Trade Policy: Part One

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[1]I wish to acknowledge Battista Severgnini for providing last year's slides to me. His generosity saved me much time, and these slides are partially based on his. Any errors are of course my own.

- Last time: Increasing Returns to Scale
  - Krugman: External Economies
    - Larger industries have lower cost
    - Drives industries to concentrate
    - A reason for trade
  - Implications of external economies
    - Historical Accident
    - Money on the table
    - Infant industries
  - Melitz and Krugman: Internal Economies
    - Larger firms have lower cost
    - Each firm a different product or variety
    - Consumers like a mix
    - Reason for trade: more (and cheaper) varieties

Plan for Today

Chapter 8:

- Review: Monopoly
- Review: Monopolistic competition
- New: Trade costs
- New: Dumping
- New: Multinationals

Chapter 9 :

- Tariffs
- Consumer & Producer Surplus
- Export Subsidies

Chapter 10 :

Review

- Begin review

External vs Internal Increasing Returns

- Firms or locations?
  - If increasing returns happen within an industry and firm, what would the economy look like?
  - If increasing returns happen within an industry and location, what would the economy look like?
- First: increasing returns within industry and location
  - Firms are very small, no affect on aggregate production
  - The more the industry produces, the lower are average costs
  - Good model for Silicon Valley startups

Decreasing marginal product of labor?

- Specific factors, HO – increase labor, fix capital, decreasing returns to labor
- Now we want increasing returns – what is the argument?
  - Specialized suppliers
  - Labor market pooling
  - Knowledge spillovers

- To start, simplest possible model
  - One country
  - One good
  - One factor: Labor
  - *External* increasing returns to scale
  - That is: industry/location scale economies

The firm's problem

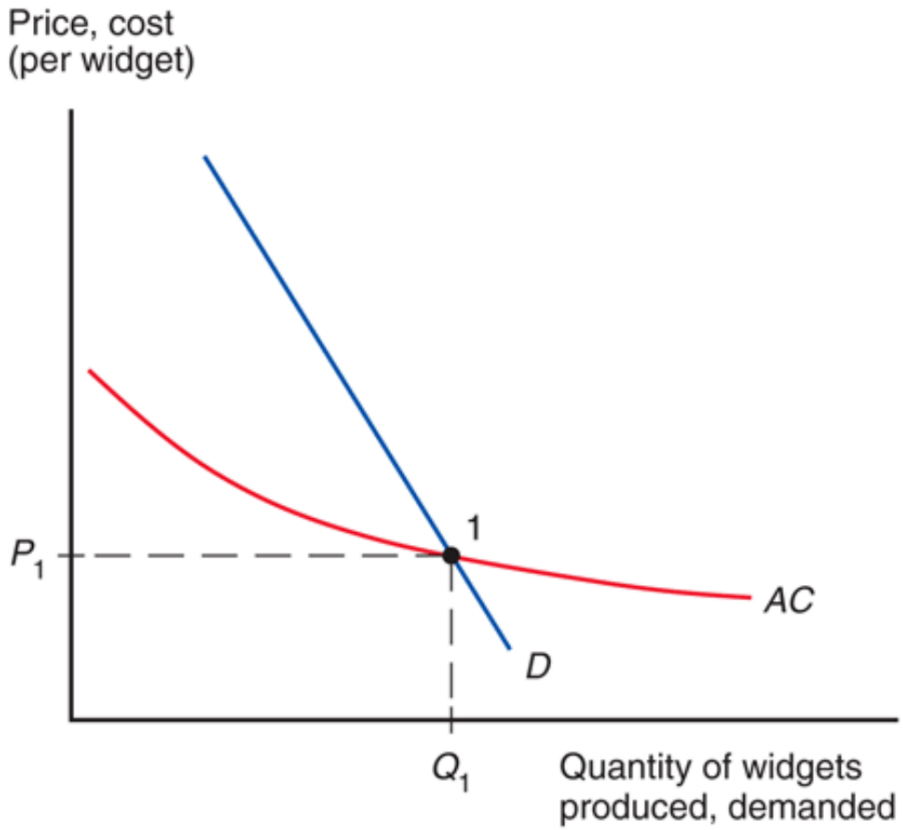
- Firms are really tiny
- They think they do not affect industry wages
- In equilibrium, zero-profits again
- What is the equilibrium wage?

Equilibrium supply and demand

- We have been equating relative supply and relative demand
- Nothing relative here, we only have one good
- Now we are going to equate average cost and demand
- Why does avg. cost have to equal price in equilibrium?
- Hint: Labor gets everything in this model

Equilibrium supply and demand

- Last piece: Average cost is falling due to external economies of scale



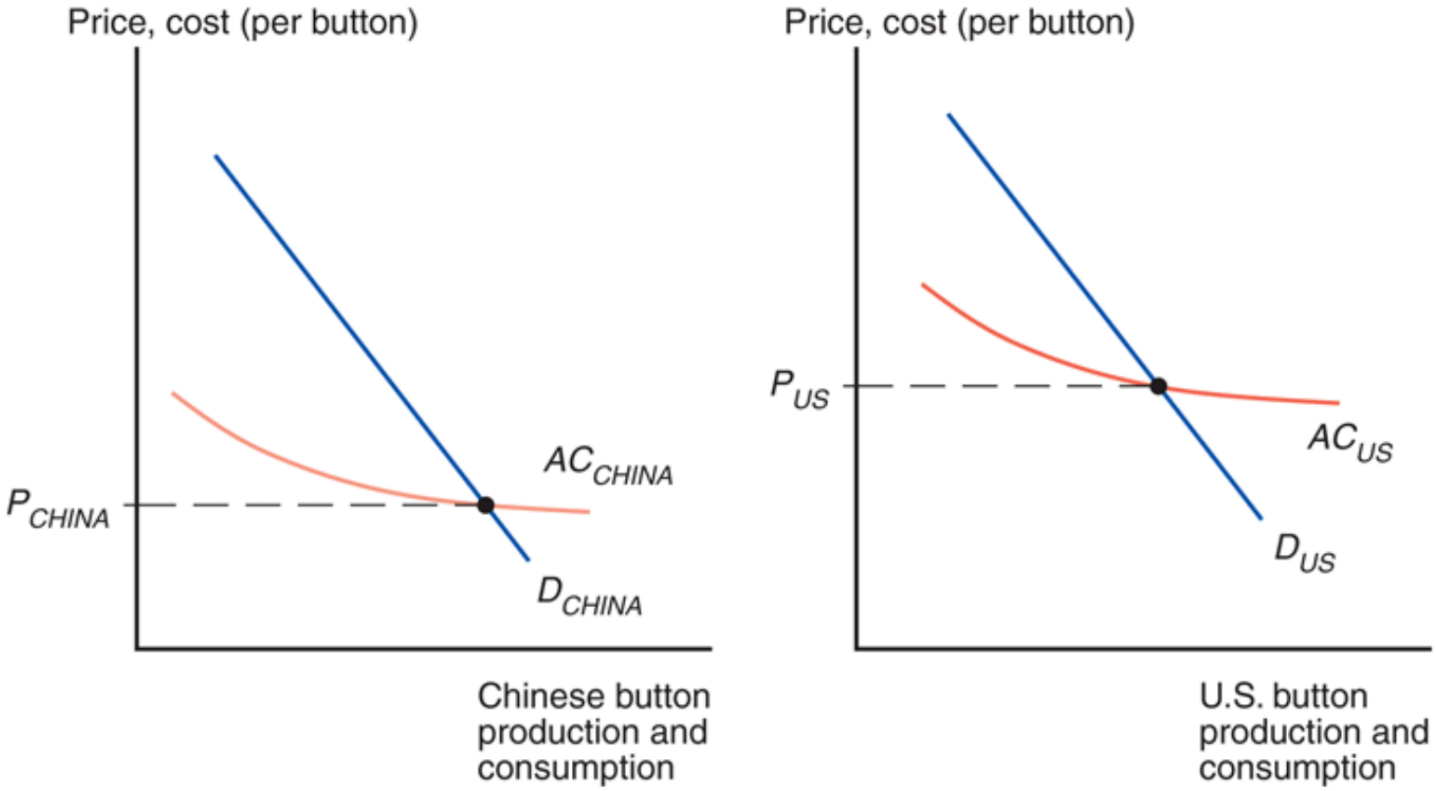
- Where does demand curve come from?

Trade and External Economies

- Two countries: China and US
- Two goods: Buttons and Not-Buttons
- One factor: Labor
- External economies of scale

No button trade

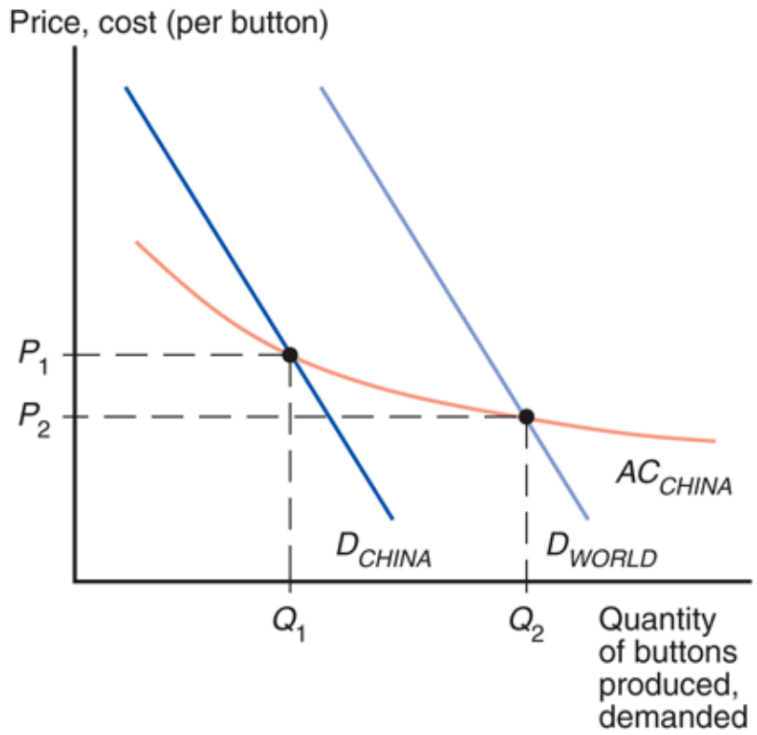
- Each country makes its own buttons (and not-buttons)



Allow button trade

- Opening to trade
  - China can undercut all American button makers
  - True even if very little Labor in American button making
  - Increasing marginal product of labor (unlike other models)
  - Implication: China makes all the buttons
- Scale economies
  - Cost of producing buttons in China goes down
  - Cost of producing buttons in US goes up
  - Cheaper buttons everywhere!
  - What about real wages of Chinese workers?
  - What about real wages of American workers?

Allow button trade

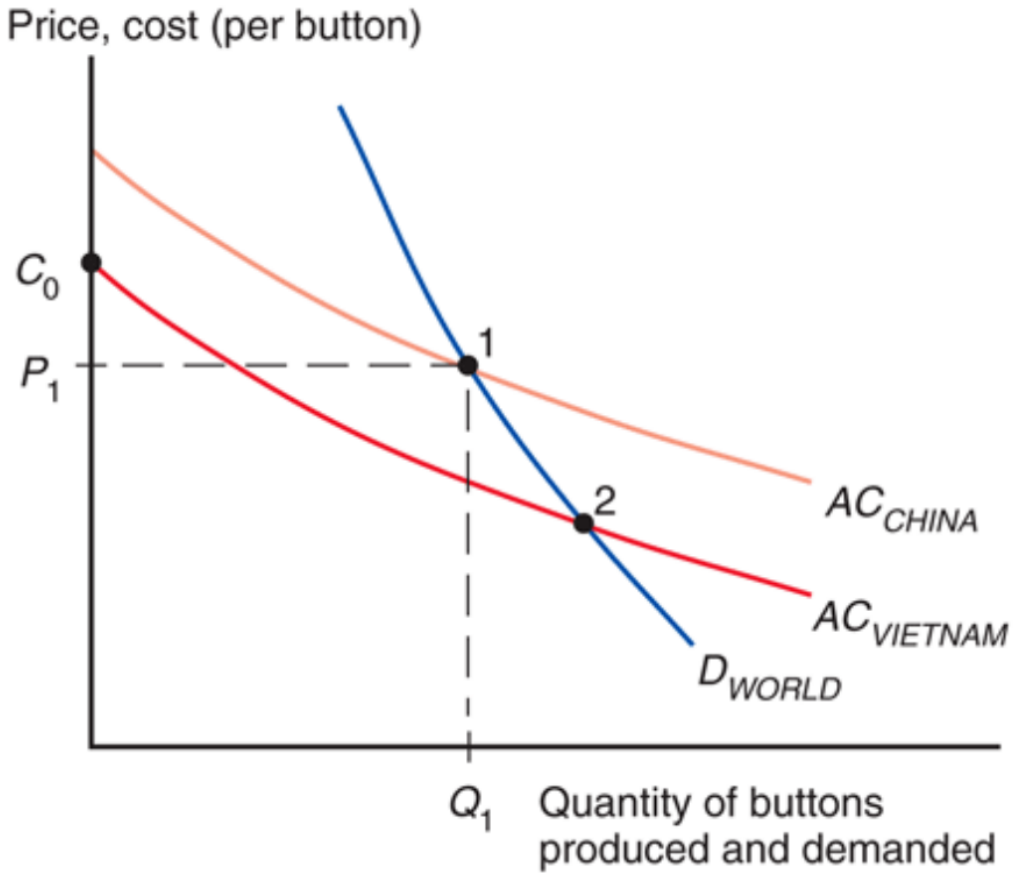


Implications of external economies model

- We are going to look at three results
  1. The world poverty trap
  2. Losses from trade
  3. Beneficial protectionism

Poverty traps and models of multiple equilibria

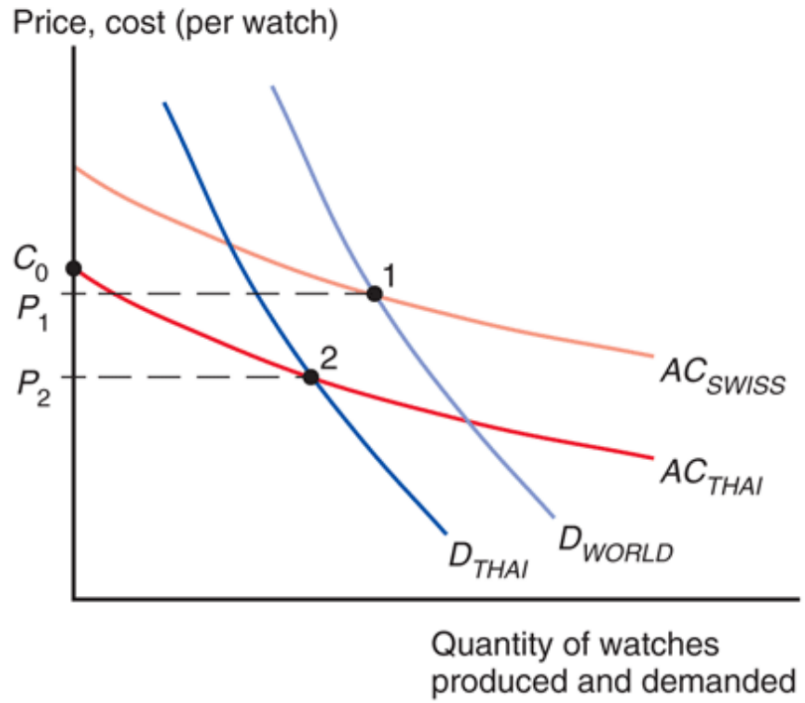
- The idea:
  - For some reason, only one country produces a good
  - Scale lowers the price of the good significantly
  - Another country would be more efficient only if it had all production
  - At current world price, no firm in other country will enter


Price, cost (per button)
C_0
P_1
1
2
AC_{CHINA}
$AC_{VIETNAM}$
D_{WORLD}
Q_1
Quantity of buttons produced and demanded

Losses from trade

- External scale economies can also create losses from trade
- Intuition: Same story as wrong equilibrium
  - Thailand can make watches cheaper, but Switzerland started first
  - Now, even if Thailand only produced Thai watches, it would get lower price
  - Again, low world price keeps firms from entering

- What if Thai government shut down trade?
- Who benefits if Thai government shut down trade and then opened it again?



Learning by doing

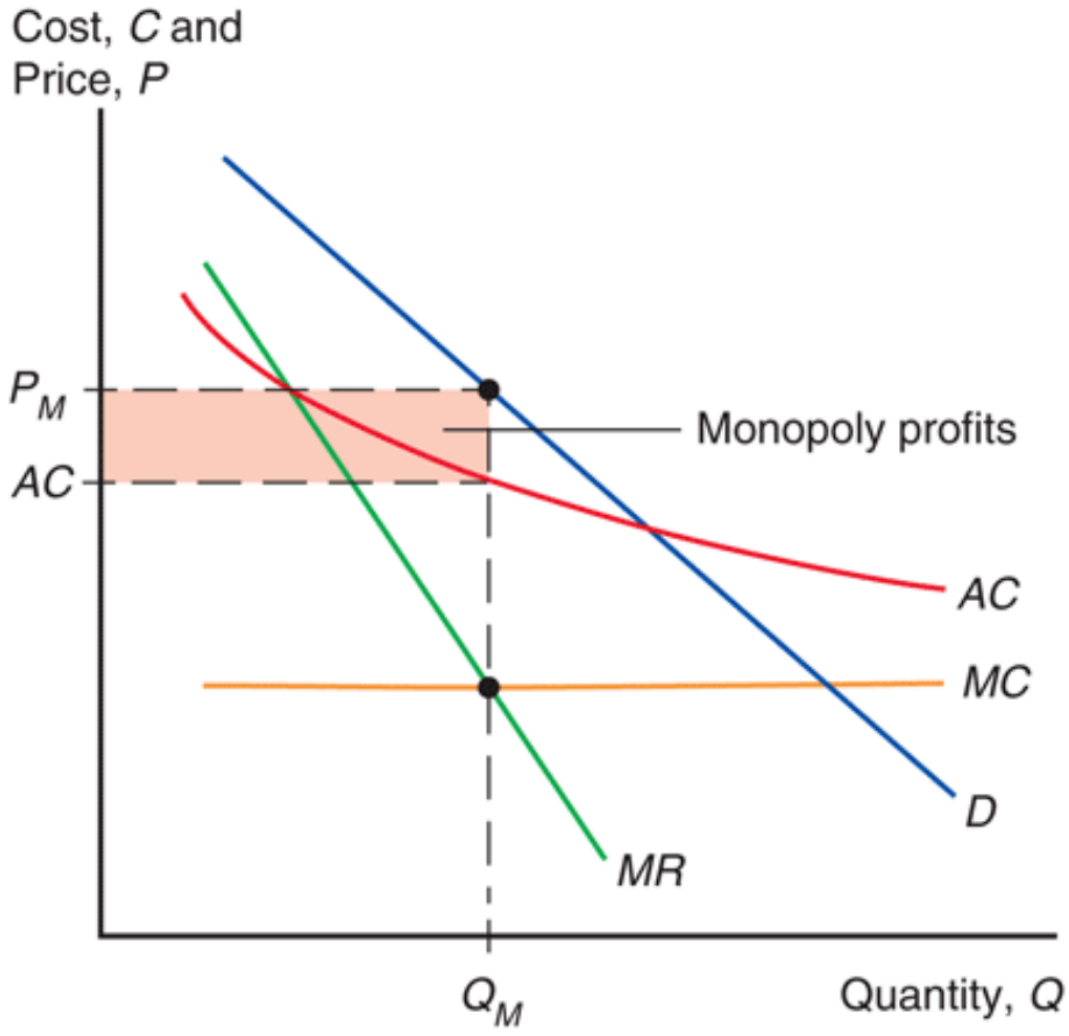
- Suppose that the more a country produces, the lower its cost
- Seems reasonable, lots of studies on WWII America show this
- Can give rise to dynamic losses from trade as well
  - Two countries, Two goods: Food and Clothing
  - Rich country has comp. adv. in Food
  - All learning in agriculture finished
  - In autarchy, both countries grow
  - Suppose Poor specializes in Food after opening to trade
  - Poor stops growing
- Trading dynamic losses for static gains

Next up: Chapter 8

- Now, internal increasing returns to scale
- The bigger the firm, the lower its cost
  - Issue: How many firms if we have two goods?
  - Solution: Each firm makes a different product
  - Implication: Each firm has a monopoly on its product
- Recently very popular, generate firm size distributions
- Past chapters: how does trade affect workers and factor owners
  - Firms were basically ignored
  - Side note: If we have L workers, how many free-entry, CRS firms are there?
- Main point of chapter: how does trade affect firms?

Monopoly

- Each firm has a monopoly over its own product
- Deconfusifying the textbook review of monopoly, go!
  - Price takers vs price makers
  - Gap between MR and Demand curves
  - Suppose linear demand: $Q = A - BP$
  - Average cost vs marginal cost


Cost, C and
Price, P
P_M
AC
Monopoly profits
AC
MC
D
MR
Q_M
Quantity, Q

Monopolistic Competition

- Monopoly models are easy to analyze
- One firm doesn't make an interesting distribution
- Oligopoly models are hard
  - Pricing decisions depend on beliefs about other firm behavior
  - With strange beliefs, strange equilibria
- Solution: Monopolistic competition
  - Firms are very small
  - Firms care about market-wide average prices
  - Individual firm deviations don't change aggregate

Monop. Comp. equilibrium

- Plan:
  - Show average cost increasing with number of firms
  - Show price decreasing with number of firms
  - Show equilibrium number of firms is intersection (zero profits)

Avg. cost increasing in firm number

- Suppose firms face the demand:

$$Q = S\left(\frac{1}{n} - b(P - \overline{P})\right)$$

- If firms are all the same, charge $\overline{P}$
- Production of a firm is $Q = \frac{S}{n}$
- What happens to production if n increases?
- What happens to the average cost of each firm?

Equil. price decreasing with number of firms

- Suppose firms face the demand:

$$Q = S\left(\frac{1}{n} - b(P - \overline{P})\right)$$

- Get price as a function of quantity
- Write down firm problem
- Write first order condition
- Substitute $Q = \frac{S}{n}$

Price equals average cost

- Suppose price were higher than average cost
  - A new firm would enter
- Suppose price less than average cost
  - Some firm would exit
- Must be that price equals average cost

Opening up to trade

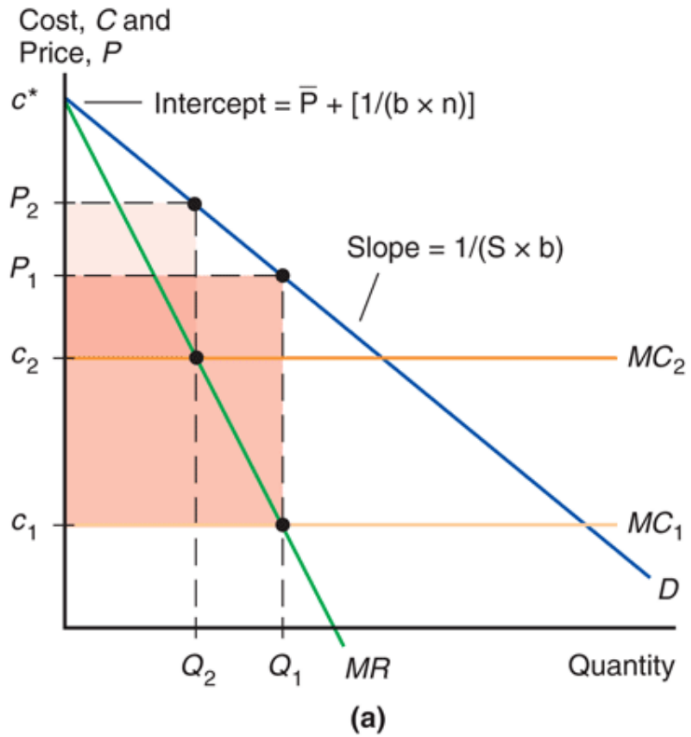
- First let's show that an increase in market size
  - Increases number of active firms (products)
  - Lowers equilibrium price of each product
- Firms produce $\frac{S}{n}$
- Market size S increases, each firm produces more
- Average cost falls
- Price firm's charge is $P = c + \frac{1}{bn}$
- Unrelated to market size

Heterogenous Firms

- Firms remain the same in every way
- *Except* that they have different marginal costs c
- Assume that firms learn c *after* they have paid fixed costs
- New equilibrium condition: Expected zero profits (net of fixed cost)

Heterogenous firm equilibrium

- Firms still produce at point where marginal revenue equals marginal cost



Heterogenous firms and trade

- Demand:

$$Q = S\left(\frac{1}{n} - b(P - \overline{P})\right)$$

- What is the slope of the demand curve?
- What is its intercept?
- When a country opens to trade, how does demand change?

Heterogenous firms and trade

- Punchline: Opening up to trade
  - Worst firms exit
  - high-cost firms shrink
  - low-cost firms grow
- Industry more efficient as production is more concentrated in low-cost firms
- Effect similar to actual productivity growth

- End review!

Trade Costs and Extensive Margin

- Suppose there is some cost to trade
- Equivalent to increasing marginal cost of production
- Recall firms with high marginal cost don't enter domestic market
- Even fewer firms will enter the export market
- *Extensive margin*: Number of firms exporting
- *Intensive margin*: How much each firms export
- Trade costs reduce both

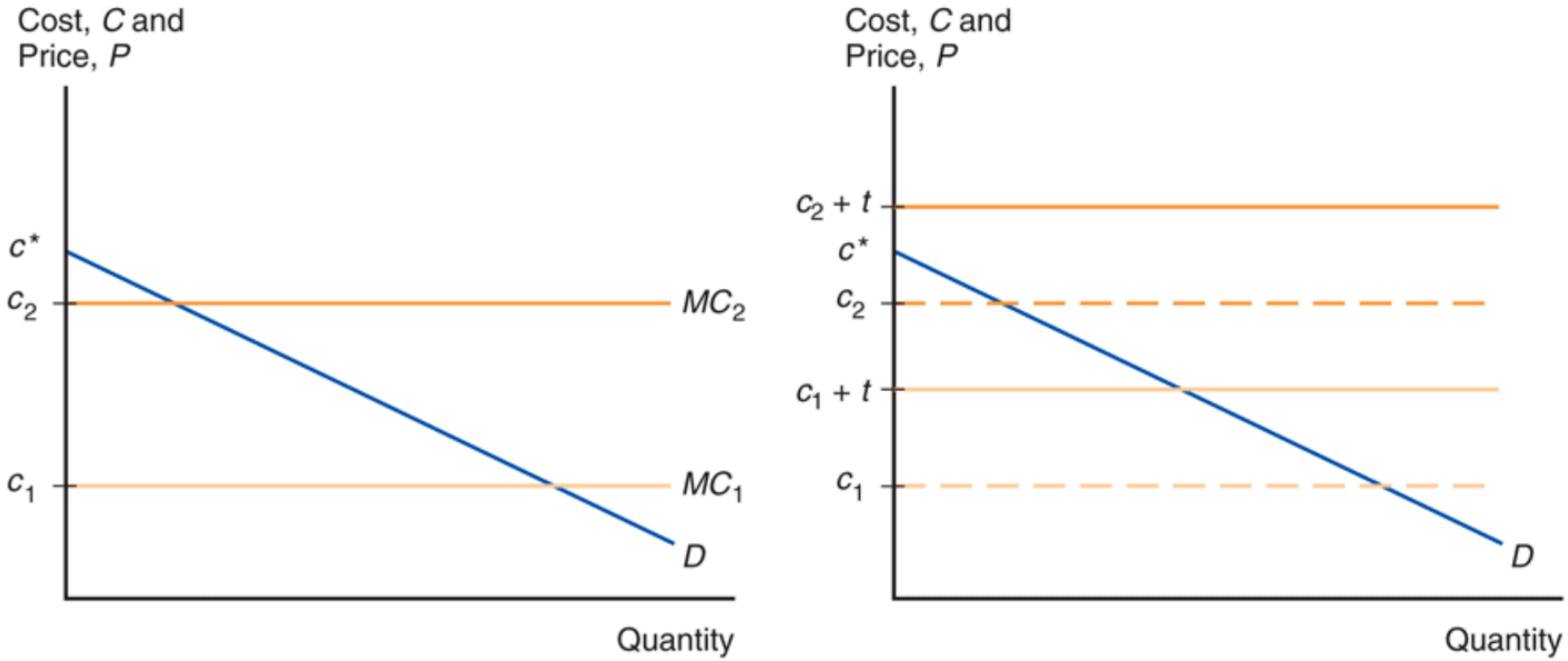
Extensive Margin is important

- Small share of firms export – 18% of American firms overall

Printing	5%
Furniture	7%
Apparel	8%
Wood Products	8%
Fabricated Metals	14%
Petroleum and Coal	18%
Transportation Equipment	28%
Machinery	33%
Chemicals	36%
Computer and Electronics	38%
Electrical Equipment and Appliances	38%

Source: A. B. Bernard, J. B. Jensen, S. J. Redding, and P. K. Schott, "Firms in International Trade." *Journal of Economic Perspectives* 21 (Summer 2007), pp. 105–130.

Extensive Margin in a Picture



Predictions of Heterogenous Firms with Trade Cost

- Subset of firms export
- Those that do are relatively productive
- Largely backed up by data:
  - Exporters on average twice as large as importers (size vs. prod?)
  - Produce on average 11% more per worker

Dumping

- *Dumping* is when a firm sells a product too cheaply abroad
  1. Sometimes if foreign price below domestic price
  2. Sometimes if foreign price below domestic price plus tariff
  3. Sometimes if foreign price is below cost of production
- Considered an unfair trade practice, WTO allows 'antidumping duty' or tariff
- Monopolistic competitive firms naturally do No. 2 (but not No. 1 or No. 3)
- Why?
- Textbook: This is just natural firm behavior
- Me: Don't feel too bad – these firms are still monopolists!

Pause

- Trade costs: exporters on average more productive
- Dumping: Depending on definition, natural behavior
- Now: Foreign Direct Investment
- Note: Not directly related to increasing returns
- Included because firm behavior in trade

Foreign Direct Investment

- Comes in two flavors
  1. *Vertical*: Do manufacturing where it is cheap
  2. *Horizontal*: Produce close to final market
- Vertical example: iPhones made in China, designed in California
- Horizontal example: Japanese cars produced in the United States

Motives for FDI

- Vertical FDI
  - ex: Take advantage of lower labor costs abroad
  - Capital can move: Factor price equalization all over again!
- Horizontal FDI
  - Proximity-Cost tradeoff
  - Language developed by my professor, Steven Yeaple (along with Melitz)
  - Low transport cost, export more
  - High transport cost, build factor abroad
  - Prediction consistent with data

Outsourcing and Offshoring

- In both flavors of FDI, keep transactions in the firm?
- Vertical
  - Should you buy intermediates from foreign frim?
  - Or build a factor abroad?
- Horizontal
  - Should you license technology to local producer?
  - Or open a foreign factory yourself?
- These are deep and difficult questions
- Depend on the theory of the firm
  - Economics about the power of the market
  - Each firm is a tiny communist country

Offshoring increasingly important

- Intermediates are 40% of manufactures trade (which are around 55% of world trade)
- Intra-firm trade is 30% of world trade
- Frontier of research, no definitive motive for internalization

Chapter 8: Summary

- Monopolistic Competition
- Fixed cost give increasing return to scale
- Model for analyzing firms and trade (why?)
- Trade grows productive firms, shrinks unproductive firms
- Effect like productivity growth
- Frontier of research: FDI and internalization decisions

Chapter 9: The Instruments of Trade Policy

Chapter 9-12

- First 8 chapters:
  - Why do countries trade?
  - Is more trade generally good or bad?
  - How does trade affect income distribution?
  - How does trade affect firms?
- Chapters 9-12:
  - How does trade policy affect welfare?
  - How is trade policy formed?
  - When is trade policy justified?
  - Open trade policy questions and the future
- Except for 9, these chapters are for the most part "chatty"

Chapter 9

- How do tariffs affect trade?
- How do tariffs affect welfare?
- How do other trade policy tools affect welfare?

Partial Equilibrium

- Previous chapters (mostly) general equilibrium
  - Begin with market structure, factor endowments, or available technology
  - All prices determined in equilibrium (think relative price in our models)
  - Equilibrium conditions like balance of trade, marginal cost equals marginal revenue, etc
  - Income effects, substitution effects
- Tariff analysis is partial equilibrium
  - Only concerned with a single good, single price
  - Strong assumption: Neither incomes nor other prices change
  - Welfare only affected by consumption or sale of the single good

Tariffs

Two types of tariffs:

1. **specific tariff:** fixed charge for each *unit* of imported goods (e.g., 1 DKK per kg of cheese)

$$P = P^* + t$$

2. ***ad valorem* tariff:** fraction of the *value* of imported goods (e.g., 25% tariff on the value of imported cars)

$$P = P^* (1 + \tau)$$

- Most discussion today: Specific tariff
- Most tariffs today: Ad valorem tariff
- Distinction will not change analysis much

Tariffs in history

- Tariffs were *the* source of government revenue for much of history
- Easy to put government agents at ports
- Same reason Turkey has extremely high petrol tax

19th century US tariffs

Year	Tariff Income	Budget % Tariff	Federal Receipts	Income Tax	Payroll Tax	Average Tariff
1792	$4.4	95.0%	$4.6	$-	$-	15.1%
1795	$5.6	91.6%	$6.1	$-	$-	8.0%
1800	$9.1	83.7%	$10.8	$-	$-	10.0%
1805	$12.9	95.4%	$13.6	$-	$-	10.7%
1810	$8.6	91.5%	$9.4	$-	$-	10.1%
1815	$7.3	46.4%	$15.7	$-	$-	6.5%
1820	$15.0	83.9%	$17.9	$-	$-	20.2%
1825	$20.1	97.9%	$20.5	$-	$-	22.3%
1830	$21.9	88.2%	$24.8	$-	$-	35.0%
1835	$19.4	54.1%	$35.8	$-	$-	14.2%
1840	$12.5	64.2%	$19.5	$-	$-	12.7%
1845	$27.5	91.9%	$30.0	$-	$-	24.3%
1850	$39.7	91.0%	$43.6	$-	$-	22.9%
1855	$53.0	81.2%	$65.4	$-	$-	20.6%
1860	$53.2	94.9%	$56.1	$-	$-	15.0%
1863	$63.0	55.9%	$112.7	$-	$-	25.9%
1864	$102.3	38.7%	$264.6	$-	$-	32.3%
1865	$84.9	25.4%	$333.7	$61.0	$-	35.6%
1870	$194.5	47.3%	$411.3	$37.8	$-	44.6%
1875	$157.2	54.6%	$288.0	$-	$-	36.1%
1880	$184.5	55.3%	$333.5	$-	$-	27.6%
1885	$181.5	56.1%	$323.7	$-	$-	32.6%
1890	$229.7	57.0%	$403.1	$-	$-	27.6%

source: http://en.wikipedia.org/wiki/Tariffs_in_United_States_history

20th century US tariffs

1900	$233.2	41.1%	$567.2	$-	$-	27.4%
1910	$233.7	34.6%	$675.2	$-	$-	15.0%
1913	$318.8	44.0%	$724.1	$35.0	$-	17.6%
1915	$209.8	30.1%	$697.9	$47.0	$-	12.5%
1916	$213.7	27.3%	$782.5	$121.0	$-	8.9%
1917	$225.9	20.1%	$1,124.3	$373.0	$-	7.7%
1918	$947.0	25.8%	$3,664.6	$2,720.0	$-	31.2%
1920	$886.0	13.2%	$6,694.6	$4,032.0	$-	16.8%
1925	$547.6	14.5%	$3,780.1	$1,697.0	$-	13.0%
1928	$566.0	14.0%	$4,042.3	$2,088.0	$-	13.8%
1930	$587.0	14.1%	$4,177.9	$2,300.0	$-	19.2%
1935	$318.8	8.4%	$3,800.5	$1,100.0	$-	15.6%
1940	$331.0	6.1%	$5,387.1	$2,100.0	$800.0	12.6%
1942	$369.0	2.9%	$12,799.1	$7,900.0	$1,200.0	13.4%
1944	$417.0	0.9%	$44,148.9	$34,400.0	$1,900.0	10.6%
1946	$424.0	0.9%	$46,400.0	$28,000.0	$1,900.0	7.7%
1948	$408.0	0.9%	$47,300.0	$29,000.0	$2,500.0	5.5%
1950	$407.0	0.9%	$43,800.0	$26,200.0	$3,000.0	4.5%
1951	$609.0	1.1%	$56,700.0	$35,700.0	$4,100.0	5.5%
1955	$585.0	0.8%	$71,900.0	$46,400.0	$6,100.0	5.1%
1960	$1,105.0	1.1%	$99,800.0	$62,200.0	$12,200.0	7.3%
1965	$1,442.0	1.2%	$116,800.0	$74,300.0	$22,200.0	6.7%
1970	$2,430.0	1.3%	$192,800.0	$123,200.0	$44,400.0	6.0%
1975	$3,676.0	1.3%	$279,100.0	$163,000.0	$84,500.0	3.7%
1980	$7,174.0	1.4%	$517,100.0	$308,700.0	$157,800.0	2.9%
1985	$12,079.0	1.6%	$734,000.0	$395,900.0	$255,200.0	3.6%
1990	$11,500.0	1.1%	$1,032,000.0	$560,400.0	$380,000.0	2.8%
1995	$19,301.0	1.4%	$1,361,000.0	$747,200.0	$484,500.0	2.6%
2000	$19,914.0	1.0%	$2,025,200.0	$1,211,700.0	$652,900.0	1.6%
2005	$23,379.0	1.1%	$2,153,600.0	$1,205,500.0	$794,100.0	1.4%

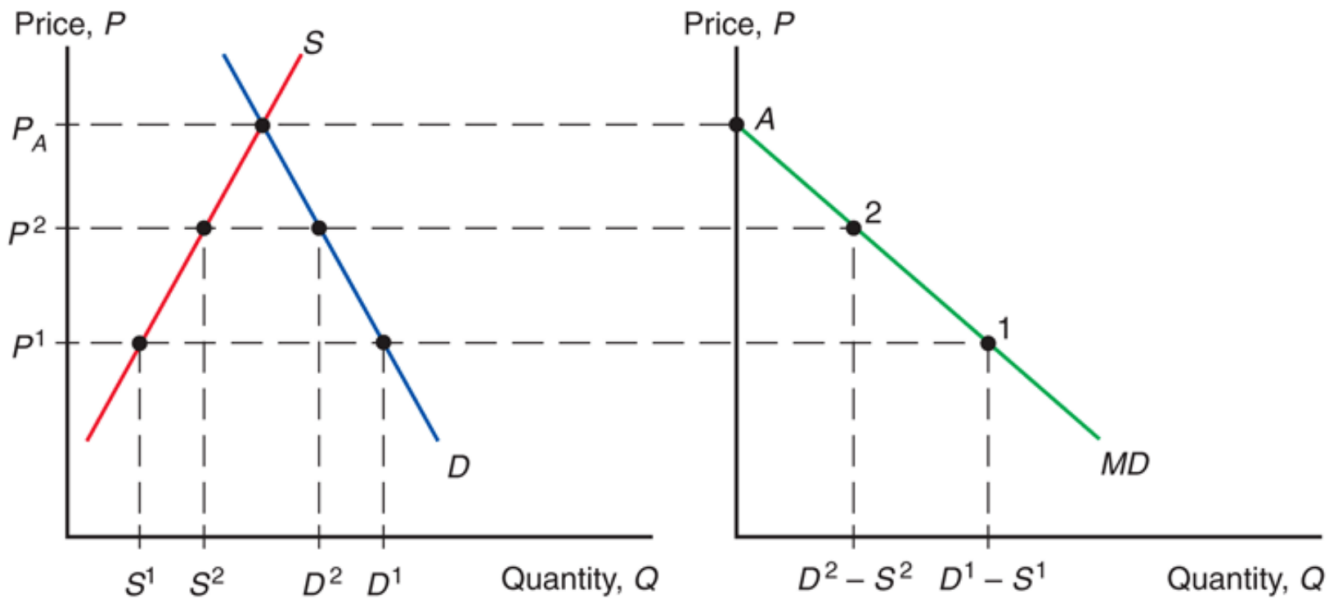
Import Demand Curve

- Import demand curve
  - Y-axis price
  - X-axis The difference between the quantity that domestic consumers demand and the quantity domestic producers supply

Export Supply Curve

- Export Supply Curve
  - Y-axis price
  - X-axis The difference between the quantity that foreign produce supply and the quantity foreign supply

Import Demand Curve



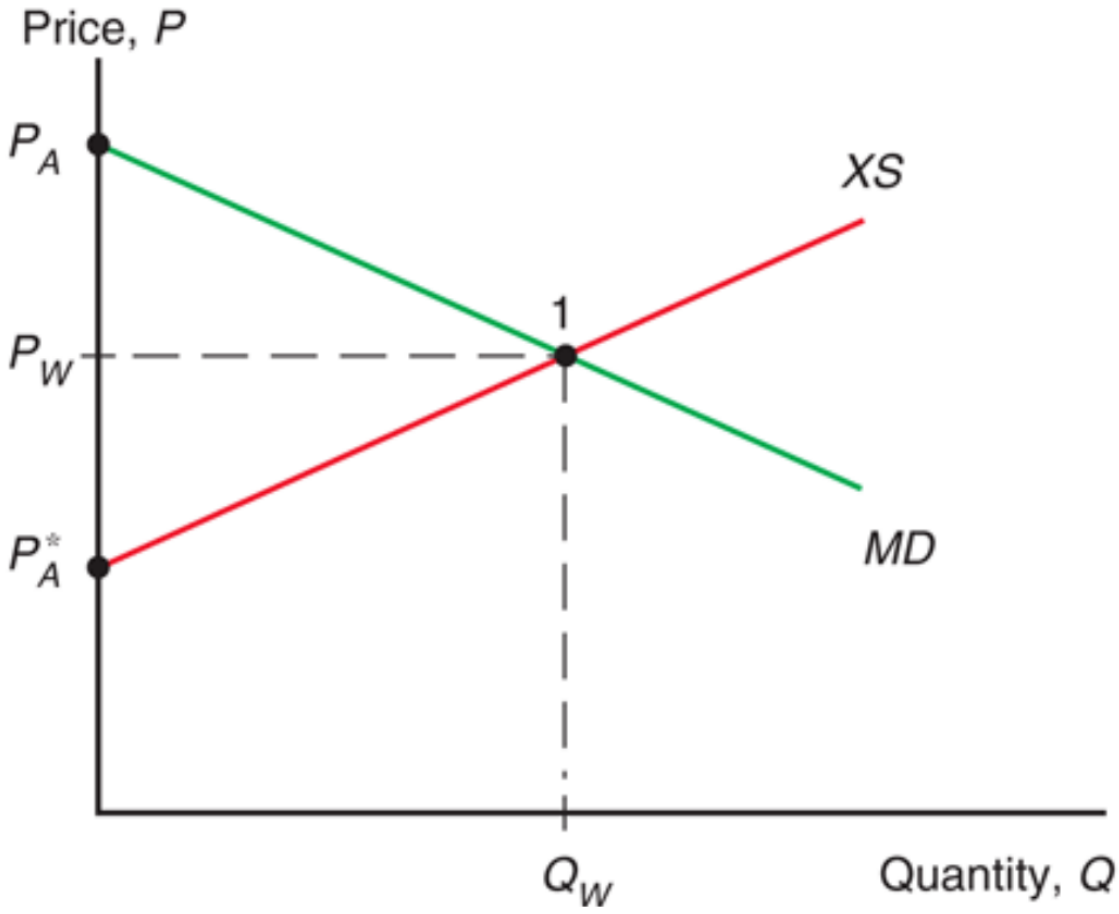
Export Supply Curve

World Market Equilibrium

Combine XS and MD curves: equilibrium price and quantity at the world market. In equilibrium

- import demand = export supply
- domestic demand - domestic supply =foreign supply - foreign demand ($D - S = S^* - D^*$)
- world demand = world supply ($D + D^* = S^* - S$)

World Equilibrium



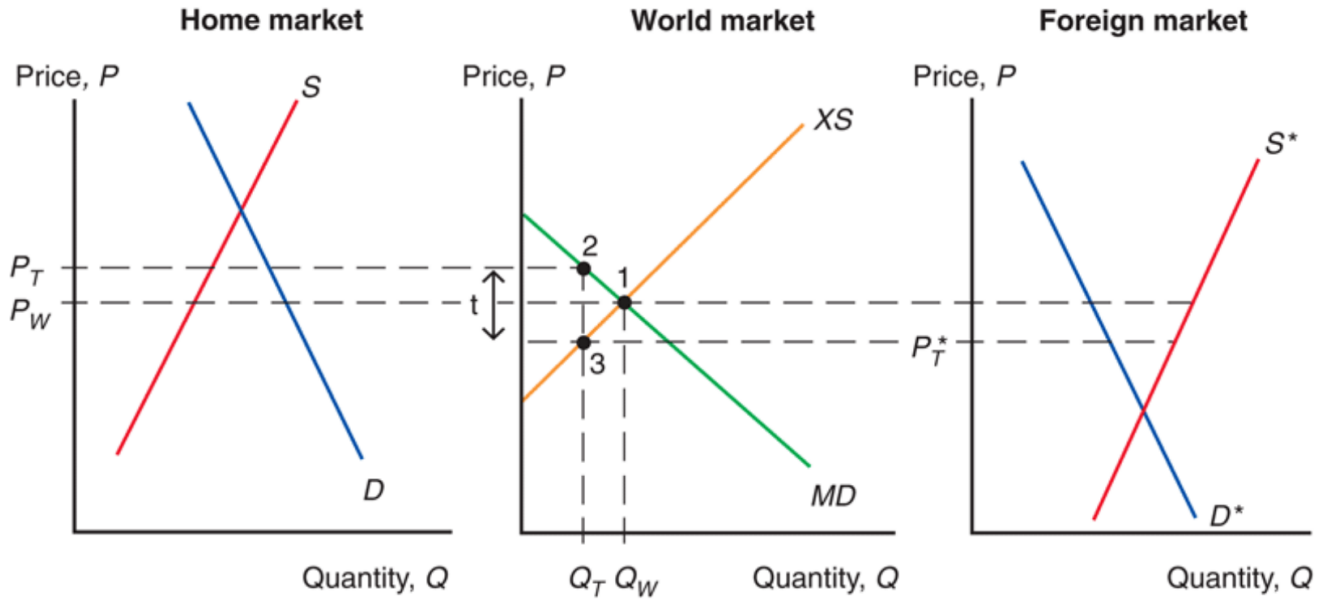
The Effects of a Tariff

- Sellers only sell abroad if the foreign price is greater than the domestic price plus the tariff. Why?
- Sellers only sell domestically if the foreign price is less than than the domestic price plus the tariff. Why?
- Equilibrium price difference is the tariff:

$$P_T - P_T^* = t$$

- Just after the tariff is set, there is excess demand at Home, and excess supply at Foreign
- Price adjusts up at Home, and down in Foreign
- Imports into Home and exports from Foreign are reduced
- Price changes depend on shape of import demand and export supply

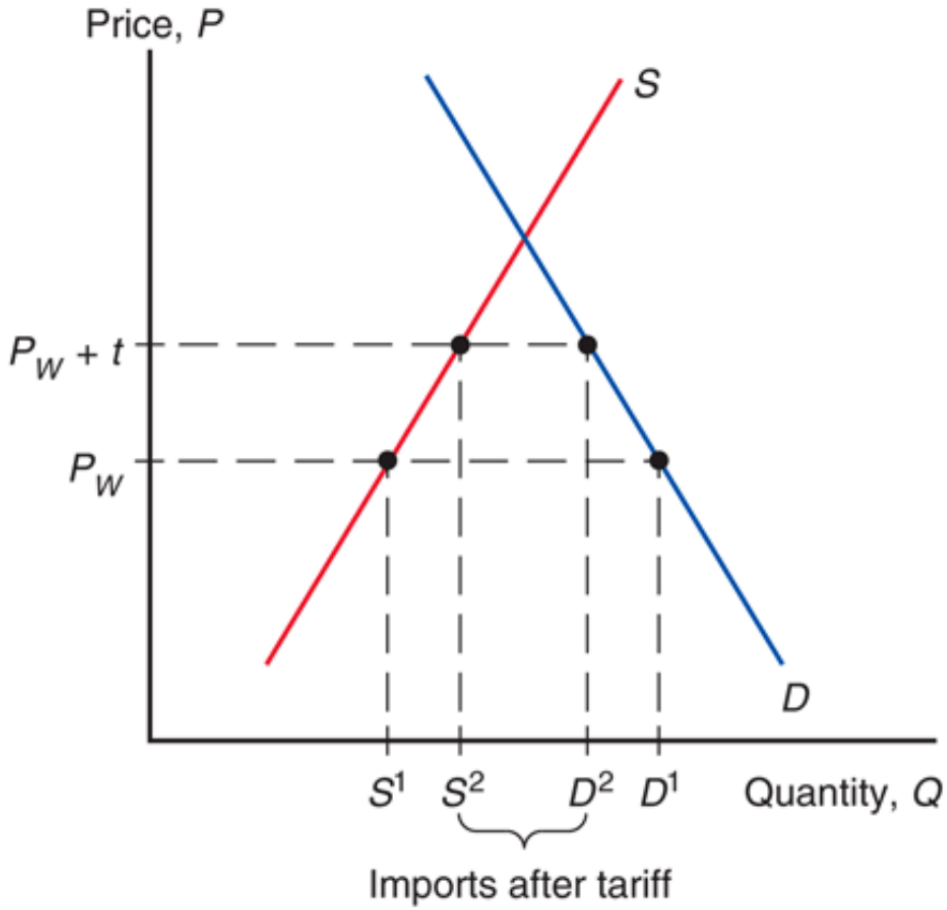
Tariff and Price



Price determination

- What would it mean if export supply were flatter?
  - Elastic supply or demand cause prices to move less
  - If Home is only a minor destination, supply and demand in Foreign very elastic
  - If Foreign drops price a small amount, a great deal more is demanded (relative to Home)
  - If Foreign drops price a small amount, a great less is supplied (relative to Home)
- If foreign supply perfectly elastic, Home prices rise the same amount as the tariff

Small Home, Flat Export Supply



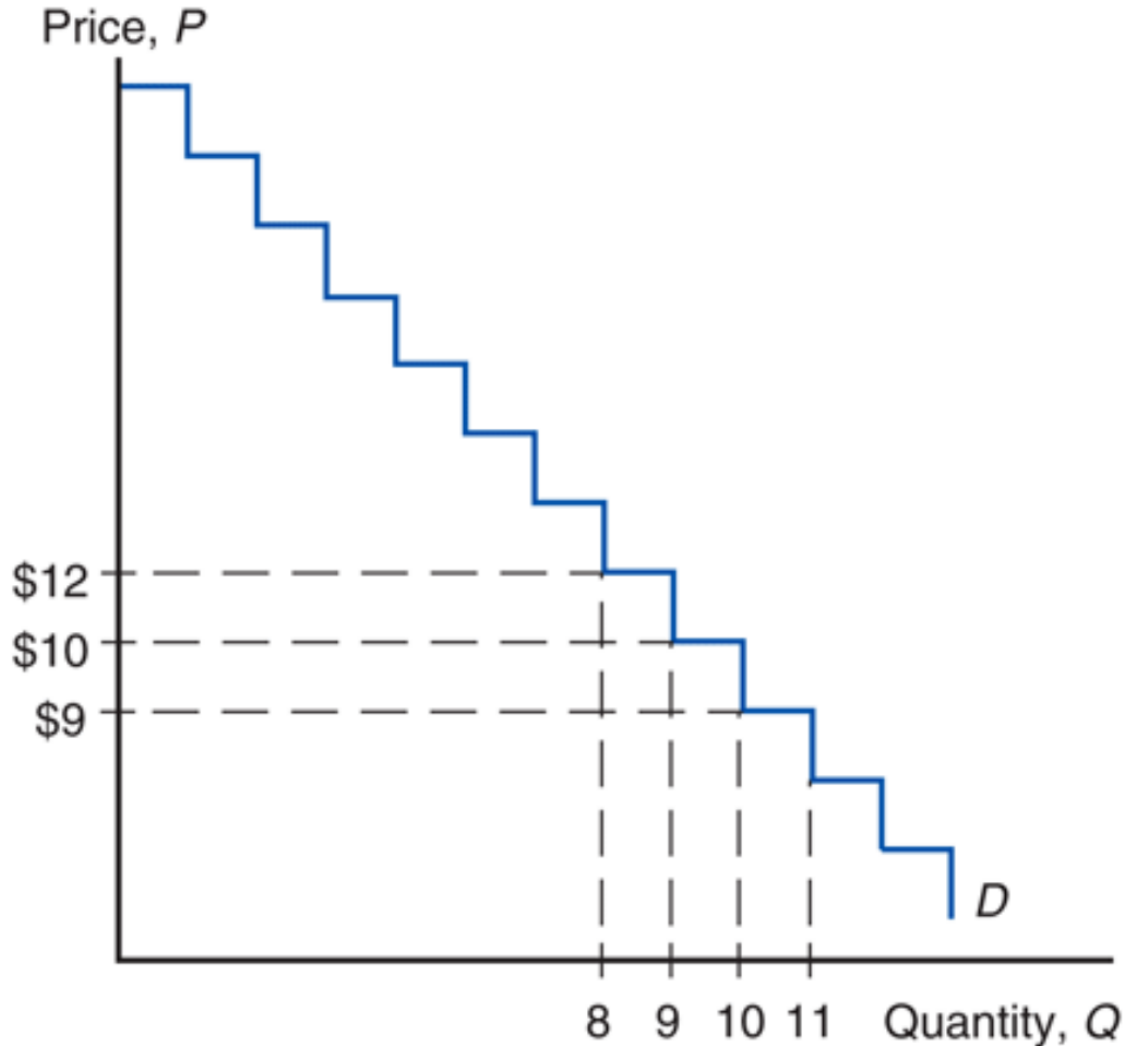
Evaluating the Costs and Benefits of Tariffs

- A tariff raises the price of a good at Home
- This hurts Home consumers and helps Home producers
- Home government also gets revenue

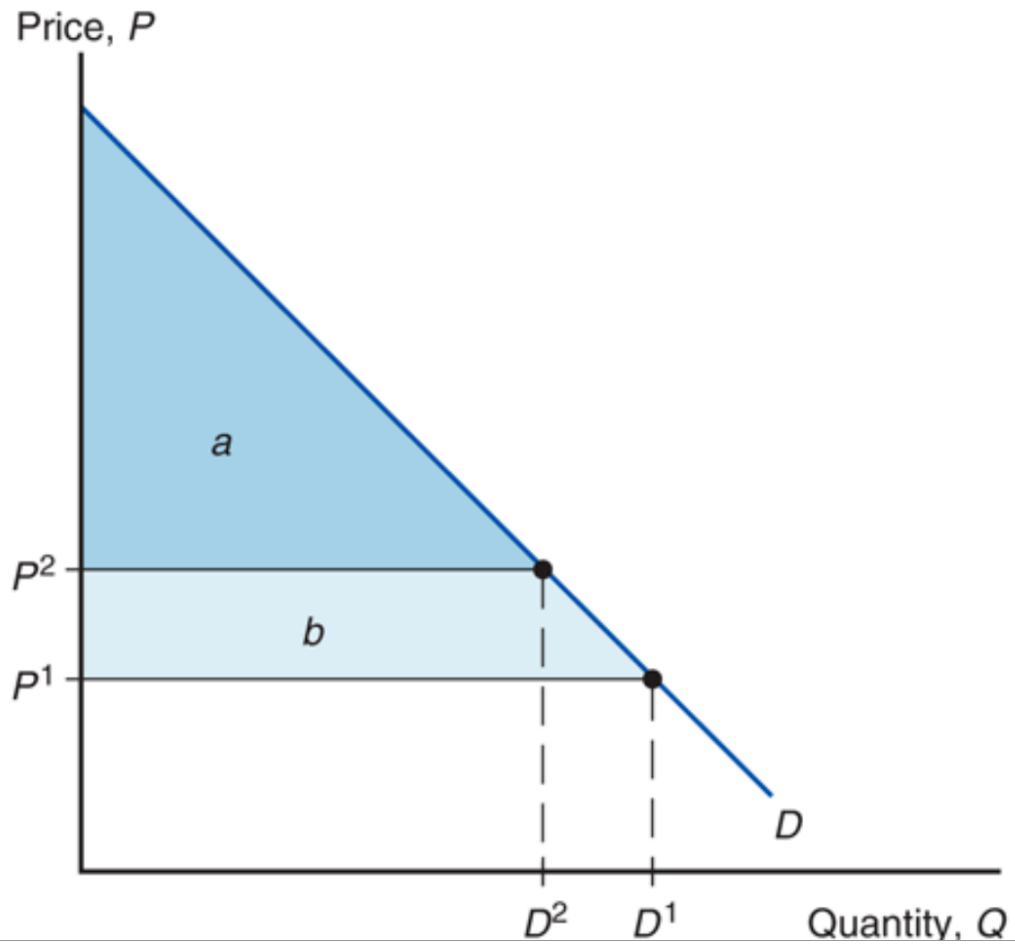
Classic partial equilibrium welfare calculations

- Consumer Surplus
  - Difference in the price consumer pays and the max price he is willing to pay
- Producer Surplus
  - Difference in at which firm sells and the min. price it would be willing to sell at
- Why partial equilibrium?
  - Where does producer surplus go?
  - Workers and owners of capital are consumers
  - The larger the producer surplus, the higher willingness to pay, etc.
  - How does price affect prices of other goods, wages, etc?

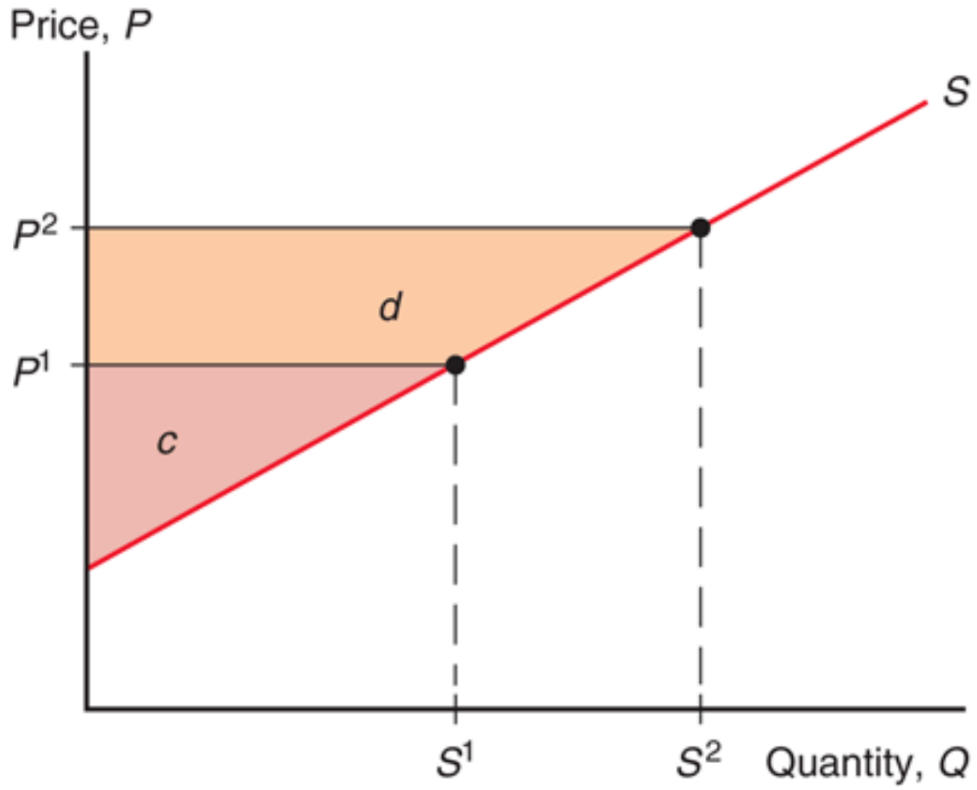
Consumer Surplus



Consumer Surplus



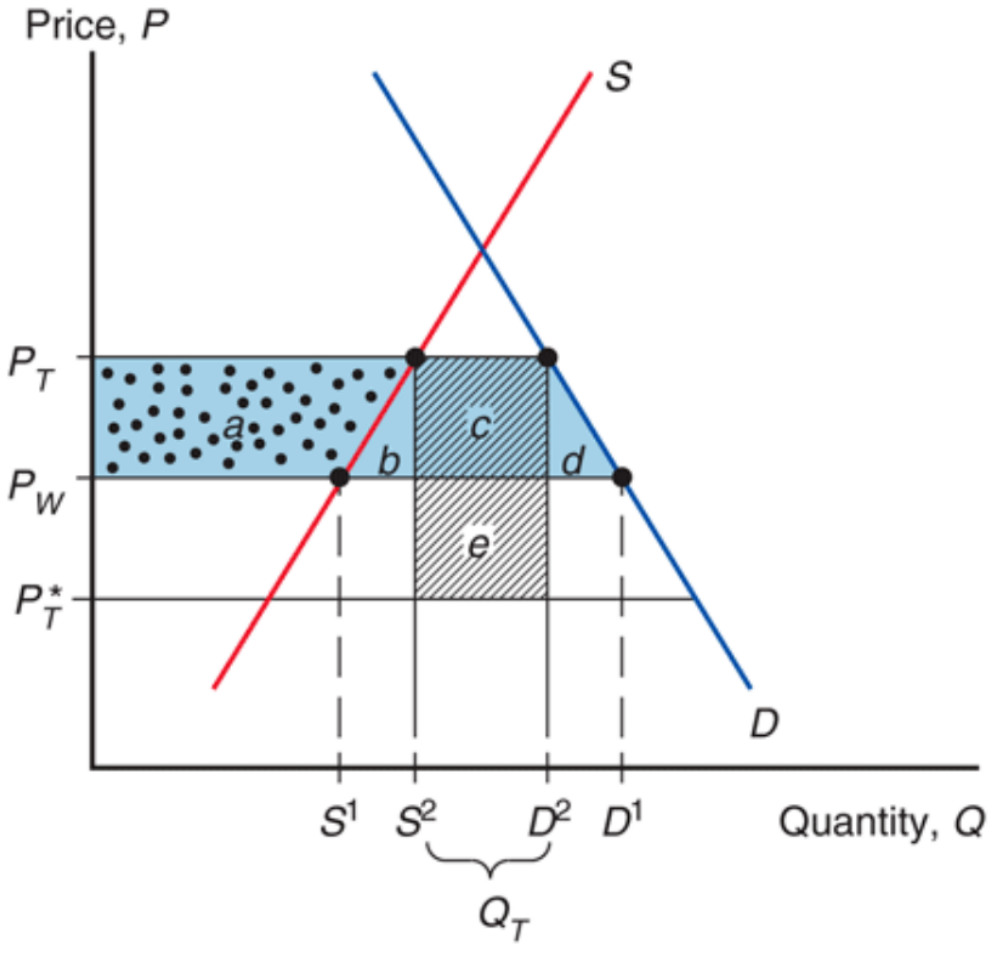
Producer Surplus



Effect of tariff

- Now the effect of tariffs on consumer, producer, and government surplus
- Now the effect of tariffs on consumer, producer, and government surplus
- First Government:
  - The government gets $t * Q$ in revenue

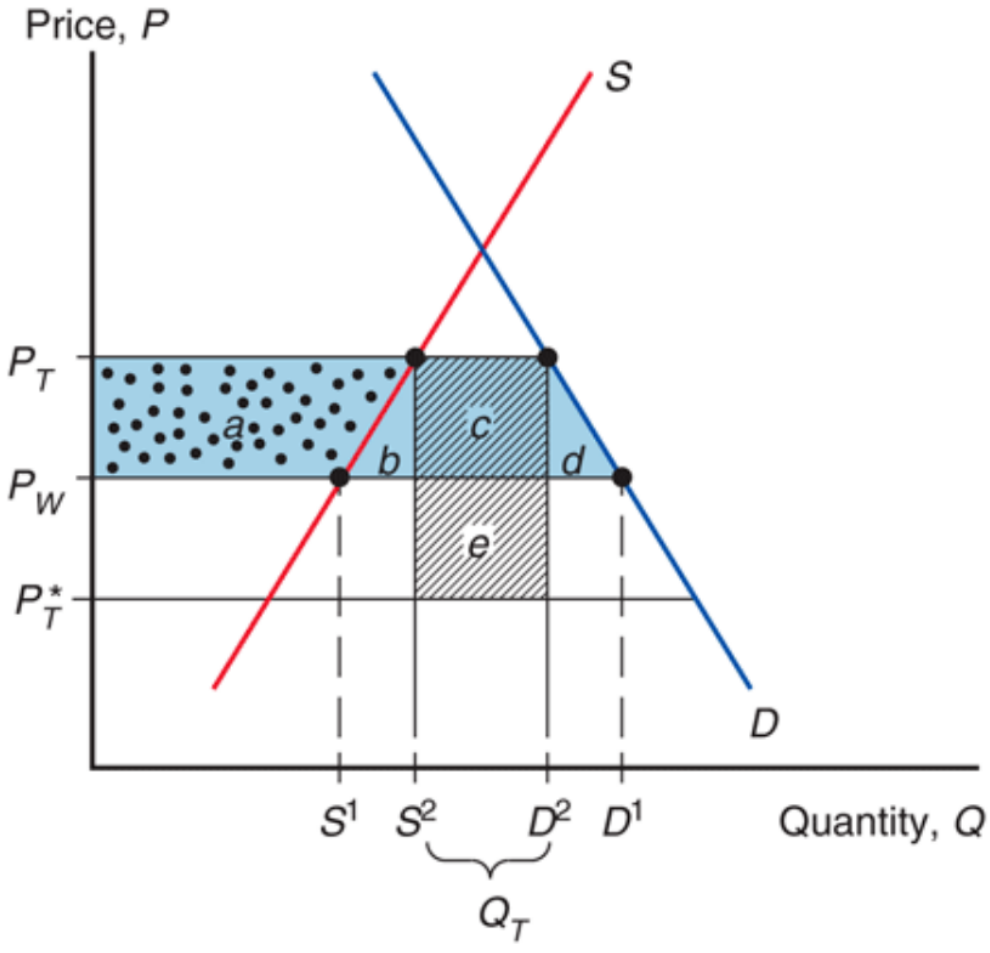
Costs and Benefits of a Tariff for the Importing Country



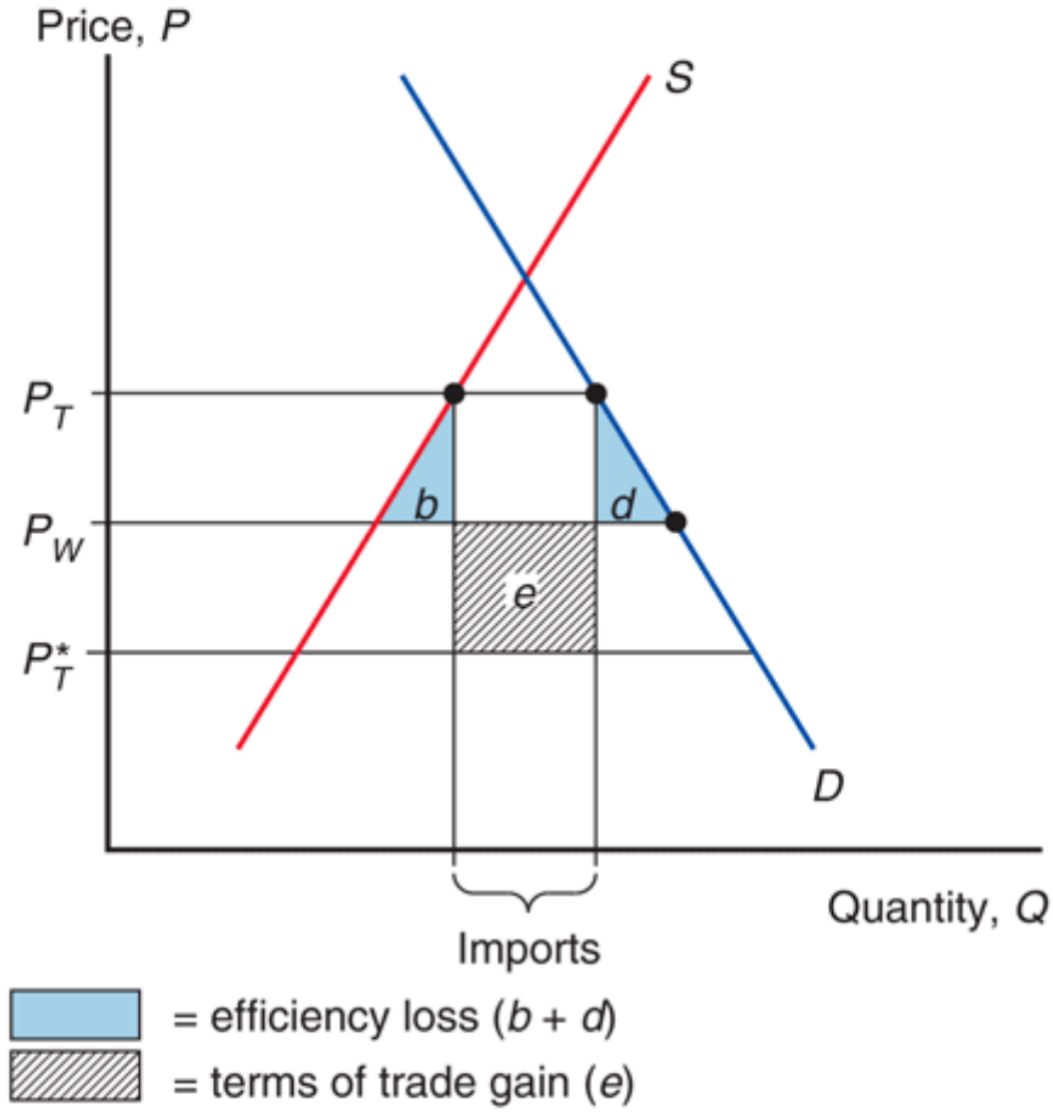
Effect of tariff

- Consumers
  - Lose consumer surplus between trade price and tariff price
- Producers
  - Gain producer surplus between trade price and tariff price

Costs and Benefits of a Tariff for the Importing Country



Net gains vs losses



Effect of tariff

- Punchline
  - Gains from government revenue
  - Losses from consumer surplus
- What happens if Home is small?

Pause

- We have seen that tariffs have costs and benefits
- Now we will analyze some other trade policy tools
  1. Export subsidies (agricultural policy)
  2. Import quotas
  3. Voluntary export restraint
- Preview: All worse than tariff
- Reason: Others get tariff government rents