EC 111: Principles of Microeconomics

Lecture Notes, Chapter 9: Application: International Trade

Onur Altındağ
Bentley University

Fall 2026

9 Application: International Trade

Chapter 3 showed that trade can make both sides better off, because each side specializes in what it does at a lower opportunity cost: its comparative advantage. Chapter 7 gave us a way to measure well-being in dollars: consumer surplus, producer surplus and total surplus. This chapter puts the two together. We open one market to the rest of the world and ask three questions. Does the country export or import the good? Who gains, who loses, and by how much? What does a tariff cost?

9.1 The determinants of trade

9.1.1 The market without trade

We keep the market from Chapters 6 and 7:

$$Q_d = 400 - P, \qquad Q_s = 3P.$$

Suppose first that the country is closed to trade. The only buyers and sellers are domestic, and the market clears where $400-P = 3P$: the price is \$100 and the quantity is 300. We call this the **domestic price**, P_D: the price that would hold without trade. From Chapter 7,

$$\text{CS} = \tfrac{1}{2} \times 300 \times (400 - 100) = \$45{,}000, \qquad \text{PS} = \tfrac{1}{2} \times 300 \times 100 = \$15{,}000,$$

so total surplus without trade is \$60,000.

9.1.2 The world price and comparative advantage

Definition 9.1 (World price)**.** The **world price**, P_W, is the price of a good in world markets.

Whether the country exports or imports the good depends on one comparison: the domestic price without trade against the world price.

- If $P_D < P_W$, the country makes the good more cheaply than the rest of the world. It has a comparative advantage in the good, and with trade it **exports** it.
- If $P_D > P_W$, the rest of the world makes the good more cheaply. Other countries have the comparative advantage, and with trade the country **imports** it.

Definition 9.2 (Small economy)**.** A **small economy** is a price taker in world markets: the amount it buys or sells is too small to change the world price.

We assume a small economy throughout. The assumption makes the analysis simple: once the country opens to trade, the world price is the only price in the market. No domestic seller accepts less than P_W, because she can sell as much as she likes abroad at P_W. No domestic buyer pays more than P_W, because he can buy as much as he likes from abroad at P_W.

Key point

With free trade, the domestic price equals the world price. Compare the no-trade price with the world price to tell whether the country exports or imports.

9.2 The winners and losers from trade

9.2.1 An exporting country

Suppose the world price is \$140. Since $P_D = 100 < 140$, the country exports. At \$140:

- domestic buyers want $400 - 140 = 260$ units,
- domestic sellers make $3 \times 140 = 420$ units,
- the difference, $420 - 260 = 160$ units, is sold abroad: **exports**.

The price at home rises from \$100 to \$140. Domestic buyers pay more and buy less; domestic sellers get more and sell more (Figure 1, left).

$\text{CS} = \frac{1}{2} \times 260 \times (400 - 140) = \$33{,}800$	(down \$11,200)
$\text{PS} = \frac{1}{2} \times 420 \times 140 = \$29{,}400$	(up \$14,400)
$\text{TS} = \$63{,}200$	(up \$3,200)

Sellers gain more than buyers lose. The net gain is the triangle between the supply and demand curves above the old equilibrium, with the exports as its base: $\frac{1}{2} \times 160 \times (140 - 100) = \$3{,}200$.

Common mistake

In an exporting country the price rises for *domestic* buyers too. Sellers will not sell at home for \$100 when the world pays \$140. So consumer surplus falls in an exporting country, even though the country as a whole gains.

9.2.2 An importing country

Now suppose the world price is \$60. Since $P_D = 100 > 60$, the country imports. At \$60:

- domestic buyers want $400 - 60 = 340$ units,
- domestic sellers make $3 \times 60 = 180$ units,
- the difference, $340 - 180 = 160$ units, is bought from abroad: **imports**.

The price at home falls from \$100 to \$60. Buyers pay less and buy more; domestic sellers get less and sell less (Figure 1, right).

$\text{CS} = \frac{1}{2} \times 340 \times (400 - 60) = \$57{,}800$	(up \$12,800)
$\text{PS} = \frac{1}{2} \times 180 \times 60 = \$5{,}400$	(down \$9,600)
$\text{TS} = \$63{,}200$	(up \$3,200)

Buyers gain more than sellers lose. The net gain is the triangle between the curves below the old equilibrium, with the imports as its base: $\frac{1}{2} \times 160 \times (100 - 60) = \$3{,}200$. (The two gains are equal here only because \$140 and \$60 are both \$40 away from \$100 and the curves are straight lines.)

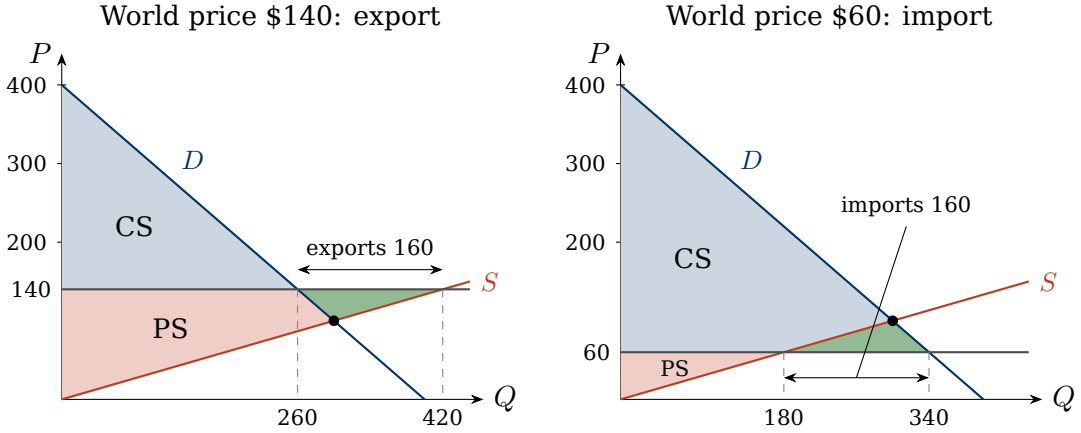


Figure 1: Opening the market $Q_d = 400 - P$, $Q_s = 3P$ to trade. The dot is the no-trade equilibrium (\$100, 300). Blue is consumer surplus, red is producer surplus, and the green triangle is the gain from trade, \$3,200 in both panels.

9.2.3 The general result

	Exporter ($P_D < P_W$)	**Importer** ($P_D > P_W$)
Domestic price	rises to P_W	falls to P_W
Consumer surplus	falls	rises
Producer surplus	rises	falls
Total surplus	rises	rises

Key point

Trade raises total surplus whether the country exports or imports. Trade also creates losers: domestic buyers of an exported good, domestic sellers of an imported good. The winners gain more than the losers lose.

Because the gains are larger than the losses, the winners *could* pay the losers enough to leave everyone better off. In practice they rarely do. That is why trade policy is a political fight even though the total gain is not in doubt.

In class

(a) When Romania opened to trade, the price of corn in Romania nearly doubled.

(b) When Romania opened to trade, the price of chocolate in Romania fell.

For each good: who has the comparative advantage? Does Romania export or import? Who gains and who loses? Does Romania gain overall?

Answers. (a) The price rose to the world price, so $P_D < P_W$: Romania has the comparative advantage in corn and exports it. Corn farmers gain and Romanian corn buyers lose; the farmers' gain is larger. (b) The price fell to the world price, so $P_D > P_W$: the rest of the world has the comparative advantage and Romania imports chocolate. Buyers gain and Romanian chocolate makers lose; the buyers' gain is larger. Romania gains in both markets.

9.2.4 The losers are concentrated: the China shock

China's share of world manufacturing exports rose from 2.8% in 1990 to 18.5% in 2015. Over 2000 to 2011 the U.S. share fell from 14% to 8.6%, and the United States lost an estimated 600,000 to 1 million manufacturing jobs to Chinese import competition (Hanson, 2021, *Foreign Affairs*, summarizing his work with David Autor and David Dorn).

The diagram describes this well in one respect and poorly in another. Buyers everywhere gained from cheaper clothes, shoes and electronics, and the gain was spread thinly over hundreds of millions of people. The losses fell on particular towns that made furniture, textiles and toys. Few of the workers who were laid off moved away or retrained, and those places stayed poorer for a long time. The triangle in Figure 1 is right about the total. It says nothing about *who* bears the loss, or for how long.

9.2.5 Other benefits of trade

The surplus diagram counts only the gain from a lower or higher price in one market. Trade has other benefits that the diagram leaves out.

- **More variety.** Buyers can choose among German, Japanese and American cars,

not only domestic ones.

- **Economies of scale.** A firm that sells to the world can produce more and bring its cost per unit down (Chapter 14).
- **More competition.** Foreign rivals limit the market power of domestic firms.
- **Higher productivity.** Trade moves resources from the least productive firms to the most productive ones.
- **The flow of ideas.** Technology spreads through traded goods.

9.3 Restricting trade

9.3.1 A tariff

Definition 9.3 (Tariff)**.** A **tariff** is a tax on goods produced abroad and sold domestically.

A tariff matters only for a good the country imports. Return to the importing case, with $P_W = \$60$ and imports of 160. The government puts a \$20 tariff on each imported unit. Foreign sellers can get \$60 anywhere else in the world, so they sell here only if they keep \$60 after the tariff: the price of an imported unit rises to \$80. Domestic sellers pay no tariff, but they sell the same good, so they can now charge \$80 too. **The domestic price rises by the full amount of the tariff, on every unit sold, imported or not.**

At \$80:

- domestic buyers want $400 - 80 = 320$ units (down from 340),
- domestic sellers make $3 \times 80 = 240$ units (up from 180),
- imports fall to $320 - 240 = 80$ (down from 160).

The tariff moves the market part of the way back toward the no-trade equilibrium.

	Free trade	\$20 tariff	Change
Consumer surplus	57,800	51,200	$-6{,}600$
Producer surplus	5,400	9,600	$+4{,}200$
Government revenue	0	1,600	$+1{,}600$
Total surplus	63,200	62,400	-800

Here CS $= \frac{1}{2} \times 320 \times (400 - 80)$, PS $= \frac{1}{2} \times 240 \times 80$, and revenue is the tariff times the units still imported, 20×80. Total surplus now has three parts, because the government's revenue is someone's gain too.

Buyers lose \$6,600. Of that, \$4,200 goes to domestic sellers and \$1,600 to the government. The remaining \$800 goes to no one: it is the **deadweight loss** of the tariff. It is made of two triangles (Figure 2).

- **Overproduction**, $\frac{1}{2} \times (240 - 180) \times 20 = \$600$. The 60 extra units made at home cost between \$60 and \$80 each to make. The world would have supplied each of them for \$60.
- **Underconsumption**, $\frac{1}{2} \times (340 - 320) \times 20 = \$200$. The 20 units no longer bought were worth between \$60 and \$80 to buyers, more than the \$60 they cost the country.

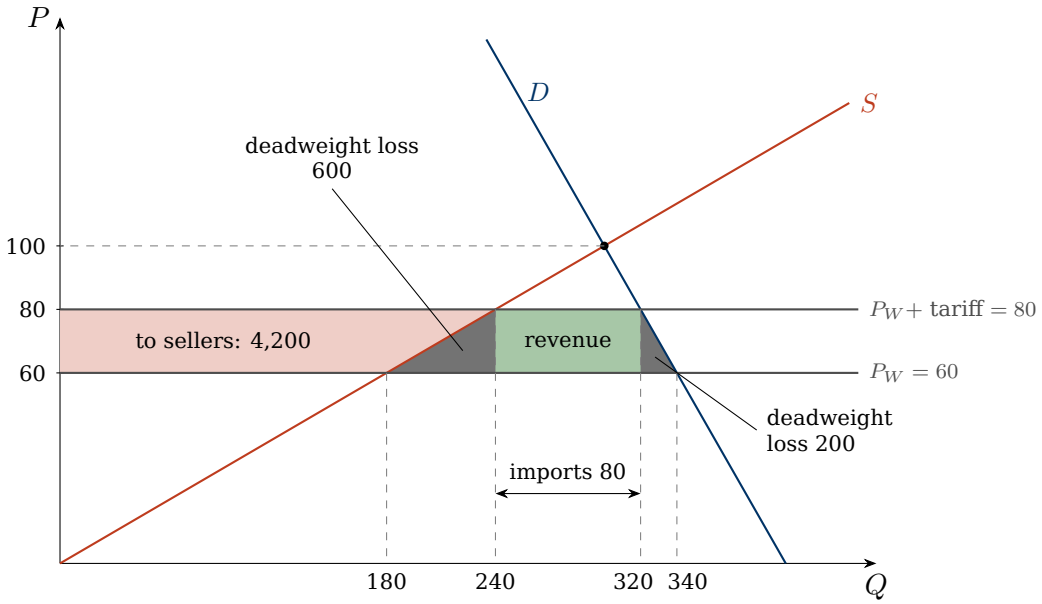


Figure 2: A \$20 tariff when the world price is \$60 (the price axis is cut off at the top; the dot is the no-trade equilibrium). The price rises to \$80. The \$6,600 that buyers lose is the whole band between \$60 and \$80, out to the demand curve: \$4,200 goes to domestic sellers (red), \$1,600 to the government (green), and the two grey triangles, \$800, are the deadweight loss.

Common mistake

Tariff revenue is the tariff times the imports *after* the tariff (20×80), not the imports under free trade (20×160). And the price rises on all 320 units bought, not only on the 80 that are imported; that is why buyers lose far more than the government collects.

Compare the three outcomes for this market:

$$\underbrace{\$60{,}000}_{\text{no trade}} < \underbrace{\$62{,}400}_{\text{\$20 tariff}} < \underbrace{\$63{,}200}_{\text{free trade}}.$$

A tariff gives up part of the gain from trade. The larger the tariff, the more it gives up; a tariff of \$40 or more would raise the price to \$100, end imports, and bring the country back to the no-trade outcome with no revenue at all.

9.3.2 An import quota

Definition 9.4 (Import quota)**.** An **import quota** is a limit on the quantity of a good that can be produced abroad and sold domestically.

Suppose the government allows only 80 units to be imported instead of charging a tariff. The price must rise until domestic buyers want exactly 80 units more than domestic sellers make: $(400 - P) - 3P = 80$ gives $P = \$80$. The price, the quantities, consumer surplus, producer surplus and the deadweight loss are the same as under the $20 tariff.

The difference is who gets the $1,600. An importer with a license buys at $60 on the world market and sells at $80 at home. With a tariff the $1,600 goes to the government; with a quota it goes to whoever holds the import licenses, often foreign firms. If the government *auctions* the licenses, it collects the $1,600 and the quota works exactly like the tariff.

Key point

A tariff or a quota raises the domestic price above the world price. Domestic sellers gain, buyers lose more, and total surplus falls by the deadweight loss.

9.4 The arguments for restricting trade

If free trade maximizes total surplus, why do countries restrict it? Five arguments come up again and again.

- **"Trade destroys jobs."** Imports do destroy jobs in the industries that compete with them. Trade also creates jobs in export industries and in the industries where buyers spend what they save. Total employment does not fall as imports rise. The real problem is the one from the China shock: the workers who lose are not the ones who gain.
- **"The industry is vital to national security."** This can be a valid argument: a country may not want to depend on a rival for steel or microchips in a war. Be careful about who is making the argument. Firms have every reason to exaggerate their role in national defense to get protection.
- **"It is an infant industry."** A new industry may need temporary protection until it can compete. In practice the government has to pick which industries will succeed, and "temporary" protection is hard to remove. Firms that expect to be profitable later can bear early losses without help, as start-ups do.
- **"The competition is unfair."** Suppose a foreign government subsidizes its exporters. That lowers the price we pay for imports. Our buyers gain more than our sellers lose, and the foreign taxpayers pay the bill.
- **"Protection is a bargaining chip."** A country can threaten a tariff to make a trading partner remove its own. If the threat fails, the country must choose between backing down and carrying out a threat that hurts itself.

9.5 Trade agreements

A country can move toward free trade in two ways. It can act **unilaterally** and remove its own barriers, as Britain did in the 19th century and Chile and South Korea did more recently. Or it can act **multilaterally** and cut barriers together with other countries. Examples are the North American Free Trade Agreement (NAFTA, 1993, replaced in 2020 by the USMCA) and the General Agreement on Tariffs and Trade (GATT), a series of negotiations after World War II that brought the average tariff among member countries from about 40% to about 5%. The World Trade Organization (WTO) now administers these rules and settles disputes.

The multilateral route is often easier politically. Domestic producers who lose from imports are few and well organized; the buyers who gain are many and scattered. An agreement brings in a second organized group, exporters, who want access to foreign markets and will lobby for the deal.

In 2018 to 2020 the United States moved the other way and raised tariffs on Chinese goods; by 2020 tariffs of about 20% covered more than half of U.S. imports from China, and China responded in kind. The tariff diagram tells you who pays. For a small importer the domestic price rises by the full tariff, so the cost falls on domestic buyers. Studies of these tariffs found that U.S. import prices rose by about the full amount of the tariff (Amiti, Redding and Weinstein, 2019; Fajgelbaum and co-authors, 2020). Foreign exporters bear part of a tariff only if the importing country is large enough that its tariff pushes the world price down.

In class

Market: $Q_d = 90 - P$, $Q_s = 2P$. Without trade, $P = 30$, $Q = 60$, CS $= 1{,}800$ and PS $= 900$ (Chapter 7). The world price is \$20.

(a) Does the country import or export? How much?

(b) Find consumer surplus, producer surplus and the gain from trade.

(c) The government sets a \$4 tariff. Find imports, tariff revenue and the deadweight loss.

Answers. (a) $P_D = 30 > 20$: it imports. At \$20 buyers want $90 - 20 = 70$ and domestic sellers make $2 \times 20 = 40$, so imports are 30. (b) CS $= \frac{1}{2} \times 70 \times (90 - 20) = 2{,}450$; PS $= \frac{1}{2} \times 40 \times 20 = 400$; TS $= 2{,}850$, up 150 from 2,700. The gain is the triangle $\frac{1}{2} \times 30 \times (30 - 20) = 150$. (c) The price rises to \$24. Buyers want 66, domestic sellers make 48, imports are 18, and revenue is $4 \times 18 = 72$. The deadweight loss is $\frac{1}{2} \times (48 - 40) \times 4 + \frac{1}{2} \times (70 - 66) \times 4 = 16 + 8 = 24$.

9.6 Summary

- Compare the domestic price without trade with the world price. If the domestic price is lower, the country has a comparative advantage in the good and exports it; if it is higher, the country imports it.
- A small economy takes the world price as given. With free trade the domestic price equals the world price.

- In an exporting country the price rises: sellers gain, domestic buyers lose, and total surplus rises.
- In an importing country the price falls: buyers gain, domestic sellers lose, and total surplus rises.
- The gain from trade is the triangle between supply and demand, from the no-trade price to the world price, with exports or imports as its base. The losses can be concentrated on particular workers and places.
- A tariff raises the domestic price by the amount of the tariff. Domestic sellers gain, the government collects revenue on the remaining imports, and buyers lose more than both gain. The deadweight loss has two parts: overproduction at home and underconsumption.
- An import quota has the same effects as a tariff, except that the license holders get what the tariff would have raised.
- Trade also brings variety, economies of scale, competition, productivity and ideas.
- The arguments for restricting trade are jobs, national security, infant industries, unfair competition and bargaining. Economists find most of them weak; national security can be valid.

Exercises

Exercise 9.1. Without trade, a ton of wheat sells for \$180 in Agraria and a bicycle sells for \$220. Agraria is a small economy. The world price of wheat is \$240 a ton and the world price of a bicycle is \$150.

(a) If Agraria opens to trade, which good does it export and which does it import? In which good does it have a comparative advantage?
(b) What are the prices of wheat and bicycles in Agraria after it opens to trade?
(c) In each market, who gains and who loses?
(d) True or false: "Agraria gains from trade in wheat and loses from trade in bicycles."

Exercise 9.2. In a small economy, $Q_d = 120 - 2P$ and $Q_s = 4P$. Without trade, $P = 20$, $Q = 80$, CS $= 1{,}600$ and PS $= 800$ (Exercise 7.2). The country opens to trade and the world price is \$14.

(a) Does the country import or export the good? How many units?
(b) Find consumer surplus, producer surplus and total surplus with trade.
(c) How much do buyers gain and how much do sellers lose? Show that the gain from trade is a triangle and compute its area.

Exercise 9.3. Continue with Exercise 9.2. The government puts a \$3 tariff on each imported unit.

(a) Find the new price, the quantity bought, the quantity made at home, and imports.
(b) Find tariff revenue.

(c) Find the change in consumer surplus and in producer surplus, and the deadweight loss. Split the deadweight loss into its two triangles.
(d) Instead of the tariff, the government limits imports to 18 units and gives the licenses away. What changes?
(e) The tariff is raised to \$6. Find imports, revenue and the deadweight loss. The tariff doubled; what happened to the deadweight loss?

Exercise 9.4. Take the market of Exercise 9.2 again, but now the world price is \$26.

(a) Does the country import or export? How many units?
(b) Find the change in consumer surplus, producer surplus and total surplus compared with no trade.
(c) Would a \$3 tariff on imports of this good change anything?
(d) Domestic buyers ask the government to ban exports of the good. Who would gain, who would lose, and what would happen to total surplus?

Exercise 9.5. Answer each in two or three sentences, using the diagrams of this chapter.

(a) A senator says: "Imported steel costs steelworkers their jobs, so a tariff on steel makes the country better off." Which part of the statement is correct, and which is not?
(b) A foreign government starts subsidizing its solar-panel makers, and the world price of solar panels falls. Your country imports solar panels. Who in your country gains, who loses, and what happens to total surplus?
(c) A country imports sugar. Is its total surplus higher with a tariff on sugar or with no sugar trade at all?

Answers to exercises

Exercise 9.1. (a) Wheat: the domestic price (\$180) is below the world price (\$240), so Agraria exports wheat and has a comparative advantage in it. Bicycles: the domestic price (\$220) is above the world price (\$150), so Agraria imports bicycles. (b) The world prices: \$240 and \$150. (c) Wheat: farmers gain, Agraria's wheat buyers lose. Bicycles: buyers gain, Agraria's bicycle makers lose. (d) False. Total surplus rises in both markets. In each one the winners gain more than the losers lose.

Exercise 9.2. (a) $P_D = 20 > 14$: it imports. $Q_d = 120 - 28 = 92$, $Q_s = 4 \times 14 = 56$, imports $= 36$. (b) Demand reaches zero at $P = 60$. CS $= \frac{1}{2} \times 92 \times (60 - 14) = 2{,}116$; PS $= \frac{1}{2} \times 56 \times 14 = 392$; TS $= 2{,}508$. (c) Buyers gain $2{,}116 - 1{,}600 = 516$; sellers lose $800 - 392 = 408$. The net gain is $108 = \frac{1}{2} \times 36 \times (20 - 14)$: the triangle between the curves below the no-trade equilibrium, with imports as its base.

Exercise 9.3. (a) The price is $14 + 3 = \$17$. $Q_d = 120 - 34 = 86$, $Q_s = 4 \times 17 = 68$, imports $= 18$. (b) $3 \times 18 = \$54$. (c) CS $= \frac{1}{2} \times 86 \times (60 - 17) = 1{,}849$, down 267. PS $= \frac{1}{2} \times 68 \times 17 = 578$, up 186. TS $= 1{,}849 + 578 + 54 = 2{,}481$, so the deadweight loss is $2{,}508 - 2{,}481 = 27$. Overproduction: $\frac{1}{2} \times (68 - 56) \times 3 = 18$. Underconsumption: $\frac{1}{2} \times (92 - 86) \times 3 = 9$. (d) The price is still \$17, since $(120 - 2P) - 4P = 18$ gives $P = 17$; quantities, CS, PS and

the deadweight loss are the same. The \$54 goes to the license holders instead of the government. (e) The price is \$20, the no-trade price: $Q_d = Q_s = 80$, imports are zero and so is revenue. The deadweight loss is the whole gain from trade, 108. Doubling the tariff multiplied the deadweight loss by four ($27 \times 4 = 108$), because both the base and the height of each triangle doubled.

Exercise 9.4. (a) $P_D = 20 < 26$: it exports. $Q_d = 120 - 52 = 68$, $Q_s = 4 \times 26 = 104$, exports $= 36$. (b) CS $= \frac{1}{2} \times 68 \times (60 - 26) = 1{,}156$, down 444. PS $= \frac{1}{2} \times 104 \times 26 = 1{,}352$, up 552. TS $= 2{,}508$, up $108 = \frac{1}{2} \times 36 \times (26 - 20)$. (c) No. The country does not import the good, so there is nothing to tax; the price stays at \$26. (d) The price would fall back to \$20. Domestic buyers would gain 444, sellers would lose 552, and total surplus would fall by 108.

Exercise 9.5. (a) The first part is correct: a tariff raises the price of steel, domestic steelmakers produce more, and they employ more workers. The conclusion is not: steel buyers (including car makers and builders) lose more than steelmakers and the government gain, so total surplus falls by the deadweight loss. (b) The price in your country falls with the world price. Buyers of solar panels gain; domestic solar-panel makers lose; buyers gain more than makers lose, so total surplus rises. The foreign taxpayers pay for the subsidy. (c) Higher with the tariff, as long as some sugar is still imported. A tariff gives up part of the gain from trade; no trade gives up all of it.