ECN 594: Introduction and Pricing

Nicholas Vreugdenhil

January 4, 2026

Plan for today

1. What is industrial organization?
2. Course structure and logistics
3. Review: Monopoly pricing
4. Monopoly regulation

Plan for today

1. **What is industrial organization?**
2. Course structure and logistics
3. Review: Monopoly pricing
4. Monopoly regulation

Your economics education so far

- So far in your economics courses you have studied (at least) two forms of competition: **perfect competition** and **monopoly**.
- We can think of these two forms of competition as polar opposites.
- **Perfect competition** (supply and demand)
  - Many tiny 'atomistic' firms
  - Total surplus is maximized and so the market is 'efficient'
- **Monopoly**
  - One single firm
  - Monopoly sets price 'too high'; the market is inefficient

Most real-world markets do not fit neatly into these two categories

- Some examples in this course:
  1. Firms set different prices for the same good (airline tickets, student discounts)
  2. Only a few big firms in the market (health insurance, tech)
  3. Firms collude to raise prices (OPEC, cartels)
  4. Firms merge with other firms (subject to **antitrust** laws)

What is industrial organization (IO)?

- **IO is the study of firm and consumer behavior in markets between (and including) the polar opposites of perfect competition and monopoly.**

- Why is this useful?

  1. Designing regulation/antitrust policy:
     - When do markets fail? How should we regulate?
  2. Firm strategy:
     - How to set prices? Design marketplaces?

IO is central to many policy debates right now

- Should we break up Google, Amazon, Meta?
- Are hospital mergers raising healthcare costs?
- Can algorithms learn to collude?
- How should we regulate AI platforms?

These are all IO questions.

Plan for today

1. What is industrial organization?
2. **Course structure and logistics**
3. Review: Monopoly pricing
4. Monopoly regulation

This course has two components

- **Theoretical:** Models of pricing, oligopoly, entry, mergers, vertical relationships
- **Empirical:** Demand estimation, merger simulation
- The empirical content (demand estimation) is typically taught at the PhD level
- But it's so useful in practice that we cover it here
- You'll estimate demand using Python and the `pyblp` package

Course structure

1. **Part 1 (Lectures 1-7):** Demand Estimation and Pricing
   - Random utility models, logit demand
   - Identification, instrumental variables
   - Estimation with `pyblp`
   - Price discrimination
2. **Part 2 (Lectures 8-14):** Competition and Industry Structure
   - Cournot, Bertrand, Hotelling
   - Entry, mergers, collusion
   - Vertical relationships

Logistics

- E-mail: `nvreugde@asu.edu`
- Office: CRTVC 455G
- Office Hours: See syllabus
- **Textbook:** Cabral, *Introduction to Industrial Organization* (2nd ed.)
- For demand estimation: selected readings (posted on Canvas)

Assessment

- **20%** Homework 1 (demand estimation, Python)
- **20%** Homework 2 (competition models, merger simulation)
- **30%** Midterm (Feb 9)
- **30%** Final (Mar 4)
- Exams: 70 minutes, calculator + one two-sided cheat sheet allowed

Building on your prior courses

- From **ECN 565** (Alvin Murphy): Discrete choice econometrics
  - You know logit, probit, MLE
  - We'll apply this to IO problems
- From **ECN 532** (Hector Chade): Game theory
  - You know Nash equilibrium, Cournot, Bertrand, repeated games
  - We'll do quick refreshers and focus on IO applications

Plan for today

1. What is industrial organization?
2. Course structure and logistics
3. **Review: Monopoly pricing**
4. Monopoly regulation

Optimal pricing for a monopolist

- Today we will discuss **optimal pricing for a monopolist**.
- The 'optimal price' is the **price which maximizes profit**.
- Why is this useful?
  - Policymakers: understand how the monopolist is reducing welfare
  - Firm strategy: how should you set prices to maximize profits?
- (Most of this is review from your previous courses)

Pricing: MR=MC

- The optimal price for a monopolist occurs when:

$$MR = MC$$

- This is a very important formula.

- **Algorithm to find optimal price:**

  1. Get MR from the demand curve (use 'double the slope' if linear)
  2. Set MR = MC; solve for optimal quantity q^*
  3. Plug q^* back into demand curve to get optimal price p^*

Worked example: Monopoly pricing

- **Question:**

- Suppose a monopolist faces demand $q = 2 - \frac{1}{5}p$ and has constant marginal cost of 5. What is the optimal price?

Take 2 minutes to solve this.

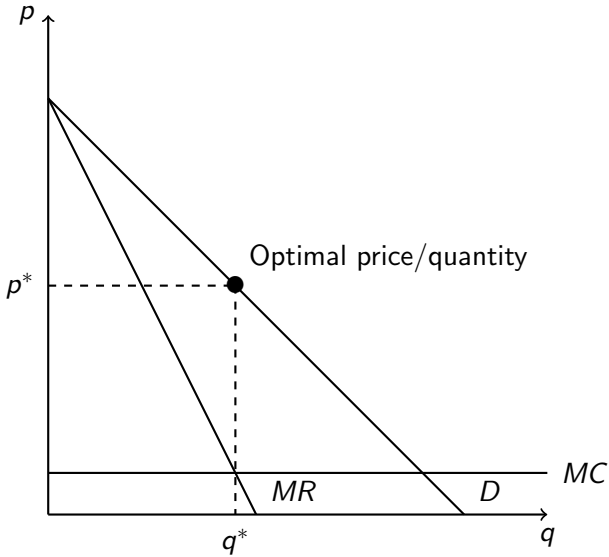
Worked example: Monopoly pricing (solution)

- **Solution:**
- First, invert demand: $p = 10 - 5q$
- MR using 'double the slope': $MR = 10 - 10q$
- Set MR=MC:

$$\underbrace{10 - 10q}_{MR} = \underbrace{5}_{MC}$$

- Solve for optimal quantity: $q^* = 0.5$
- Plug into demand curve: $p^* = 10 - 5 \times 0.5 = 7.5$

Pricing: MR=MC (graph)



The Lerner Index

- There is a relationship between the optimal price and demand elasticity.
- This is known as the **Lerner index** (or elasticity rule):

$$L = \underbrace{\frac{p - MC}{p}}_{\text{Margin}} = \underbrace{\frac{1}{|\varepsilon|}}_{\text{Inverse elasticity}}$$

- The Lerner index measures **market power**
- $L = 0$: perfect competition (price = MC)
- L close to 1: high market power

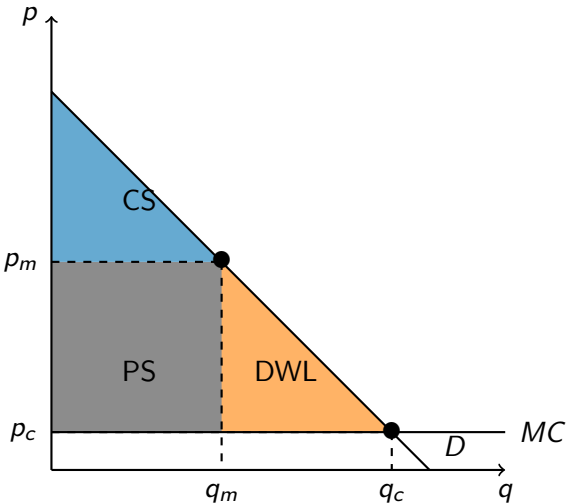
Why is the Lerner index useful?

- Suppose you work as an economist in a firm pricing a product.
- You know MC. You can estimate the demand elasticity ε.
- Then just plug into the elasticity rule:

$$p = \frac{MC}{1 + \frac{1}{\varepsilon}}$$

- This is exactly what we'll do in Part 1 of this course:
  - Estimate demand $\rightarrow$ get elasticities $\rightarrow$ compute optimal prices

Welfare costs of monopoly pricing



- Competitive outcome: p_c, q_c
- Monopoly outcome: p_m, q_m
- Monopoly sets price 'too high' and quantity 'too low'
- This causes **deadweight loss** (DWL)
- Monopoly is a **market failure**

Plan for today

1. What is industrial organization?
2. Course structure and logistics
3. Review: Monopoly pricing
4. **Monopoly regulation**

Regulating monopolies

- How can we correct the market failure of monopoly?
- **Option 1:** Break up the monopoly (antitrust)
  - Standard Oil (1911), AT&T (1984)
  - Current debates: Google, Meta, Amazon
- Sometimes breaking up isn't possible (natural monopolies)
  - Power plants, bridges, water utilities
  - High fixed costs make one firm efficient
- How should we regulate these natural monopolies?

Marginal cost pricing

- **Idea:** Force the monopolist to set $p = MC$
  - This is the competitive price; no deadweight loss
- **Problem:** Suppose cost is $C(q) = F + cq$ (fixed cost + marginal cost)

Marginal cost pricing

- **Idea:** Force the monopolist to set $p = MC$
  - This is the competitive price; no deadweight loss
- **Problem:** Suppose cost is $C(q) = F + cq$ (fixed cost + marginal cost)
- If $p = MC = c$, then profit is:

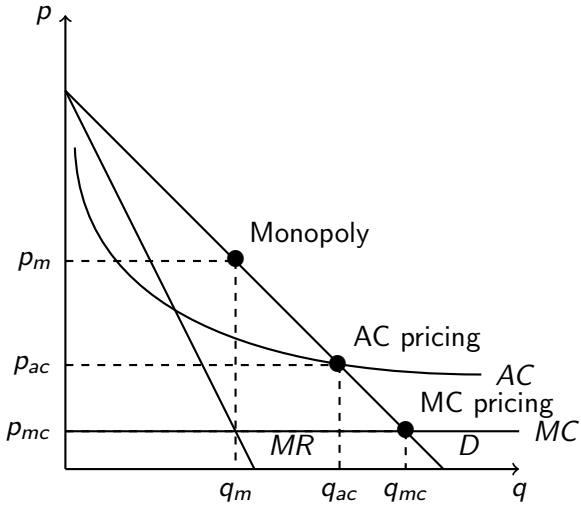
$$\pi = pq - F - cq = cq - F - cq = -F < 0$$

- Firm makes **negative** profit and would shut down!
- Solution: government **subsidy** of F

Average cost pricing

- **Alternative:** Force the monopolist to set $p = AC$
- This is the price where the monopolist makes zero profit:
  - If $\pi = 0$ then $TR = TC$
  - So $pq = TC$, which means $p = TC/q = AC$
- The monopolist can only exercise market power to cover fixed costs
- No government subsidy needed
- Commonly used for utilities ("rate of return regulation")

Average cost pricing (graph)



Price caps

- **Price cap regulation:** Set a maximum price the firm can charge
- Often indexed to inflation ("CPI-X" regulation)
  - Price can rise with inflation, minus an efficiency factor X
- Advantage: incentivizes cost reduction
  - Under AC pricing, firm has no incentive to cut costs
  - Under price caps, cost savings become profit
- Common in UK utilities, telecoms

Summary

- **IO** studies firm behavior between perfect competition and monopoly
- This course: both **theory** (pricing, oligopoly) and **empirical** (demand estimation)
- **Monopoly pricing:** $MR = MC$, Lerner index $L = (p - MC)/p = 1/|\varepsilon|$
- Monopoly causes **deadweight loss** (market failure)
- **Regulation options:**
  - Break up (antitrust)
  - MC pricing (+ subsidy)
  - AC pricing (zero profit)
  - Price caps

Next time

- **Part 2:** Utility models and demand
  - Why do we need demand models in IO?
  - Random utility framework
  - From individual choice to market demand