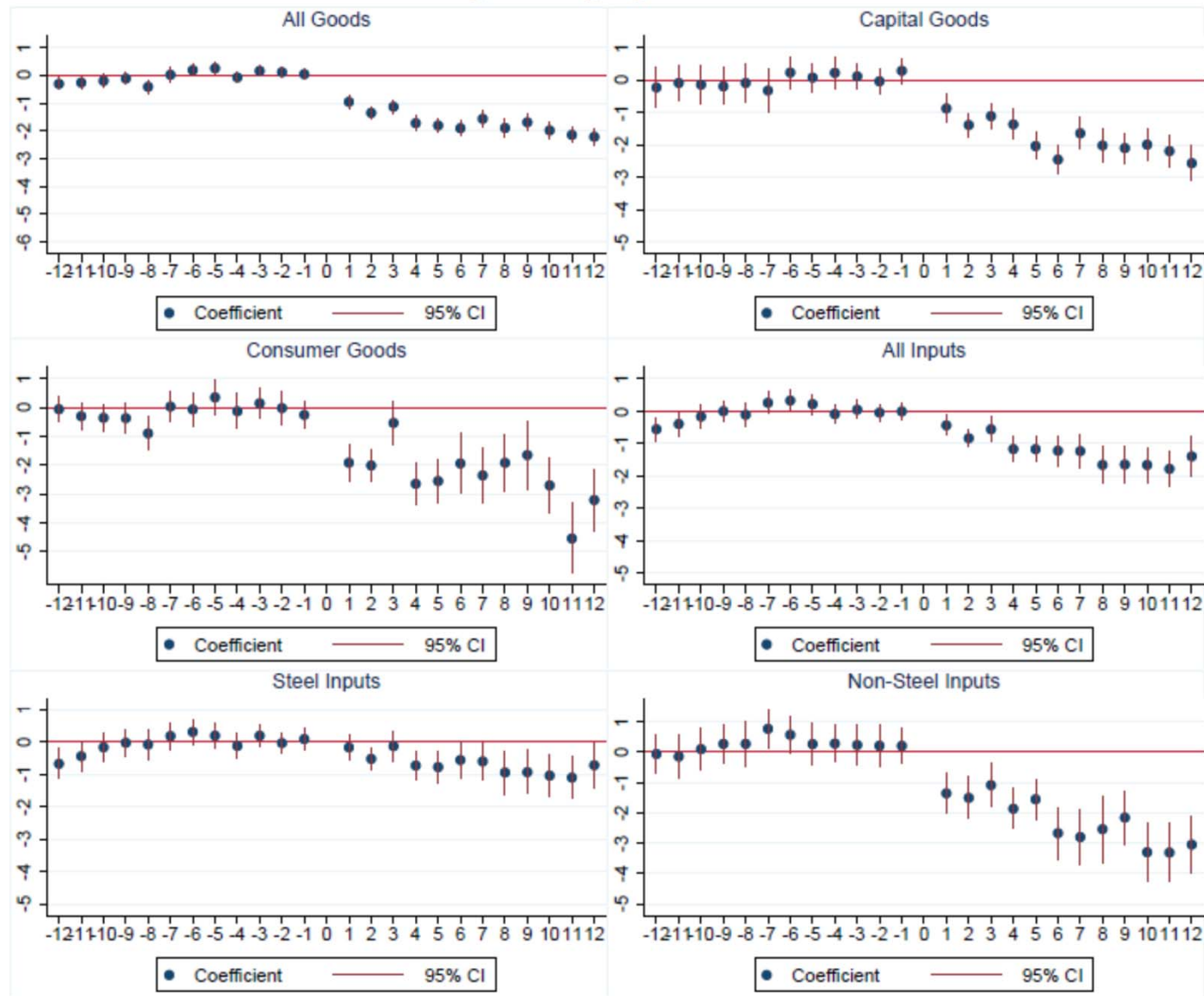
Notes: Authors calculations based on data from the US Census Bureau; US Trade Representative (USTR); US International Trade Commission. Tariffs on the 10-digit Harmonized Tariff Schedule (HTS) product code by country, weighted by 2017 annual import value. Dashed vertical lines indicate the implementation of each of the eight major waves of new tariffs during 2018-2019; tariffs implemented after the 15th of the month counted for the subsequent month. Four tranches of tariffs were imposed on China, designated by 1, 2, 3, and 4. Import values associated with each line correspond to headline numbers, not 2017 values, which are a little lower.

Figure 2: Log Import Prices (Inclusive of Tariffs)



Notes: Authors calculations based on data from the US Census Bureau; US Trade Representative (USTR); US International Trade Commission. Points correspond to the elasticities of the tariff-inclusive import price with respect to tariffs (β_s) obtained from estimating equation (1).

Figure 3: Log Import Values



Notes: Authors calculations based on data from the US Census Bureau; US Trade Representative (USTR); US International Trade Commission. Points correspond to the elasticities of import value with respect to tariffs (β_s) obtained from estimating equation (1).

Empirical Estimates (through 2018)

Table 3

Impact of Foreign Tariffs on US Exporting

	<i>log change US export prices (1)</i>	<i>log change foreign import quantities (2)</i>	<i>log change foreign import quantities (3)</i>	<i>log change foreign import values (4)</i>	<i>log change foreign import values (5)</i>
	$\Delta \ln(p_{ijt}^{US})$	$\Delta \ln(x_{ijt}^{US})$	$\Delta \ln(x_{ijt}^{US})$	$\Delta \ln(p_{ijt}^{US} \times x_{ijt}^{US})$	$\Delta \ln(p_{ijt}^{US} \times x_{ijt}^{US})$
log change tariff $\Delta \ln(1 + \text{Tariff}_{ijt})$	0.077** (0.034)	-1.233*** (0.146)	-3.498*** (0.710)	-1.134*** (0.130)	-3.942*** (0.827)
<i>N</i>	1,320,495	1,320,495	2,784,226	2,191,243	3,930,620
<i>R</i> ²	0.014	0.011	0.076	0.013	0.072

Note: Observations are at the HTS10-country-month level for the period January 2017 to December 2018. Variables are in twelve-month log change. All columns include HTS10 product fixed effects and country-year fixed effects. Columns 1–3 drop any observations with a ratio of unit values in t relative to $t - 12$ greater than 3 or less than 1/3. The dependent variable in column 1 is the log change of prices (excluding the tariff) charged by US exporters. The dependent variables in columns 2 and 3 are the log change and the change in the inverse hyperbolic sine of foreign import quantities (US export quantities). The dependent variables in column 4 and 5 are the log change and the change in the inverse hyperbolic sine of foreign import values (US export values). We use the inverse of the hyperbolic sine transformation $\log[x + (x^2 + 1)^{0.5}]$ to be able to estimate changes when import quantities or values are zero in t or $t - 12$. Standard errors reported in parentheses are clustered at the Harmonized System six-digit (HS6) level, because foreign export tariffs vary at the HS6 level. For additional details of the regression and full results, see the online Appendix available with this article at the *Journal of Economic Perspectives* website.

*, **, and *** indicate significance levels of $p < 0.10$, $p < 0.05$, and $p < 0.01$, respectively.

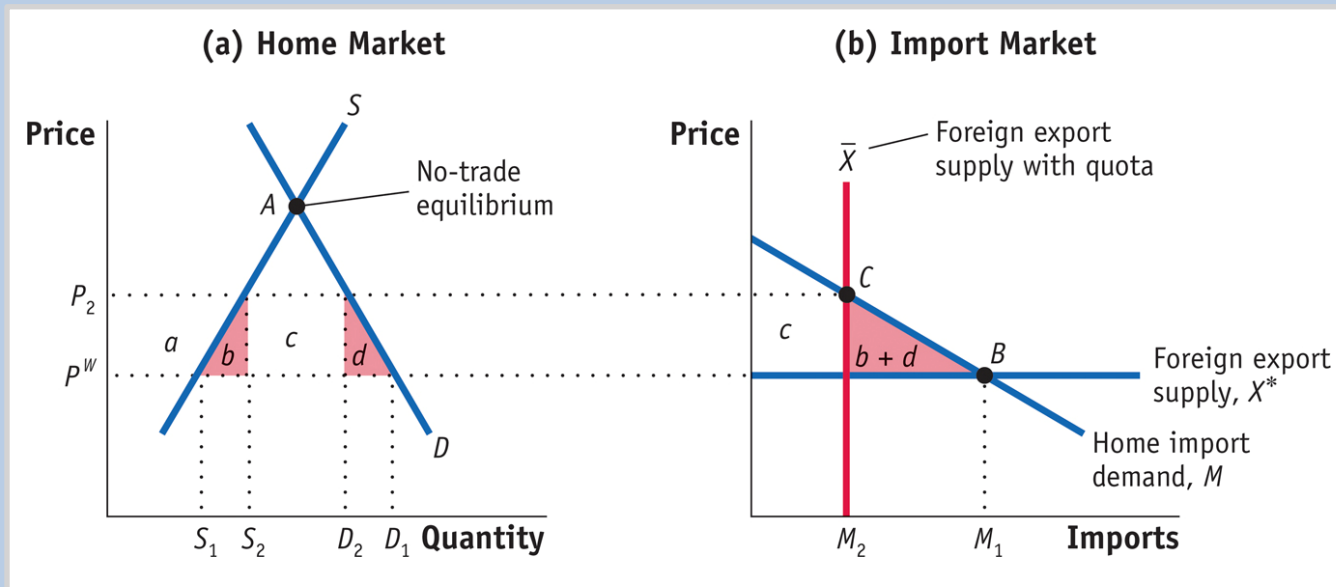
5 Import Quotas

For every level of the import quota, there is an **equivalent import tariff** that would lead to the same Home price and quantity of imports.

Import Quota in a Small Country

Free-Trade Equilibrium, Effect of the Quota, Effect on Welfare

FIGURE 8-11

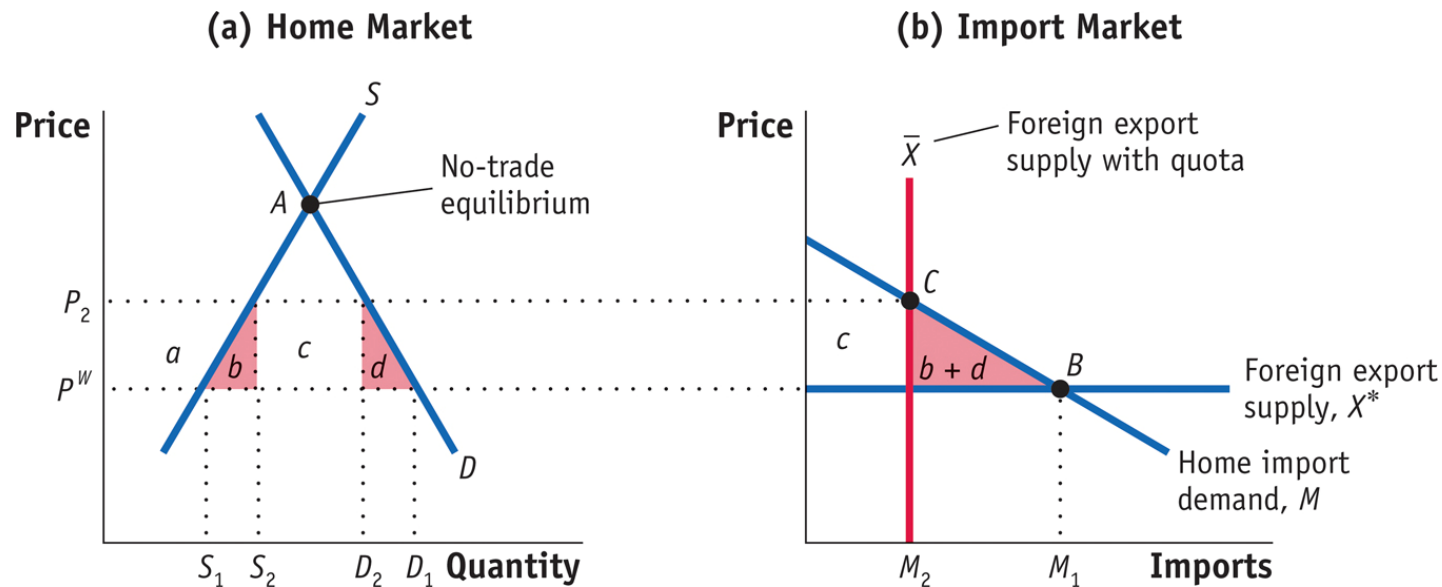


Quota for a Small Country Under free trade, the Foreign export supply curve is horizontal at the world price P^W , and the free-trade equilibrium is at point B with imports of M_1 . Applying an import quota of $M_2 < M_1$ leads to the vertical export supply curve \bar{X} —with the equilibrium at point C . The quota increases the import price from P^W to P_2 . There would be the same impact on price and quantities if instead of the quota, a tariff of $t = P_2 - P^W$ had been used.

5 Import Quotas

Import Quota in a Small Country

FIGURE 8-11 (revisited)



- The quota and tariff differ in terms of area c , in Figure 8-9, which would be collected as government revenue under a tariff.
- Under the quota, this area equals the difference between the domestic price P_2 and the world price P^W , times the quantity of imports M_2 .

5 Import Quotas

Import Quota in a Small Country

- Whoever is actually importing the good will be able to earn the difference between the world price P^W and the higher Home price P_2 by selling the imports in the Home market.
- We call the difference between these two prices the *rent associated with the quota*, and hence the area c represents the total **quota rents**.
- Next we examine the four possible ways that these quota rents can be allocated.

5 Import Quotas

Import Quota in a Small Country

1. Giving the Quota to Home Firms

Quota licenses (i.e., permits to import the quantity allowed under the quota system) can be given to Home firms: With home firms earning the rents c , the net effect of the quota on Home welfare is

Fall in consumer surplus: $-(a + b + c + d)$

Rise in producer surplus: $+a$

Quota rents earned at Home $+c$

Net effect on Home welfare: $-(b + d)$

5 Import Quotas

Import Quota in a Small Country

2. Rent Seeking

If licenses for the imported chemicals are allocated in proportion to each firm's production of batteries in the previous years, then the Home firms will likely produce more batteries than they can sell (and at lower quality) *just to obtain the import licenses for the following year*.

Alternatively, firms might engage in bribery or other lobbying activities to obtain the licenses.

These kinds of inefficient activities done to obtain quota licenses are called **rent seeking**. If rent seeking occurs, the welfare loss due to the quota would be

Fall in consumer surplus: $-(a + b + c + d)$

Rise in producer surplus: $+ a$

Net effect on Home welfare: $-(b + c + d)$

5 Import Quotas

Import Quota in a Small Country

3. Auctioning the Quota

A third possibility for allocating the rents that come from the quota is for the government of the importing country to auction off the quota licenses.

In a well-organized, competitive auction, the revenue collected should exactly equal the value of the rents, so that area c would be earned by the Home government.

Using the auction method to allocate quota rents, the net loss in domestic welfare due to the quota becomes

Fall in consumer surplus: $-(a + b + c + d)$

Rise in producer surplus: $+ a$

Auction revenue earned at Home $+ c$

Net effect on Home welfare: $-(b + d)$

5 Import Quotas

Import Quota in a Small Country

4. “Voluntary” Export Restraint

The final possibility for allocating quota rents is for the government of the importing country to give authority for implementing the quota to the government of the *exporting* country.

Because the exporting country allocates the quota among its own producers, this is sometimes called a **“voluntary” export restraint (VER)**, or a **“voluntary” restraint agreement (VRA)**.

In the 1980s the United States used this type of arrangement to restrict Japanese automobile imports.

In this case, the quota rents are earned by foreign producers, so the loss in Home welfare equals

Fall in consumer surplus: $-(a + b + c + d)$

Rise in producer surplus: $+ a$

Net effect on Home welfare: $-(b + c + d)$

5 Import Quotas

Import Quota in a Small Country

Costs of Import Quotas in the United States

TABLE 8-3

Annual Cost of U.S. Import Protection (\$ billions) Shown here are estimates of the dead weight losses and quota rents due to U.S. import quotas in the 1980s, for the years around 1985. Many of these quotas are no longer in place today.

	U.S. Deadweight Loss (area $b + d$)	Quota Rents (area c)
Automobiles	0.2–1.2	2.2–7.9
Dairy	1.4	0.25*
Steel	0.1–0.3	0.7–2.0
Sugar	0.1	0.4–1.3
Textiles and apparel	4.9–5.9	4.0–6.1
Import tariffs	1.2–3.4	0
Total	7.9–12.3	7.3–17.3