

ECO364H1S: International Trade Theory

Lecture 9¹

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Outline

- ▶ Previous Lecture
 - Tariffs, Export Subsidies, Quotas, VERs
- ▶ Today
 - Political Economy of Trade Policy
 - Trade and the distribution of income
 - Trade and the political process
 - Trade and Institutions
 - KOM, Ch. 10
 - Firms in the Global Economy
 - Monopoly
 - Monopolistic Competition
 - KOM, Ch. 8

Why are trade barriers implemented?

- ▶ Distribution concerns
 - Use tariffs to protect industries hurt by free trade (type of redistribution)
- ▶ Political considerations
 - Trade policy as a tool for political gains
- ▶ Collective action problems
 - Small groups (industry trade unions) organize better than large ones
- ▶ Terms of trade considerations
 - Large countries can be made better off (through increase in terms-of-trade) by implementing tariffs (lecture 8)

Small Open Economies and Tariffs

- ▶ We have seen that tariffs and quotas will tend to *hurt* small open economies
- ▶ In practice, many small open economies still use tariffs.
 - Canada is (arguably) small, still uses tariffs
 - More extreme example: Saint Kitts and Nevis (population of around 50 000) has an average tariff rate of 12.46 %

Trade and the Distribution of Income

- ▶ Why would countries who are unlikely to affect world prices use tariffs?
- ▶ Some potential explanations (infant industry) require analytical tools we will develop later
 - We will circle back and discuss trade and welfare in these more complex environments at the end of the course
- ▶ One simple explanation: aggregate gains from free trade still involve *winners and losers*
 - Trade barriers may be used to achieve *distributional* goals

Trade and the Distribution of Income

- ▶ For thinking about distributional concerns, useful to reconsider some results from the first half of the course:
 - **Stopler-Samuelson Theorem:** A rise in the relative price of a good will lead to a rise in the real returns earned by the factor used most intensively in the production of that good. There will also be a fall in the real returns to the other factor
 - **Specific Factors Model:** A rise in the relative price of a good will increase the real returns of the factor specific to that industry. The real return to the specific factor in the other industry will fall

Trade and the Distribution of Income

- ▶ Generally, moving to free trade hurts factors of production that are important to the non-comparative advantage industry
- ▶ Tariffs can be used to keep the prices of the non-comparative advantage higher than the world price, keeping the real returns of these factors from falling
- ▶ Incentive for individuals to lobby against free trade
 - Manufacturing in the U.S.?
 - Dairy in Canada?

Trade and the Distribution of Income

- ▶ Important note: Heckscher-Ohlin and Specific Factors Models still imply *aggregate* gains from trade.
 - In principle, a (lump-sum) tax and transfer system can be used to compensate people whose real returns fall due to trade
 - Aggregate gains from trade imply that nobody would be made worse off, and many better off, by this arrangement
 - Difficult to achieve in practice?
- ▶ As a result, many economists are skeptical of distributional arguments against free trade

So are distributional concerns important?

- ▶ Yes, because politics plays an important role in free trade
- ▶ In particular, politics drive trade policy and protection levels, which in turn have implications for distribution of aggregate welfare
- ▶ But how do we model the political process?

Median Voter Model

Classic model policy choice in democracies given by Downs (1957)

1. Two politicians choose policies to maximize their chances of getting elected
2. Citizens vote for the politician with the policies that benefit them the most
3. The policy space is a one-dimensional variable, such as a tariff rate
4. Each citizen only has a single preferred tariff rate, and will vote for the politician who chooses the policy closest to their preferred rate
 - Single peaked preference

Median Voter Theorem

In a model where conditions 1-4 hold, both politicians choose the policy preferred by the median voter

Understanding the Median Voter Theorem

- ▶ Why does the Median Voter Theorem Hold?
- ▶ Suppose your opponent chooses a tariff rate above the median voter's preferred tariff
 - Guaranteed to be elected if you choose a tariff slightly below this!
- ▶ If instead your opponent chooses a tariff below the median voter's preferred tariff, choose a slightly higher tariff!
- ▶ If your opponent chooses the median voter's preferred tariff, you can only lose by choosing anything else.

The Median Voter Theorem and Trade Policy

- ▶ Does the median voter theorem helps us understand why many countries choose to implement tariffs?
- ▶ Dutt and Mitra (2002): *Levels* of trade protection inconsistent with median voter Hecksher-Ohlin (small open economy) models
 - Capital is typically concentrated in hands of small number of people. Therefore, MV model imply politicians should choose trade policies that benefit labour over capital
 - For MV model to be consistent, capital scarce countries (where distribution of capital and labour is more similar) should be in favour of trade
 - More inequality \rightarrow greater trade barriers
 - However, in the real world we almost always see trade policies against free trade

The Median Voter Theorem and Trade Policy

- ▶ Dhingra (2014): Accounting for terms-of-trade concerns may help explain protection levels (Are all economies “large”?)
- ▶ Biggest challenge to median voter models: many trade restrictions only benefit a small number of people
- ▶ Example: Sugar industry in the United States

Example: Sugar in United States

- ▶ Over past 25 years, US average price of sugar has been two times larger than the world price of sugar.
 - Partly due to tariff-rate quotas on sugar imports
- ▶ A 2000 study by United States General Accounting Office found that costs to consumers of sugar protection amounted to 1.9 billion dollars in 1998
 - Estimated benefits to sugar producers in 1998 of around 1 billion.
 - Net loss of 900 million dollars!

Example: Sugar in the United States

- ▶ Unlikely most consumers would wish to keep this sugar import restrictions in place.
- ▶ How do we make sense of this?
 - Note that the costs of sugar tariffs are very small at the individual level- just under \$7 per person in 1998.
 - However, individual benefits to sugar producers very large
 - Seventeen sugar farms generate more than half the profits for the whole sugar can industry. (KOM)
 - Sugar producers are also well organized in trade organization.
 - American Sugar Alliance spent nearly \$3 million in lobbying expenses in 2013 (KOM)
- ▶ Actual policy making involves *collective action problems*, which may lead to inefficient policy choices.

Collective action problems and policy choices

- ▶ Olson (1965): Political activity is public good → Free-riding
 - If political activity is costly (e.g. lobbying), individuals will under provide political effort since the full benefits of any particular policy are not fully internalized by each member.
 - Larger interest groups face larger free-riding problems since individual benefits are small
 - Small interest groups have better incentives to provide political effort.
- ▶ Small groups are more likely to be able to overcome collective action problems, and therefore are more likely to be heard by policy makers.
 - May explain why some small groups manage to convince policy makers to implement policies that only benefit a small group, while hurting the majority of citizens.

Collective Action Problems: A simple “lobbying” model

- ▶ Suppose politicians are more likely to implement a policy (e.g. removing/implementing a tariff) the more they hear about it.
- ▶ Consider an interest group of size N , all of whom want politicians to choose policy A .
- ▶ Total benefit to group is given by B .
- ▶ For simplicity, suppose total benefits of the policy are split evenly among the group.
- ▶ Private benefit: $\frac{B}{N}$

Collective Action Problems: A simple “lobbying” model

- ▶ N : group size, A : desired policy, B : total benefit, B/N : private benefit
- ▶ Let $x_i \in \mathbb{R}$ denote “lobbying” effort by group member $i = 1, 2, \dots, N$
- ▶ Probability that the policy is implemented (P_A) depends on total lobbying effort of the group $X \equiv \sum_{i=1}^N x_i$
 - Suppose $P_A(X) = \frac{X}{\alpha + X} = \frac{\sum_{i=1}^N x_i}{\alpha + \sum_{i=1}^N x_i}$
- ▶ Each unit of “lobbying” has a constant marginal cost of c

Private Provision of Lobbying

- ▶ Each member i chooses x_i to maximize the expected return to lobbying

$$EU(x_i) = \frac{\sum_{i=1}^N x_i}{\alpha + \sum_{i=1}^N x_i} \frac{B}{N} - cx_i$$

- ▶ FOC:

$$\frac{\alpha}{\left(\alpha + \sum_{i=1}^N x_i\right)^2} \frac{B}{N} = c \rightarrow \frac{\alpha}{(\alpha + X)^2} \frac{B}{N} = c$$

- ▶ Solving for total lobbying effort, X^*

$$X^* = \left(\frac{\alpha B}{Nc}\right)^{1/2} - \alpha$$

Private Provision of Lobbying

Total lobbying effort:

$$X^* = \left(\frac{\alpha B}{Nc} \right)^{1/2} - \alpha$$

- ▶ Larger groups (larger N) put in less lobbying effort overall since individual benefits become smaller!
- ▶ Since lobbying a public good, overall effort depends on $\frac{B}{N}$, rather than the overall benefits B
- ▶ **Conclusion:** A policy generating small aggregate benefit to a small group ($N=5$, $B=5000$) more likely to be implemented than policy with large aggregate benefits for a large group ($N=500,000$, $B=500,000$)

Lobbying and Trade Policy

- ▶ Baldwin and Magee (2000) investigate whether campaign contributions affected the likelihood that a particular politician will vote for NAFTA or GATT
 - Business and labour contributions appears to strongly affect voting patterns
 - Estimated model allows them to look at counterfactual worlds without contributions
 - Note: 214 votes needed to pass bill

	Vote for NAFTA	Vote for GATT
Actual	229	283
Model	229	290
No labour contributions	291	346
No business contributions	195	257
No contributions	256	323

Tariffs and Large Open Economies

- ▶ So far, we have considered why a small open economies may choose to implement trade barriers
 - Distributional concerns
 - Political incentives
 - Collective action problems

Tariff and Large Open Economies

- ▶ As discussed last lecture, large open economies have stronger incentives to use implement trade barriers due to terms of trade concerns
 - From previous lecture, we saw that large economies can gain from tariffs
- ▶ Two questions:
 1. Is it appropriate to treat most countries as large?
 2. Are tariff rates across countries consistent with terms of trade incentives?
 - i.e. can tariffs be explained by incentives to improve terms of trades?

Do terms of trade incentives matter empirically?

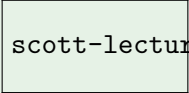
Broda, Limao, and Weinstein (2008): Roughly two questions:

1. Do most countries have enough market power for their trade policy to affect world prices?
 - **Answer:** Yes, as measured by their foreign export supply elasticity (lecture 8)
 - Includes some countries that we might consider small
 - E.g. Paraguay, Latvia, each of which has about 1/20th of a percent of world GDP
2. Is trade policy consistent with terms of trade manipulation?
 - **Answer:** Yes, their empirical estimates indicate that tariffs tend to be higher on goods for which the country has greater market power
 - Market power effects on tariff setting are approximately 1.6 times larger than “political economy” variables (e.g. lobbying)

Terms of trade manipulation and welfare

- ▶ If terms of trade considerations matter, unilaterally setting tariffs to maximize own-country welfare can be problematic for world welfare
 - Each country has an incentive to manipulate terms of trade, which hurts other countries
 - Can lead to trade wars, which may actually lead to lower welfare in *both* countries compared to an outcome where countries cooperate
- ▶ Tariff setting with large open economies may resemble a *prisoner's dilemma*

Prisoner's Dilemmas and Trade Wars



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Terms of Trade Externalities and Trade Institutions

Since unilateral policy-setting may lead to suboptimal outcome → role for trade institutions

- ▶ Bagwell and Staiger (2010) argue that the GATT and WTO have institutional structures that solve the terms of trade incentive problems.
 - E.g. Principle of reciprocity: Accepted norm within GATT/WTO negotiations where two countries aim to obtain a “balance of concessions.” (Roughly: \uparrow Imports = \uparrow Exports)
 - Bargaining over tariffs with balance of concessions as a constraint creates an incentive for countries to cut tariffs, since bilateral tariff cuts with balance of concessions keeps world prices constant → no terms of trade losses
- ▶ How did the WTO emerge?

Brief History of Trade Institutions

- ▶ Substantial liberalization until the Great Depression which started around 1929
- ▶ Many countries increased trade protection hoping to save domestic jobs
- ▶ Substantial retaliatory tariffs then killed off international demand and further deepened the depression

Brief History of Trade Institutions

- ▶ The Smoot-Hawley Tariffs in the United States raised tariffs on 20,000 goods
- ▶ Canada was greatly harmed by this and, in retaliation, raised its own tariffs
- ▶ After the Great Depression and WWII, many countries pursued policies of tariff reduction
 - Negotiations tended to occur bilaterally

Brief History of Trade Institutions

- ▶ 1947: General Agreement on Tariffs and Trade introduced.
 - Goal: Create a large, multilateral trade agreement for many countries.
 - Was supposed to be done through an institution call the International Trade Organization (ITO), but this body never materialized due to political opposition
 - Instead, a group of 23 countries reached a provisional agreement to lower various tariffs (the "GATT")
 - Various new rounds of GATT agreements negotiated from 1947-1986
 - World Trade Organization (WTO) created in 1995

Brief History of Trade Institutions

- ▶ WTO Structure:
 - Allows for dispute resolution and establishes “rules”
 - Tariff cuts must be “binding”
 - “Non-discrimination”: countries cannot be treated differently
- ▶ Preferential trade agreements are generally illegal between sets of two countries...
 - ...but free trade areas and customs unions are allowed

Free Trade Areas and Customs Unions

- ▶ Free trade areas are where countries largely remove all tariffs on trade within borders
 - e.g. North American Free Trade Agreement (NAFTA)
 - Countries do not harmonize/equalize external tariffs (against outside countries)
- ▶ In a customs union, there is free trade within the union and all external tariffs are harmonized/equalized
 - e.g. European Union

Politics and Trade: Key Ideas

- ▶ Trade barriers may be implemented because of:
 - Distributional concerns
 - Political considerations (Median Voter Model)
 - Collective action problems
 - Terms of trade considerations

Firms in the Global Economy

Introduction: Firms and International Trade

- ▶ So far we have focused on comparative advantage based models of international trade
 - Models of “inter-industry” trade
- ▶ In practice, a lot of trade is “intra-industry” (within-industry)
 - Many countries import and export the same “product” at the same time
 - E.g. The United States exported approximately \$226 million worth of golf clubs in 2009, while also importing approximately \$284 million in golf clubs.
- ▶ Hard to explain with comparative advantage based models

How common is intra-industry trade?

$$\text{Intra-industry trade index} = \frac{\text{Min}\{EX, IM\}}{\frac{1}{2}(EX+IM)}$$

Industry	Index
Metalworking Machinery	0.97
Inorganic Chemicals	0.97
Power-Generating Machines	0.86
Medical and Pharmaceutical Products	0.85
Scientific Materials	0.84
Organic Chemicals	0.79
Iron and Steel	0.76
Road Vehicles	0.70
Office Machines	0.58
Telecommunications Equipment	0.46
Furniture	0.30
Clothing and Apparel	0.11
Footwear	0.10

Source: KOM Ch. 8

Further challenges for comparative advantage based models

- ▶ Comparative advantage based models predict that countries with very different technologies or endowments should trade with each other the most
 - Not always true in practice:
 - E.g. The U.S. is Canada's biggest trading partner, but also quite similar in terms of technology and factor endowments

Why do similar countries trade?

How do we account for intra-industry trade and “similar-country” trade?

1. Product Variety

- Individual items, such as golf clubs, are not identical
 - Different qualities for similar types
 - Different styles that appeal to some consumers, but not others (luxury vs regular goods)
- Two-way trade due to the fact that golf clubs produced in different countries not “exactly” the same product (e.g. automobiles)

2. Increasing Returns to Scale

- If average costs decreases with production levels, may make sense to export more goods to other countries to lower costs
- Does not rely on factor-endowment differences

Aside: Forms of Economies of Scale

- ▶ **Internal economies of scale:** Average costs fall as the output of the firm increases
- ▶ **External economies of scale:** Average costs fall as the output of the industry increases
- ▶ We will look at these economies of scale in a later part of the course

Variety, Returns to Scale, and Perfect Competition

Accounting for product variety and increasing returns to scale at the firm level very difficult in a model where all producers are “price-takers”

- ▶ If every variety of a product is “different”, how can its price be taken as given?
 - If you are the sole producer of a product, surely you choose its price
- ▶ Increasing returns to scale at the firm level leads to contradictions when combined with price taking
 - If average costs fall with output, while your price remains constant, you will always earn larger profits by increasing the scale of production
 - All firms should produce infinite output!

Market Power and Imperfect Competition

- ▶ We can handle increasing returns and product variety by allowing firms to have *market power*, or the ability to influence their own price
- ▶ Models where firms have market power are called models of *imperfect competition*

Market Power and Imperfect Competition

- ▶ There are several different models of imperfect competition:

sellers \ll buyers	sellers \sim buyers	sellers \gg buyers
Monopoly	Monopolistic Competition	Monopsony
Oligopoly		Oligopsony

- ▶ We will focus on monopolies and monopolistic competition and use them to think about issues in international trade

Introduction to Monopoly: Some Terminology

Suppose a monopolist faces demand function $Q(P) = A - B \times P$

- ▶ *Inverse Demand* $\equiv P(Q)$: What price leads to exactly Q sales?
 - $P(Q) = \frac{A}{B} - \frac{Q}{B}$
- ▶ *Revenue* $\equiv R(Q) = P(Q) \times Q$: Inverse demand times quantity
 - $R(Q) = \frac{A}{B}Q - \frac{Q^2}{B}$
- ▶ *Marginal Revenue* $\equiv MR(Q) = \frac{\partial}{\partial Q} (P(Q) \times Q)$: Revenue generated by selling an additional unit
 - $MR(Q) = \frac{A}{B} - \frac{2Q}{B}$
 - In general: $MR(Q) = P(Q) + \frac{\partial P}{\partial Q}Q$

Marginal Revenue and Demand

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Notes:

- ▶ MR has double the slope of demand for linear demand curves
- ▶ MR always lies below demand (Why?)

More Monopoly Terms

- ▶ *Fixed Costs* $\equiv F$: A cost that does not depend on the level of output
 - Example: Rent
 - Need to pay this for all Q (even zero!)
 - Fixed costs \neq Sunk costs
- ▶ *Variable Costs* $\equiv V(Q)$: Costs that depend on how much is produced
 - Example: Labour costs
- ▶ *Total Cost* $\equiv TC(Q)$: Total cost to produce Q units
 - $TC(Q) = V(Q) + F$
- ▶ *Average cost* $\equiv AC(Q) = \frac{TC(Q)}{Q}$: Total cost faced by the firm divided by the quantity produced
- ▶ *Marginal cost* $\equiv MC(Q) = (\frac{\partial TC}{\partial Q})$: Extra cost generated by producing an extra unit

Average and marginal cost

Example: $TC(Q) = cQ + F$

► $V(Q) = cQ$

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Note: Declining $AC \rightarrow$ Increasing returns to scale!

FOCs for Monopolist

In general, the profit maximizing condition for a monopolist is:

$$MR(Q^*) = MC(Q^*)$$

- ▶ If $MR > MC$, monopolist earns greater profits by increasing production.
- ▶ If $MR < MC$, monopolist loses profits by increasing production.

Profit maximization by the monopolist: Price

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Profit maximization by the monopolist: Profits

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Basic Monopoly Results

1. Profit is maximized when marginal cost is equal to marginal revenue
 2. Monopolists usually earn profits (whereas in perfect competition, all firms profits = 0)
 - Chose quantity so that $P > MC$
 - Profits whenever $P > AC$
 - Will hold as long as F sufficiently small
- Let's now use the insights from our simple monopoly model to consider an environment with multiple firms

Monopolistic Competition: Basic Setup

- ▶ Basically a model of oligopoly that works a lot like the monopoly model discussed before
- ▶ Key Assumptions:
 - Firms differentiate their products
 - It is as if a firm is a monopolist for their own *variety* of a product (e.g. dry cleaners, coffee shops, grocery stores)
 - Rival firm prices affect the demand function faced by each firm
 - Competitive environment matters!
 - They enter as a parameter that can shift an individual firms demand function
 - Firms perceive their price as affecting own sales, but not rivals' price
 - Firms will take *average prices* as given
 - In perfect competition, firms take own price as given

Firm-Level Demand

- ▶ Firm j sells more:
 - The larger the size (S) of the market
 - The smaller the number of firms in the market (n)
 - The lower its price (p_j)
 - The higher the average price charged on the market ($\bar{p} \equiv \frac{1}{n} \sum_{k=1}^n p_k$)
- ▶ Example of a demand function satisfying these properties:

$$q_j(p_j) = S \left[\frac{1}{n} - b(p_j - \bar{p}) \right]$$

- “Monopolistic competition with outside good”, Salop (1979)

Firm-Level Costs

Assume a linear total cost function as in the monopoly case:

$$TC(q) = F + cq$$

- ▶ Variable costs $V(q) = cq$
- ▶ Constant marginal costs
 - $MC(q) = \frac{\partial TC(q)}{\partial q} = c$
- ▶ The fixed costs F generate increasing returns to scale, i.e. falling average costs:
 - $AC(q) = \frac{TC(q)}{q} = c + \frac{F}{q}$

Market equilibrium

- ▶ Assuming *each* firms faces the same cost and demand function the resulting equilibrium will be *symmetric*
- ▶ In other words, all firms will offer the same price: $p_j = p \quad \forall j$
- ▶ While each firm *could* set a different price, there are no differences between firms in efficiency nor how consumers value their output
- ▶ Implies $q_j = q$ and $AC(q_j) = AC \quad \forall j$

Recipe for solving the monopolistic competition model

Determine equilibrium using 3 equations to pin down 3 unknowns: $\{n, p, AC\}$:

1. “Average Cost Curve”: Relationship between number of firms (n) and average cost for each firm (AC)
2. “Price Curve”: Relationship between number of firms (n) and price charged by each firm (p)
3. Close the model by assuming free entry and exit
 - Firms make zero profits, which means price (p) must equal average cost (AC)

Deriving the Average Cost Curve

- ▶ When all firms charge the same price, $p = \bar{p}$, so:

$$q_j(p) = S \left[\frac{1}{n} - b(p - \bar{p}) \right] = S \left[\frac{1}{n} - 0 \right] = \frac{S}{n}$$

- ▶ Substitute into average cost equation:

$$AC = c + \frac{F}{q} = c + n \frac{F}{S}$$

- ▶ Equilibrium average cost increases with number of firms
 - With more firms for a given S , each firm sells a smaller quantity (q) and lose ability to exploit economies of scale
- ▶ Equilibrium average costs fall as the size of the market increases
 - If the market size increases for a given n , each firm sells a larger quantity (q) and can better exploit economies of scale

Average cost curve

$$AC = c + n \frac{F}{S}$$

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Deriving the price curve: Key condition

Firms behave like a monopolist for the pricing of their particular variety

- ▶ Profit maximization leads to the same first order condition:

$$MR_j = MC_j$$

We know marginal cost ($MC_j = c \quad \forall j$), so let's derive marginal revenue for a given firm:

Deriving the price curve: Firm-level marginal review

- ▶ Recall marginal revenue derivations from the monopoly model:

$$R(q_j) = p(q_j) \times q_j \rightarrow$$

$$MR \equiv \frac{\partial R(q_j)}{\partial q_j} = p_j + \frac{\partial p(q_j)}{\partial q_j} \times q_j$$

- Applies the product rule
- ▶ Invert the demand function to get $p_j = p(q_j)$:

$$q_j = \left(\frac{S}{n} + Sb\bar{p} \right) - Sbp_j : p_j = p(q_j) = \left(\frac{1}{nb} + \bar{p} \right) - \frac{q_j}{Sb}$$

- ▶ Partially differentiate inverse demand to obtain $\frac{\partial p(q_j)}{\partial q_j}$
(Holding \bar{p} fixed!)

$$\frac{\partial p(q_j)}{\partial q_j} = \frac{-1}{Sb}$$

- ▶ Substituting in to marginal revenue yields: $MR_j = p_j - \frac{q_j}{Sb}$

Deriving the Price Curve

- ▶ Rearrange profit maximizing condition $MR_j = MC_j$

$$p_j - \frac{q_j}{Sb} = c$$

$$p_j = c + \frac{q_j}{Sb}$$

- ▶ Recall that we are considering a symmetric equilibrium, so $q_j = q = \frac{S}{n}$ and $p_j = p \quad \forall j$

$$p = c + \frac{1}{bn}$$

- ▶ Things to note:
 - DO NOT impose symmetry before deriving firm level marginal revenue (Why?)
 - What happens when n , number of firms, goes to infinity?

Price curve

$$p = c + \frac{1}{bn}$$

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- ▶ $p > MC$ due to the *markup* $\equiv \mu = \frac{1}{bn}$
- ▶ Markups fall as more firms enter (more competition \rightarrow less market power), and as price sensitivity rises b

Closing the model

- ▶ We assume free entry and exit
- ▶ With identical firms, this means that firms enter (exit) until everyone earns zero profits

$$p = AC$$

- ▶ From our derivation of the average cost and price curves, we also know that in equilibrium:

$$AC = c + n \frac{F}{S}$$

$$p = c + \frac{1}{bn}$$

- ▶ Intersection of average cost and price curves (where $p = AC$) determines the equilibrium number of firms

Equilibrium

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- Analytically

$$n^* = \left(\frac{S}{Fb} \right)^{1/2} \quad p^* = c + \left(\frac{F}{bS} \right)^{1/2}$$

Monopolistic Competition and Trade

- ▶ Trade can be seen as an increase in market size (Krugman 1979): $\uparrow S$

- ▶ Recall:

$$AC = c + n \frac{F}{S}$$

$$p = c + \frac{1}{bn}$$

- ▶ Average cost curve *rotates* downwards, price curve remains constant

Monopolistic Competition and Trade

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Gains from trade with monopolistic competition

- ▶ When two countries open up to trade, the integrated market sustains more varieties of goods than each of the two markets did alone
 - $\uparrow n$: Consumers gain from more varieties/firms
- ▶ Because under free trade each firm produces at a larger scale, it can exploit economies of scale further, cutting costs
 - Recall $q = \frac{S}{n}$
 - While both S and n rise, can show that $\uparrow S > \uparrow n$ (Problem Set 4)
- ▶ Consumer gain from lower prices
 - Recall that markups are given by: $\mu = \frac{1}{bn}$
 - $\uparrow n$, increased competition, firms decrease their markups, and prices fall (“Pro-competitive” gains from trade)

Market size, trade integration, and competition

- ▶ We have just considered opening up to trade as an increase in market size, and showed that this increases the number of firms selling to a *particular country* in equilibrium
- ▶ Note that there will generally be more firms operating *across* the two countries before integration
- ▶ While varieties available to each consumer increases, increased competition causes some firms to exit the market
 - We tend to see effects of this sort in practice:
 - Following NAFTA, General Motors cut in half the number of car models produced in Canada

Exit-Effects Following Trade Liberalization

- ▶ Consider two completely identical countries, where the autarky number of firms in each country:
 - $n^A = \left(\frac{S}{Fb}\right)^{1/2}$
 - Overall number of firms $2n^A = \left(\frac{S}{Fb}\right)^{1/2}$
- ▶ Total number of firms in the free-trade *integrated* equilibrium
 - $n^T = \left(\frac{2S}{Fb}\right)^{1/2}$
- ▶ Note that since $\sqrt{2} < 2$

$$n^T = \left(\frac{2S}{Fb}\right)^{1/2} = \sqrt{2} \left(\frac{S}{Fb}\right)^{1/2} < 2 \left(\frac{S}{Fb}\right)^{1/2} = 2n^A$$

- ▶ Model predict that firms will exit the market following trade-liberalization!
- ▶ Despite this, there are still more varieties available to consumers after free trade since $n^A < n^T$
 - Can interpret this as gains from trade

Exit-Effects Following Trade Liberalization

- ▶ While some firms will exit the market following trade integration, model makes no predictions as to *who* will exit the market
- ▶ Empirical literature has generally found that *less productive* firms are most likely to exit the market following trade liberalization (E.g. Pavcnik 2002)—sounds reasonable
- ▶ To make sense of these facts, we need a model that accounts for *firm heterogeneity*
 - In our simple model, firms are symmetric (same demand and cost functions)
 - Next class!

What have we learned today?

► Politics:

- Trade barriers may be due to distributional concerns, politically motivated concerns, collective action problems, or terms of trade considerations

► Firms and the Global Economy

- Models of trade with increasing returns to scale and market power needed to understand “intra-industry” trade
- Pro-competitive gains from trade and gains from variety

Extra References

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