Economics, Law and Ethics

Part IB CST
2023-24

Lecture 2: Economics of information

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with many thanks to Ross Anderson

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Overview

- Information economics:
  - Competition and information
  - Lock-in
  - Network effects
  - Price discrimination
  - Income distribution

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Monopoly and technology

- Monopolies are common in the information goods and services industries
- Monopolists have an incentive to price discriminate, to mop up all the available surplus
- Hence the many prices of Windows!
- But it's not just tech. Think airline tickets, cars, and even food.

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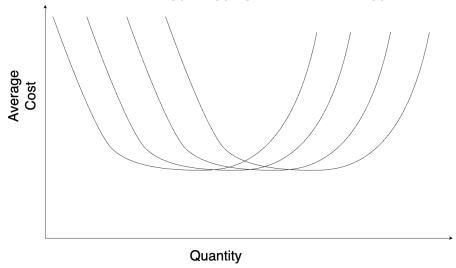
Effects of technology on supply and demand



- In a traditional industry, technology can improve the process; larger / newer factories may be better
- Some industries have natural limits (not everyone wants to drive a Ford)
- In information goods and services industries, marginal costs may never rise – so firms like Microsoft enjoy ever-increasing returns to scale

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Competition and information

- The marginal cost of producing information is zero, so that's the market clearing price!
- Example – machine-readable phone books
  - 1986 – Nynex charge $10,000 per disk
  - ProCD had the phone book retyped in Peking and started selling for $300
- Now it's a few bucks for a CD, or free online
- Hence Free Software Foundation slogan: 'information wants to be free'
- So how can you make money out of selling information – software, books, music, …?

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Lock-in

- Often, buying a product commits you to buying more of it, or spending money on one or more of:
  - durable complementary assets, such as apps for a computer or phone, tunes for your iPod
  - skills, e.g. fluency with Win/Mac/Linux or Office
  - services, e.g. network service for a PC or mobile phone
- Same applies to services – facilities management firms make it hard to switch to their competitors
- Not new (fewer people change their bankers than their spouses) but has very pronounced effects in information goods markets

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Lock-in (2)

- 'Fundamental theorem' (Shapiro, Varian); the net present value of your customer base is the total cost of switching
  - Suppose you're an ISP and it costs £25 to set up a new customer
  - Suppose it costs a customer £50 of hassle to switch
  - If your new business model makes the customer worth £100, offer them £60 cashback to switch
  - They're £10 ahead, you're £15 ahead
- So the value of Microsoft is what it would cost people to switch to Google Docs and Linux …
- Example: razor-razorblade, printer-cartridge

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Lock-in (3)

- The incumbent will strive to maximise switching costs, competitors to minimise them
  - file format wars
  - loyalty programs
  - phone number portability
- Incumbents promote complementary goods and services that increase lock-in – from tied printer cartridges to G Suite and Facebook Connect
- Asymmetric switching costs – a phone network may supply a phone to win a customer, but to keep one can offer extra minutes which cost it nothing

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Network externalities

- Many networks become more valuable to each user the more people use them
- Metcalfe's law: the value of a network is proportional to the square of the number of users
- It's actually more complex than this (local effects are stronger) but still more than linear
- Overall effect: past some threshold, network use takes off rapidly (and creates lock-in)
  - Telephone – late 19th century
  - Fax – 1985–88
  - Email – 1995–99

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Network externalities (2)

- As well as 'real networks' like fax and email there are 'virtual networks' such as PCs and software
  - Most people used to buy PCs rather than Macs because of software
  - Back in 1985 companies started to write software for PCs first and Macs second, as they thought the PC was winning
  - So it won – people bought PCs for the software
- It works for bads as well as for goods: malware writers target Windows although Mac (and Linux) are also vulnerable

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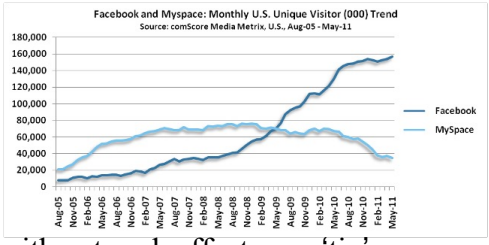
Network externalities (3)



- So markets with network effects can 'tip'
- It's particularly common with two-sided markets
- Other examples:
  - Rail gauges in the 19th century
  - Colour TV standards in the 1950s
  - VHS v Betamax, Blu-Ray vs HD-DVD, …
  - Paypal v other online payment startups 15 years ago (until 2005)
  - Facebook v Myspace, Bebo, Friendster, … (until 2010)

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Network externalities (4)

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Strategic issues

- Each of these factors – high fixed costs plus low marginal costs, significant switching costs due to technical lock-in, and network externalities – tends to lead to a dominant-firm market model
- Given all three, monopoly is even more likely
- Hence the race for market share whenever a new product or service market opens
- Hence the 1990s Microsoft philosophy 'ship it Tuesday and get it right by version 3'
- Business driver: is your customer acquisition cost (CAC) still less than your lifetime value (LTV)?

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Strategic issues (2)

- Ethics: how bad are monopolies?
- Policy: do you hope that the incumbents become obsolete, or do you regulate?
- EU law: a fairly-won monopoly is OK but using dominance in one field to get it in another is illegal (Amazon store vs web-host)
- US: monopoly used to be measured by consumer surplus (which doesn't work for Google, Facebook, Amazon, Wikipedia...)

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Price discrimination

- Recall: an efficient monopolist sells to each customer at her reservation price – 'selling to value'
- Pigou's three degrees of price discrimination:
  1. Personalised pricing (e.g. haggling, loyalty cards …)
  2. Versioning (e.g. first / business / economy class)
  3. Group pricing (e.g. student and OAP discounts)
- Around forever – but getting more powerful and pervasive
- Tech simultaneously increases the motive and the means (and drives the erosion of privacy)

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Price discrimination (2)

- Versioning can include 'pricing for sharing', e.g. scientific journals charge libraries more than private readers
- Disney DVDs are cheaper than titles people rent
- Versioning can include marketing – e.g. magazines cheap for students but expensive for business
- Much of the promised efficiency gain from e-commerce was based on hope of more effective price discrimination
- But discrimination is often unpopular (and sometimes illegal)!

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What is an example of price discrimination that you've come across, directly or indirectly?

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Cruel, mean or lavish …

It is not because of the few thousand francs which would have to be spent to put a roof over the third-class seats that some company or other has open carriages with wooden benches. What that company is trying to do is prevent the passengers who can pay the second-class fare from travelling third-class; it hits the poor, not because it wants to hurt them, but to frighten the rich. And it is again for the same reason that the companies, having proved almost cruel to the third-class passengers and mean to the second-class ones, become lavish in dealing with first-class passengers. Having refused the poor what is necessary, they give the rich what is superfluous. (Jules Dupuit, 1849)

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Bundling (1)

- One way to conceal discrimination in 'bundling': selling a number of products together, as with Microsoft Office
- Suppose Alice and Bob have the following reservation prices for Word and Excel

	Word	Excel
Alice	£50	£75
Bob	£75	£50

- With separate pricing, MS would charge £50 per product and get £100 per customer, or £75 and get £75
- By selling them together, it gets £125
- Can sell different bundles, e.g. annual sub with Office 365

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Bundling (2)

- The Economist offered a bundle for same price as one of the options
- Sales for bundle increased because people perceived getting the web version as free!
- Decoy effect: adding an option no one would choose changes what people choose

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Curbing the power of monopolies

- Belief that technology companies are too powerful and need to be reigned in
  - EU: 2022 Digital Markets Act (DMA) & Digital Services Act (DSA); 2018 GDPR
  - UK: 2021 Competition and Markets Authority's Digital Markets Unit; Digital Markets, Competition and Consumers Bill; Data Protection Act 2018
  - US: 2021 Biden's executive order aimed at cracking down on anti-competitive practices
  - China: anti-monopoly rules, data protection laws, protections for gig workers…

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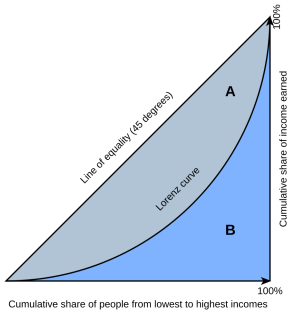
Income distribution



- Increasing inequality globally
- The Gini coefficient is used to measure inequality
- Gini = A/(A+B) in the graph above
- Gini = 0: communism; Gini = 1: the king has the lot

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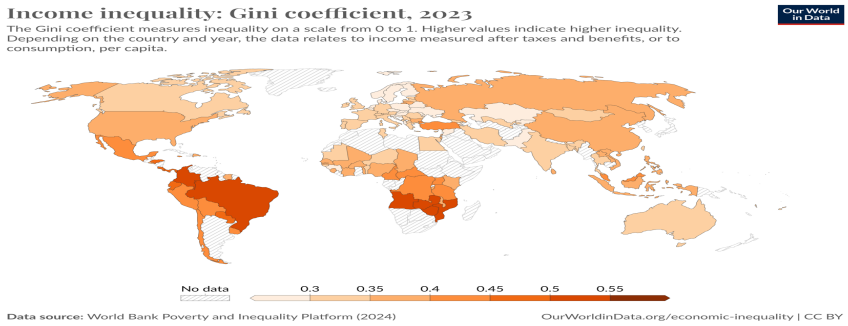
Income distribution (2)



- Generally speaking, Gini falls with development
- Ranges from 0.24 in Slovakia to 0.63 in South Africa
- Conflict theory explanation: over time, the poor fight harder for welfare than the rich resist them
- Democracy cuts both ways though: e.g. farm subsidy that gives each farmer £20000 but costs each nonfarmer £200

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