

ECON 442: Quantitative Trade Models

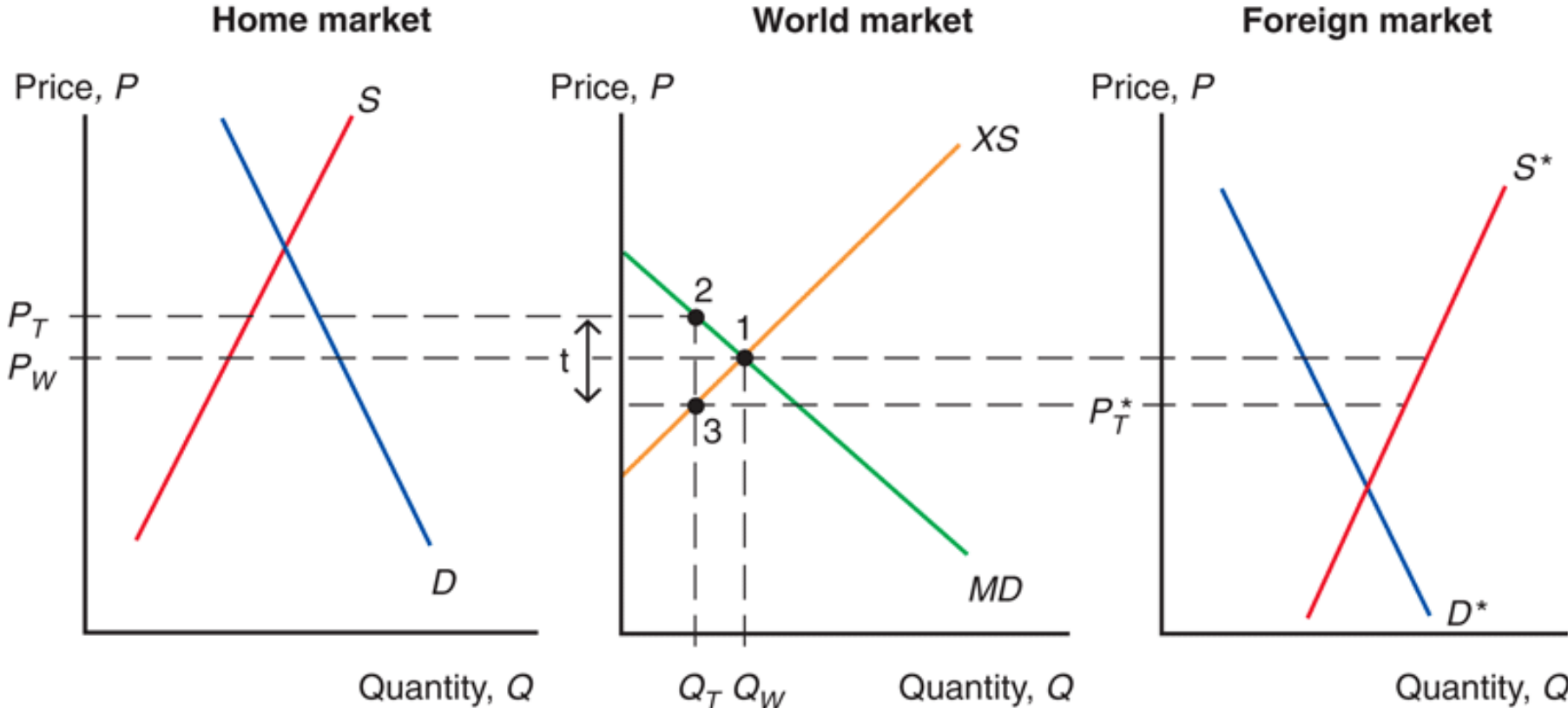
Jack Rossbach

Instruments of Trade Policy

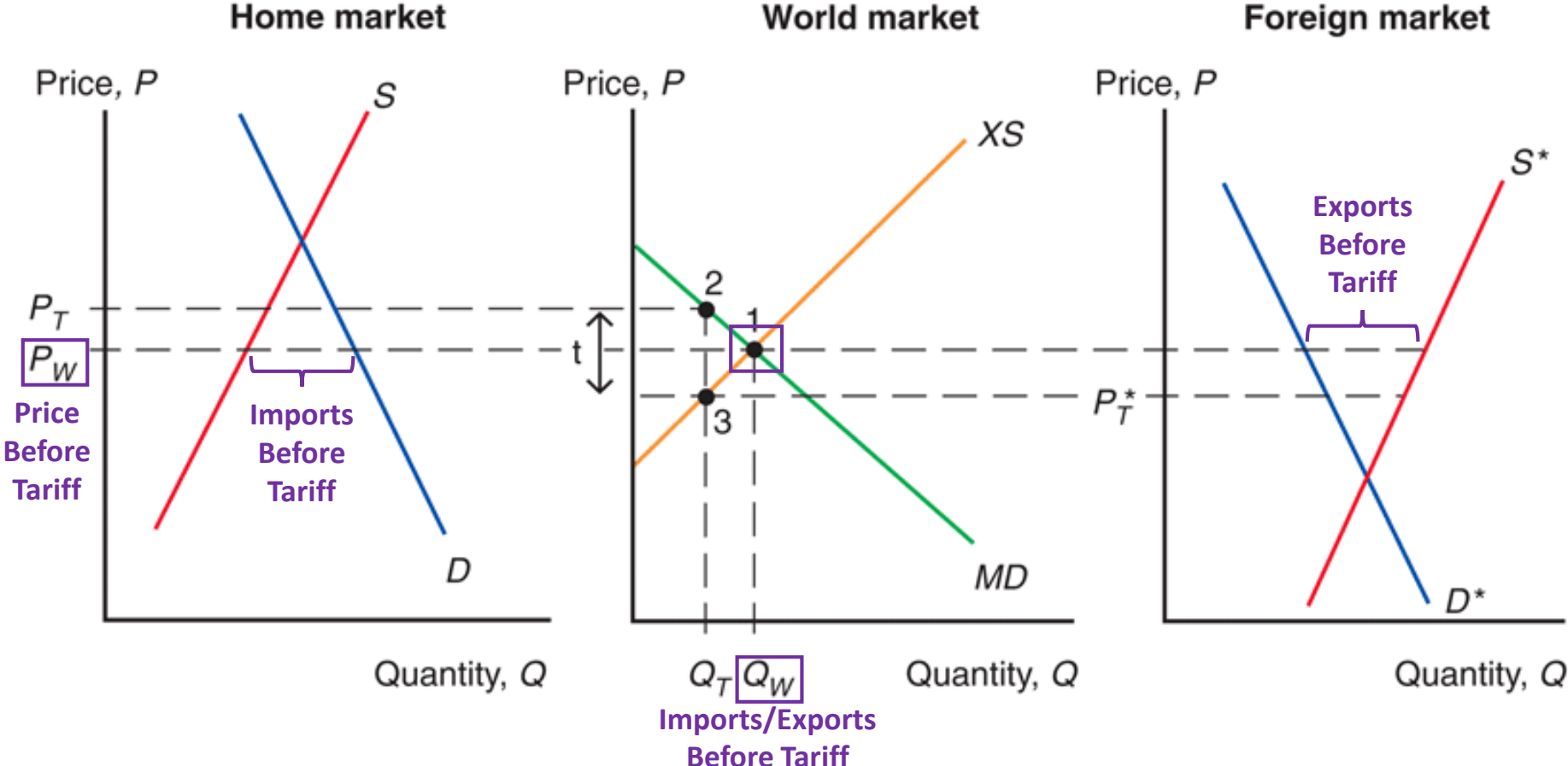
Many instruments available to affect international trade flows and prices. Non-exhaustive list:

- **Tariffs:** Taxes on Imports. Effect is to increase price of imports, decrease quantity of imports, and collect tariff revenues.
- **Export Subsidies:** Subsidies on exports. Effect is to decrease price of exports and increase quantity of exports. Must be funded by government.
- **Quotas:** Limits on quantity of imports. Effect is to increase price of imports, decrease quantity of imports.
- **Export Restrictions:** Limits on quantity of exports. Effect is to increase price of exports, decrease quantity of exports.
- **Local Content Requirements:** Requirement that a sufficient portion of value added for a good is local. Increases price of imports (due to higher production costs), and decreases quantity.

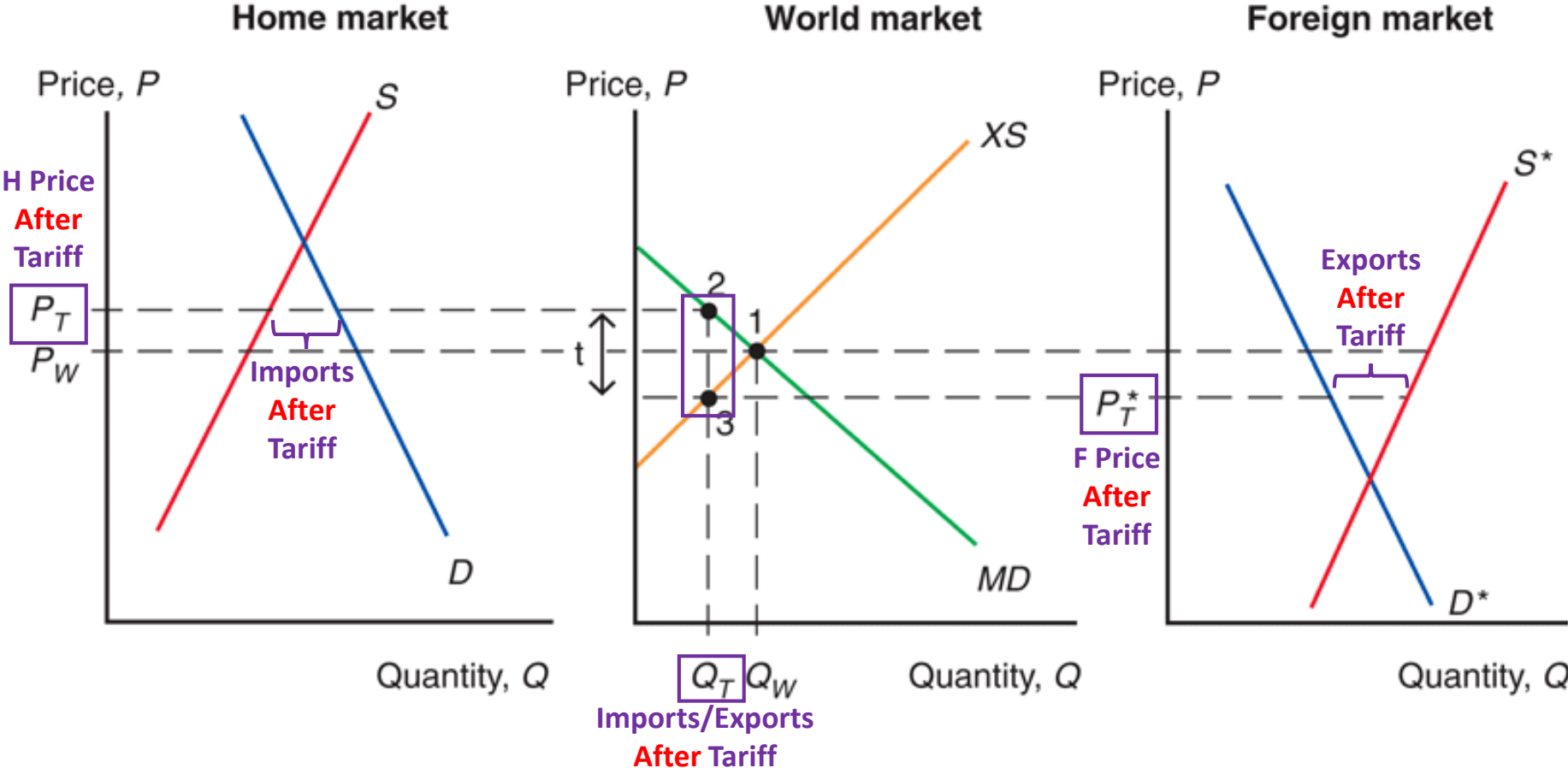
Effects of an Import Tariff



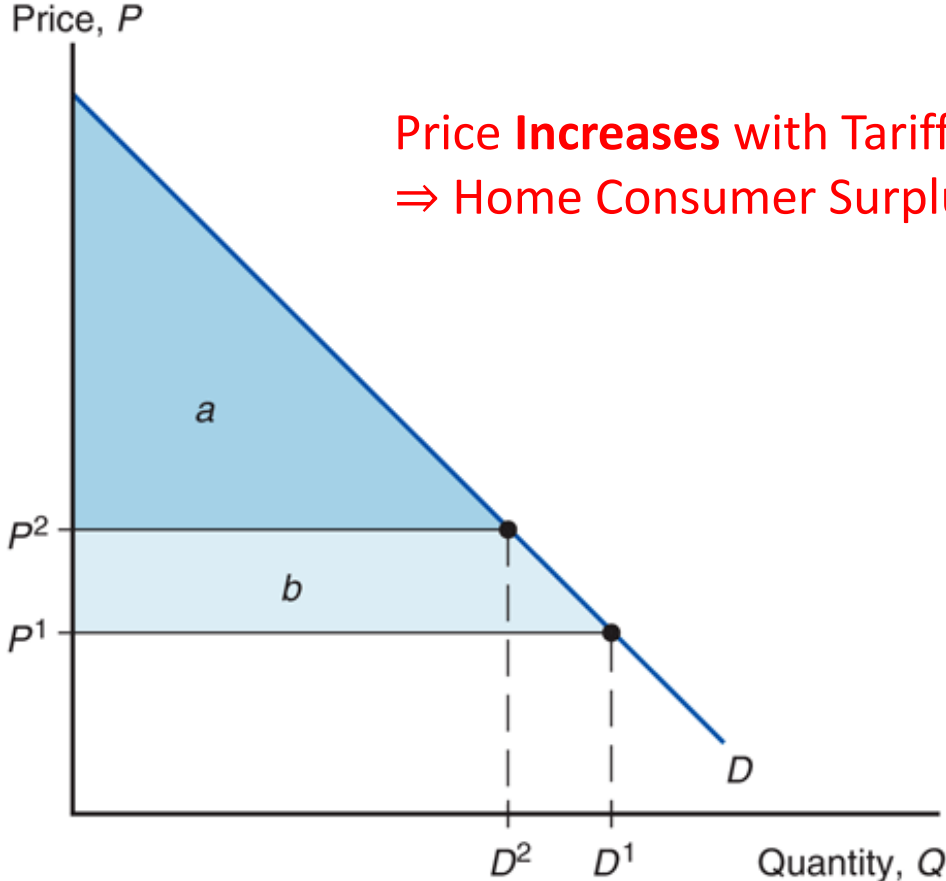
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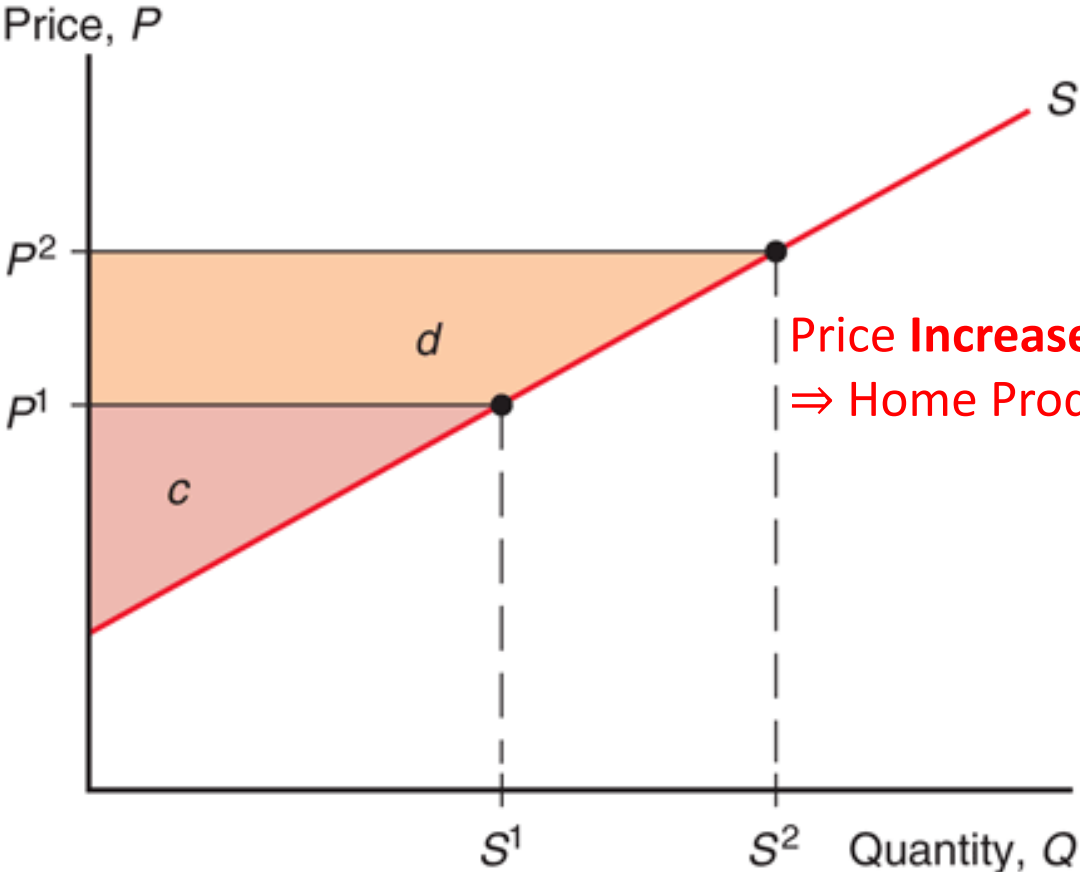


Welfare Effects of **Import Tariff** in Home (**Importing Country**)



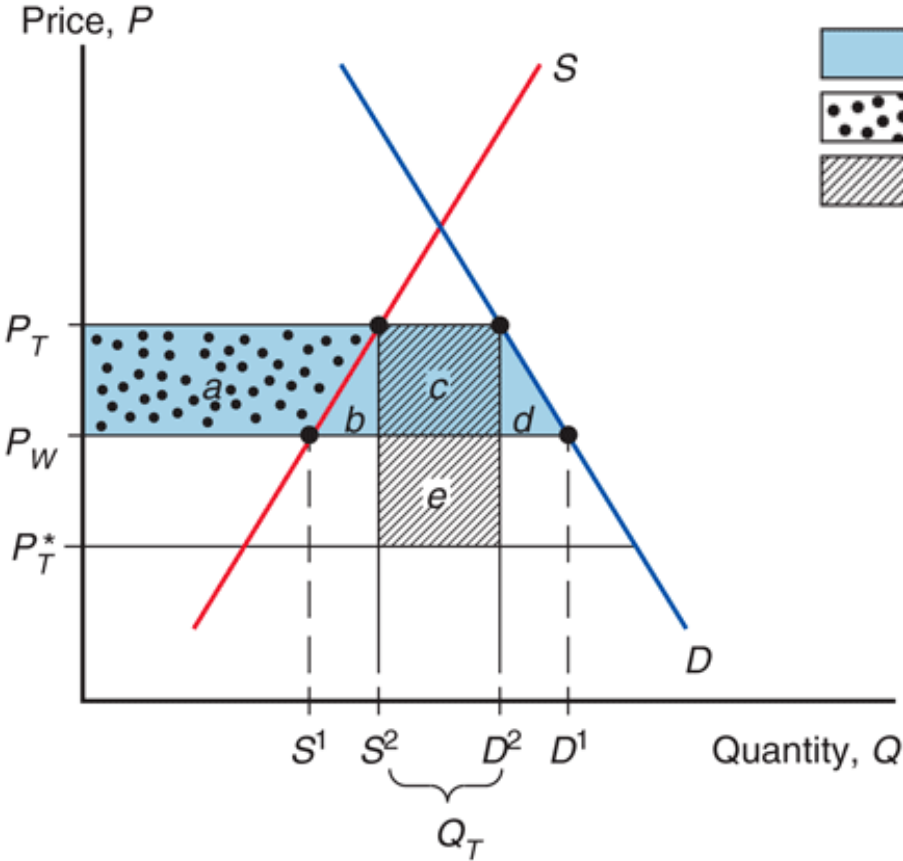
Price **Increases** with Tariff
 \Rightarrow Home Consumer Surplus **Decreases**




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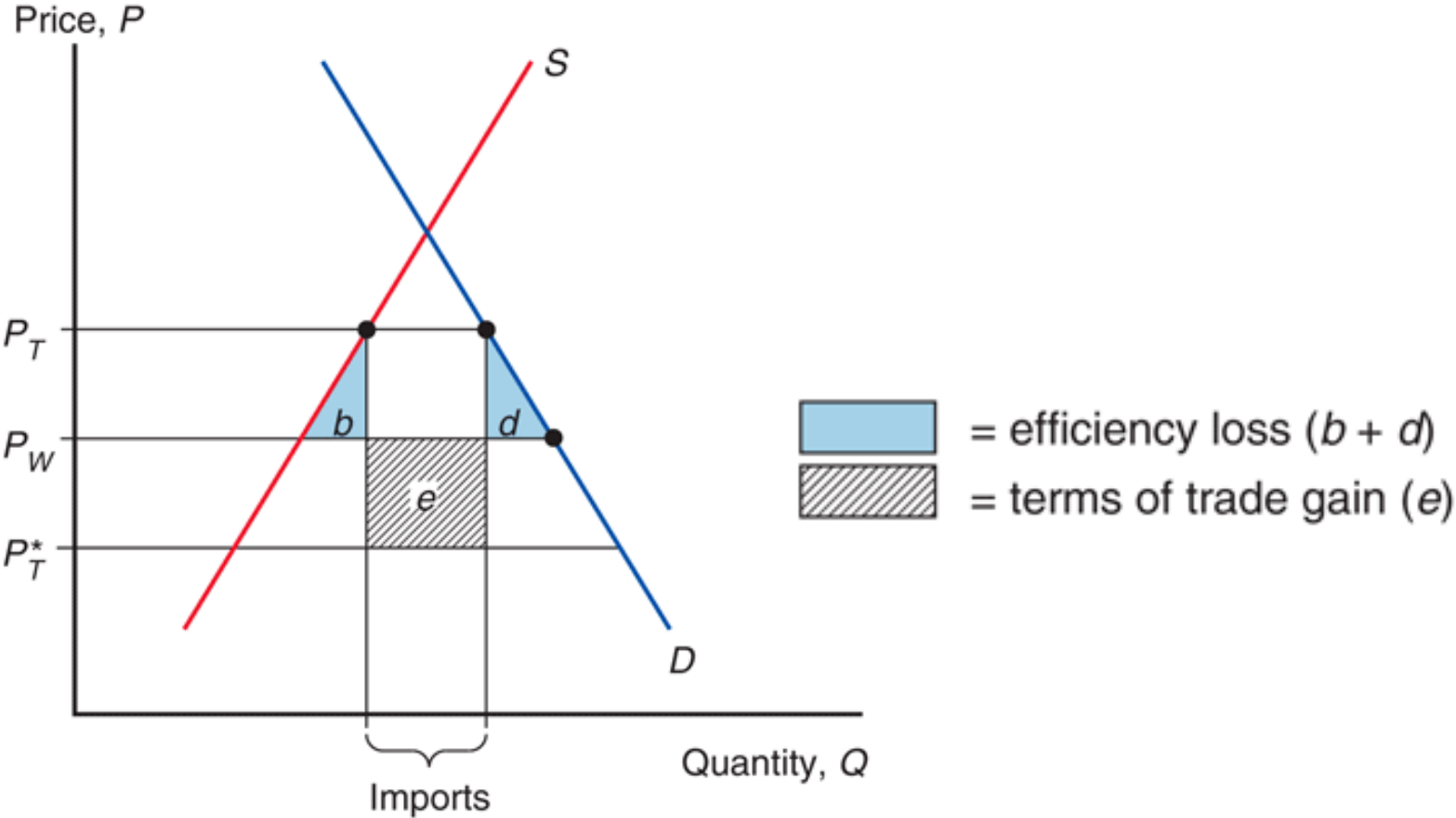
Price **Increases** with Tariff
 \Rightarrow Home Producer Surplus **Increases**

Welfare Effects of **Import Tariff** in Home (**Importing Country**)

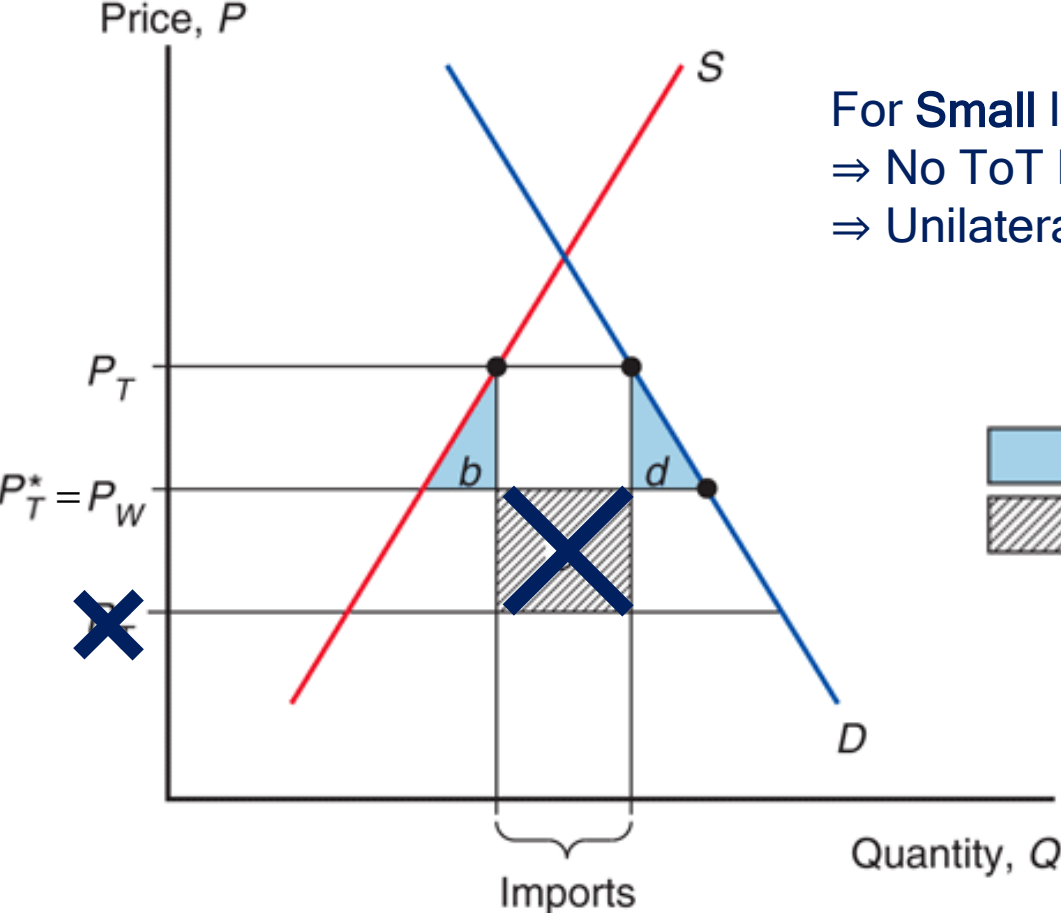


-  = consumer loss ($a + b + c + d$)
-  = producer gain (a)
-  = government revenue gain ($c + e$)



Welfare Effects of **Import Tariff** in Home (**Importing Country**)



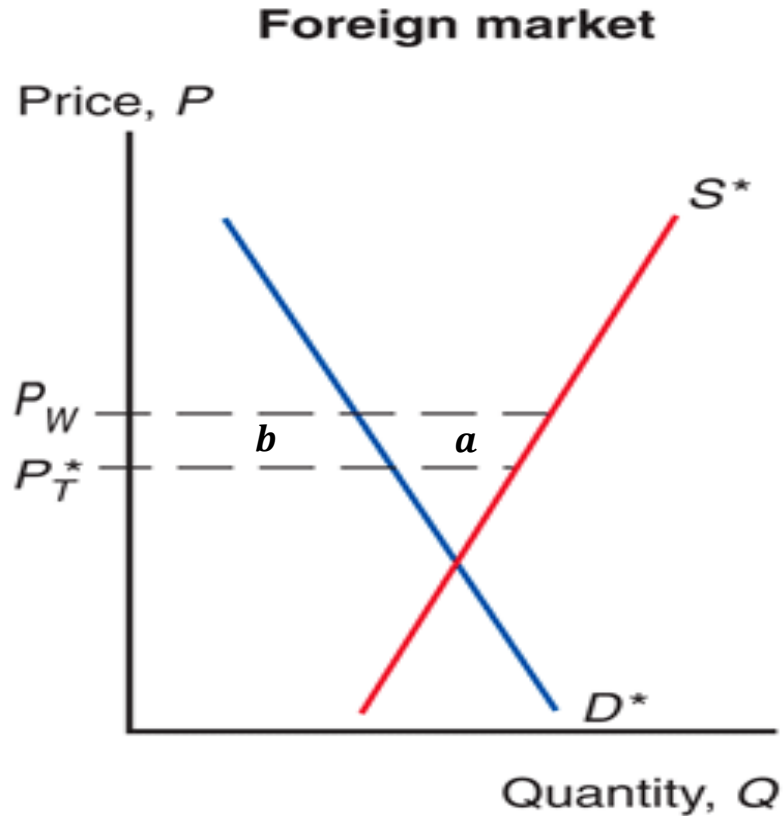
Welfare Effects of **Import Tariff** in Home (**Importing Country**)



For **Small Importers** P_T^* stays at P_W
⇒ No ToT Effects
⇒ Unilateral tariffs bad for small countries

 = efficiency loss ($b + d$)
 = terms of trade gain (e)

Effects of an **Import Tariff** in Foreign (**Exporting Country**)



Producer Loss = $a + b$

Consumer Gain = b

Net Loss = a

Welfare Effects of Tariffs

Net Welfare effect is ambiguous for importing country

- Positive welfare effect if Terms of Trade effect dominates
- Negative welfare effect if efficiency loss dominates

Net Welfare always negative for exporting country

- Cheaper exports. Producer loss dominates consumer gain since exporting.

Net World Welfare always decreases

Effective Rate of Protection

Effective rate of protection measures how much protection a tariff provides

- Tariffs have bigger impact on goods that have low value added

$$\text{Effective Rate of Protection} = \frac{\text{Value Tariff}}{\text{Value Added}}$$

Example:

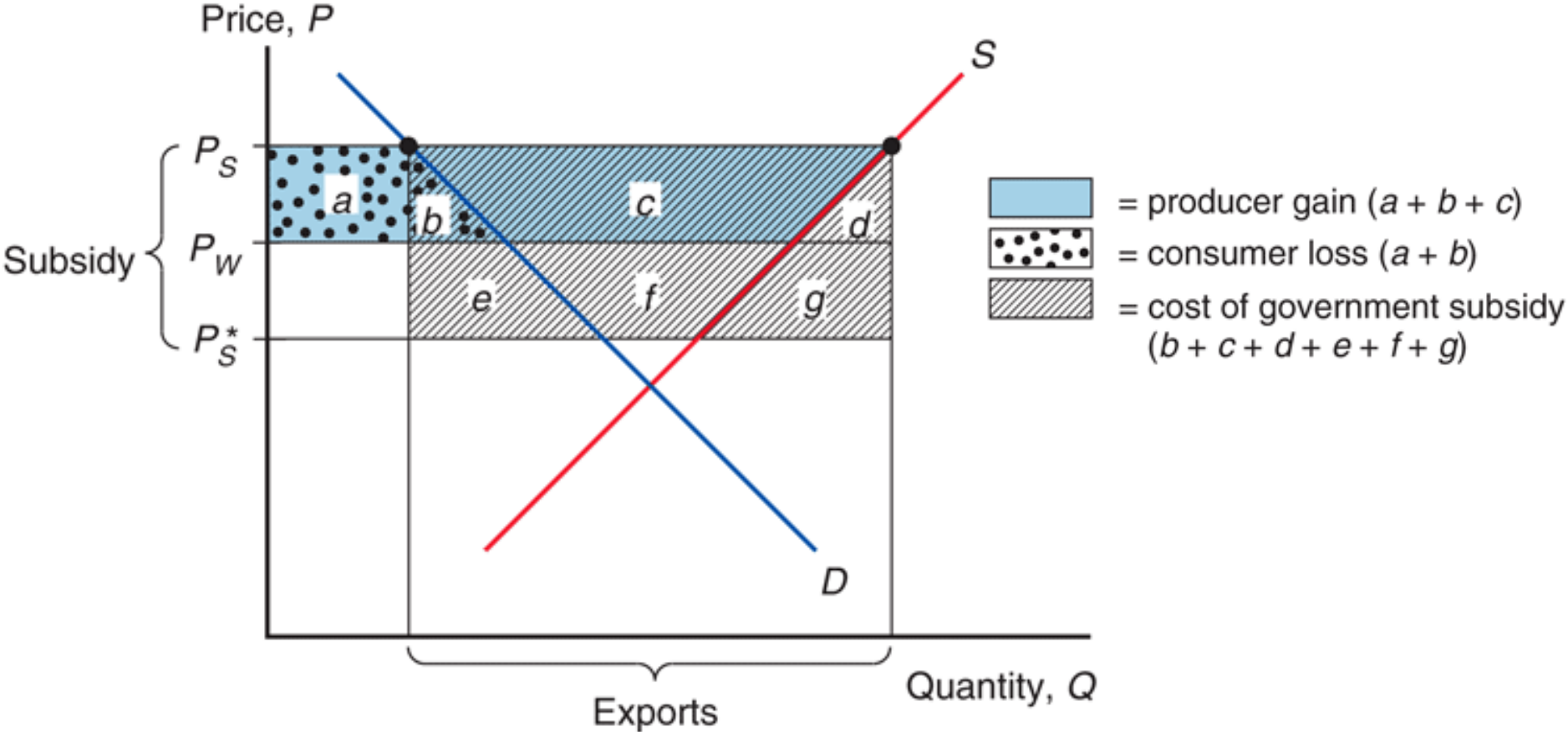
- Cars sell for \$8,000, Cost \$6,000 to produce; 50% tariff makes price \$8,000x1.5=\$12,000

$$\text{Value Added} = 8,000 - 6,000 = 2,000$$

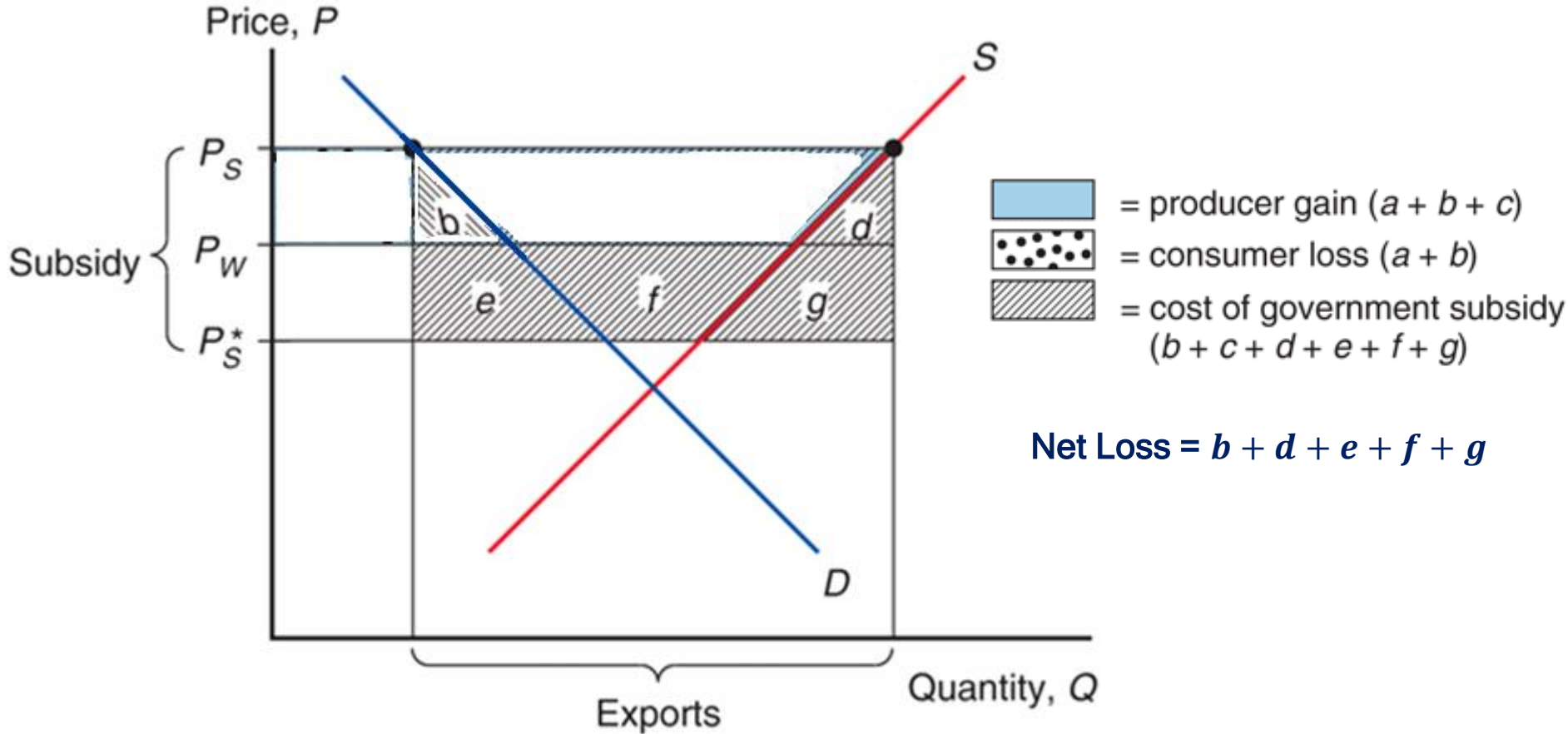
$$\text{Value Tariff} = 12,000 - 8,000 = 4,000$$

$$\text{Effective Rate of Protection} = \frac{4,000}{2,000} = 2 \text{ [i.e. 200\%]}$$

Effects of an Export Subsidy in Home (Exporting Country)



Effects of an Export Subsidy in Home (Exporting Country)



Welfare Effects of an Export Subsidy

Net Welfare effect is bad for exporting country

- Have to pay for subsidy. Producer gain isn't enough to offset cost.

Net Welfare positive for importing country.

- Cheaper imports. Consumer gain dominates producer loss since importing.

Net World Welfare always decreases

Export Subsidies in Practice: Agriculture in EU

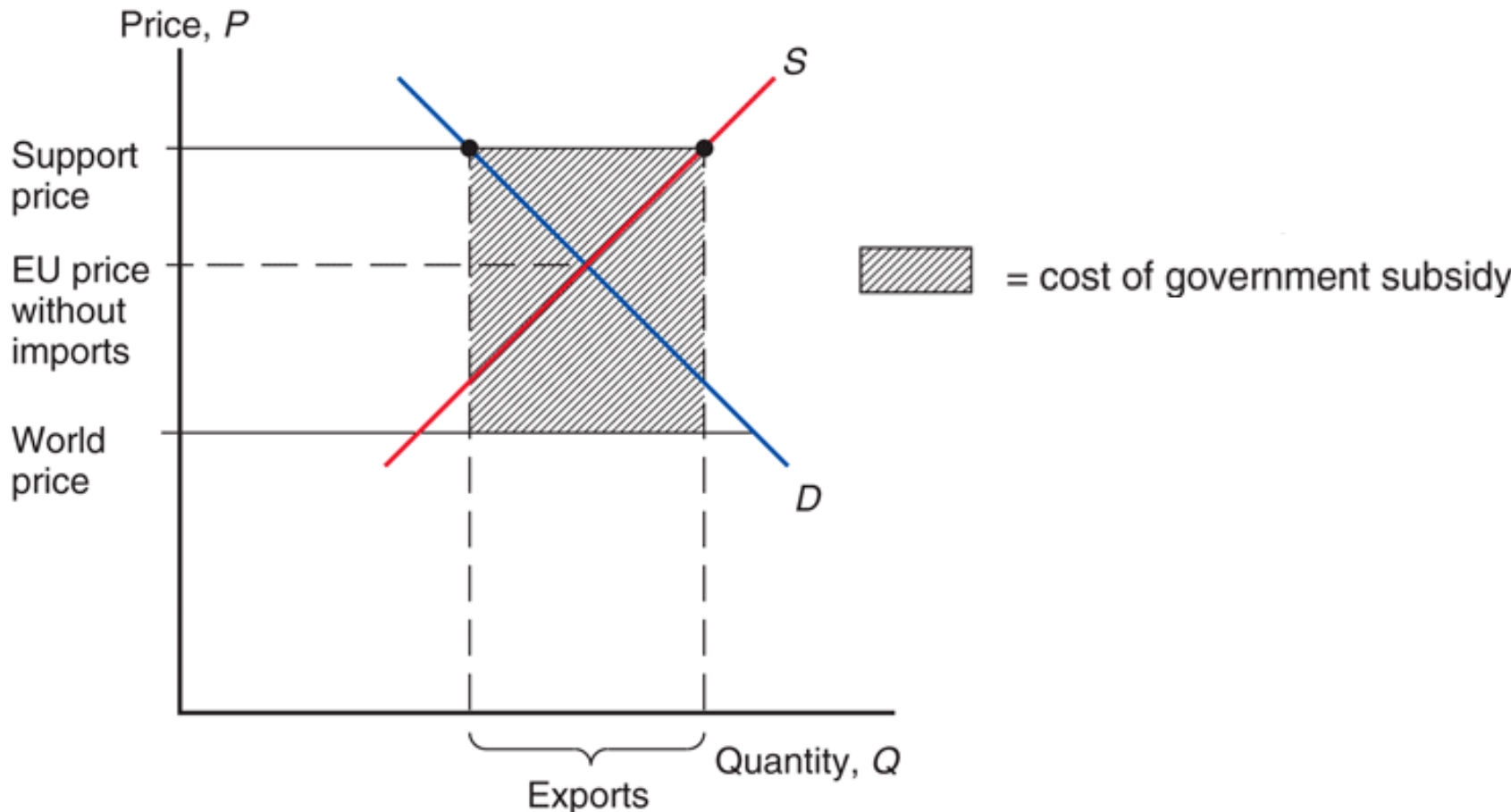
European Union has price floor & export subsidies for agriculture

- **Price Floor:** Sets minimum price for agricultural goods. This raises price, means there is excess supply.
- **Export Subsidies:** Subsidizes exports for agricultural goods, to get rid of excess supply

Agricultural Producers in EU gain, however, net welfare change from policy is negative

- Cost of policy is \$30 billion/year, which is approximately 22% value of all farm output.

Export Subsidies in Practice: Agriculture in EU



Effects of an Import Quota

Import Quotas restrict quantity of imports

- Quotas typically enforced by issuing licenses to exporters
- Owners of quota licenses have market power, and can earn quota rents
- In practice, Government may choose to sell quota licenses. This allows government to capture quota rents, and the quota then acts like a tariff.

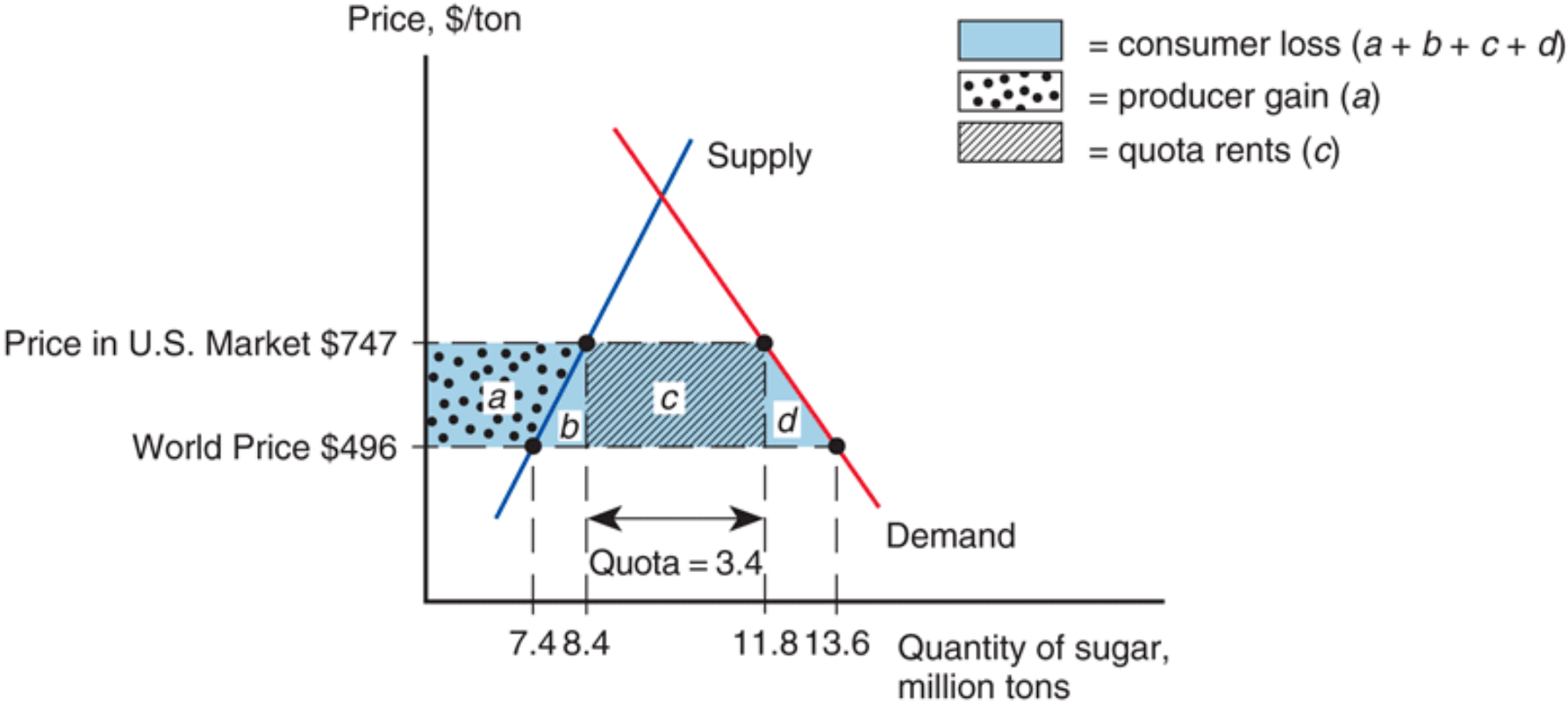
Import Quota in Practice: U.S. Sugar Industry

United States has an elaborate set of policies for Sugar Industry

Tariff Rate Quotas: Small amount of quantity can enter country at low tariff.

- After quota is met, imports are subject to high tariff, effectively stopping imports of sugar.
- Can model as a quota

Welfare Effects of Import Quota: Sugar Market in United States



Import Quota in Practice: U.S. Sugar Industry

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Re-Export Programs: No tariffs on intermediate goods, if final output is exported

- Sugar is an intermediate good. Used in the production of other goods.
- Quotas mean costs are higher for U.S. producers that use sugar as an input
- Re-Export program means costs are not higher for U.S. Producers if they export their output

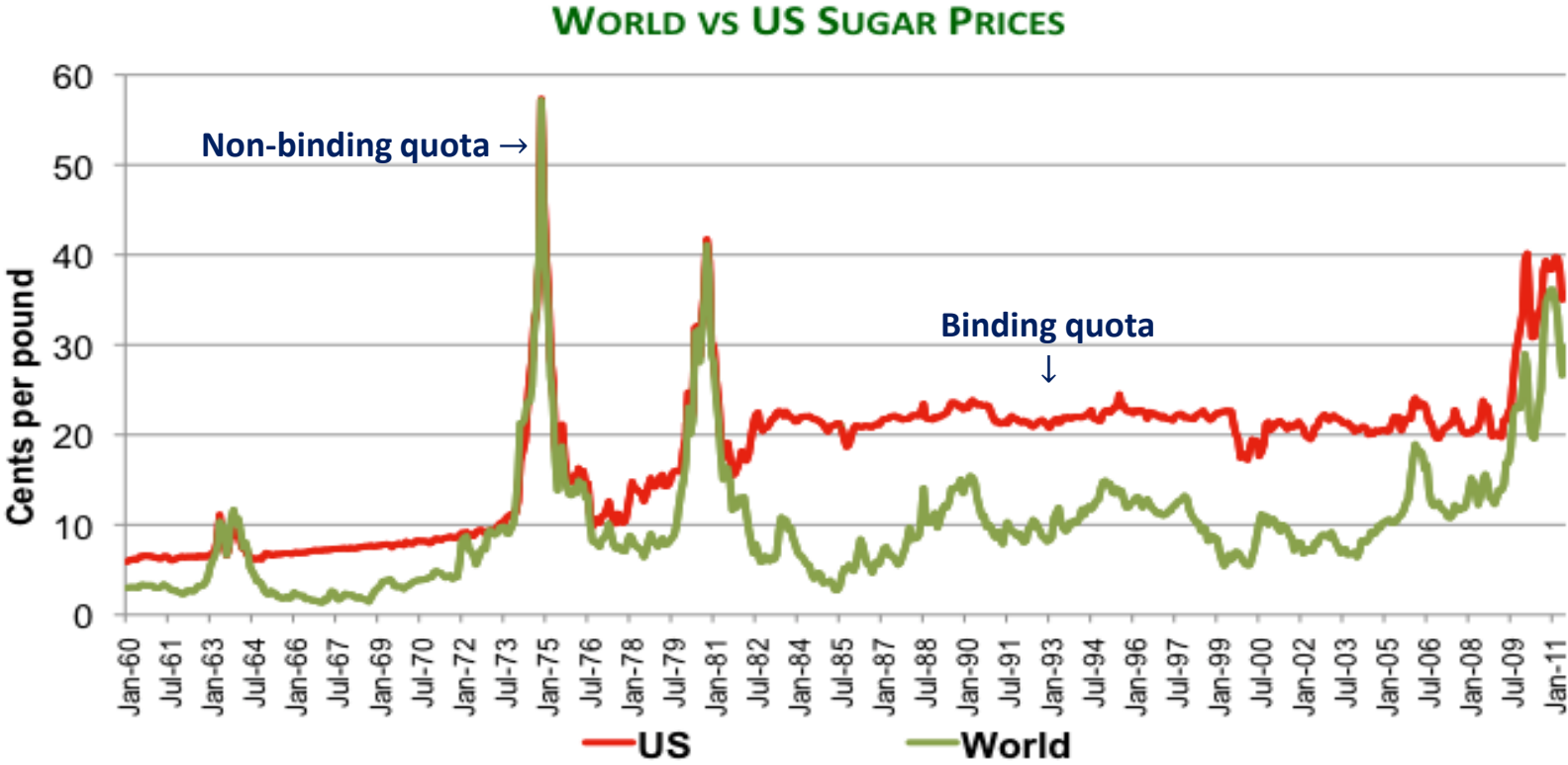
Import Quota in Practice: U.S. Sugar Industry

United States has an elaborate set of policies for Sugar Industry

Loan-based Price Floors: Loans for sugar producers, based on price floor for sugar

- If market price is below price floor, government takes sugar as payment for loan
- If market price above price floor, producers sell sugar and uses revenue to repay loan

Import Quota in Practice: U.S. Sugar Industry



U.S. raw sugar price, duty free paid, New York, monthly

World raw sugar price, monthly

Source: USDA

Local Content Requirements

Local Content Requirements require goods to have certain amount of value added be domestic

- If no intermediate inputs. Then good is either all domestic or all foreign.
- Most goods have intermediate inputs, means intermediate inputs must be locally sourced

Example: American Recovery and Re-Investment Act of 2009

- Public works projects funded through act require U.S. Iron, steel, and manufactured goods
- Increases costs and occasionally causes delays due to trouble sourcing domestic products

Trade Agreements and Political Economy

Large literature on political economy of trade protectionism and agreements

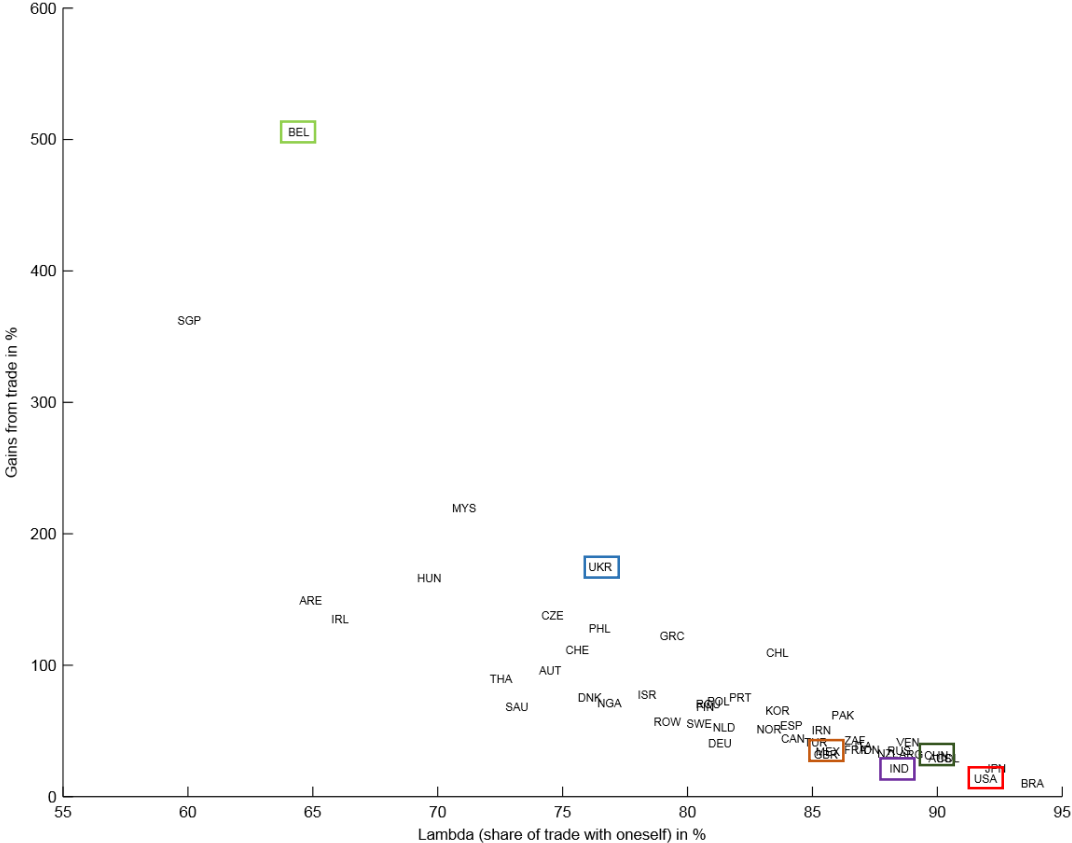
Why do countries choose protectionism?

- Winners and losers from trade, either of which may lobby government.
- Redistribution from winners to losers isn't always feasible to make everybody better off.
- May have negative externalities to trade. Or positive externalities from domestic production.

Why do organizations like WTO exist?

How should FTAs be designed?

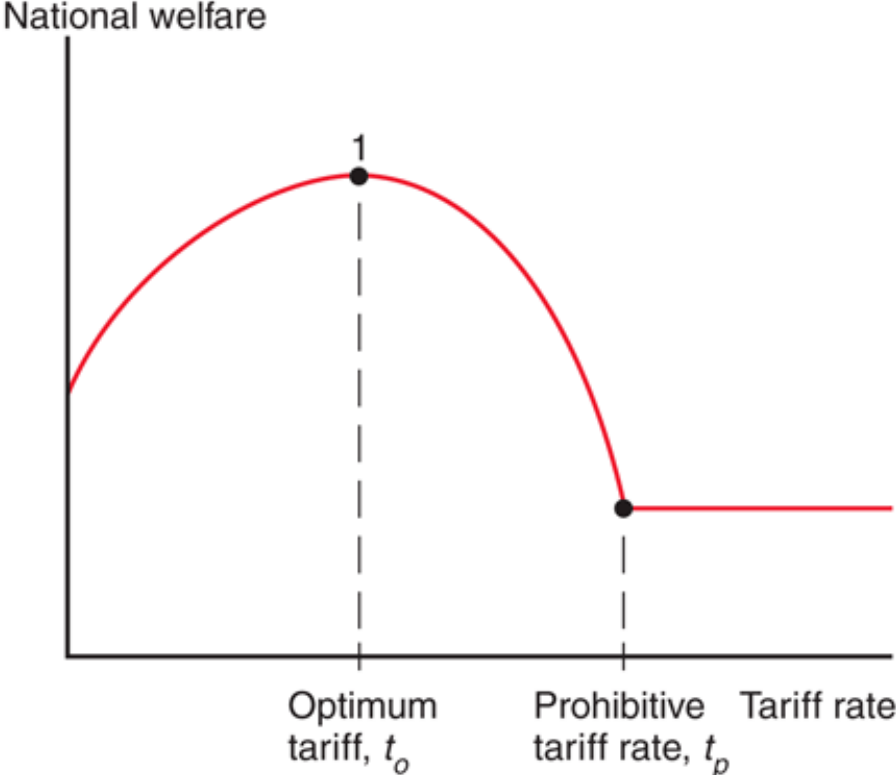
Welfare Effects of Free Trade vs Autarky



Example Gains
USA: 14%
India: 21%
China: 31%
Mexico: 34%
Ukraine: 175%
Belgium: 505%

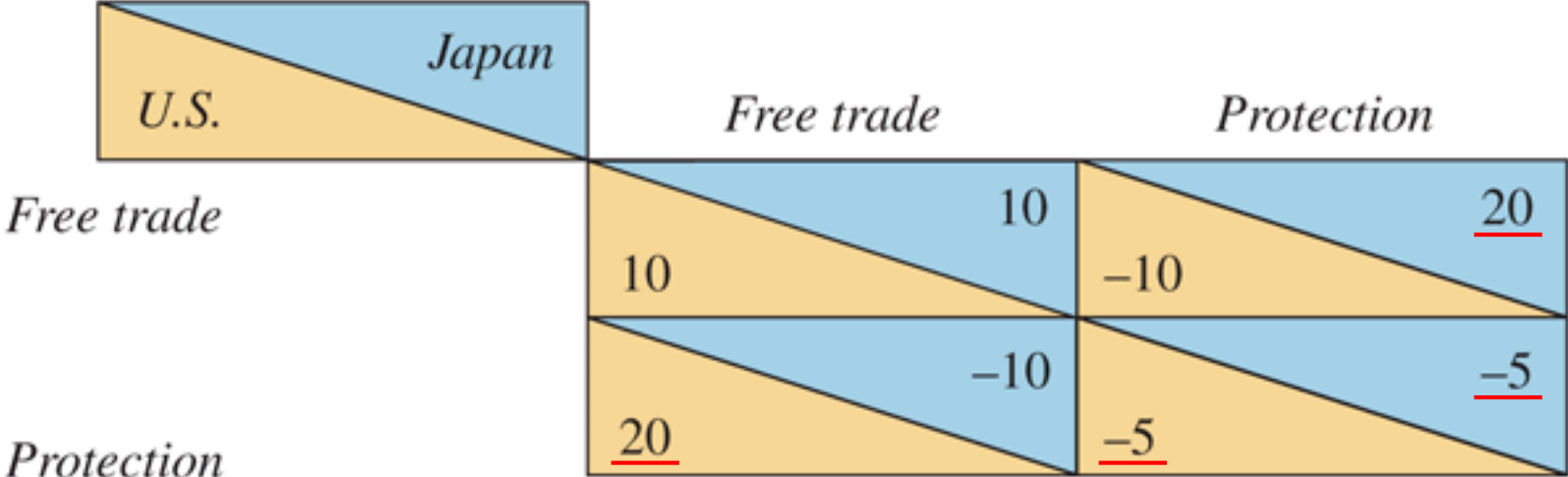
Optimal Tariffs

If importing country is large enough for ToT effects to dominate. Optimal tariff may be non-zero



Trade Wars

Tariffs are classic case of Prisoners' Dilemma:



Unilateral Tariffs

Saw in basic Ricardian framework that optimal unilateral tariffs are non-zero

- Problem is trade wars and prisoner's dilemma
- Both countries worse off if everybody imposes tariffs
- How much worse off depends on framework
 - Larger welfare losses with monopolistic competition and with trade in intermediates

A Theory of the GATT/WTO

General Agreement on Tariffs and Trade (GATT) formed in 1947

- Transformed into World Trade Organization (WTO) in 1995
- In both forms, it acted to reduce trade restrictions through international bargaining

Bagwell and Staiger (1999,2003) discuss why the GATT/WTO exists

- What problem does it solve?
- Focus on two features of the GATT/WTO: Reciprocity and Nondiscrimination

What Problem Does the WTO Solve

In a standard small open economy framework, unilateral tariffs are free trade

- No need for the WTO, will have free trade due to unilateral optimality (maximizes income)

Provides hints as to why Free Trade Agreements (FTAs) might exist

- Countries may not maximize national income, e.g. political motivations
- Countries may be large

Non-Optimality of Unilateral Tariffs for Large Economies

Bagwell and Staiger (1999) show that Unilateral Nash Equilibrium tariffs are not Pareto Optimal

- There is a terms-of-trade externality, which is **only** reason for non-optimality
 - When an import tariff is imposed, part of cost is shifted to foreign exporters
 - For wide class of gov. objective functions, ToT externality only source of inefficiency
- Purpose of trade agreements are therefore to address these ToT effects

Key Features of WTO

Set up a game where countries negotiate over tariffs and formalize features of WTO

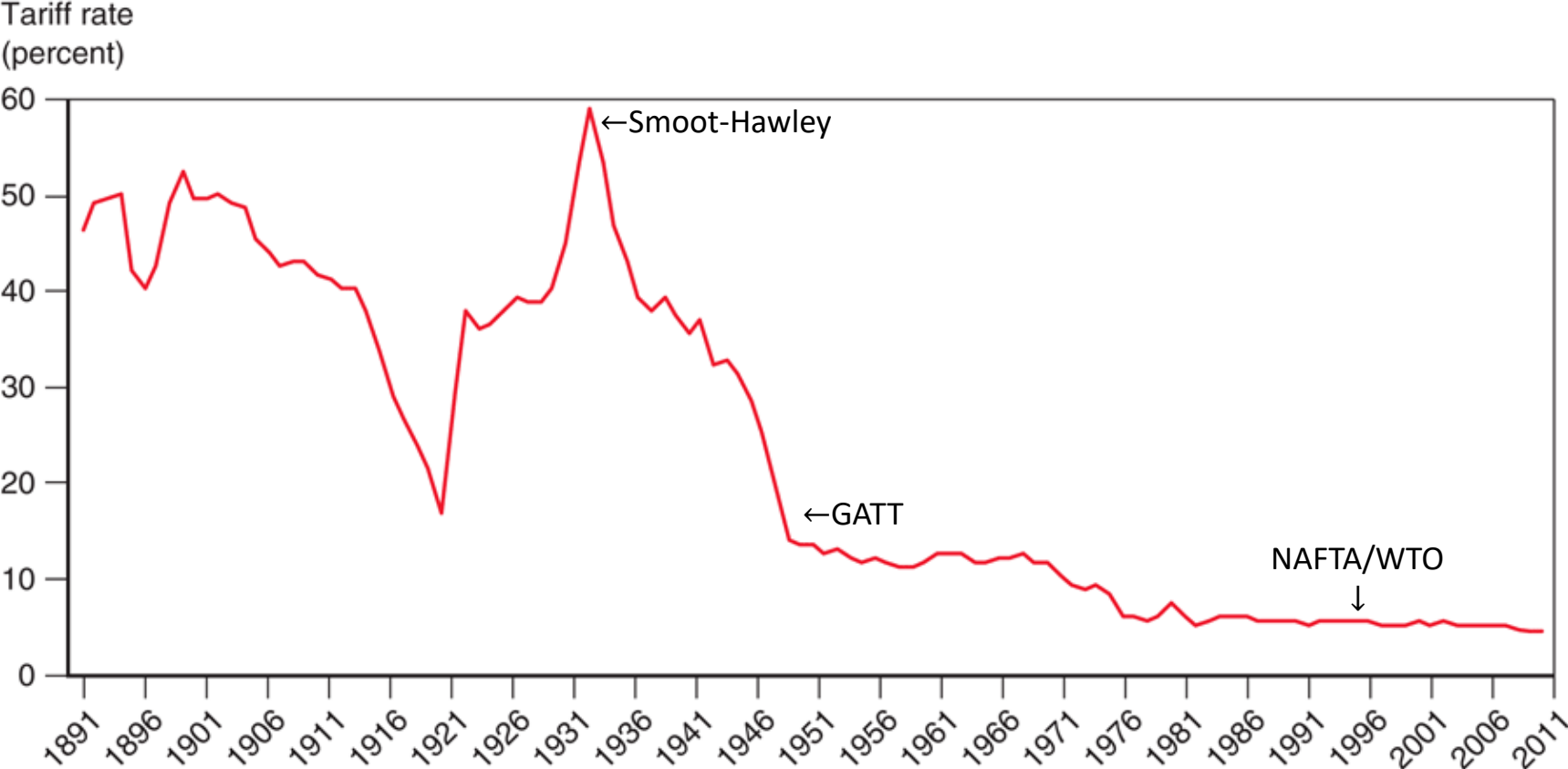
Reciprocity: Mutual changes in trade policy such that world price is unchanged

- Changes in value of each country's imports equals changes in value of each country's exports
- Reciprocity eliminates inefficiency caused by world price effects
- Key feature is that it separates outcome of negotiations from bargaining power of negotiators

Non-discrimination: In a multicountry framework, tariffs can be discriminatory and inefficient even under bilateral reciprocity, therefore need non-discrimination so tariffs are applied uniformly on a given product across all trading partners

- Preferential FTAs circumvent non-discrimination and undermine the WTO/GATT

United States' Average Tariff Rate over Time



Effects of World Trade Organization

The WTO has been very successful at reducing tariffs and protectionism

- Some industries remain highly protected (e.g. agriculture and textiles)

Breakdown of Gains from Removing Remaining Tariffs and Trade Protections

Economy	Agriculture and Food	Textiles and Clothing	Other Merchandise	All Goods
Developed	46	6	3	55
Developing	17	8	20	45
All	63	14	23	100

Source: Kym Anderson and Will Martin, “Agricultural Trade Reform and the Doha Agenda,” *The World Economy* 28 (September 2005), pp. 1301–1327.

Other Gains from Openness

Protectionism may lead to inefficiencies and misallocation

- Cartels and Monopolies form to lobby for protection and increase prices
- When firms are sheltered from competition, may not innovate

Examples:

- Iron-ore industry in United States: Inefficiently run before it became possible to import iron ore pellets. Quickly reformed under threat of losing shares to foreign countries.
- Sugar-beet industry in United States: Cartel formed to lobby for sugar-beet protectionism and keep out both domestic and foreign competition.
- Computer industry in Brazil: Protectionism under infant industry argument. Never innovated or developed good computers, only suffered high prices.

Productivity of Iron Ore Industry in Minnesota



Source: Schmitz (2003)

Price of Computers in Brazil



Source: Feenstra and Taylor, 2009