UNIVERSITY OF CAMBRIDGE

Lecture 2 - Economics of information goods

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From (physical) atoms to (digital) bits

Lecture 2 overview

- Lecture 1: Equilibrium, efficiency for physical goods.
- But digital goods are different!

Physical vs. digital markets

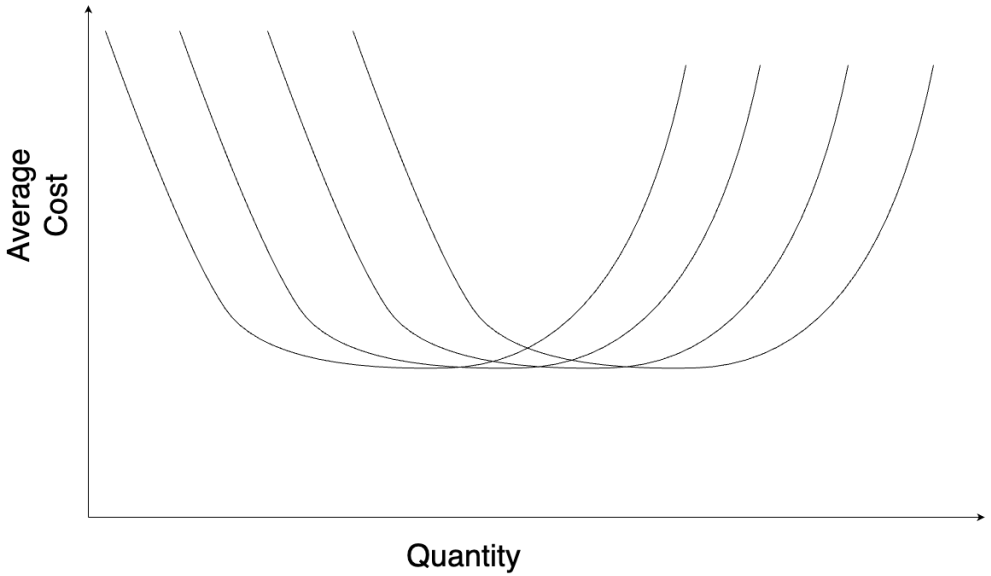
Physical goods

- Increasing cost with quantity.
- Rival consumption.
- Easy entry and competition.

Digital goods

- High fixed cost, near-zero marginal cost.
- Non-rival consumption.
- Network effects and lock-in.

Supply and demand for physical goods



Traditional industries:

- Need better technology or more factories to flatten production cost.
- Natural limits to demand, rivalrous consumption.

Supply and demand for digital goods

Increasing returns to scale

- Building a digital system is expensive once, cheap to replicate.
- Cost per additional user tends toward zero.
- Economies of scale $\rightarrow$ market concentration.

Example

Training a large AI model may cost £100M, serving one more query costs £0.0001.

Under perfect competition

Marginal cost $\simeq 0$, market price should approach 0. How do companies avoid this?

From productions costs to demand control

- If producing another digital copy costs almost nothing, how do firms stay profitable?
- They shift focus from production costs to *user retention*.
- Next: mechanisms of consumer *lock-in*.

Consumer lock-in

- Users face barriers to switching providers.
- Firms design ecosystems that make leaving costly.

Examples

- iOS vs. Android (apps, data, ecosystem)
- Cloud providers (migration costs)
- Productivity suites (file formats)
- File format wars, phone number portability

Question

Would you change your email provider today?

Why lock-in matters

- Reduces competition, users stay despite better alternatives.
- Allows firms to raise prices or restrict choice.

Firm incentives

- Existing firms try to maximise switching costs for users.
- Competitors try to minimise switching costs.

Illustration

A phone network may supply a phone to win a customer, but to keep one can offer extra minutes which cost it nothing.

From lock-in to network effects

- Lock-in keeps users inside a platform, but what attracts them there in the first place?
- The answer: each new user can increase the product's value for others.
- Next: self-reinforcing *network effects*.

Network effects

- The value of a product increases with the number of users.
- Two types:
  1. **Direct:** Communication platforms (WhatsApp)
  2. **Indirect:** Marketplaces with more buyers attract more sellers
- Network effects can lead to lock-in

Business driver

Is your customer acquisition cost less than lifetime value?

Example: Virtual networks

PCs vs. Macs (1980s–1990s)

- Software developers started prioritising PCs.
- Users bought PCs because more software existed.
- Positive feedback loop reinforced PC dominance.
- A “virtual network” based on *compatibility*, not cables.

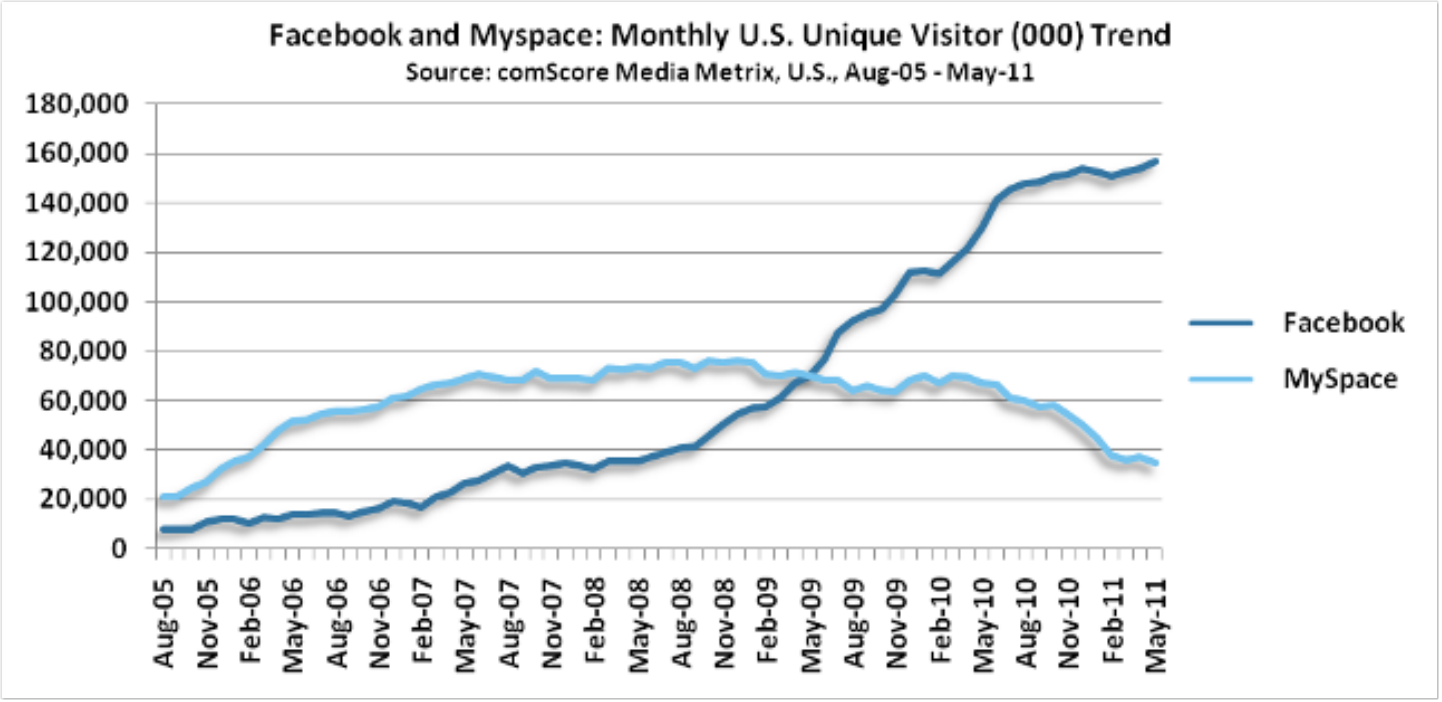
Indirect network effect

The value of a product increases with the number of *complementary goods*.

Dark side of network effects

Malware writers also target Windows first although Mac (and Linux) are also vulnerable.

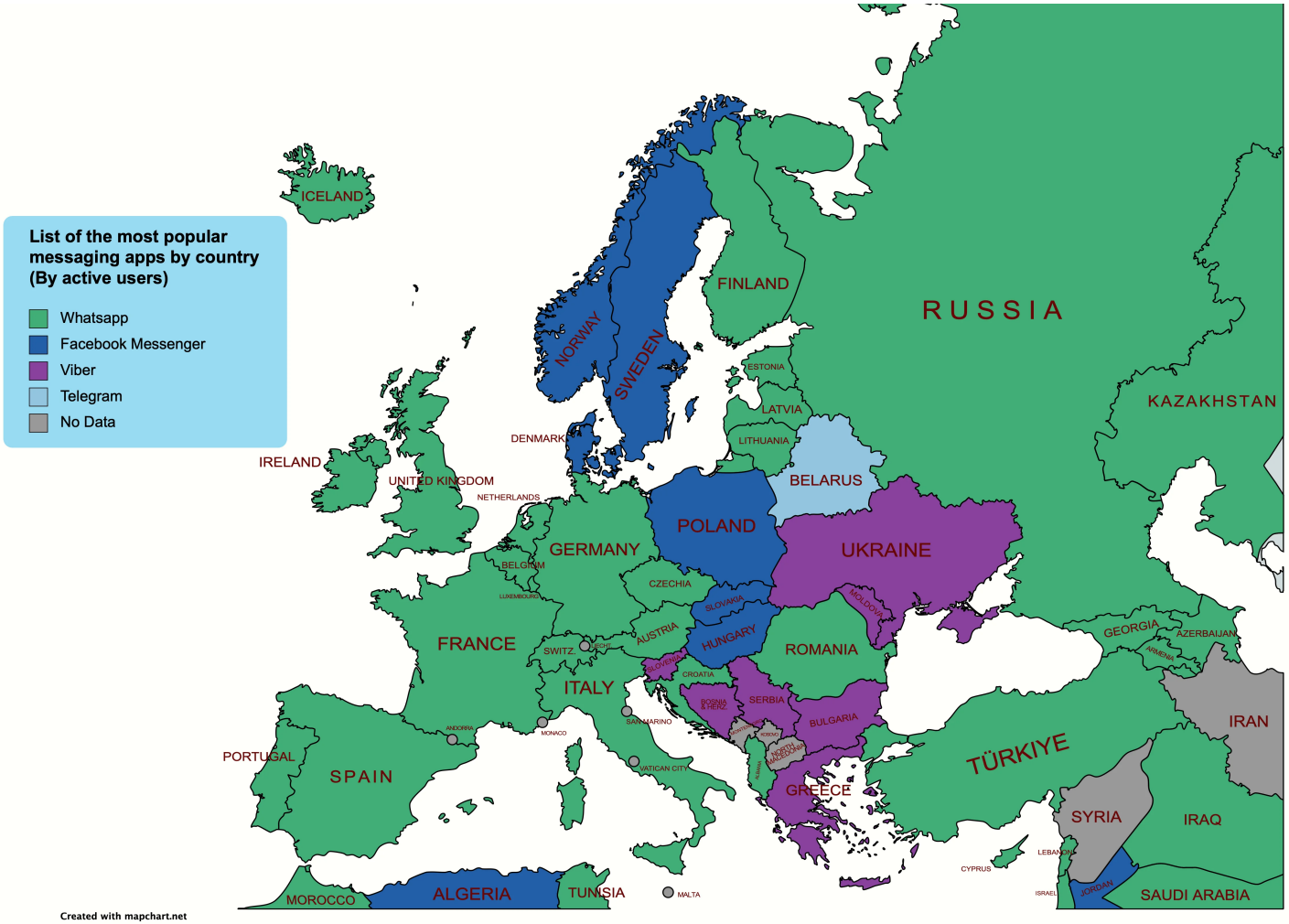
Example: Social media networks



Market tipping

- Past a threshold $\rightarrow$ winner-takes-all outcome.
- Without bad behaviour $\rightarrow$ market highly concentrated.

Example: Messaging networks



From networks to dominance

From networks to market power

- Network effects and lock-in lead to concentrated markets.
- Dominant firms can shape prices, access, user behaviour.
- Let's see why dominance matters, and how policy responds.

Why dominance emerges

- High fixed costs, low marginal costs
- Switching costs and lock-in
- Network effects
- Early market share decisive

Ethics & policy

- Regulate or wait and hope?
- *EU:* dominance OK, abuse illegal (Amazon).
- *US:* Based on consumer surplus, hard to measure for digital goods.

Personalised pricing in the digital age

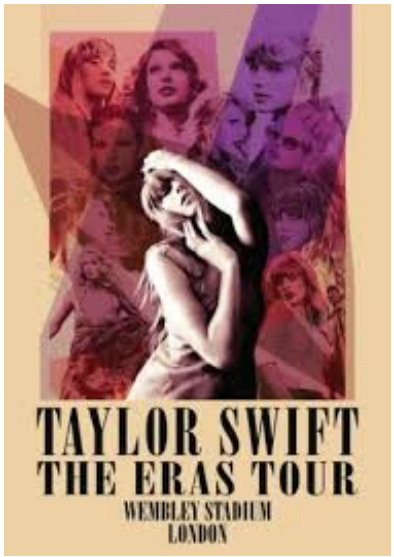
Key ideas

- Firms know far more about each consumer.
- Prices can vary for the same product.
- Classical forms reappear digitally.

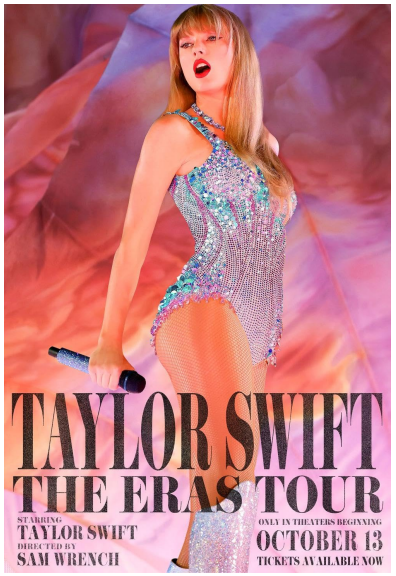
Forms of price discrimination

1. **Versioning:** “Basic / Pro / Premium” tiers.
2. **Windowing:** Staggered releases over time.
3. **Bundling:** Microsoft 365, Adobe Creative Cloud.

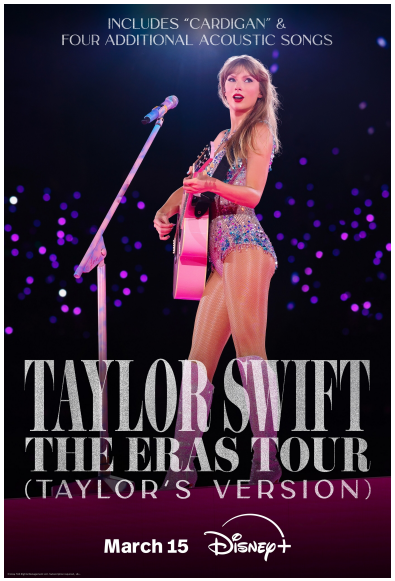
Example: Windowing & Taylor Swift



Concert (Live)



Cinema Release



Streaming Platforms

Revenue effects

- Maximises revenue by segmenting audiences.
- Fans pay a premium for early or exclusive access.
- Later audiences access cheaper versions.

Example: Bundling & Creative Cloud

User	Photoshop	Premiere	Total value
Alice (designer)	£150	£60	£210
Bob (videographer)	£50	£160	£210

Users value tools differently – one prefers design, the other video.

Revenue increases

- Separate pricing: £150 (Photoshop), £160 (Premiere) $\rightarrow$ one customer each, total £310.
- Bundled price £200 $\rightarrow$ both buy, total £400.

Digital bundling strategy

Subscription models (Adobe Creative Cloud, Microsoft 365) exploit variation in user valuations to capture more surplus.

Decoy effect

Decoy rationale

- Offer a bad option to make another option stand out
- More customers choose the $10 option if the $9 exists

Example: Decoy effect & Economist

Choose your subscription to *The Economist*

	BEST VALUE	
Print	**Print + Digital**	**Digital**
		
Weekly print edition	Weekly print edition Economist.com *The Economist* app for iOS Weekly classic digital edition app Espresso, our morning briefing	Economist.com *The Economist* app for iOS Weekly classic digital edition app Espresso, our morning briefing
Introductory offer **12 weeks for only €20**	Introductory offer **12 weeks for only €20**	Introductory offer **12 weeks for only €20**
Subscribe now	Subscribe now	Subscribe now
Student and gift options available	Student and gift options available	Student and gift options available

Pricing: $59 Digital, $125 Print + Digital, $125 Print

Example: Decoy effect & Apple

Space Gray

New

2.0GHz Processor
256GB Storage

$1,499.00

Up to 18 months of special financing ›

Space Gray

New

Touch Bar and Touch ID
2.9GHz Processor
256GB Storage

$1,799.00

Up to 18 months of special financing ›

Space Gray

New

Touch Bar and Touch ID
2.9GHz Processor
512GB Storage

$1,999.00

Up to 18 months of special financing ›

From firm strategy to social outcomes

- So far: we've seen how digital firms extract more surplus through bundling and personalised pricing.
- But who captures the gains — firms, users, or society?
- Next: how digital concentration translates into **wealth inequality**.

From market dominance to wealth inequality

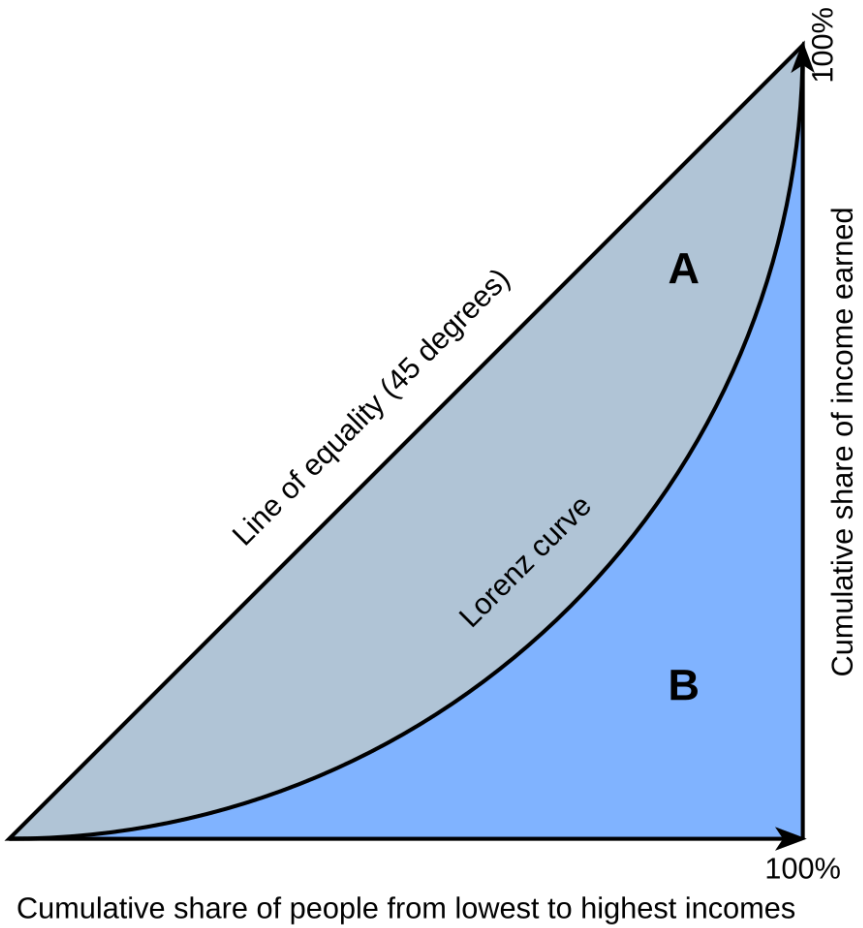
Overview

- So far: digital firms extract surplus with personalised pricing.
- But who captures the gains: firms, users, or society?
- Next: Market dominance translates into *wealth inequality*.

Wealth effect chain

1. Network effects + lock-in $\Rightarrow$ concentration of users and data.
2. Concentration $\Rightarrow$ pricing power and high profits.
3. Profits $\Rightarrow$ wealth accumulation and inequality.
4. Inequality $\Rightarrow$ low social mobility
5. Low social mobility $\Rightarrow$ social and political instability

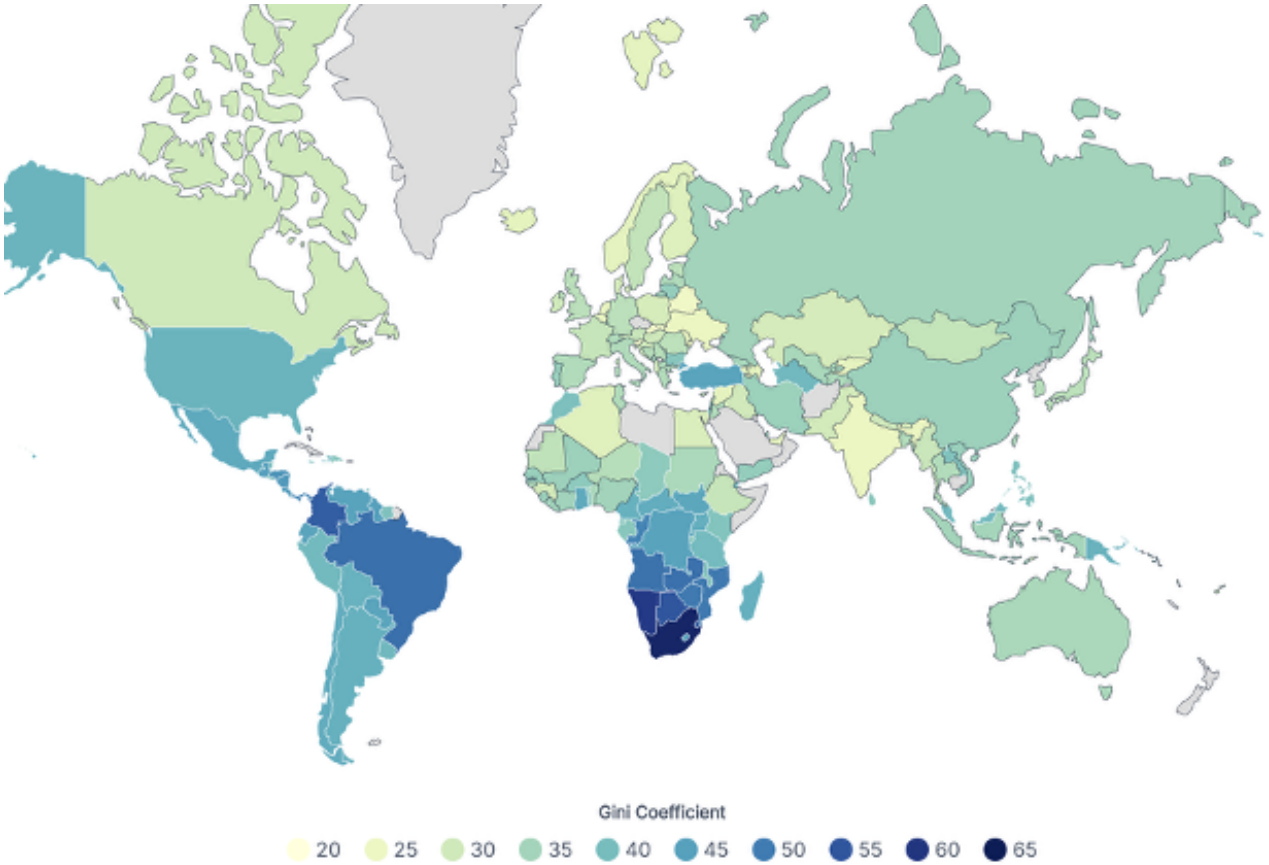
Measuring wealth inequality & Gini coefficient



Interpretation:

- 0 = perfect equality
- 1 = total inequality
- Tech-driven economies show rising Gini

Wealth inequality across the world



Ranking: Slovakia: 0.241 (highest) South Africa: 0.631 (lowest)

Summary and next lecture

Lecture 2 summary

- Digital goods differ from physical, near-zero marginal cost.
- Lock-in and network effects lead to market dominance.
- Firms use various forms of personalised pricing.
- These amplify inequality and raise new policy challenges for competition and regulation.

Next time: Market failures and behavioural economics

- Even without monopolies, markets can fail due to externalities, asymmetric information, and coordination problems.
- We'll also explore how human biases deviate from rational behaviour.