International Trade I

Trade Policy II

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Outline of the Lecture

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Plan

Previously	Today	Next
The effects of **import tariffs** under different environments	The effects of **quotas and export subsidies** under different environments	Multilateral and regional trade agreements

Motivation

- What are the welfare effects of import quotas and export subsidies?
- Are there any rationales for their use?
- How do import quotas and export subsidies differ from import tariffs?
- Does the difference depend on the type of competition in the market?

Reading

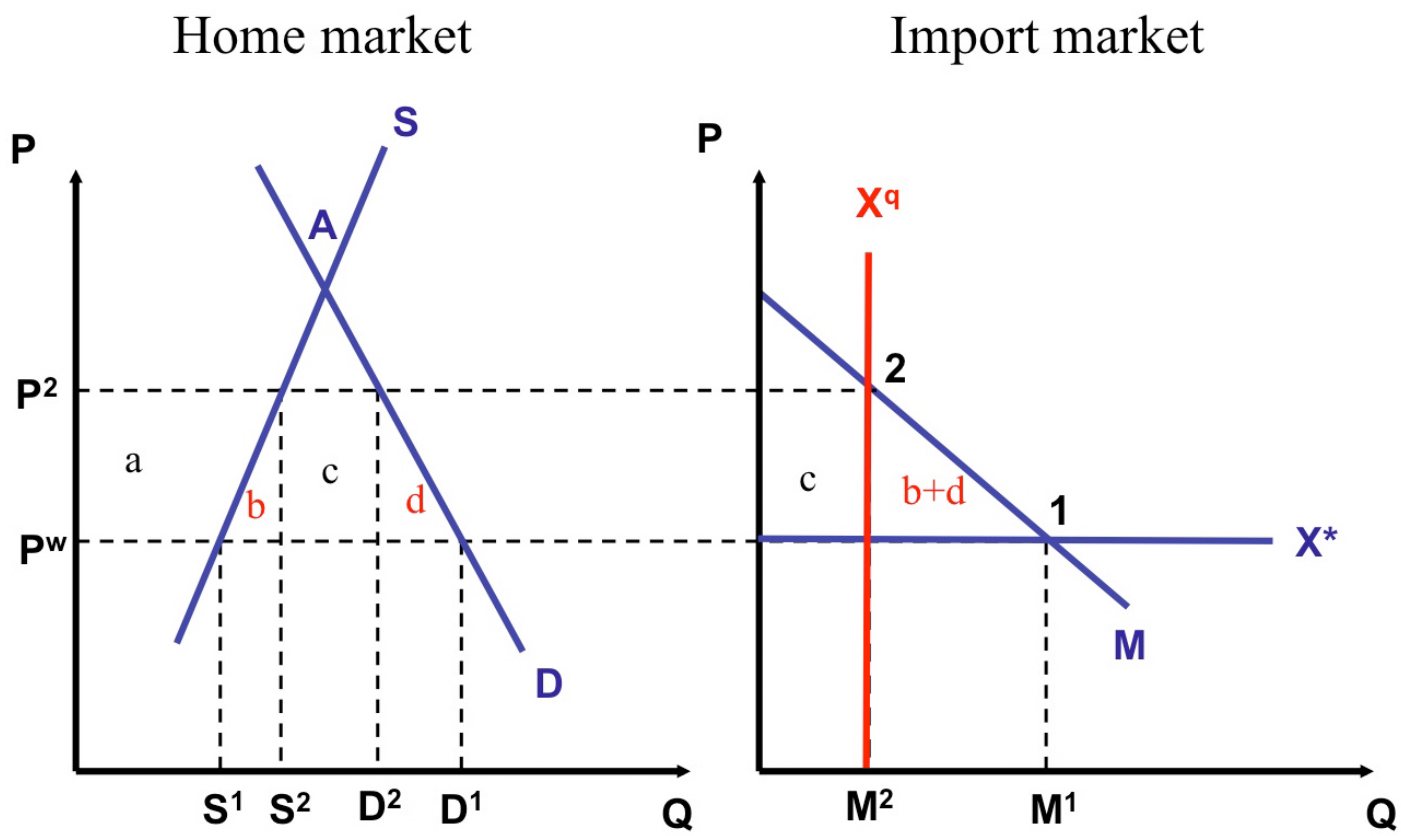
- *F Ch. 8
- Bhagwati, J. N., “On the Equivalence of Tariffs and Quotas,” in R. E. Baldwin et al. (eds.), Trade, Growth and the Balance of Payments: Essays in Honor of Gottfried Haberler, Chicago: Rand McNally (1965).
- Brander, J.A., “Strategic Trade Policy,” Ch. 27 in Grossman, G. and K. Rogoff (eds.), *Handbook of International Economics*, Volume 3, North-Holland, 1995.
- Brander, J.A. and B.J. Spencer, “Export Subsidies and International Market Share Rivalry,” *Journal of International Economics*, 1985.
- Eaton, J. and G.M. Grossman, “Optimal Trade and Industrial Policy under Oligopoly,” *Quarterly Journal of Economics*, 1986.
- *Introductory level:* FT Chs. 8-10 or KOM Ch. 9

Outline of the Lecture

Import Quotas - Introduction

- A quota restricts the quantity of a good that can be imported
- Our goal is to compare the effect of a quota with the effect of an import tariff
- Assumptions:
  - Small country (SOE)
  - Initially free trade: Home imports M^1
  - Then: Home imposes a quota fixing the importing quantity at M^2

Effect of an Import Quota in a SOE: Graph



Effect of an Import Quota in a SOE: Summary

- **Price and quantity effect:** A quota yields the same price and quantity of imports as an *equivalent import tariff*

- **Welfare effects:**
  - Home consumers lose: $\Delta CS = -(a + b + c + d)$
  - Home producers gain: $\Delta PS = +a$
  - Quota rents: $\Delta TR = +c$

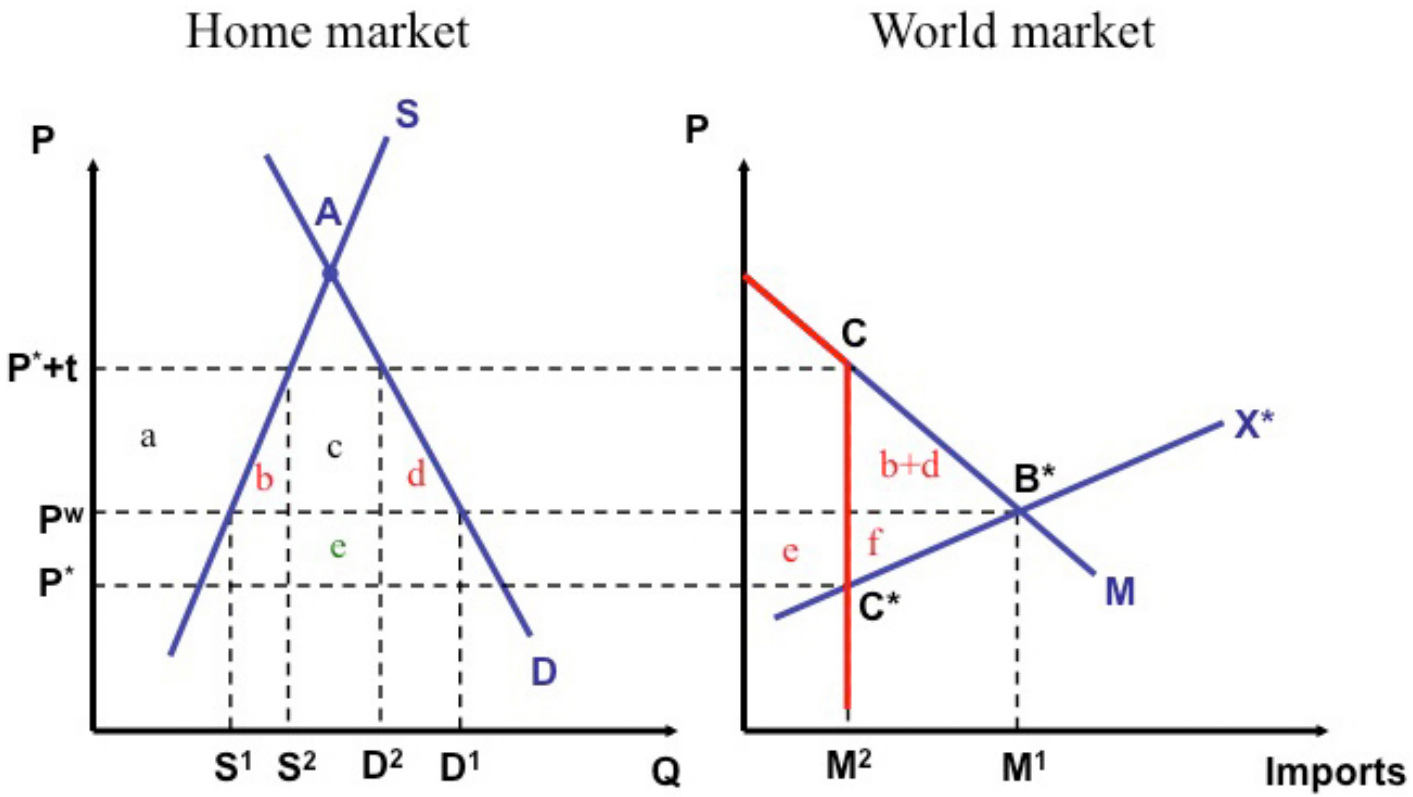
- The effect of a quota on CS and PS is the same as the effect of an equivalent import tariff

- BUT: An import quota generates quota rents ($\neq$ tariff revenue)
- Depending on how these quota rents are allocated, a quota may have the same or worse welfare effect as an equivalent tariff

Quota rents allocation

- Giving the Quota to Home Firms
  - quota rents earned at home $\Rightarrow$ net effect on Home welfare $-(b+d)$
- Rent seeking
  - quota rents wasted $\Rightarrow$ net effect on Home welfare $-(b+d+c)$
- Auctioning the Quota
  - quota rents earned at home (as auction revenue) $\Rightarrow$ net effect on Home welfare $-(b+d)$
- Voluntary Export Restraint
  - quota rents earned by foreign exporters $\Rightarrow$ net effect on Home welfare $-(b+d+c)$

Effect of an Import Quota in a LOE: Graph

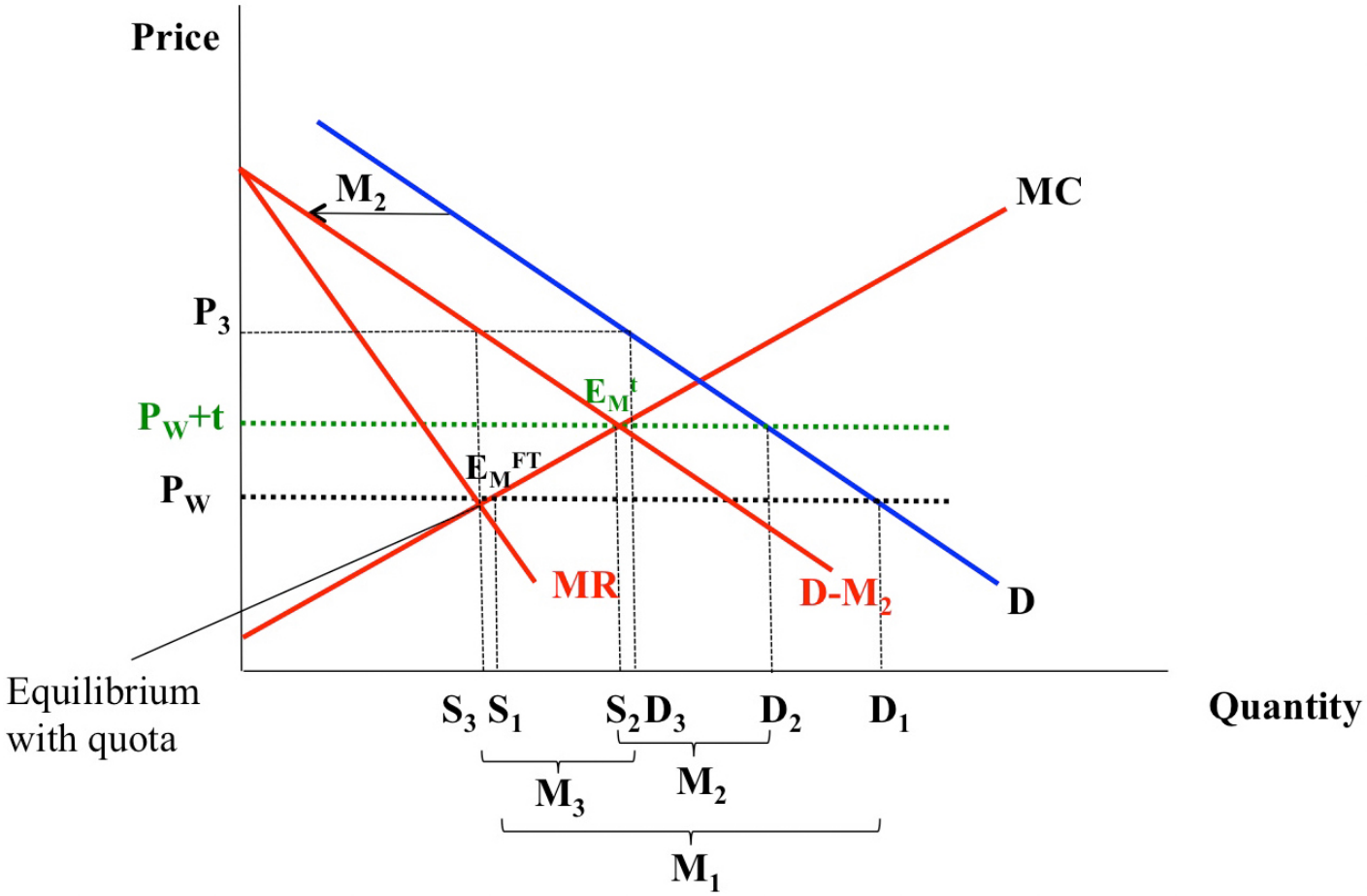


Effect of an Import Quota in a LOE

- Quota truncates Home's import demand curve
  - Shown as red kinked line in graph
- Same allocative effect as the equivalent tariff
- **Difference:** government gets tariff revenue, who gets the rent or scarcity value of the quota depends on how it is alloted.
  - If quota is competitively auctioned, the bid will equal the tariff revenue
  - Sometimes rent is given to foreign exporting firms (VER) to "bribe" them into accepting the restriction (not complain to WTO)
- If domestic producers have market power, then import quota gives them more power, because they face a less elastic demand curve. See next.

Effect of a Home Quota with Home Monopoly

- Suppose that Home (SOE) imposes a quota limiting imports to M_2



Equilibrium Effects of a Home Quota with Home Monopoly

- The quota equilibrium has (by construction) the same level of imports: $M_3 = M_2$
- The price charged under the quota is higher than the price under the tariff: $P_3 > P_w + t$
- The monopolist produces lower quantity than under the tariff: $S_3 < S_2$
- The monopolist may even produce lower quantity than under free trade: $S_3 < S_1$
  - $\rightarrow$ workers may fail to be protected by the quota (employment could fall)
- The quota can have undesirable effects as compared with a tariff

Welfare Effects of a Home Quota with Home Monopoly

- Prices are higher with the quota than with an equivalent tariff
  - Consumers lose more
  - The monopolist gains more
- **Overall:** the deadweight loss is higher for a quota than for an equivalent tariff because the Home monopolist charges a higher price (extra deadweight loss coming from the exercise of monopoly power)

Other effects of quotas: Quality upgrading

- Quotas are imposed on categories that contain economically distinct subcategories
  - e.g. quota on autos aggregates compact, family sedan, sports cars,...
- The equivalent tariff (scarcity value or shadow price of the quota) is like a specific tax that applies equally to all of the subcategories
- Therefore it raises the domestic price of all of them by equal absolute amounts: the proportional increase is highest for the lower-value subcategories
- Example:
  - Pre-quota Subcompact car $\$15,000$, Full-sized $\$30,000$
  - Equivalent tariff $\$5,000$, raises these to $\$20,000$ and $\$35,000$
  - The relative price drops from 2.0 to 1.75

Other effects of quotas: Quality upgrading

⇒ Result: mix of imports within the large category shifts toward the higher-end subcategories: this is “quality upgrading”

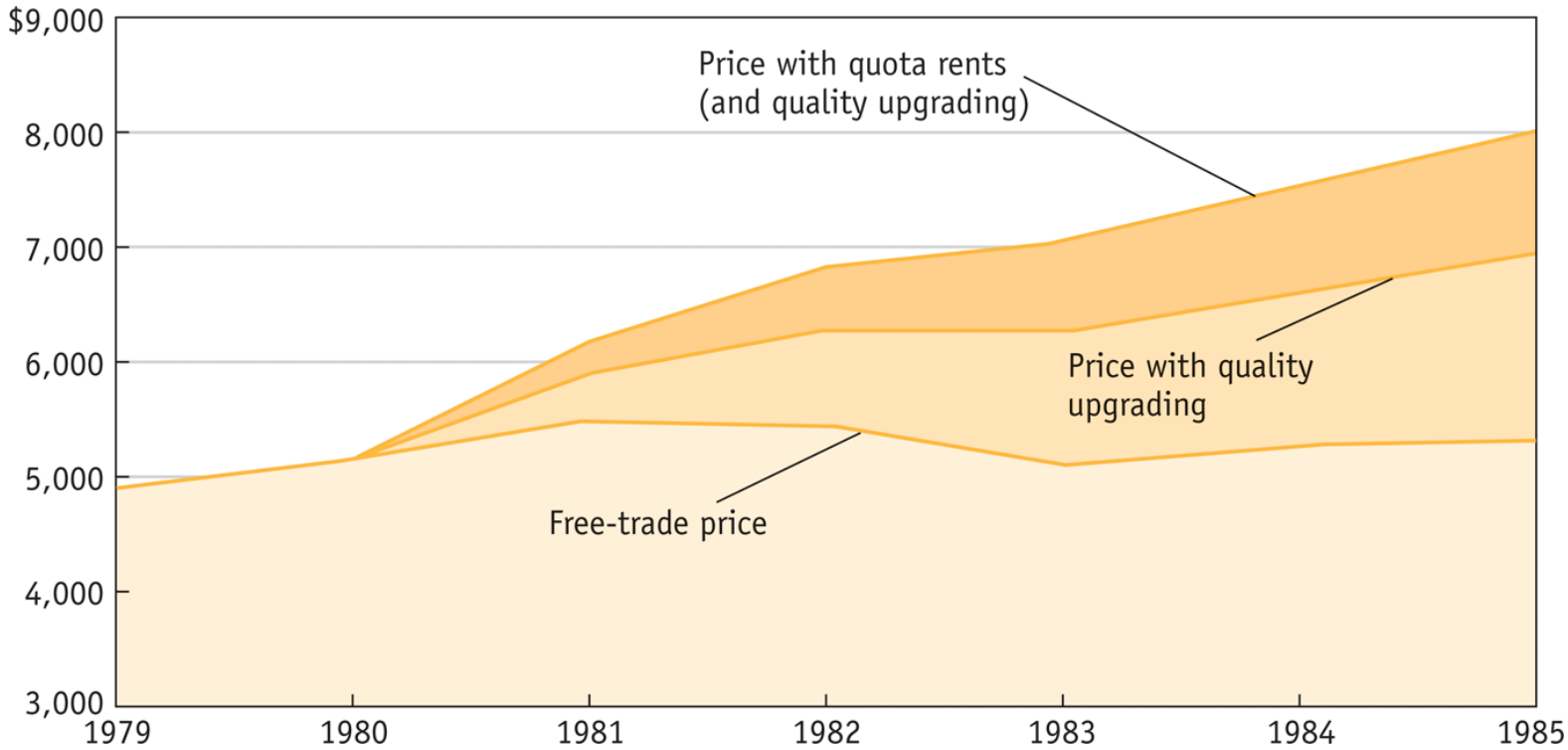
- Example: US quota (actually implemented as VER) on Japanese autos in 1981
- “Quality upgrading” sounds good but is actually a distortion: Makes the lower-value products unavailable to those who would prefer them: the poor, the single and students in the case of autos.

Application: US Imports of Japanese Automobiles

- Early 1980s: deep recession in the US $\rightarrow$ less spending on durable goods $\rightarrow$ rise in unemployment in auto industry
- In 1980, the United Automobile Workers and Ford Motor Company applied to the ITC for protection under Article XIX of GATT and Section 201 of US trade laws $\rightarrow$ application rejected
- But several Congress members pursued import limitation by other means $\rightarrow$ April 1981 a bill was introduced in the Senate to restrict imports
- May 1, Japanese government announced that it would "voluntarily" limit Japan's export of autos to the US market

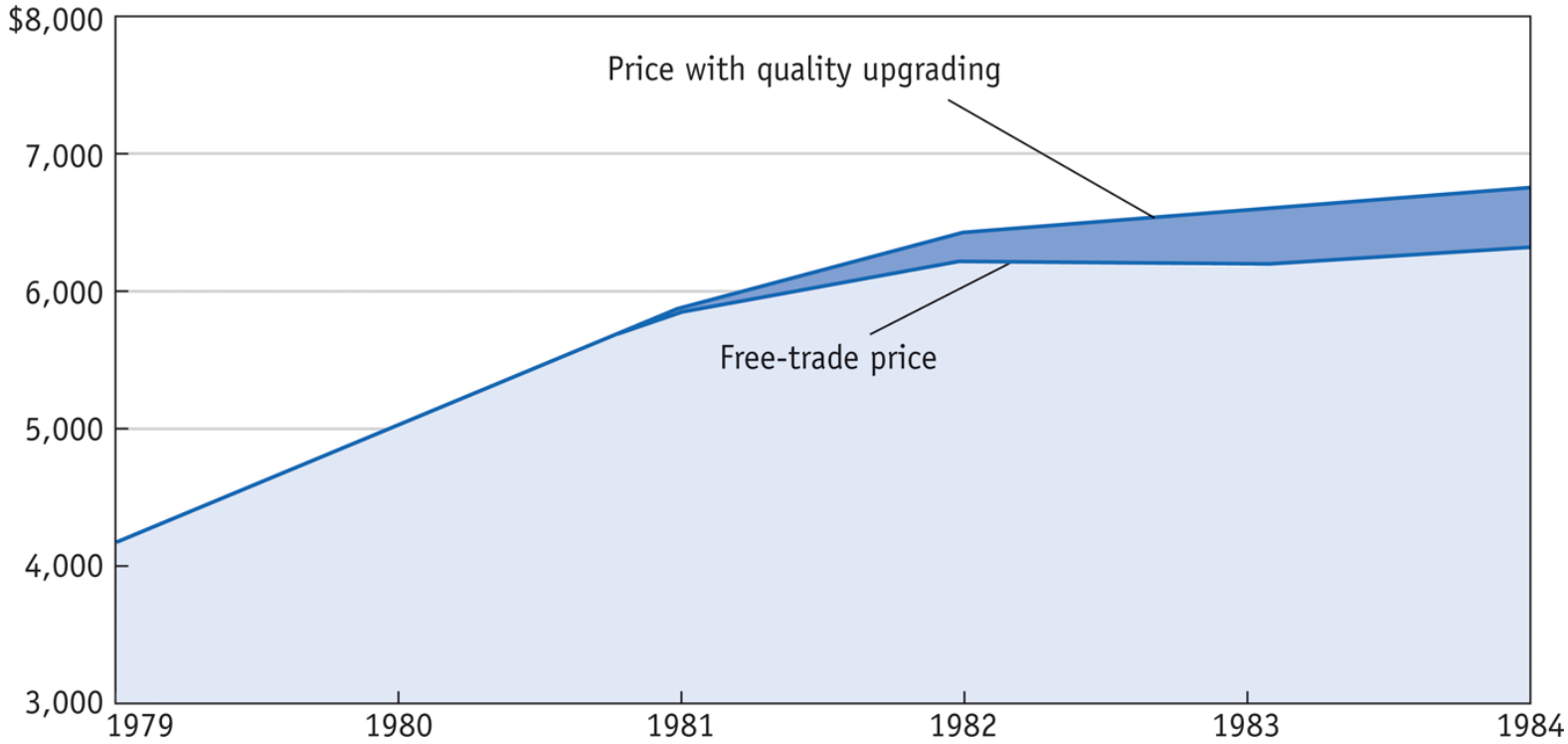
Price and Quality of Imports

- Figure from [FT]



Price of US Cars

- Figure from [FT]



Outline of the Lecture

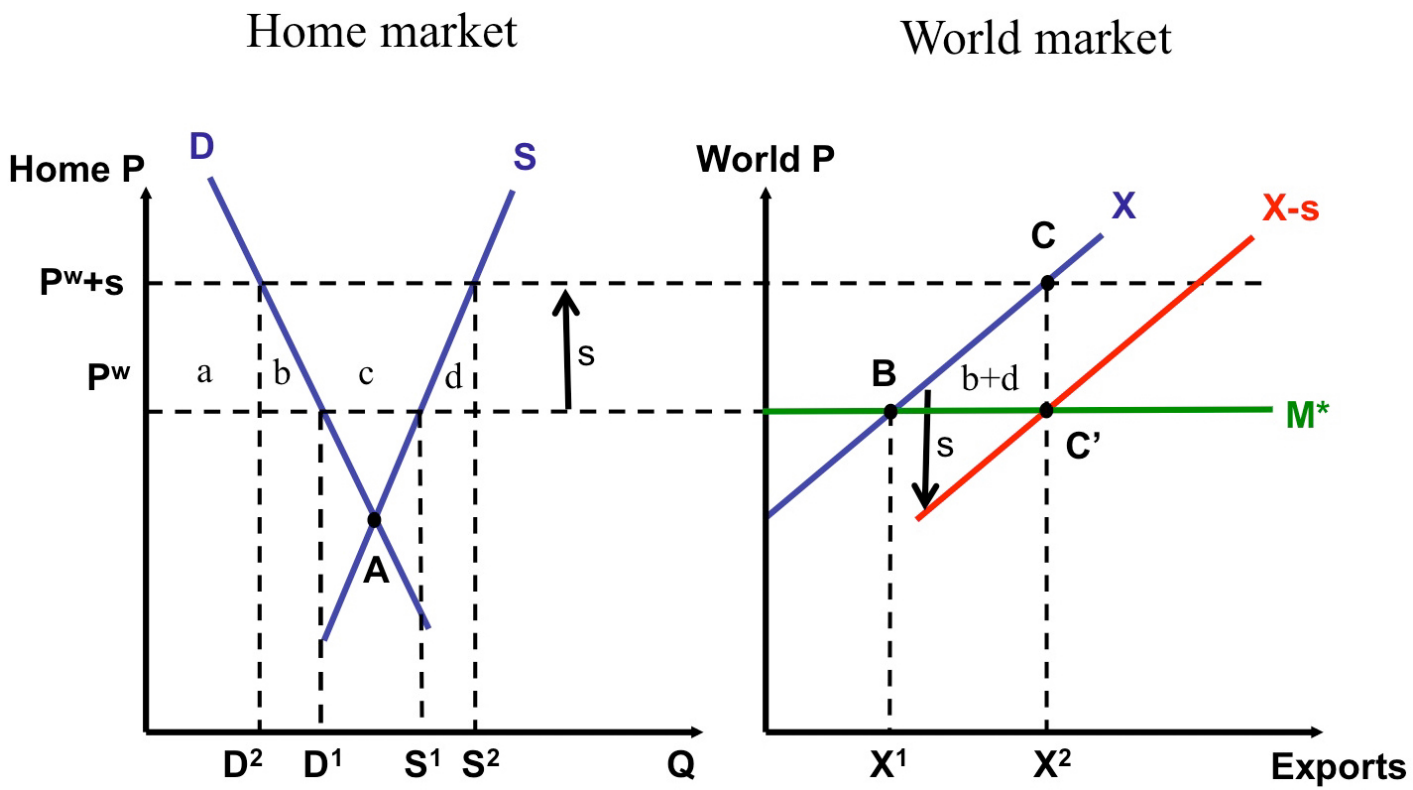
Export Subsidies - Basics

- An **export subsidy** is a payment to firms for every unit exported (fixed amount or a fraction of the sales price)
- Export subsidies are used by governments to encourage domestic production
  - Direct subsidies
  - Indirect subsidies
- WTO on export subsidies (more next lecture)

Agreements made at the Hong Kong WTO Meeting (December 2005)

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 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 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.

Impact of an Export Subsidy (SOE): Graph



Impact of an Export Subsidy (SOE): Price and Quantity

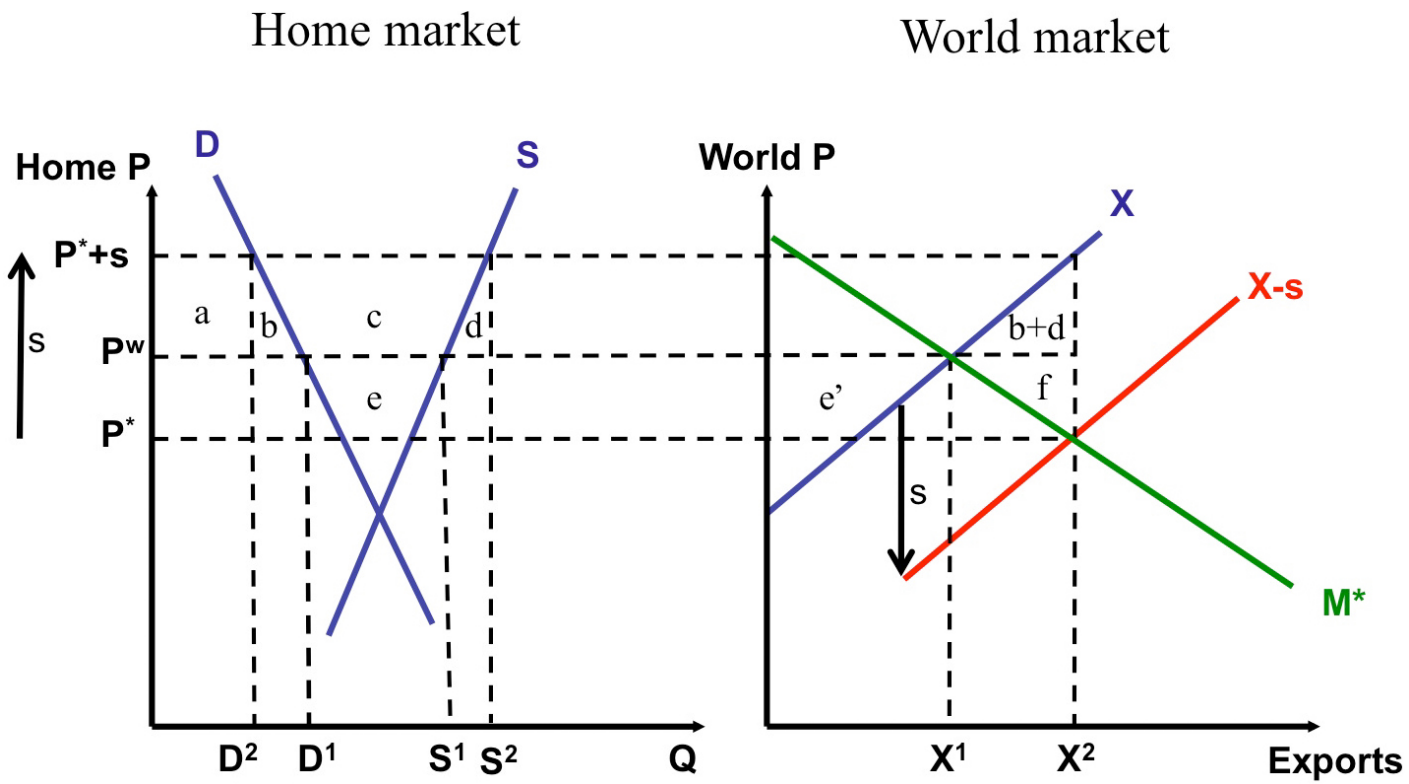
- Domestic Perspective
  - Movement along the domestic export supply curve
  - The export subsidy increases both the price and quantity of exports
- World Perspective
  - The export supply curve shifts down by the amount of subsidy
  - The export subsidy results in an increase in export supply and, given an unchanged world price (SOE)

$\Rightarrow$ The subsidy has driven a wedge between what domestic exporters receive and what importers abroad pay

Impact of an Export Subsidy (SOE): Welfare

- Welfare effects:
  - Home consumers lose: $\Delta CS = -(a+b)$
  - Home producers gain: $\Delta PS = +(a+b+c)$
  - Home government loses: $\Delta R = -(b+c+d)$
  - Net effect on Home welfare: $\Delta W = -(b+d)$
- Deadweight loss: $-(b+d)$
  - Production loss: d
  - Consumption loss: b

Impact of an Export Subsidy (LOE): Graph



Impact of an Export Subsidy (LOE): Price and Quantity

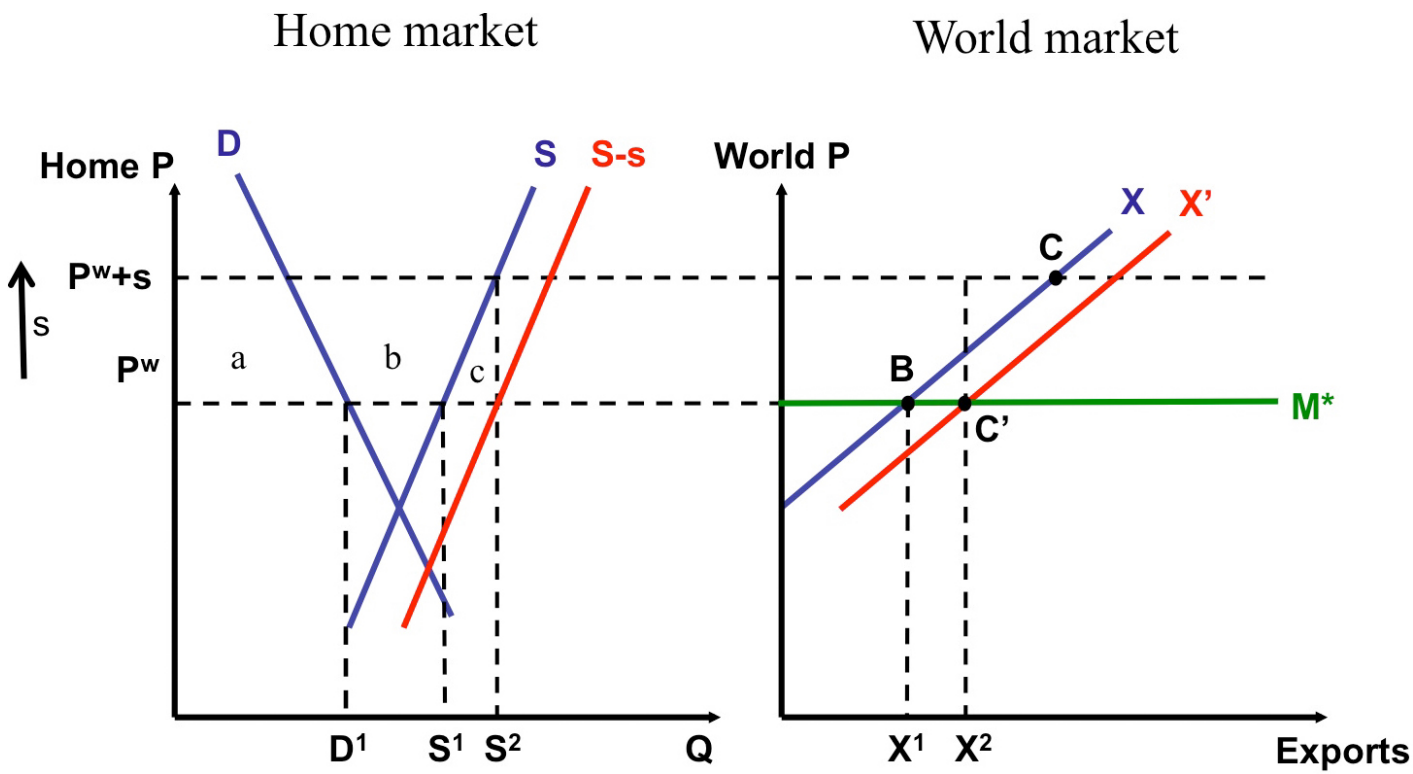
- A subsidy to Home export production shifts down the Home export supply curve
- LOE affects the world price
  - the world price goes down
  - the new domestic price goes up by less than the subsidy
- Terms of trade = ratio of export prices to import prices
  - Home: terms-of-trade loss
  - Foreign: terms-of-trade gain

Impact of an Export Subsidy (LOE): Welfare

- Home welfare:
  - Home consumers lose: $\Delta CS = -(a+b)$
  - Home producers gain: $\Delta PS = +(a+b+c)$
  - Home government loses: $\Delta R = -(b+c+d+e)$
  - Net effect on Home welfare: $\Delta W = -(b+d+e)$
- Deadweight loss: $-(b+d)$
  - Production loss: d
  - Consumption loss: b
- Extra source of loss for LOE: terms-of-trade loss: $e = e' + f$
- Foreign and world welfare:
  - Foreign definitely gains: $\Delta CS^* = +e'$
  - World welfare loss: $-(b+d+f)$

  $\rightarrow$ Home terms-of-trade loss is not completely offset by Foreign terms-of-trade gain

Impact of a Production Subsidy (SOE): Graph



Impact of a Production Subsidy (SOE): Price and Quantity

- The consumer price at home is not affected (no difference between domestic sales and exports)

$\Rightarrow$ Domestic demand unchanged

$\Rightarrow$ Exports rise by less than in the export subsidy case

Impact of a Production Subsidy (SOE): Welfare

- Home welfare:
  - Home consumers unaffected: $\Delta CS = 0$
  - Home producers gain: $\Delta PS = +(a + b)$
  - Home government loses: $\Delta R = -(a + b + c)$
  - Net effect on Home welfare: $\Delta W = -c$
- Deadweight loss: $-c$

$\rightarrow$ (lower than in the case of export subsidy, because consumer decisions unaffected)

$\Rightarrow$ The production subsidy is a better policy instrument to achieve an increase in Home supply

Targeting Principle

- To achieve some objective, it is best to use the policy instrument that achieves the objective most directly!

Impact of a Production Subsidy (LOE)

- LOE: downward-sloping Foreign import demand curve
- The increase in supply as a result of the production subsidy would lower the world price, but less than in the case of an export subsidy
- Production subsidies have a smaller impact on world prices and a smaller deadweight loss

Strategic Export Subsidies

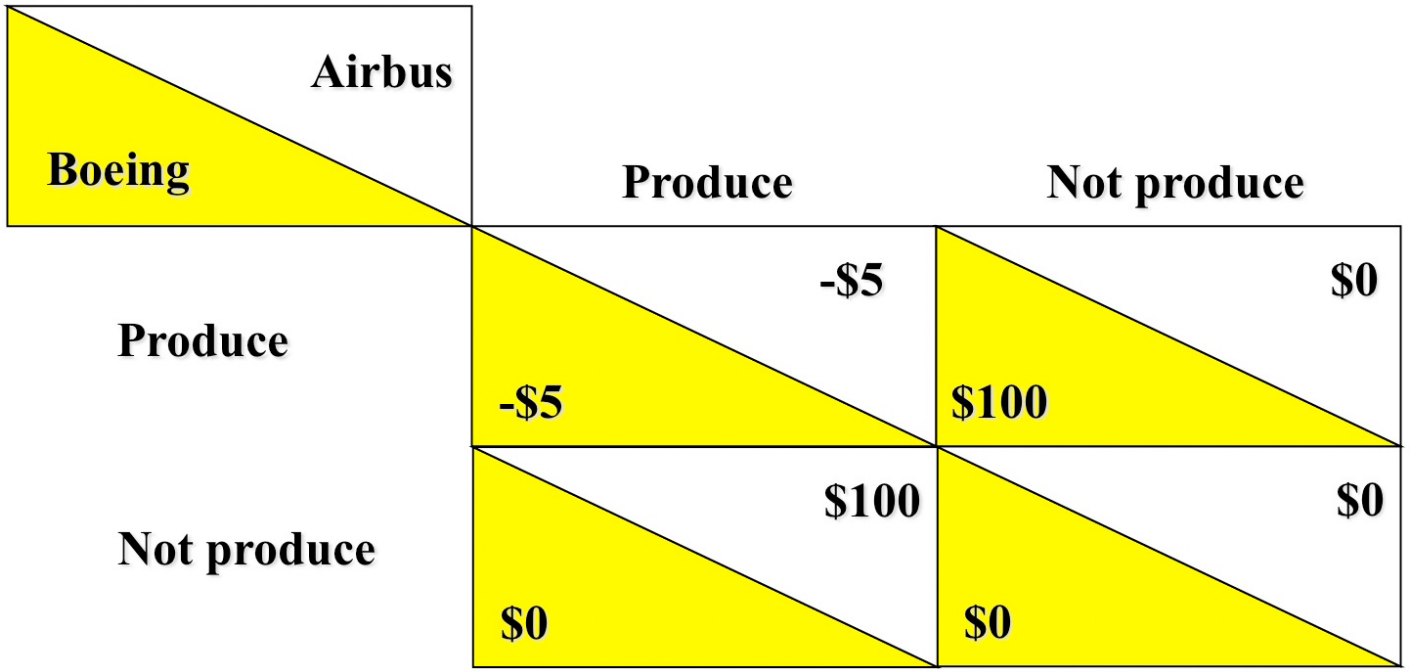
- Export subsidies might give a strategic advantage to export firms competing with a small number of rivals in international markets

→ Strategic trade policy in the presence of oligopoly

- Recall:
  - Oligopoly (duopoly)
  - Payoff matrix
  - Nash equilibrium

Example: Dupoly between Airbus and Boeing

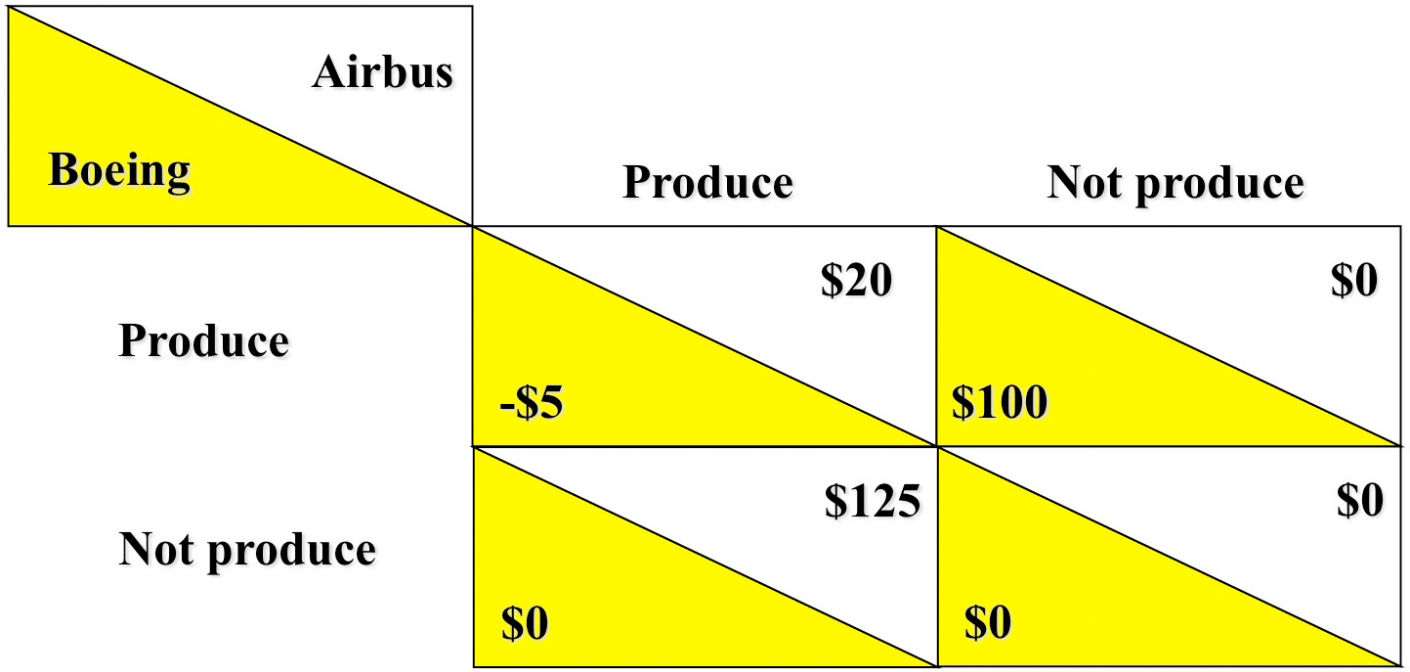
- Payoff matrix in million $:



- Nash equilibria? Best strategies?

Effect of a Subsidy to Airbus

- Payoff matrix in million $ with a $25 million subsidy to Airbus:



- Nash equilibria? Best strategies? Effect on European Welfare?

Export subsidies with imperfect competition: formal model

- Suppose a single home firm and a single foreign firm sell to a third market
  - Boeing vs Airbus in China
- Is it in national interest (i.e. welfare-improving) to subsidize?

Cournot duopoly

- x (x^*) sales of the home (foreign) firm
- x and x^* differentiated products
- Home firm earns the price $p(x, x^*)$, Foreign firm earns $p^*(x, x^*)$
- Home export profits

$$\pi = p(x, x^*)x - C(x)$$

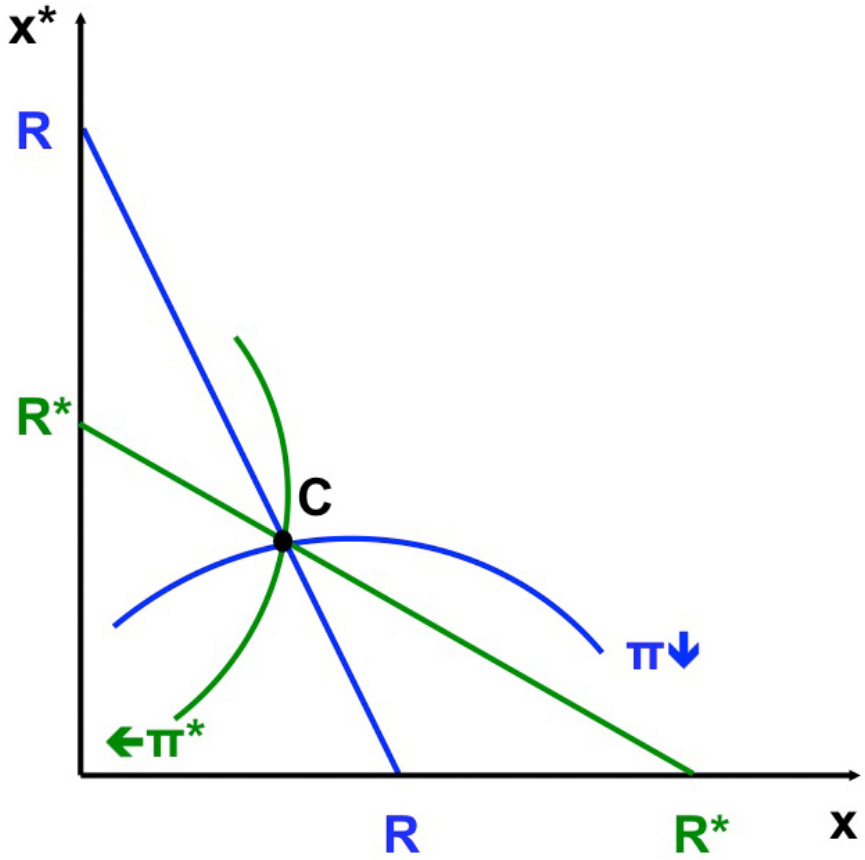
- FOC

$$\pi_x = p(x, x^*) + xp_x - c'(x) = 0 \tag{1}$$

- SOC: $\pi_{xx} = 2p_x + xp_{xx} - C'' < 0$
- Using (1), we obtain home reaction function (home exports x as a function of foreign sales x^*): $x = r(x^*)$. Same for foreign.
  - downward sloping

Cournot duopoly: graph

- The intersection of the rection functions determines the Cournot equilibrium.



Cournot duopoly: impact of an export subsidy

- $p(x, x^*)$ price paid by the buyer, s specific subsidy, $p(x, x^*) + s$ price received by home firm
- Home profits

$$\pi = [p(x, x^*) + s]x - C(x) \tag{2}$$

- FOC

$$\pi_x = p(x, x^*) + s + xp_x - c'(x) = 0 \tag{3}$$

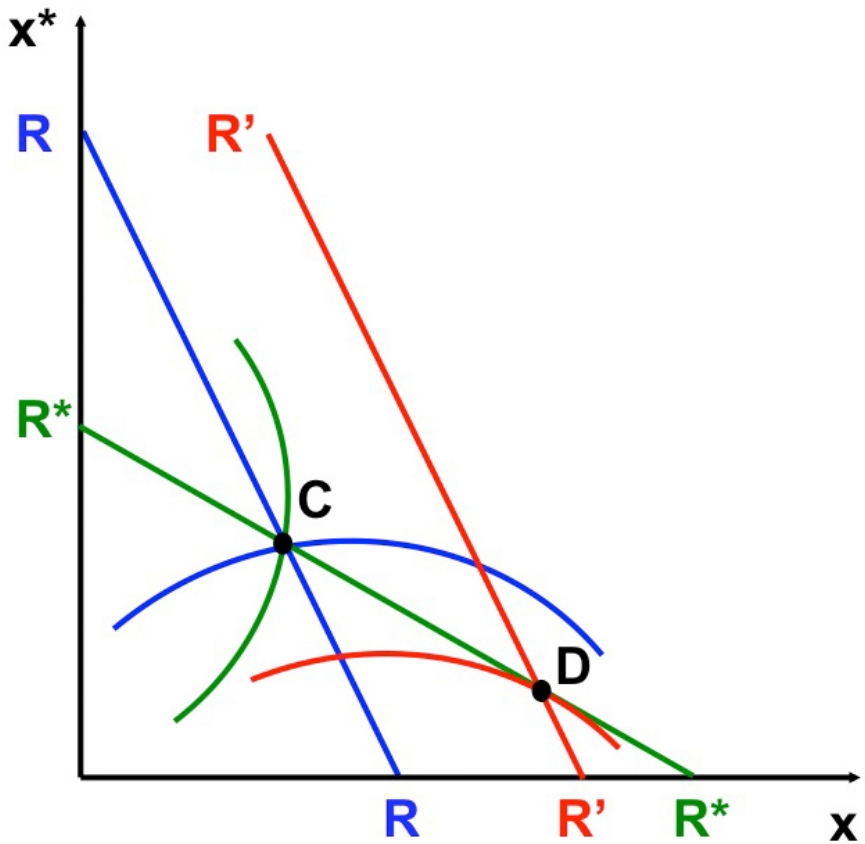
where (3) defines a new reaction curve $x = r(x^*, s)$

- Totally differentiating (3) gives

$$\frac{dx}{ds} = -\frac{1}{\pi_{xx}} > 0 \quad \text{by SOC}$$

Subsidy in Cournot duopoly: graph

- The export subsidy shifts the home reaction curve to the right from RR to $R'R'$
  - $x \uparrow, x^* \downarrow \Rightarrow \pi \uparrow$



Subsidy in Cournot duopoly: effect on welfare

- Welfare with the subsidy s:

$$W = [p(x, x^*) + s]x - C(x) - sx = p(x, x^*)x - C(x) \tag{4}$$

- The original iso-profit curve π measures social welfare
- Note profits in (2) and social welfare in (4) are evaluated at different equilibrium quantities (C vs D)!
  - $W \uparrow$
  - Optimal subsidy where welfare contour tangent to foreign reaction curve

Bertrand duopoly

- Home and Foreign firms are now choosing prices
  - $x(p, p^*)$ denotes exports of the home firms to the third market, p price paid by the buyer
- Home profits

$$\pi = (p + s)x(p, p^*) - C[x(p, p^*)] \tag{5}$$

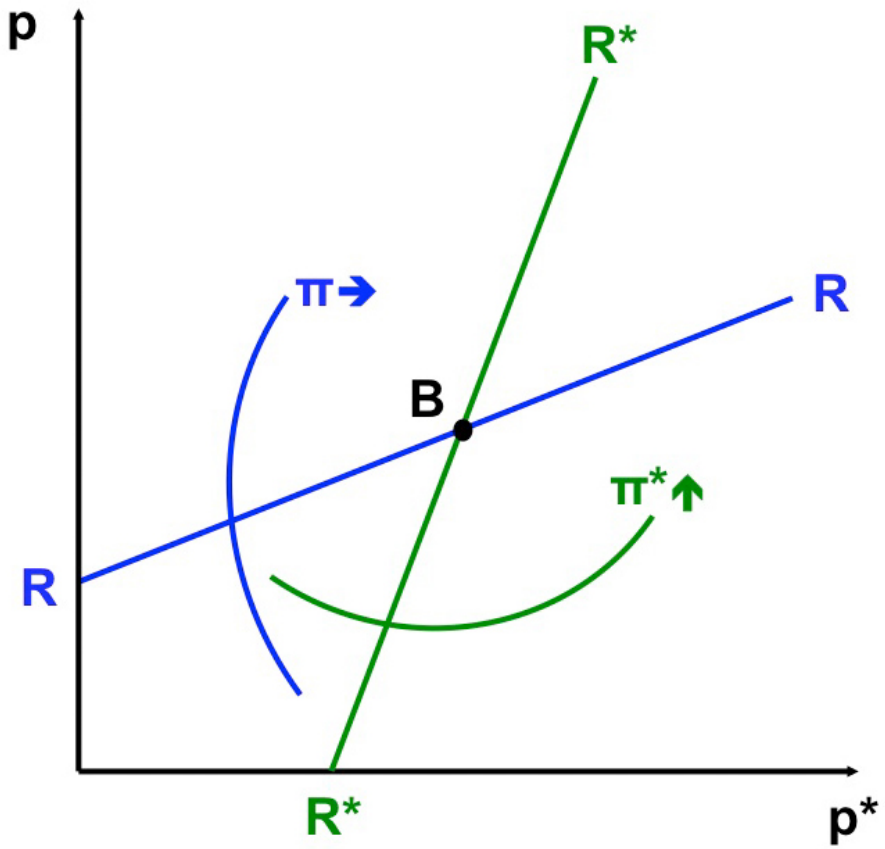
- FOC

$$\pi_p = x(p, p^*) + (p + s)x_p - C'(x)x_p \tag{6}$$

- Given the foreign price p^* and the subsidy s, we can use (6) to express the home reaction function $p = r(p^*, s)$. Same for Foreign.
  - upward sloping

Bertrand duopoly: graph

- The intersection of the rection functions determines the Betrand equilibrium.



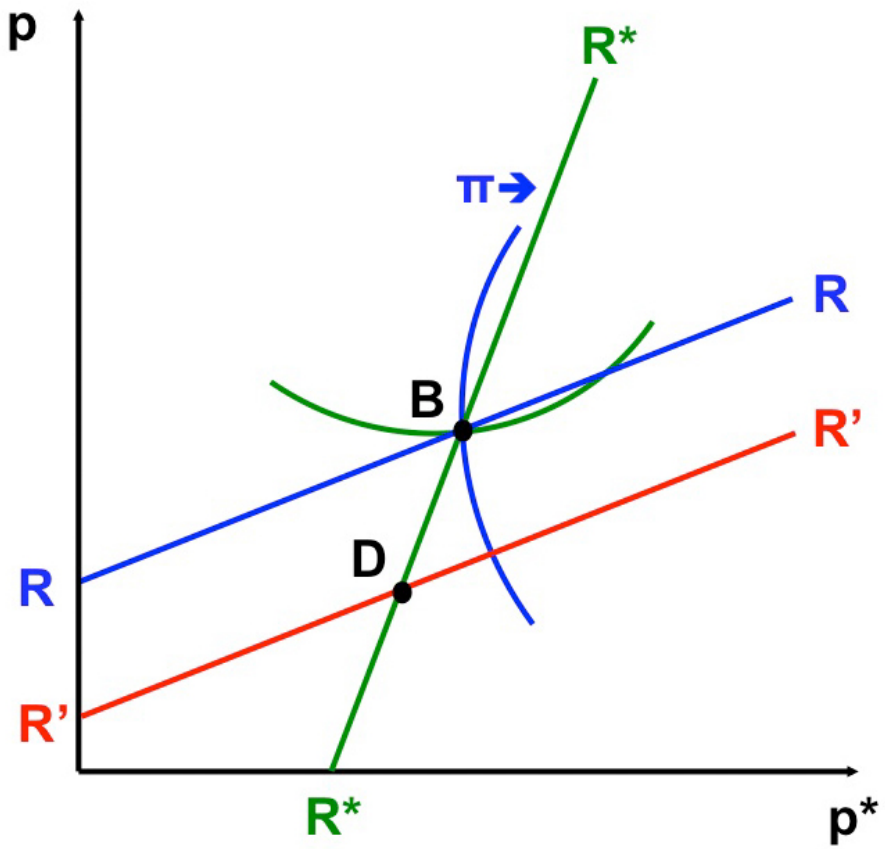
Betrand duopoly: impact of an export subsidy

- How does the application of a subsidy shift the home reaction curve?
- Totally differentiating (6)

$$\frac{dp}{ds} = -\frac{x_p}{\pi_{pp}} < 0 \quad \text{by SOC} \tag{7}$$

  - so and export subsidy will lower the price charged by the home firm for its exports
  - the equilibrium is moved from B to a point like D

Subsidy in Betrand duopoly: graph



Subsidy in Betrand duopoly: effect on welfare

- Welfare with the subsidy s:

$$W = (p+s)x(p,p^*) - C[x(p,p^*)] - sx(p,p^*) = px(p,p^*) - C[x(p,p^*)] \tag{8}$$

- The original iso-profit curve π measures social welfare
  - Increases in the rightward direction, i.e. when $p^* \uparrow$
- Hence export subsidy, by leading to a fall in prices, reduces home welfare.
  - Any increase in home profits inclusive of the subsidy is more than offset by the revenue cost of the subsidy.
- For the home country to gain from export policy, it must impose an export tax.

Strategic Trade Policy Theorem

1. **Brander and Spencer (1985):** Under Cournot duopoly, a subsidy to exports raises home welfare.

2. **Eaton and Grossman (1986):** Under Betrand duopoly, a tax on exports raises home welfare.