

ECON-C5100 Digital Markets

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Lecture 8: Platforms

- Platforms
- Equilibria in platforms
- Identifying externalities

Reminder: Network effects

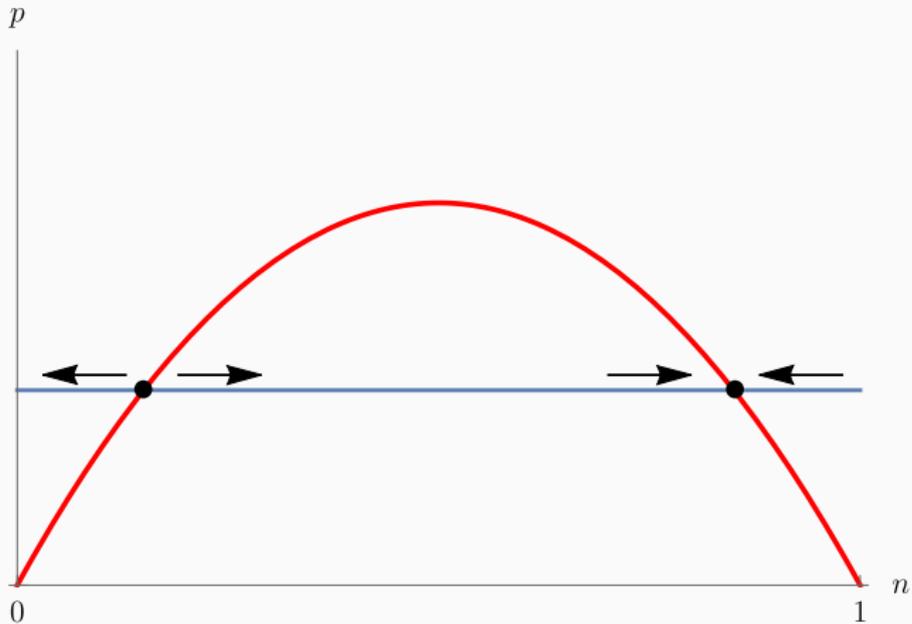


Figure. Positive network effects: Beyond tipping point (on the left) there is a high stable equilibrium (on the right).

What could go wrong?

- Not all the users are the same
 - Instead of pure scale, quality matters.
- Network effects are often indirect
 - Need to take into account separate user groups.
- Network effects can work in reverse
 - Shifts in customer base may occur rapidly.

Network effects on platforms

- Platforms create value when customers find good matches.
- Scale helps: if there are more customers, the chance that any particular customer will find a good match increases.
- But most customers on most platforms are not very good matches for each other.
- A smaller platform with many good matches is more attractive than a bigger platform with fewer good matches.
- Network effects result from getting the right customers, and not just more customers.

“ Many, if not most markets with network externalities are characterized by the presence of two distinct sides whose ultimate benefit stems from interacting through a common platform.
–Rochet & Tirole (2003)

”

Ad-supported media – Example: Google

Q4 2021 supplemental information (in millions, except for number of employees; unaudited)

Revenues, Traffic Acquisition Costs (TAC) and number of employees

	Quarter Ended December 31,	
	2020	2021
Google Search & other	\$ 31,903	\$ 43,301
YouTube ads	6,885	8,633
Google Network	7,411	9,305
Google advertising	46,199	61,239
Google other	6,674	8,161
Google Services total	52,873	69,400
Google Cloud	3,831	5,541
Other Bets	196	181
Hedging gains (losses)	(2)	203
Total revenues	<u>\$ 56,898</u>	<u>\$ 75,325</u>
Total TAC	\$ 10,466	\$ 13,427

Figure. Create content to attract users, then sell ads. Q4/2021 earnings of Alphabet. Total revenue for the year \$257 billion (cf. expected GDP of Finland in 2021: \$255 billion).

Source: Alphabet.

Exchanges – Example: Andela



Figure. Match buyers with sellers. Andela matches African developers with global clients.

Figure: Tom Saater for The New York Times.

Software – Example: R

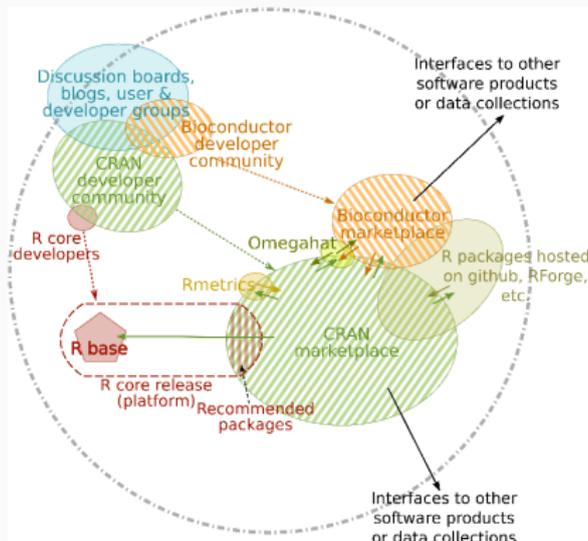


Figure. Environment to create apps that users like. Example of R development community.

Figure: Plakadis et al. 2017.

Transaction services – Example: MobilePay

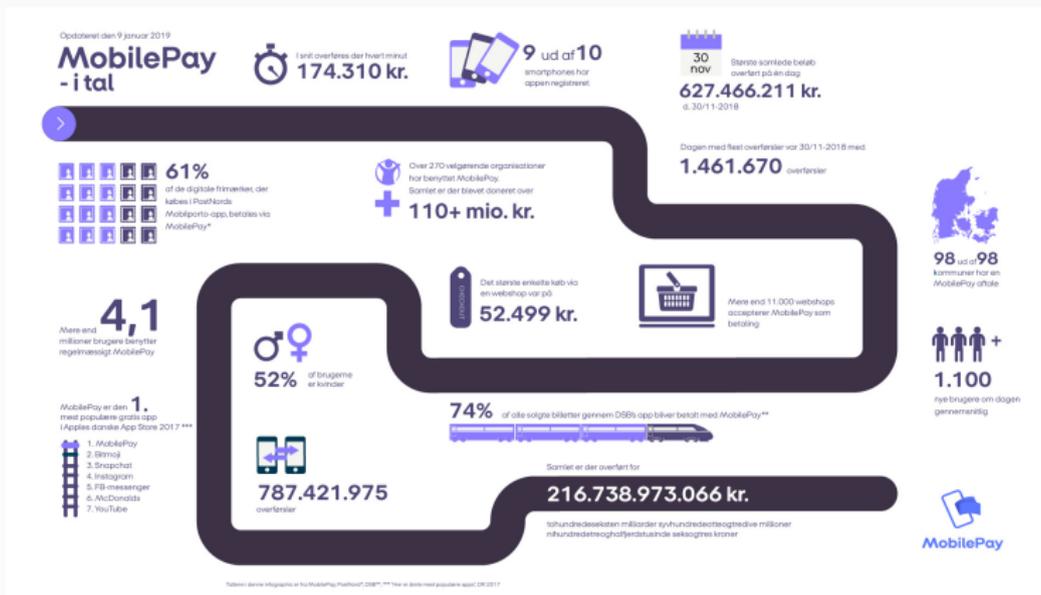


Figure. Moving money to move stuff. MobilePay is a mobile transaction payment system.

- Platforms are matchmakers:
 - Ads: Find right ads to viewers/users.
 - Exchanges: Match buyers with sellers.
 - Software: Match developers, users, and hardware.
 - Transaction: Match consumers with merchants.
- A platform provides a way for the parties to enter into socially beneficial exchange or transaction, provided that:
 - The groups are distinct.
 - There are indirect network effects or inter-group externalities.
 - The platform can facilitate coordination more efficiently than the parties can by themselves.

In-class exercise: Platform or not?

Come up with a business/website that you think operates as a platform.

Use the text field in the Presemo presemo.aalto.fi/digimar vote to add the site and the link.

Vote for the ones you think are platforms.

Reminder: Network effects

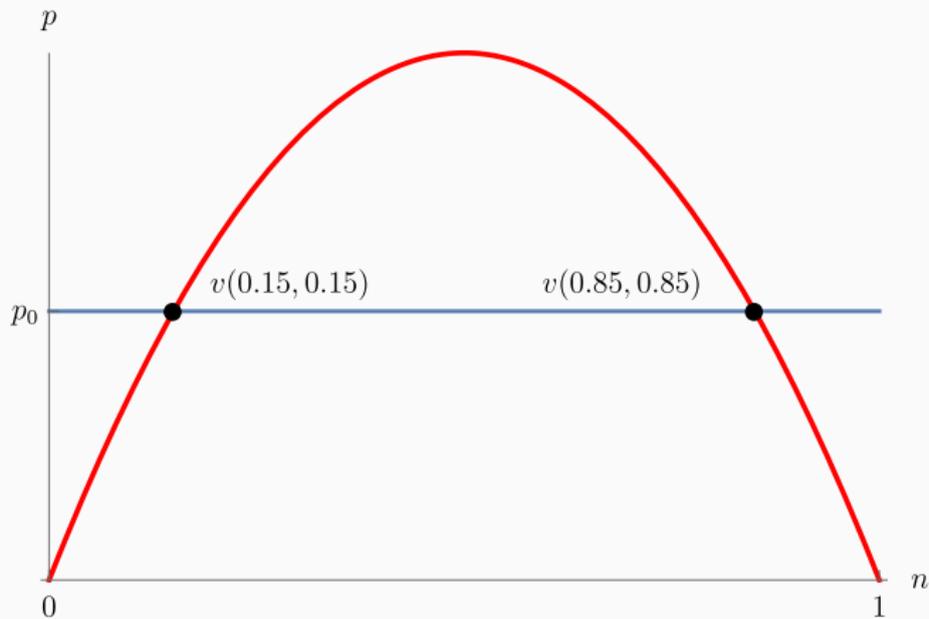


Figure. Equilibrium prices with $p = vn$. A given price p_0 determines how many participants the network will end up having.

- With platforms, multiple user groups make even richer patterns possible.
- We will use a simplistic model for the platform demand.
- There are two sides: e.g. buyer and sellers.

- We assume the following valuations for the two sides:

$$v_b(n_b, n_s) = (1 - n_b)n_s$$

$$v_s(n_b, n_s) = (1 - n_s)n_b$$

where n_b is the number of buyers and n_s the number of sellers.

- This means that
 - The valuation on both sides decreases as the number of participants on their own side increases (as normal).
 - The valuation for the buyers depends on the number of sellers and vice-versa (externality).

*Note: n_b and n_s are normalized to represent market coverage, from 0 to 1, rather than absolute quantities.

- Assume that the platform charges a price for participation.
- Then the surpluses for the participants, if they join the network, are as follows:

$$\pi_b(n_b, n_s; p_b) = (1 - n_b)n_s - p_b$$

$$\pi_s(n_b, n_s; p_s) = (1 - n_s)n_b - p_s.$$

where p_b is the price for buyers and p_s the price for sellers.

Equilibria in platforms

- The buyers and sellers will be indifferent between not-joining and joining to the platform when their gain from joining the market just equals the cost for them, i.e. the prices:

$$(1 - n_b)n_s = p_b$$

$$(1 - n_s)n_b = p_s.$$

- If we fix the price, we can compute the combinations of n_b and n_s where the equations hold.
- If, for given prices p_b and p_s , there are n_b and n_s so that both of the equations hold simultaneously, then those n_b and n_s and prices p_b and p_s are a market equilibrium.

Platform equilibria

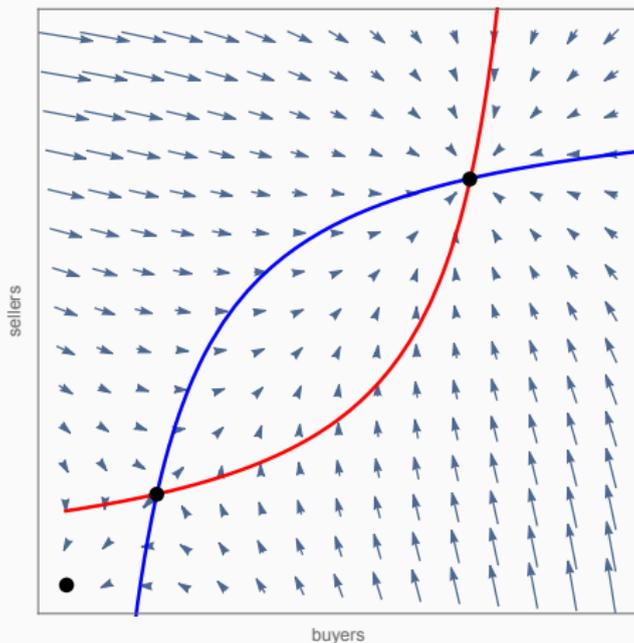


Figure. Indifference curves for buyers (red line) and sellers (blue line) with fixed prices. Black dots show the equilibria, and the arrows to which equilibria a given starting position would lead.

Demonstration of the platform effects.

Identifying externalities

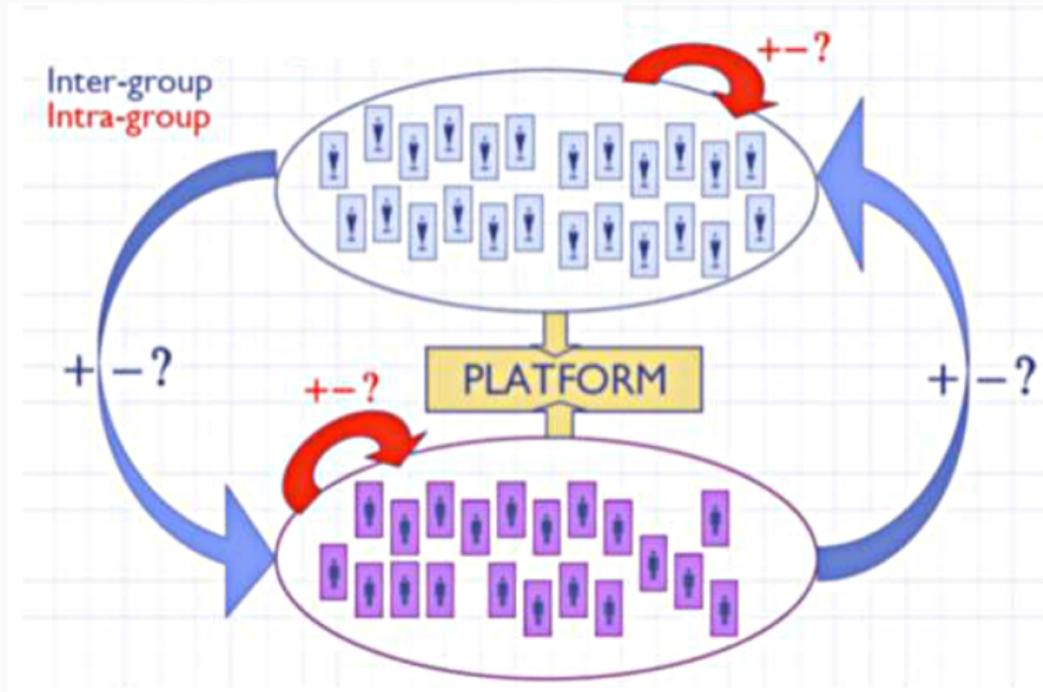


Figure. Externalities within a group and between groups.

Identifying externalities

	side	inter-group	intra-group
Ad market (traditional)	A. Viewers/readers	A to B: +	In A: 0
	B. Advertisers	B to A: -	In B: -
Ad market (social media)	A. Users	A to B: +	In A: +
	B. Advertisers	B to A: -	In B: -
Exchanges	A. Buyers	A to B: +	In A: - or 0
	B. Sellers	B to A: +	In B: - or 0
Software	A. Users	A to B: +	In A: +
	B. Developers	B to A: +	In B: -
Transactions	A. Consumers	A to B: +	In A: 0
	B. Merchants	B to A: +	In B: -

Table. Externalities within a group and between groups.

- In our simple model, the both inter-group externalities between buyers and sellers are positive, and there were no negative effects.
- How might the other cases look like?
- (Please do note, that these figures are illustrative, not a reflection of empirical situations.)

- In a simplistic social media ad market model:
 - Users benefit from other users participating to the network.
 - Advertisers benefit from users.
 - Users dislike advertisement.
- We can illustrate with the following model:

$$\pi_b(n_b, n_s; p_b) = (1 - n_b)\kappa_b n_b - \lambda_b n_s - p_b$$

$$\pi_s(n_b, n_s; p_s) = (1 - n_s)\kappa_s n_b - p_s.$$

- Parameter λ_b tells how strongly the users dislike ads.

Ad market model (illustrative)

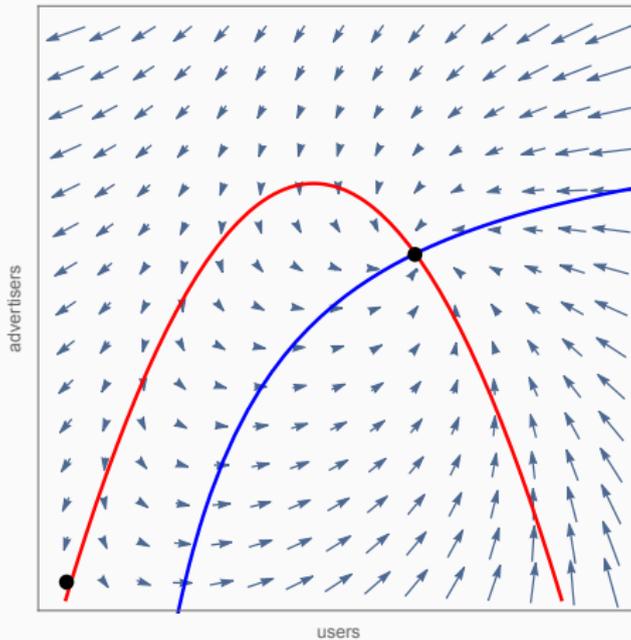


Figure. Simple ad model: Indifference curves for buyers (red line) and sellers (blue line) with fixed prices. Black dots show the equilibria, and the arrows to which equilibria a given starting position would lead.

- Platforms are matchmakers: ads, exchanges, software, transactions.
- Economics within the platform are affected by externalities: both between the groups and within the groups.

Materials for this week

Online resources (for Lecture 7):

- **Externalities.** Remind yourself of the economics of positive externalities mru.org: [Positive Externality](#).
- **Network externalities.** www.core-econ.org 21.3 and 21.4.
- **Platforms.** www.core-econ.org 21.5.

Reading assignment 4:

- Katz, M. and C. Shapiro (1994) "Systems Competition and Network Effects", *The Journal of Economic Perspectives*. Read at least until top of p. 103 and Conclusions.
- Evans, D. and R. Schmalensee (2007) "The Industrial Organization of Markets with Two-Sided Platforms", *Competition Policy International*. Feel free to skip V and VI. Also, Section III A. Pricing, will be discussed more in depth in Lecture 10.

Strategies of platforms

- Openness
- Pricing

Appendix

Typology of platforms

- Advertising-supported media:
 - The platform creates content, buys content, or lets the users create content.
 - The content is used to attract viewers, the viewers are used to attract advertisers.
- Exchanges:
 - Buyers and sellers search for feasible trades and the best prices.
 - There are obstacles for them to achieve efficient allocation by bargaining with each other.

Typology of platforms

- Software platforms:
 - Users can run applications only if they have the same software platform as that relied on by the developers.
 - Developers can sell their applications only to users that have the same software platform they have relied on in writing their applications.
- Transaction systems:
 - Any method for payment works only if buyers and sellers are willing to use it.

Strength of the externalities

- How does the strength of the inter-group externalities affect the platform demand?
- We can study the “strength” of externalities within our simplistic model by introducing parameters κ_b and κ_s as follows:

$$v_b(n_b, n_s) = (1 - n_b)\kappa_b n_s$$

$$v_s(n_b, n_s) = (1 - n_s)\kappa_s n_b.$$

- (Above both κ_b and κ_s equal to 1.)

Weak externalities: Platform does not form

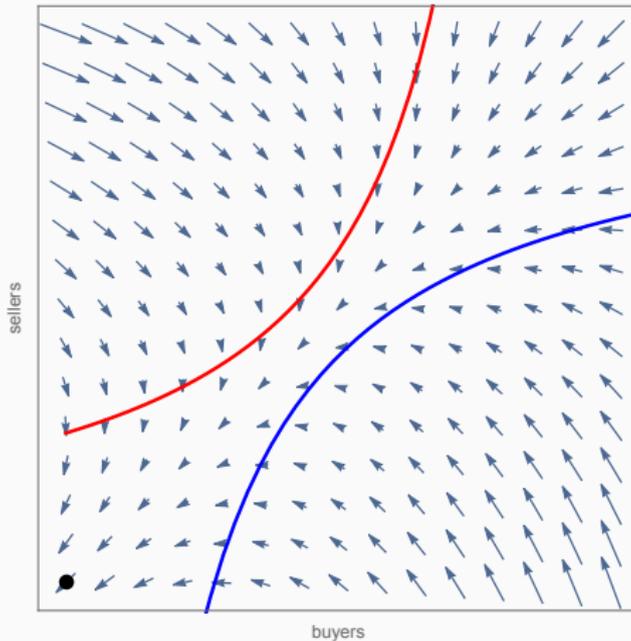


Figure. $\kappa_b = \kappa_s = 0.5$: Indifference curves for buyers (red line) and sellers (blue line) with fixed prices. Black dots show the equilibria, and the arrows to which equilibria a given starting position would lead.