International Trade I: Theory

Trade Policy

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Outline of the Lecture

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Trade Policy: The Empirical Landscape

- Average tariffs fell dramatically across the globe from 1950-2018
  - Average tariffs higher in low-income countries than in middle income countries, which are higher than in high income countries
  - Applied tariffs lower than bound tariffs in many low and middle income countries
  - Some sectors still high tariffs: textile, apparel, footwear in the US
  - Tariff escalation; higher tariffs on final goods than capital and intermediate goods
  - Discrimination, especially via: (i) regional and bilateral agreements (ii) administered protection, e.g., anti-dumping
- Non-tariff barriers still/more important
  - Quotas, other QRs have mostly been eliminated (but returning?)
  - Regulatory restrictions
  - Hidden barriers, red tape etc. Large “border effect” remains in empirical studies of trade flows
- Trump tariffs (discriminatory, not rules-based, high on intermediate goods); Anti-globalization trends since 2018

Trade policy literature: key questions

1. **Individual country prespective:**
   - Why are countries protectionist?
   - Can protectionism ever be “optimal”?
   - Can we explain how trade policies vary across countries, industries, and time?

2. **World perspective:**
   - How should trade agreements be designed?
   - Can we explain the main institutional features of actual trade agreements (e.g. WTO, NAFTA, EU)?

Trade policy literature: importance of model choice

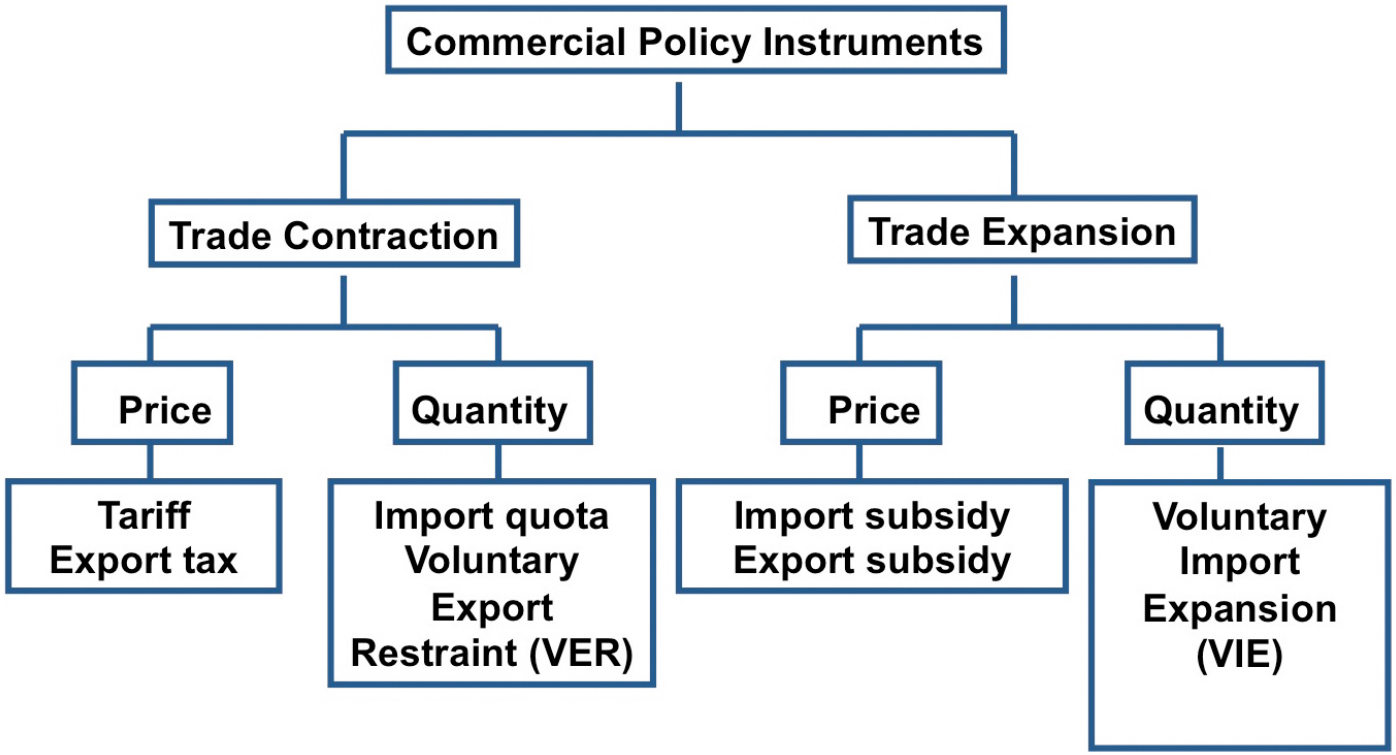
- In order to shed light on these questions, one needs to take a stand on:

1. **Economic environment:** What is the market structure? Are there distortions, e.g. unemployment or pollution?

2. **Political environment:** What is the objective function that governments aim to maximize, e.g. social welfare, welfare of the median voter, political support? What are the trade policy instruments, e.g. import tariffs, quotas, product standards? Are trade policy instruments the only instruments available?

3. **Constraints on the set of feasible contracts:** Do trade agreements need to be self-enforcing? How costly is it "to complete" contracts?

Classification of Trade Policy Instruments



- Other possible instruments: licensing, product regulation, administrative...

Plan for the remaining lectures

1. The effects of **import tariffs** under different environments
2. The effects of **quotas and export subsidies** under different environments
3. Political economy of trade policy
4. Trade agreements

Import Tariff Classification

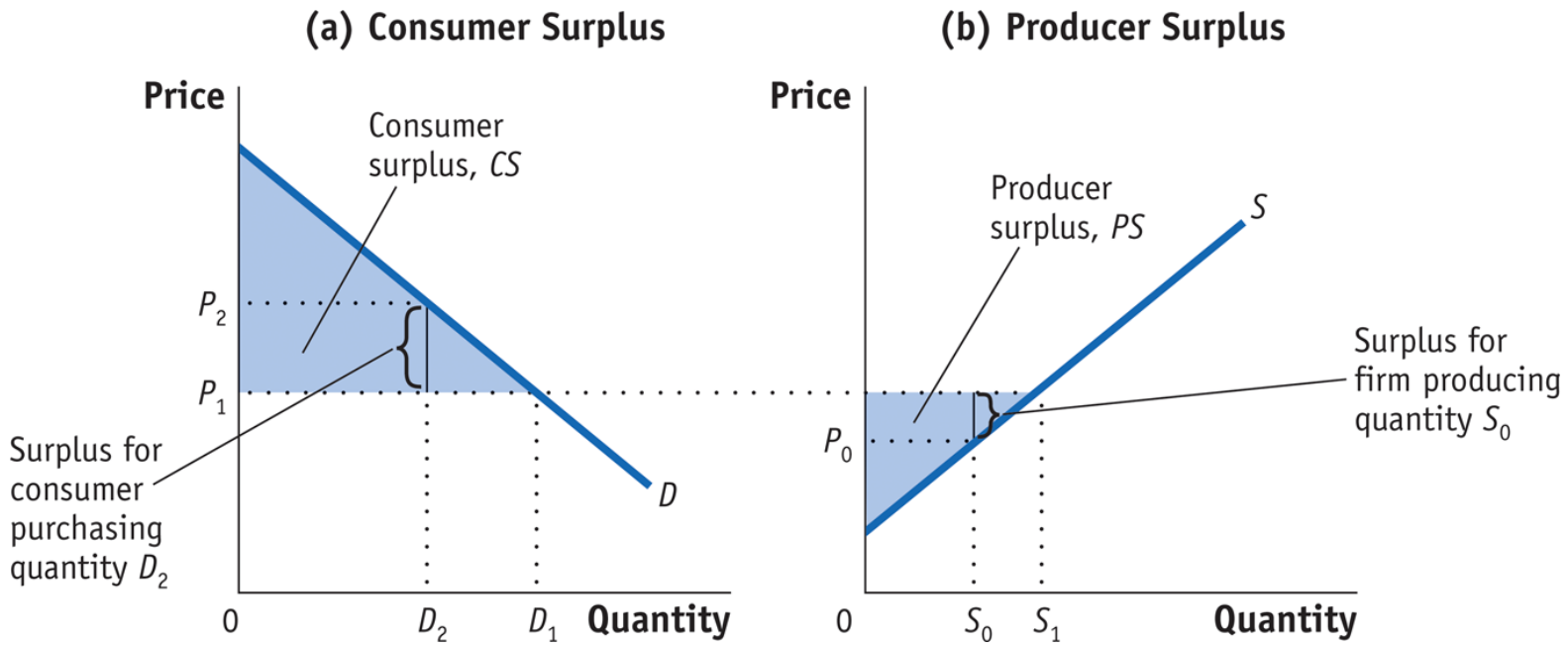
Tariffs can be classified as:

- **Specific tariffs:** Taxes that are levied as a fixed charge for each unit of goods imported
  - E.g.: A specific tariff of $10 on each imported bicycle with an international price of $100 means that customs officials collect the fixed sum of $10.

- **Ad valorem tariffs:** Taxes that are levied as a fraction of the value of the imported goods
  - E.g.: A 20% ad valorem tariff on bicycles generates a $20 payment on each $100 imported bicycle.

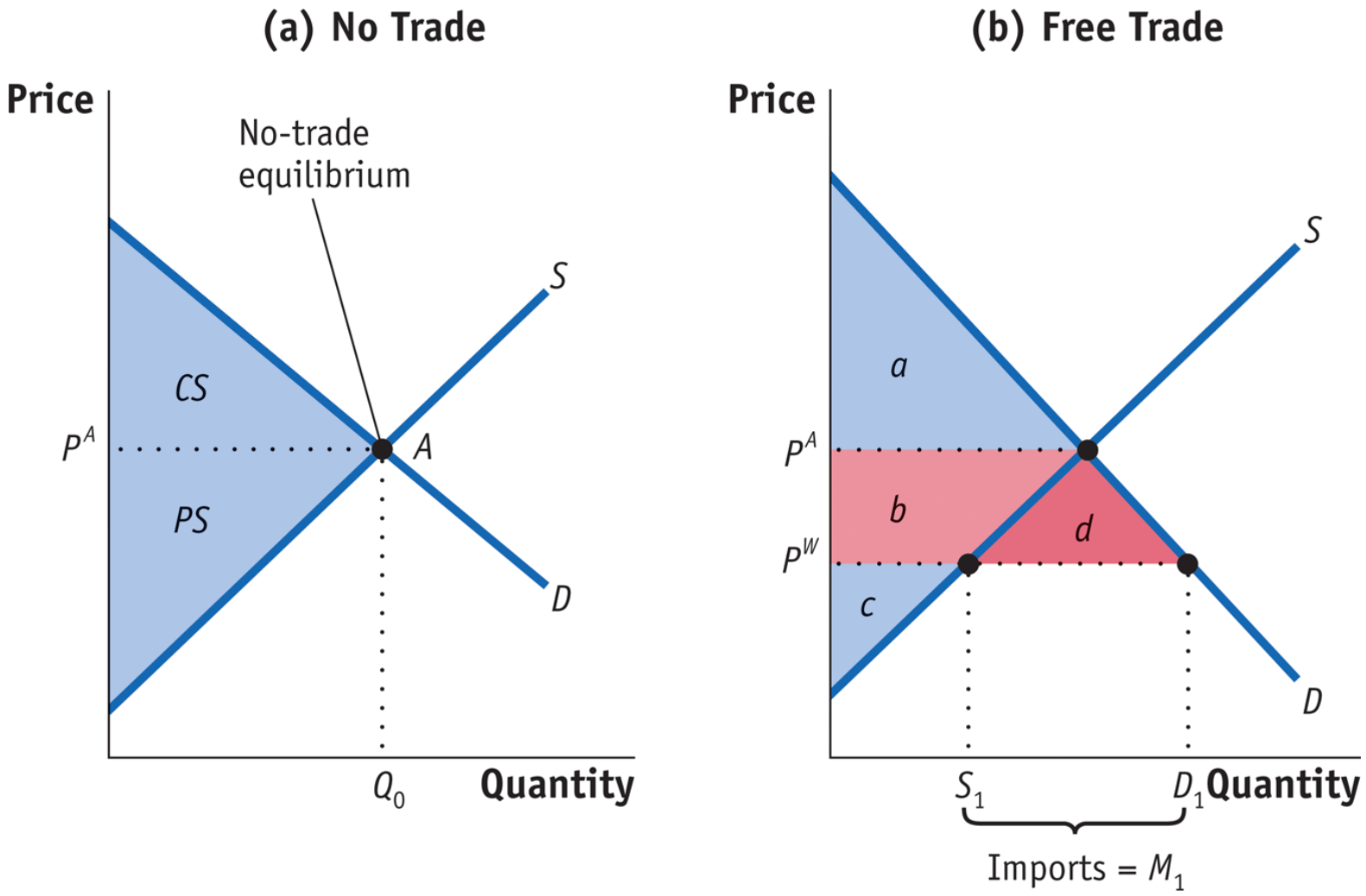
Recap: consumer and producer surplus

- Figure from [FT]:



Trade and home welfare

- Figure from [FT]:



Gains from trade

- Total change in Home welfare due to opening of trade:
  - Rise in consumer surplus: $\Delta CS = +(b + d)$
  - Fall in producer surplus: $\Delta PS = -b$
  - **Net effect on Home welfare:** $\Delta W = +d$

Main assumptions

De facto partial equilibrium analysis:

- Single import good subject to a tariff
  - p price of that good in the importing country
  - p^* world price of that good, $p = p^* + t$
- Numéraire good traded at a fixed world price $= 1$
- Labor $=$ only factor of production, 1 unit of labor needed to produce 1 unit of the numéraire $\Rightarrow$
  - $w = 1$
  - total income $= L$

Social welfare

- Social welfare

$$W[p, L + tm + py - C(y)] \equiv W(t) \tag{1}$$

  - y: output
  - $C(y)$: cost of production with marginal cost $C'(y)$
    - ★ Under perfect competition, $C(y)$ denotes industry costs
    - ★ Under monopoly, $C(y)$ denotes the firm's costs
    - ★ Under oligopoly with a homogeneous product, we should replace $C(y)$ with $NC(y)$ where N is the number of firms
  - $m = d(p) - y$: imports with $d'(p) < 0$
  - tm: tariff revenue redistributed back to consumers
  - $py - C(y)$: profits of the import-competing industry also redistributed to consumers

Variations of social welfare with the tariff

$$\frac{dW}{dt} = \underbrace{-m\frac{dp^*}{dt}}_{ToT} + \underbrace{t\frac{dm}{dp}\frac{dp}{dt}}_{VoT} + \underbrace{[p - C'(y)]\frac{dy}{dt}}_{PS} \tag{2}$$

- TOT: terms-of-trade effect
- VOT: volume-of-trade effect
- PS: profit-shifting effect

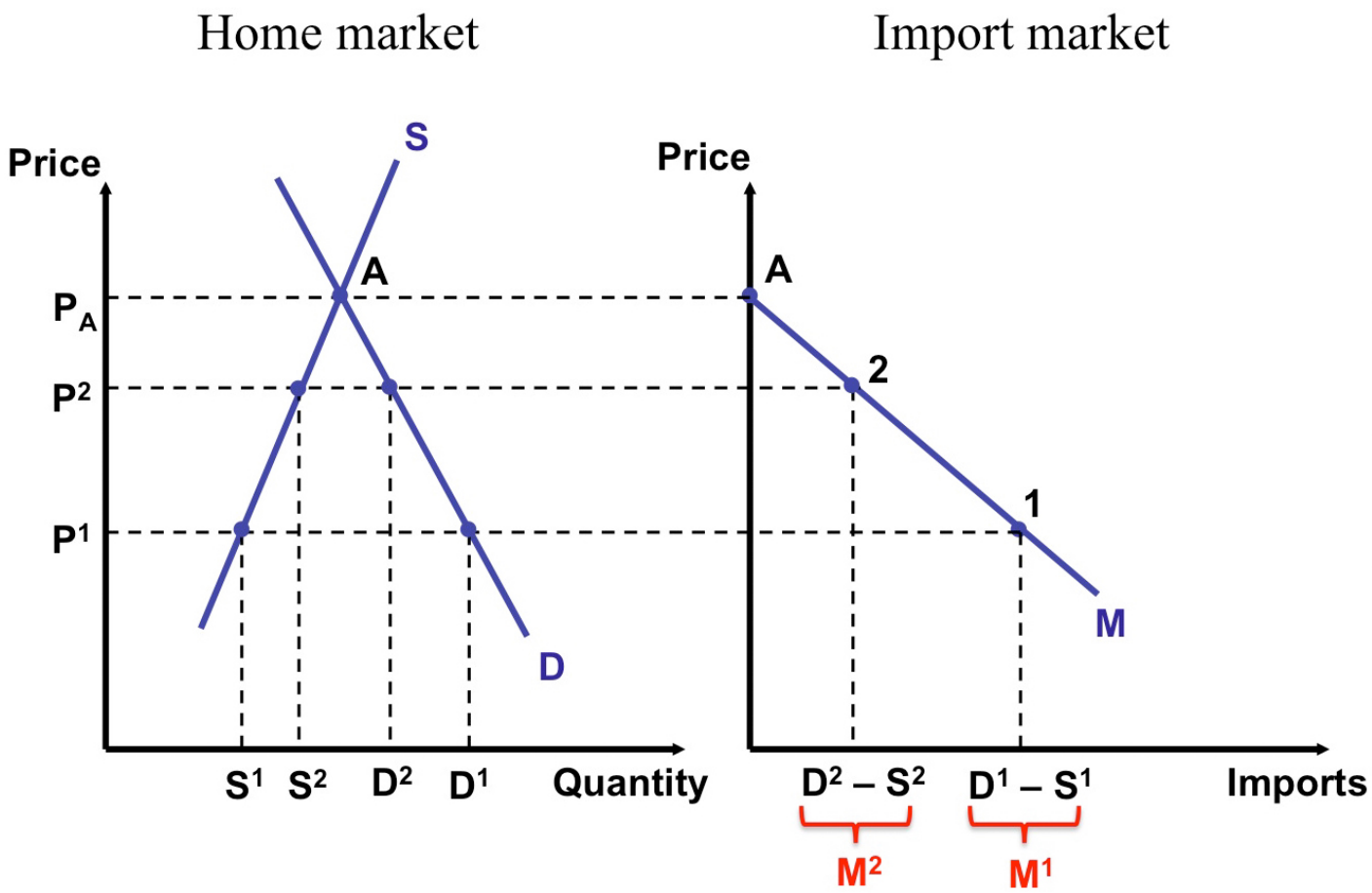
Outline of the Lecture

Basic Tariff Analysis: SOE

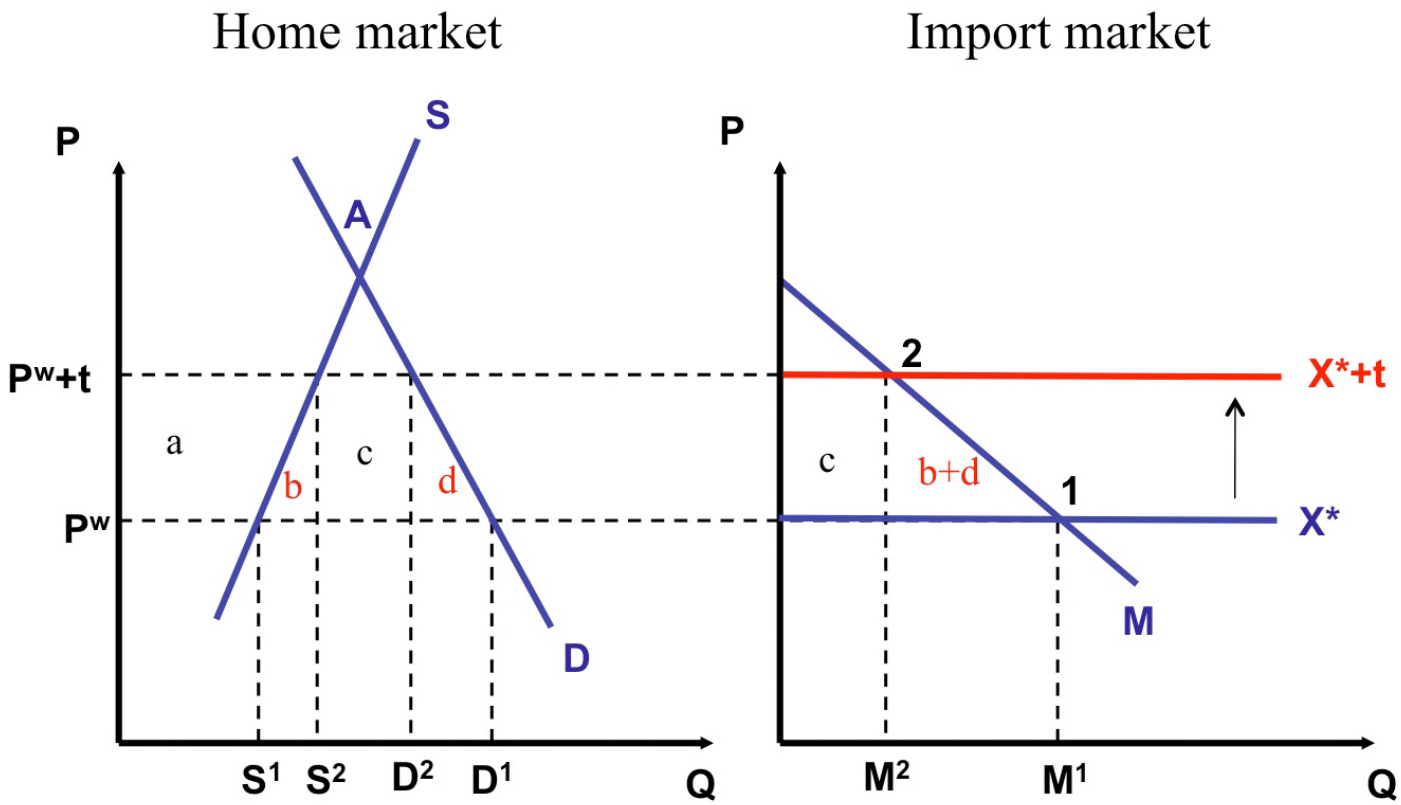
- Assumptions:
  - Home is small (Small Open Economy - SOE)
    - ★ It cannot affect world prices
    - ★ It faces a horizontal Foreign export supply
  - Partial equilibrium (one industry only)
  - Perfect competition

- To analyze the relationship between the world price and the quantity demanded by Home consumers (and the effect of a tariff on this relationship): **Import demand curve**
  - Shows the maximum quantity of imports the Home country would like to consume at each price of the imported good.
  - It is the excess of what Home consumers demand over what Home producers supply: $M = D(P) - S(P)$

Home Import Demand Curve



Effect of an Import Tariff in a SOE: Graph



Effect of an Import Tariff in a SOE: Summary

- SOE $\Rightarrow$ world price unchanged, home price rises, imports fall
- Welfare effects:
  - Home consumers lose: $\Delta CS = -(a + b + c + d)$
  - Home producers gain: $\Delta PS = +a$
  - Government gains: $\Delta TR = +c$
  - **Net effect on Home welfare (deadweight loss):** $\Delta W = -(b + d)$
- Conclusion: A tariff always leads to a deadweight loss for a small importing country

Effect of an Import Tariff in a SOE: Algebra

- (2) gives the decomposition of the effect of a tariff on W:

$$\frac{dW}{dt} = \underbrace{-m\frac{dp^*}{dt}}_{ToT} + \underbrace{t\frac{dm}{dp}\frac{dp}{dt}}_{VoT} + \underbrace{[p - C'(y)]\frac{dy}{dt}}_{PS}$$

- Perfect competition $\Rightarrow p - C'(y) = 0$
- Small country $p = p^* + t$ with p^* fixed and so
  - $dp^*/dt = 0$
  - $dp/dt = 1$
- Hence (2) becomes

$$\frac{dW}{dt} = t\frac{dm}{dp}$$

Optimal Tariff for a SOE: Algebra

- *The optimal tariff for a small country is zero:*

$$\left.\frac{dW}{dt}\right|_{t=0} = 0 \quad \text{and} \quad \left.\frac{d^2W}{dt^2}\right|_{t=0} = \frac{dm}{dp} < 0$$

- Welfare loss from applying a tariff t:

$$W(t) - W(0) \approx \frac{1}{2}t^2 \left.\frac{d^2W}{dt^2}\right|_{t=0} = \frac{1}{2}t^2\frac{dm}{dp} = \frac{1}{2}\Delta p \Delta m < 0$$

So why are tariffs applied?

- "Easy-to-collect" source of government revenue
- Politics

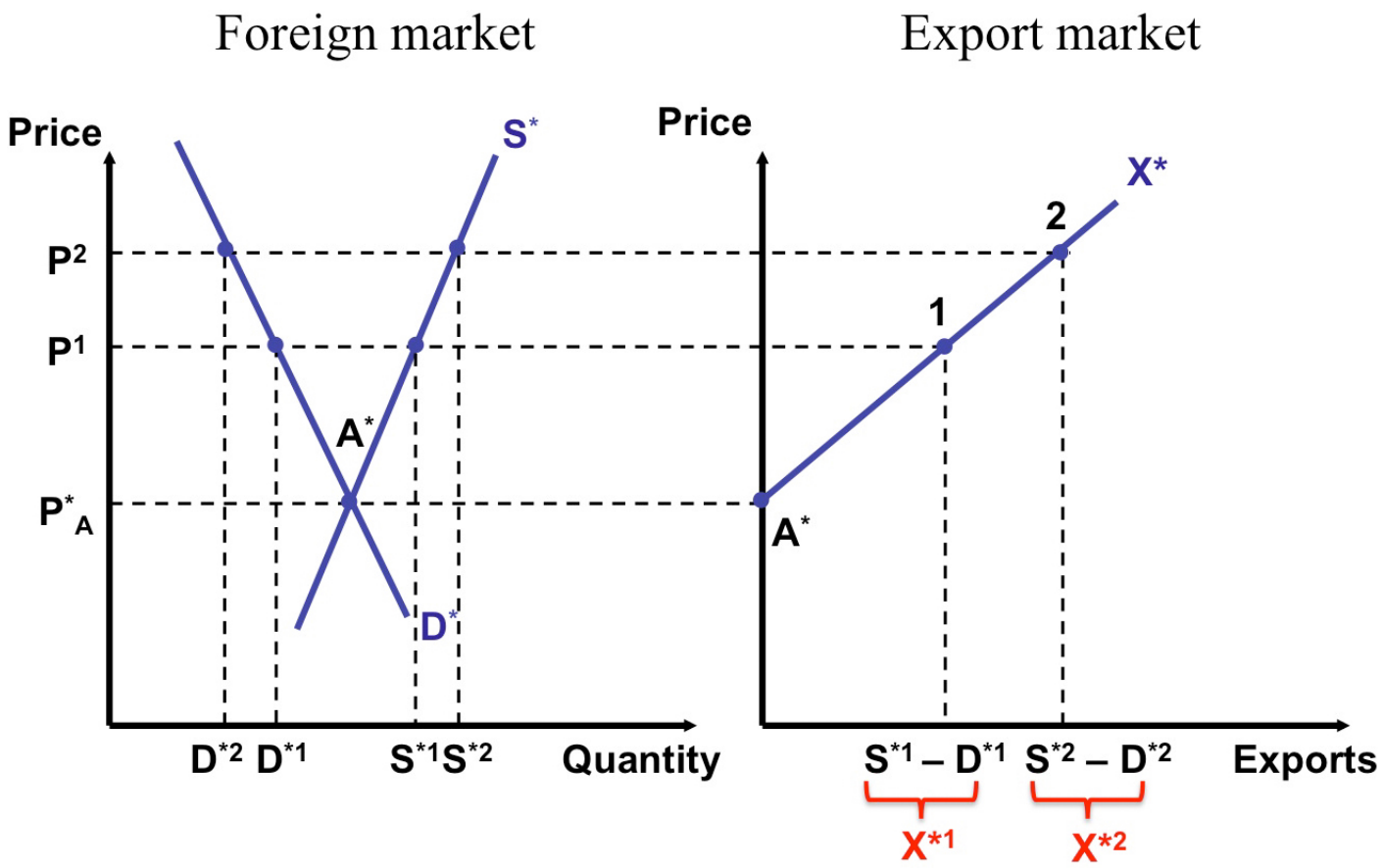
- Note that protection combines a production subsidy and a consumption tax at the same rate
- The same level of output could be achieved at less efficiency cost by the production subsidy only
  - Why tax only the consumers of *that* good?
- So, most of the (few) good arguments for protection are arguments for *production subsidies*, not for tariffs
- More generally: the case for free trade is *not* the same as the case for *laisser faire*

Basic Tariff Analysis: LOE

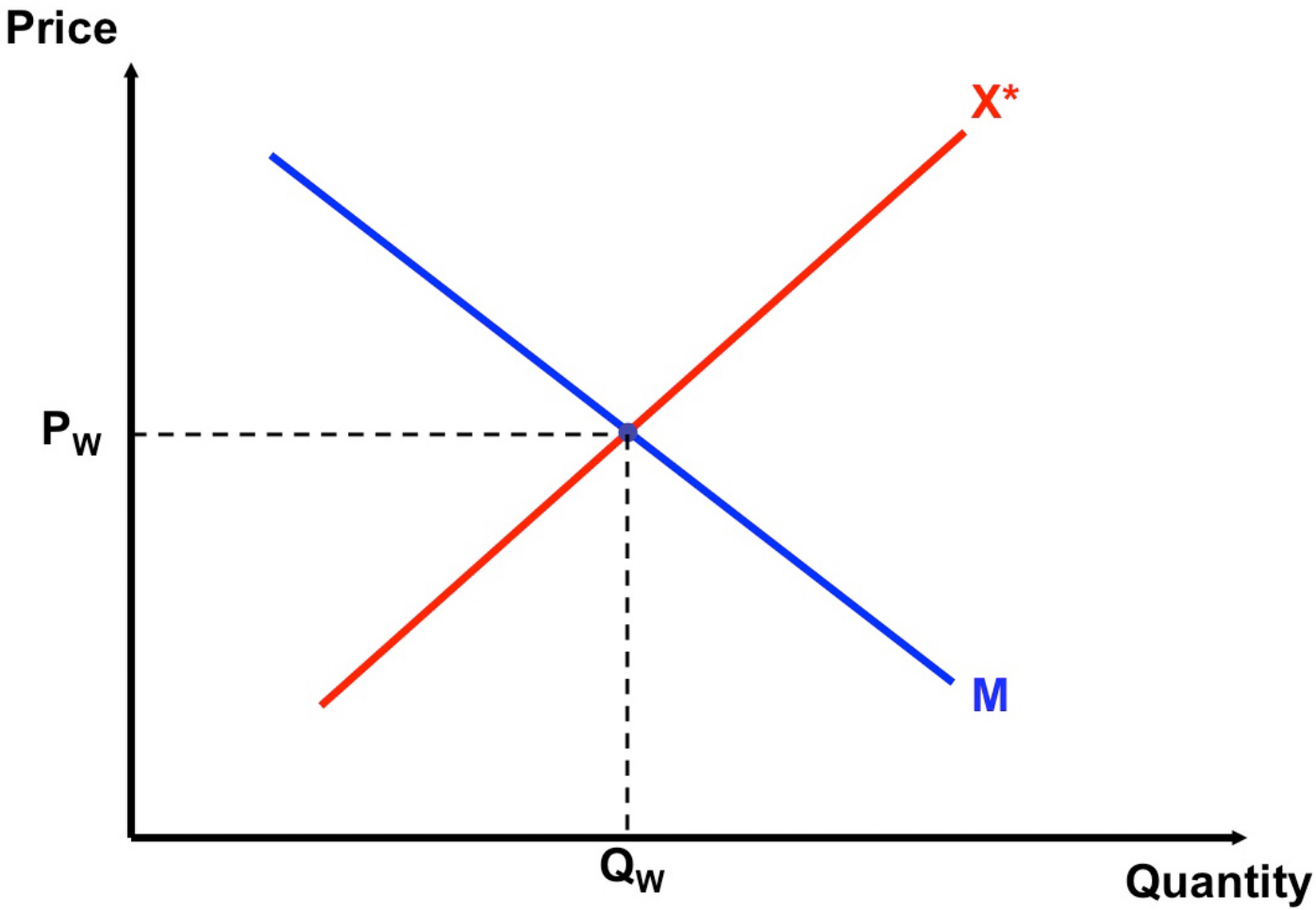
- Assumptions:
  - Home is large (Large Open Economy - LOE)
    - ★ It can affect world prices
    - ★ It does not face a horizontal Foreign export supply
  - Partial equilibrium (one industry only)
  - Perfect competition

- **Foreign export curve**
  - Shows the maximum quantity exported by foreign firms at each price.
  - It is the excess of what foreign producers supply over what foreign consumers demand: $X^* = S^*(P^*) - D^*(P^*)$

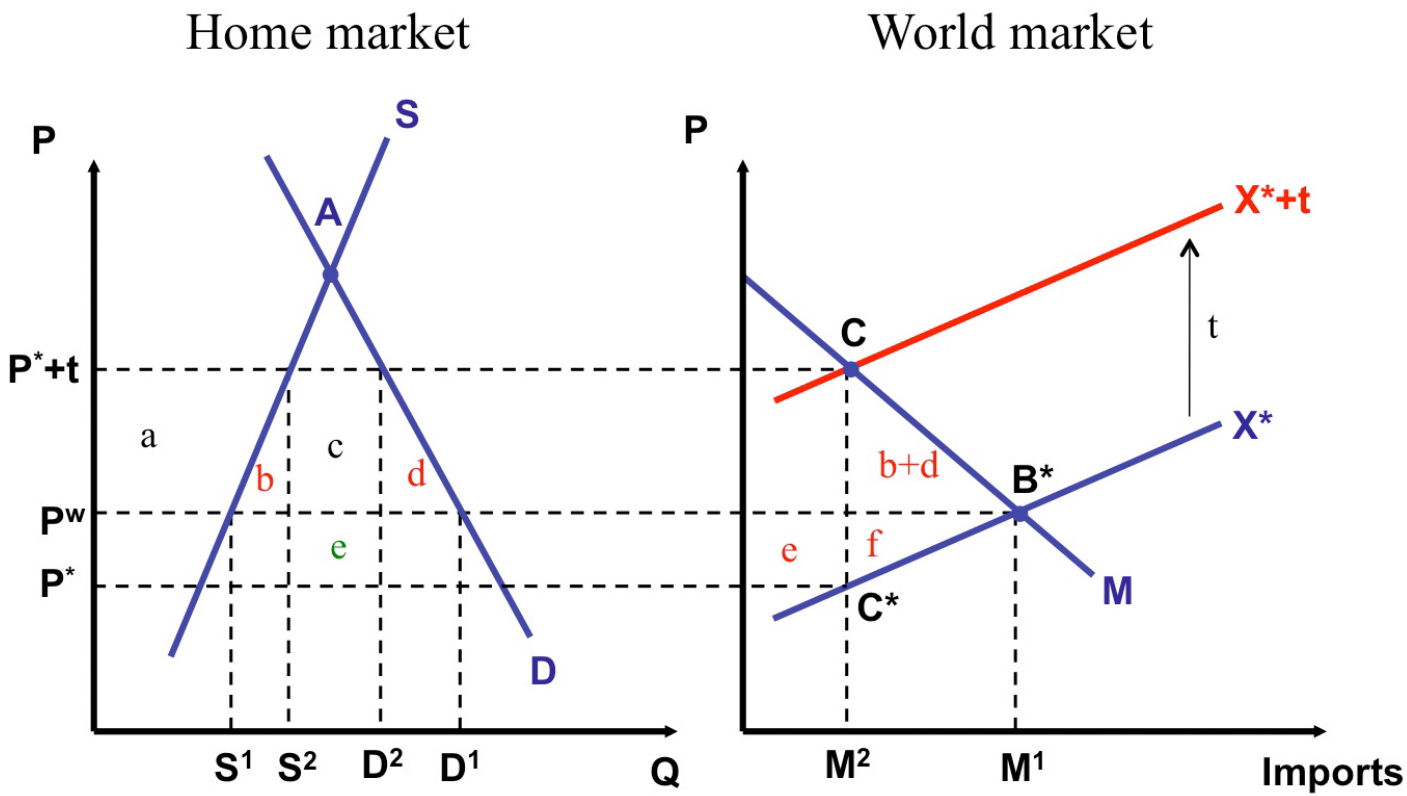
Foreign Export Supply Curve



World Market Equilibrium



Effect of an Import Tariff in a LOE: Graph



Trade Effects of an Import Tariff in a LOE

- In the absence of tariff, the world price is P^w
- LOE $\Rightarrow$ can affect world prices:
  - Tariff pushes up the home price to $P^* + t$
  - Tariff pushes down the world price to P^* (the price difference is t)
  - The increase in the domestic Home price is less than the tariff, because part of the tariff is reflected in a decline in Foreign's export price (difference with SOE)
- In Home: producers supply more and consumers demand less due to the higher price, so that fewer imports are demanded
- Foreign: producers supply less and consumers demand more due to the lower price, so that fewer exports are supplied.

$\Rightarrow$ Thus, trade volume declines due to the imposition of the tariff.

Home Welfare Effects of an Import Tariff (LOE)

- **Home welfare effects:**
  - Home consumers lose: $\Delta CS = -(a+b+c+d)$
  - Home producers gain: $\Delta PS = +a$
  - Government gains: $\Delta TR = +(c+e)$
  - **Net effect on Home welfare:** $\Delta W = +e-(b+d)$

$\Rightarrow$ A large country can gain from imposing a tariff if the **terms-of-trade gain** e exceeds the deadweight loss $b+d$

- **Optimal tariff** argument for a tariff: only valid argument for the use of a tariff with perfect competition

- But...

Foreign and World Welfare Effects of an Import Tariff (LOE)

- **Foreign welfare effects:** Foreign producers lose: $\Delta W^* = \Delta PS^* = -(e + f)$

$\Rightarrow$ The exporting country definitely loses

- Note: Home's gain comes at the expense of Foreign ("beggar thy neighbor" policy)

- **World welfare effects:** $\Delta W^W = -(b + d + f)$ (deadweight loss for the world)

Effect of an Import Tariff in a LOE: Algebra

- (2) gives the decomposition of the effect of a tariff on W:

$$\frac{dW}{dt} = \underbrace{-m\frac{dp^*}{dt}}_{ToT} + \underbrace{t\frac{dm}{dp}\frac{dp}{dt}}_{VoT} + \underbrace{[p - C'(y)]\frac{dy}{dt}}_{PS}$$

- Perfect competition $\Rightarrow p - C'(y) = 0$
- Hence (2) becomes

$$\frac{dW}{dt} = -m\frac{dp^*}{dt} + t\frac{dm}{dp}\frac{dp}{dt}$$

Optimal Tariff for a LOE: Algebra

- The optimal tariff for a large country is not zero:

$$\left.\frac{dW}{dt}\right|_{t=0} = -m\frac{dp^*}{dt} > 0$$

- *The optimal percentage tariff t^*/p^* equals the inverse of the elasticity of foreign export supply.*

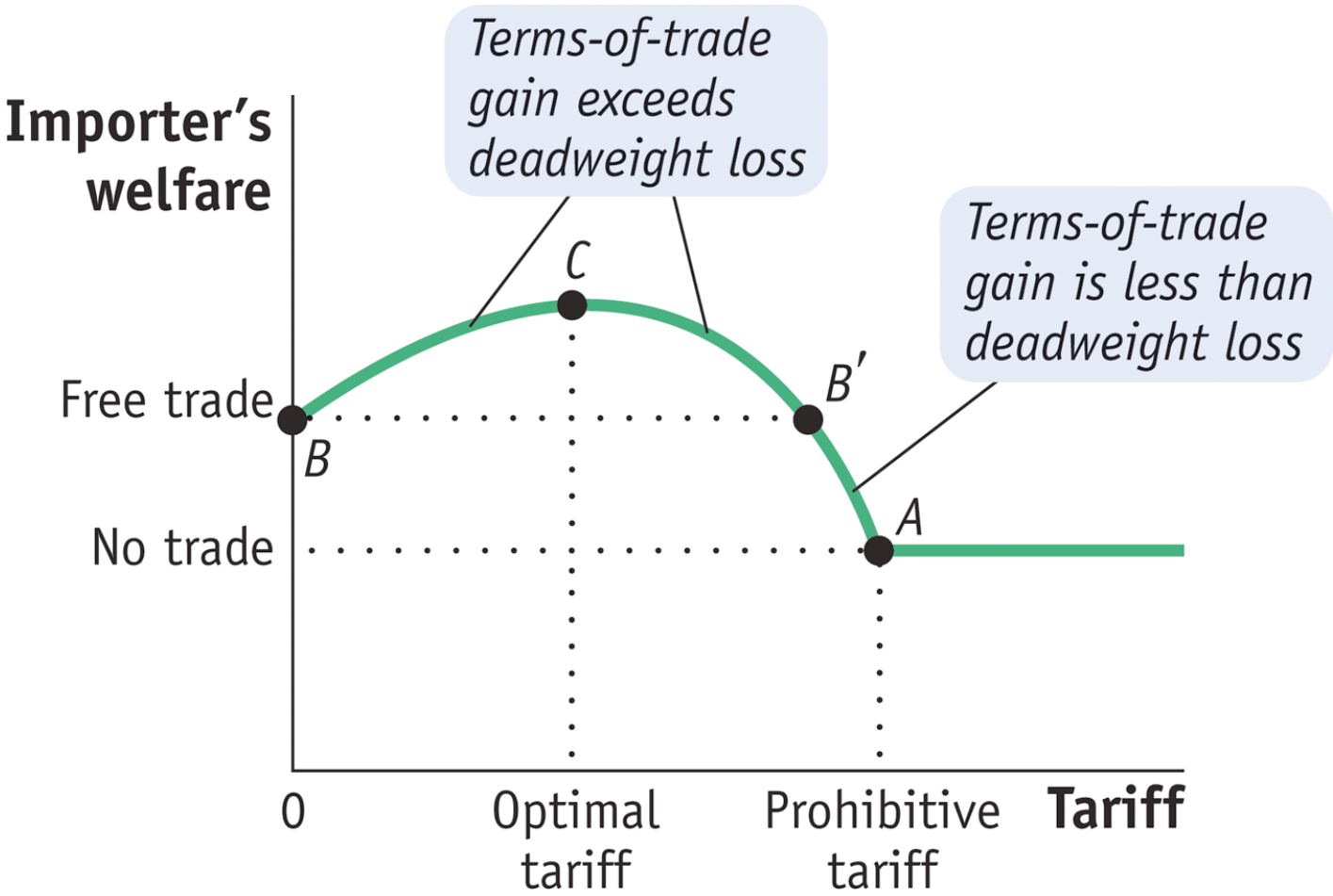
$$\frac{t^*}{p^*} = 1/\left(\frac{dx}{dp^*}\frac{p^*}{x}\right)$$

Optimal Tariff for a LOE: intuition

- The Home LOE gains from a tariff if the terms-of-trade gains exceeds the deadweight loss: $e > b + d$
- In other words:
  - For a country facing an upward-sloping foreign export supply curve, monopsony power can be exploited with an import tariff
  - But eventually welfare declines as the tariff rate increases
  - Finally imports fall to zero (tariff becomes prohibitive); welfare falls to the autarky level
- Optimal tariff formula: optimal tariff = 1 / (price elasticity of ROW's export supply
  - Just like formula for a monopolist's profit-maximizing markup of price over MC
- Similarly an exporting country with national monopoly power should levy an optimal export tax

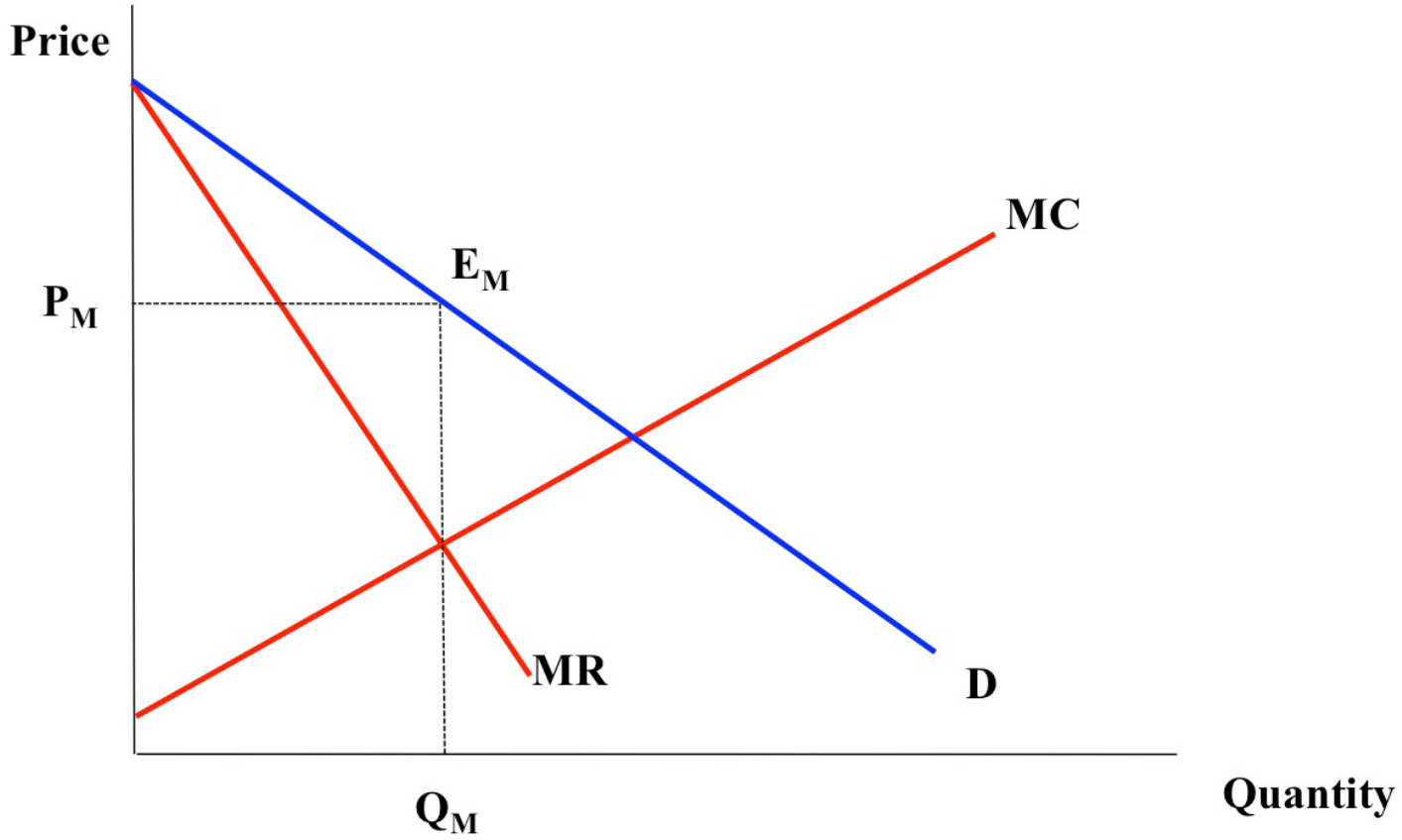
Optimal Tariff for a LOE: graph

- Figure from [FT]

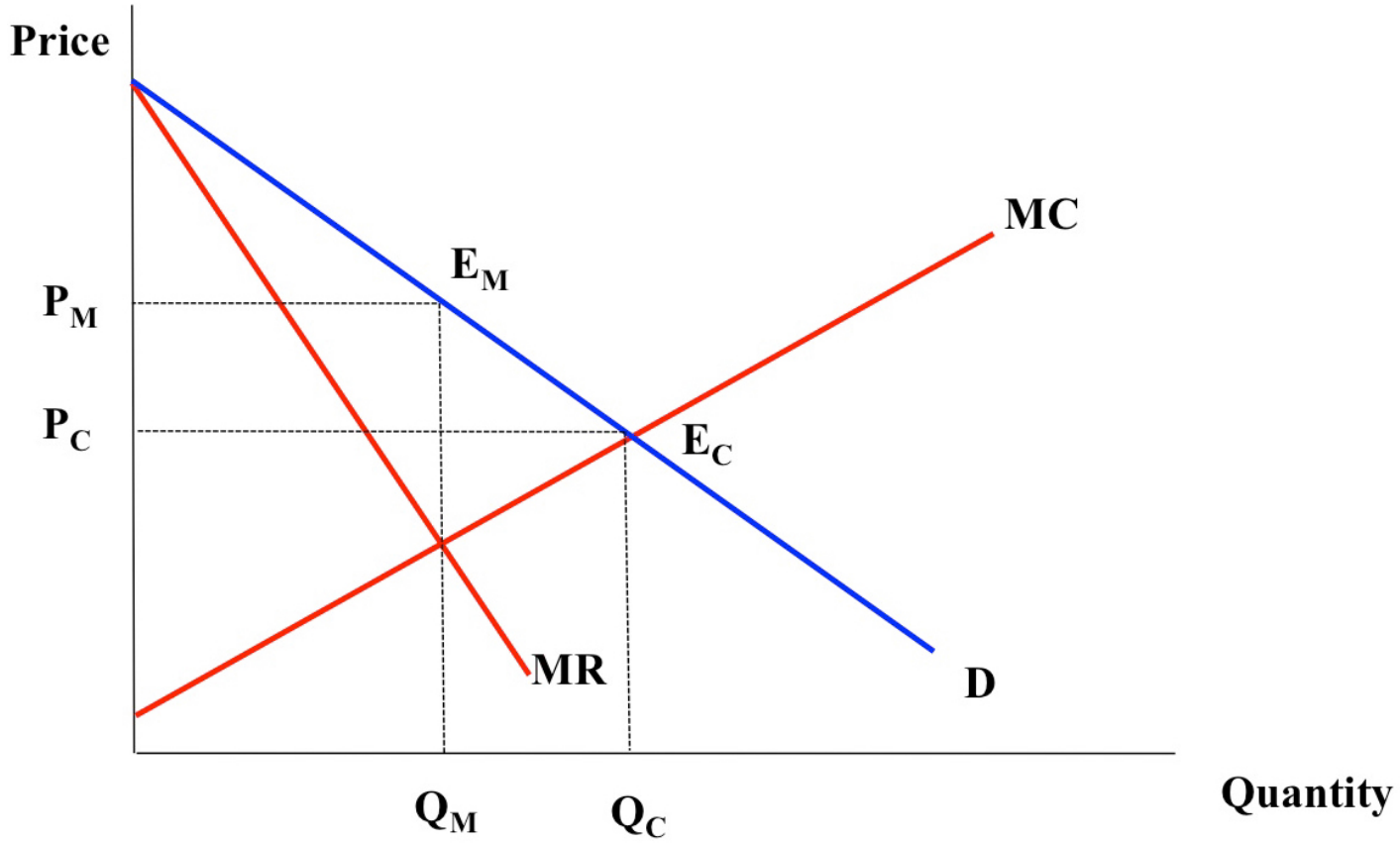


Outline of the Lecture

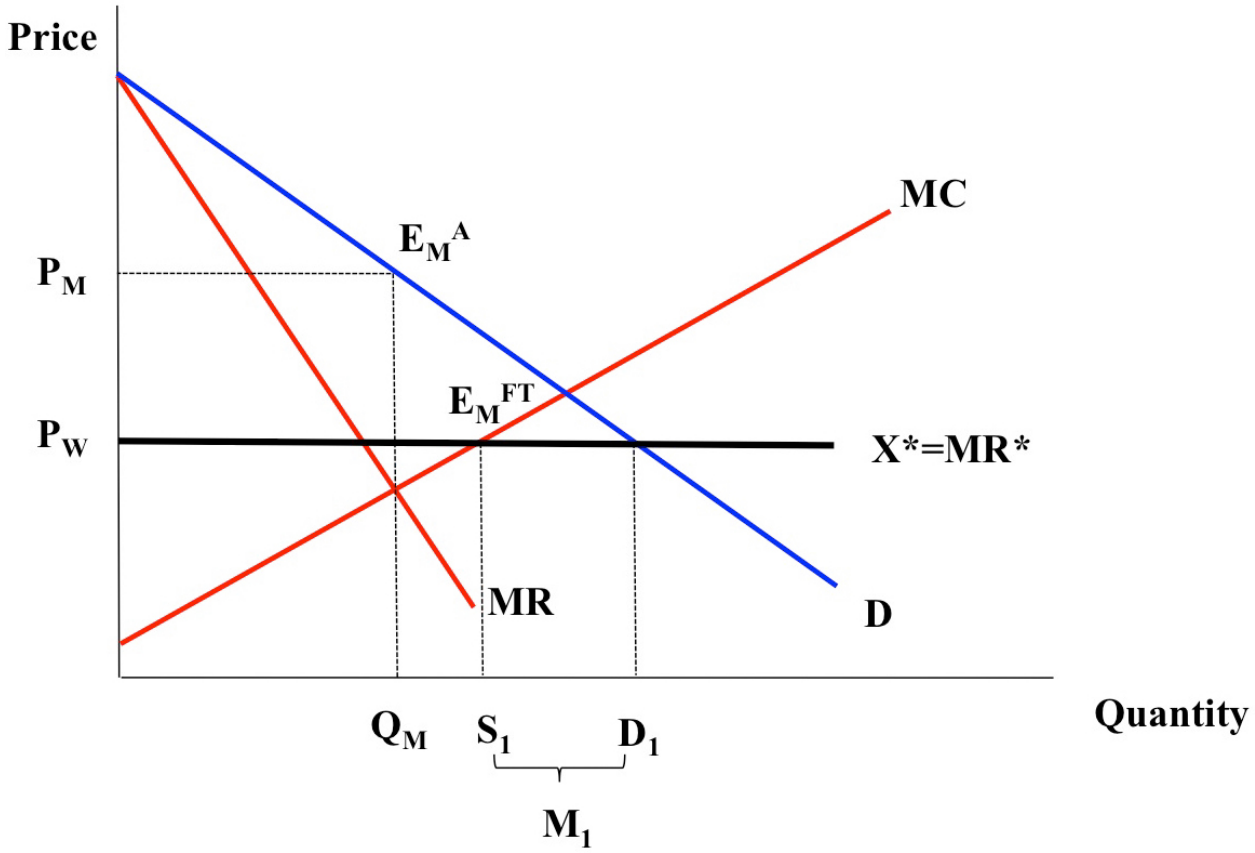
Recap: Monopoly Equilibrium in Autarky



Comparison with Perfect Competition



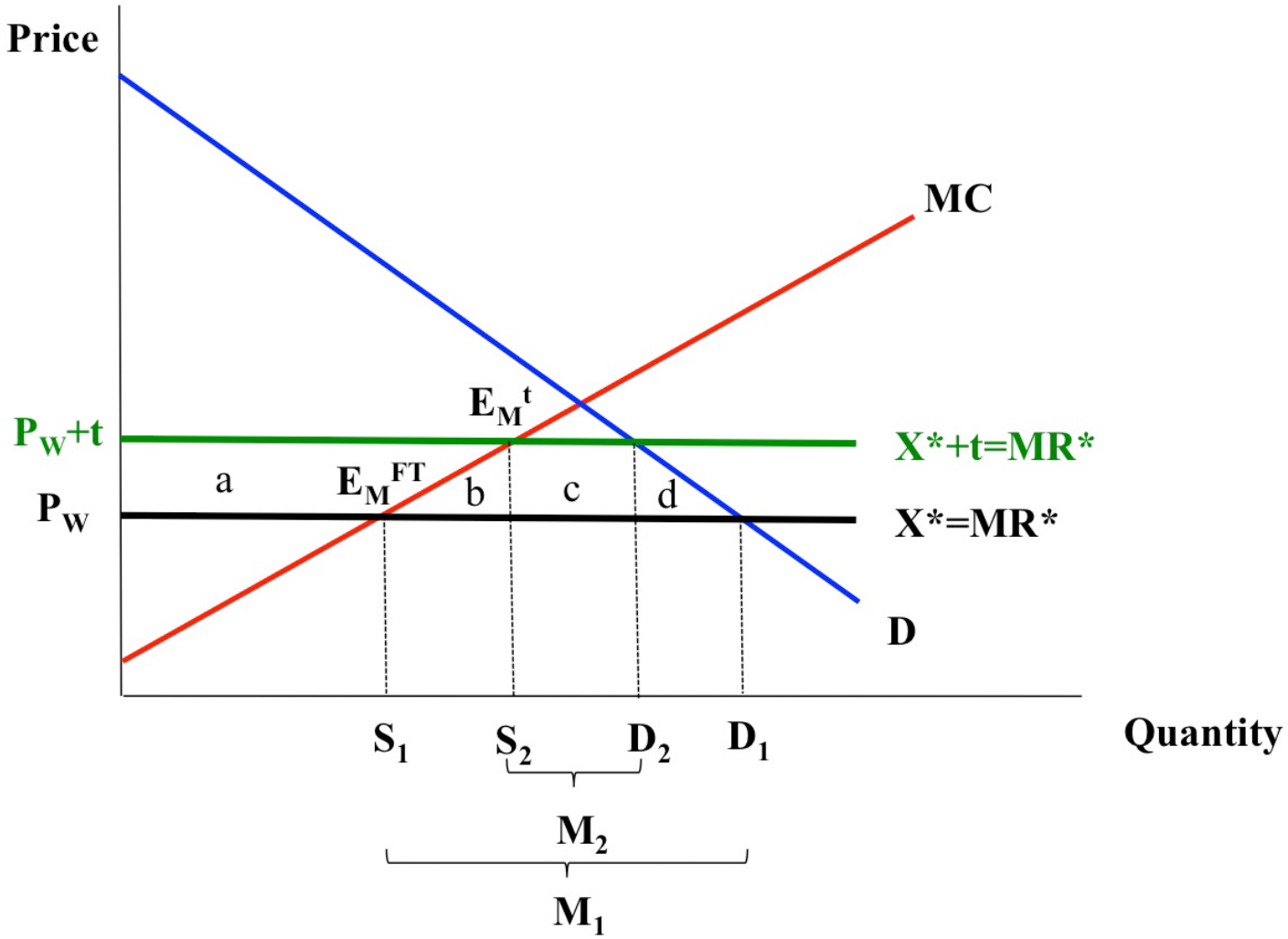
Monopoly Equilibrium in Free Trade (SOE)



- In free trade, the monopoly produces the same quantity and charges the same price as a perfectly competitive industry
- Free trade for a small country eliminates the monopolist's market power (its control over price)

Effect of a Home Tariff with Home Monopoly

- Assume Home is a small country



Effect of an Import Tariff with Home Monopoly: Summary

- Comparison with Perfect Competition: with a tariff, the Home monopolist produces the same quantity and charges the same price as would a perfectly competitive industry

- Welfare effects:
  - Home consumers lose: $\Delta CS = -(a + b + c + d)$
  - Home producer gains: $\Delta PS = +a$
  - Government gains: $\Delta TR = +c$
  - **Net effect on Home welfare (deadweight loss):** $\Delta W = -(b + d)$

- A tariff leads to a deadweight loss for a small importing country with a Home monopoly

Outline of the Lecture

Effect of an Import Tariff with Foreign Monopoly

- Single foreign exporter selling into the home market
- Foreign profits: $\pi^*(x) = x[p(x) - t] - C^*(x)$ where x are foreign sales in the home market, $p^* = p(x) - t$ the price received by the exporter and $C^*(x)$ foreign costs
- FOC and SOC $\Rightarrow$

$$\frac{dp}{dt} = p'(x)\frac{dx}{dt} = \frac{p'(x)}{\pi^{*\prime\prime}(x)} > 0$$

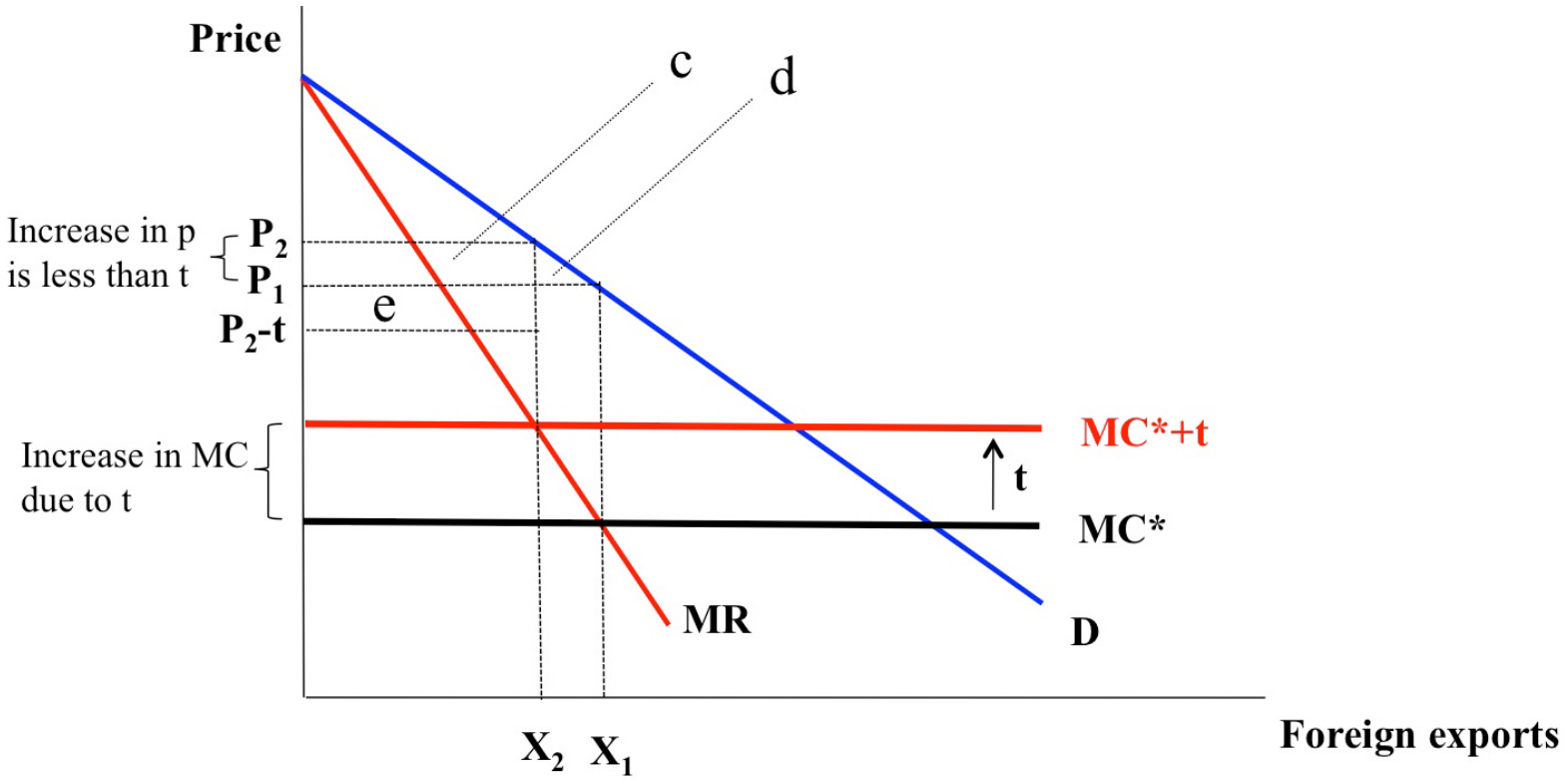
- Then $dp/dt < 1$ IFF $p'(x) + xp''(x) - C^{*\prime\prime}(x) < 0$

Brander and Spencer Theorem (1984)

When the home country imports from a foreign monopolist with constant marginal costs,

1. a small specific tariff improves the terms of trade and raises home welfare if marginal revenue is steeper than demand;
2. a small ad valorem tariff improves the terms of trade and raises home welfare if the elasticity of demand increases as consumption of the importable falls.

Effect of an Import Tariff with Foreign Monopoly: Graph



Effect of an Import Tariff with Foreign Monopoly: Summary

- The effect of an import tariff applied against a Foreign is similar to the effect of a tariff imposed by a large country
- Welfare effects:
  - Home consumers lose: $\Delta CS = -(c + d)$
  - Government gains: $\Delta TR = +(c + e)$
  - **Net effect on Home welfare:** $\Delta W = (e - d)$
- Home gains from imposing a tariff if the terms-of-trade gain e exceeds the deadweight loss d: $e > d$

A quick note on oligopoly

- Recall the change in social welfare from (2) with $m = x$:

$$\frac{dW}{dt} = \underbrace{-x\frac{dp^*}{dt}}_{ToT} + \underbrace{t\frac{dx}{dt}}_{VoT} + \underbrace{[p - C'(y)]\frac{dy}{dt}}_{PS}$$

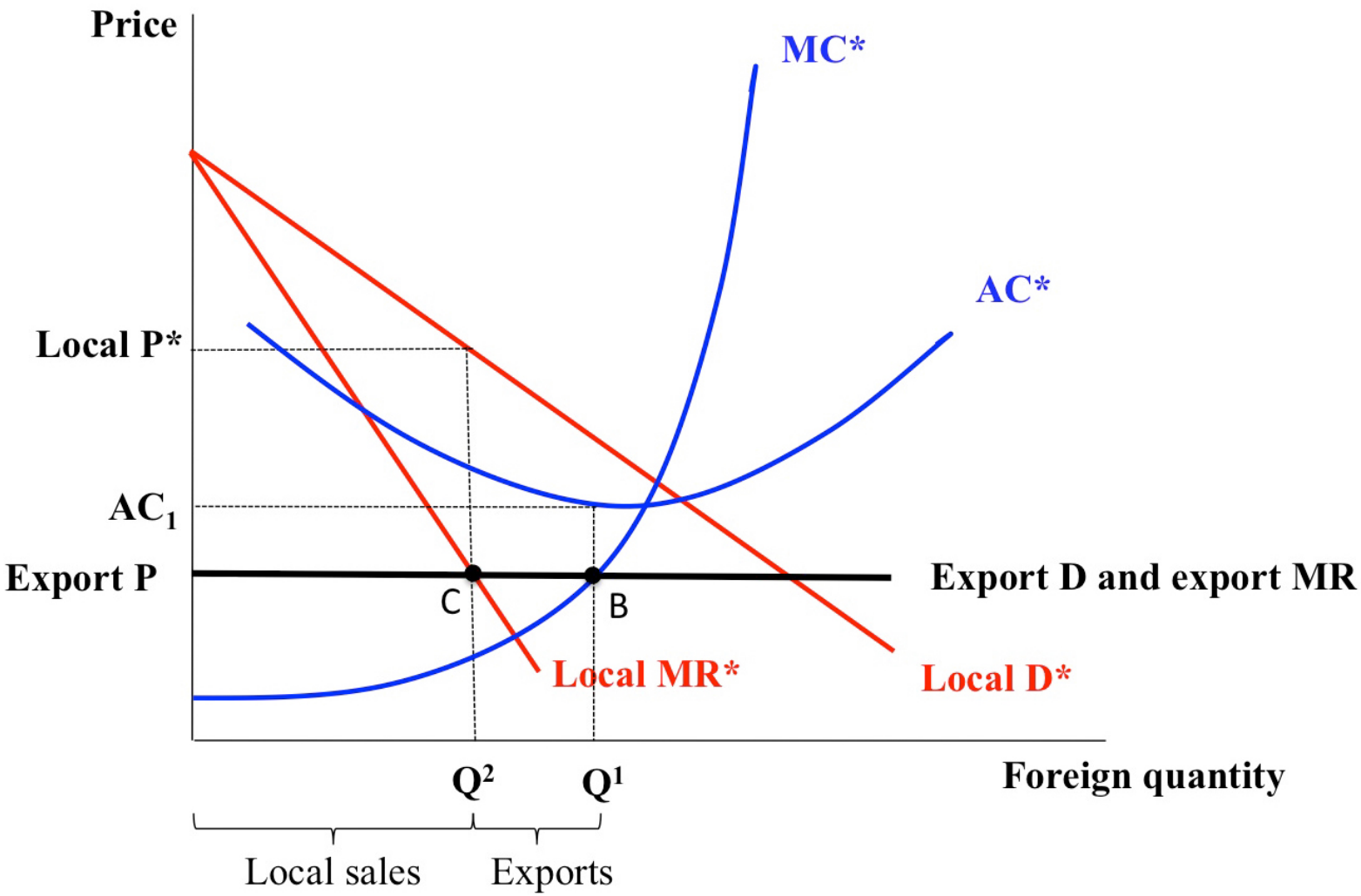
- Under Cournot competition with constant marginal costs, a specific tariff increases home output $\Rightarrow$ the tariff moves the home firm to a higher level of output and reduces the distortion between price and marginal cost
  - "profit-shifting" motive for the use of tariffs
  - depends crucially on assumptions made (disappears with free entry etc.)

Outline of the Lecture

Dumping: Introduction

- With imperfect competition, firms have the ability to influence the price of their product
- With international trade, not only can firms charge $p > MC$, but they can also charge different prices in different markets (countries) $\rightarrow$ **price discrimination** when markets are **segmented**
- **Dumping - definition:** Country A firm is dumping in country B if its price in B is less than either its price in A or its unit cost of production in A.
- Why would any firm dump at all?

Dumping: Example of Discriminating Monopoly



Reciprocal dumping: setup

- Two countries, Home and Foreign with N and N^* firms
- $p(z)$ price in the home market where $z = \sum_{i=1}^{N} y_i + \sum_{j=1}^{N^*} x_j$
- $p^*(z^*)$ foreign price where $z^* = \sum_{i=1}^{N} y_i^* + \sum_{j=1}^{N^*} x_j^*$
- Iceberg transportation costs T
  - $p(z)$ is the c.i.f. (cost, insurance, freight) price
  - p/T is the f.o.b. (free on board) price
  - Dumping if $p/T < p^*$
- Identical, constant marginal cost c
- Fixed cost of production α
- Home's firms' maximization problem

$$\max_{y_i, y_i^*} \pi = [p(z) - c]y_i + [p^*(z^*) - cT]y_i^* - \alpha$$

Reciprocal dumping: solution

- FOCs + symmetry:

$$\text{Home firms:} \quad p\left(1-\frac{y/z}{\sigma}\right)=c \quad \text{and} \quad p^*\left(1-\frac{y^*/z^*}{\sigma^*}\right)=cT \tag{3}$$

$$\text{Foreign firms:} \quad p^*\left(1-\frac{x^*/z^*}{\sigma^*}\right)=c \quad \text{and} \quad p\left(1-\frac{x/z}{\sigma}\right)=cT \tag{4}$$

- Market clearing (market shares must add up to one):

$$N(y/z)+N^*(x/z)=1 \tag{5}$$

$$N(y^*/z^*)+N^*(x^*/z^*)=1 \tag{6}$$

Reciprocal dumping: theorem

- From market clearing we can solve for the number of firms in each country. Then combining this with FOCs we get

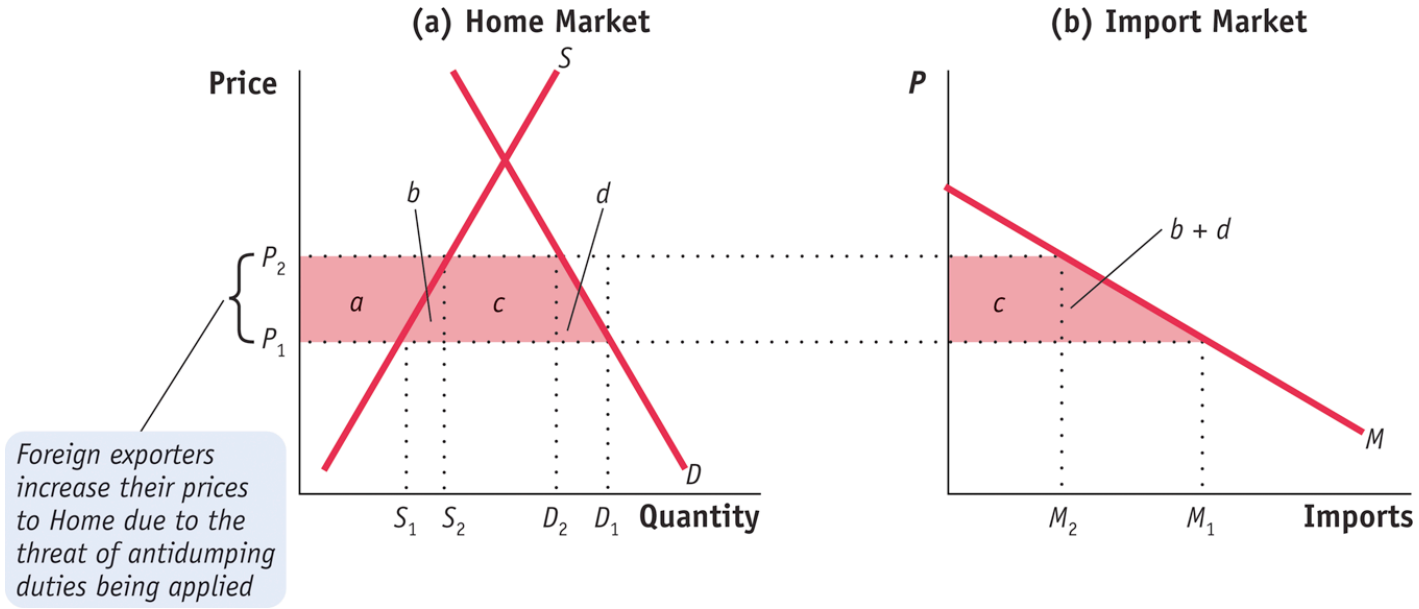
$$N = \frac{\sigma c}{D}\left(\frac{T}{p} - \frac{1}{p^*}\right) > 0 \text{ IFF } p/T < p^* \tag{7}$$

$$N^* = \frac{\sigma c}{D}\left(\frac{T}{p^*} - \frac{1}{p}\right) > 0 \text{ IFF } p^*/T < p \tag{8}$$

- **Theorem:** When the elasticities of demand and marginal costs of production are equal across countries, and firms in both countries are selling in both markets, then reciprocal dumping necessarily occurs: $p/T < p^*$ and $p^*/T < p$.
- Welfare effect of trade:
  - with free entry welfare increases
  - with fixed number of firms, welfare effect ambiguous

Policy Response to Dumping: Antidumping Duties

- Under the WTO rules, an importing country is entitled to apply an antidumping tariff any time that a foreign firm is dumping a product.
- The amount of the antidumping duty is calculated as the difference between the exporter's local price and the "dumped" price in the importing country.
- Does the application of antidumping duties lead to a terms-of-trade gain for the Home country? [Figure from [FT]]



Outline of the Lecture

Infant Industry Protection

- Figure from [FT]