Seminar Competition Policy

Lecture
Two-Sided Markets

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A Two-Sided Market - I

A market where firms act as platforms and sell two different products to two different groups of buyers

taking into account that demand from one group of buyers depends on demand from the other group of buyers (so that these are not externalities for the firm)

while buyers of the two groups do not take this indirect network effects into account (so that these are in fact externalities for buyers)

(see Armstrong, 2006)

So that a two-sided platform

- is a particular two-product firm

- is different from a firm selling complement products
A Two-Sided Market - II

An additional condition is that customers on one side should not be able to pass through completely to customers on the other side an increase in the price they are asked by the platform.

In a two-sided market one can distinguish

a) the price level (roughly the sum of the two prices)

b) the price structure (roughly the ratio of the two prices)

The non-neutrality of the price structure (for firms profits and for welfare) is a sufficient condition for the existence of a two-sided market

(see Rochet and Tirole(2006))
Two-Sided markets: a clarification

Not all firms are two-sided platforms

Because firms buy inputs and sell output

This implies:

- they do not offer a service to input producers

- the input producers do not care about demand for their product by consumers once they are paid by the firm (note: it depends on the contract!)

e.g. Is a supermarket a two-sided platform?

Yes, but only to the extent it is able to make the wine producer pay (though a discount?) to have its wine on the right shelf (then it offers a service to them…)

Only then the wine producer will care about how many clients the supermarket has …
Different Two-Sided Markets

Two types of two-sided market: the “media type” and the “payment card type” or equivalently “two-sided transaction” markets and “two-sided non transaction” markets

Also two types of two-sided markets of the “payment type”: the “3-party system” and the “4 (or 5) party system”
Two Types of Two-Sided Market

1) Two-Sided Transaction Market:
There is a transaction between end-users and it is observable to the platform

e.g. payment cards, auction houses

2) Two-Sided Non-Transaction Market:
There is no transaction between end-users

e.g. newspapers, TV

Note that
A non-transaction market is an extreme case of two-sided market

At the other extreme there is a one-sided market
Two types of two-sided markets

Distinction above corresponds roughly to:


A Two-Sided Market: Media

Newspapers, TV, Radio, Internet...

Media Firm

reader/viewer/listener

advertiser

price for content

media content

ad slot

ad fees

F_1^A

Note: no per-interaction fees

Note: no transaction here, but interaction, usually not observable (but see clicks on ads)

Note: maybe per-interaction fees
Media as two-sided markets: the idea - 1

- two markets: advertisers & readers/viewers/listeners

- Membership (or adoption) externalities (indirect network externalities):
  - the larger the audience, the higher the demand from advertisers at a given price or the higher the price which can be charged for a given ad slot
  - the more advertising (concentration), the .... the demand from readers/viewers/listeners

- not internalized by advertisers & readers/viewers/listeners
- internalized by media company

Notes for the seminar Competition Policy: Advanced Theory and Cases - Tilburg 2009
A Two-Sided Market: Payment Cards-1

Also: auction house, operating systems

Note: transaction here, usually observable
A Two-Sided Market: Payment Cards-2

payment card association (4 party system)

issuer → interchange fee → acquirer

issuer → price → acquirer

buyer ← price ← seller

Note: on-us vs off-us transactions

card-holders fees
fixed fee + per-transaction fee

merchant fees
fixed fee + merchant discount

Notes for the seminar Competition Policy: Advanced Theory and Cases - Tilburg 2009
Payment cards as two-sided markets: the idea - 2

• two markets: cardholders & merchants

• membership externalities (indirect network externalities):
  – the more cardholders, the higher demand from sellers
  – the more sellers accept it, the higher demand from buyers

• usage externalities:
  - for the cardholder to pay with his/her card the merchant must be willing to be paid with it
  - for the merchant to be paid with a card the cardholder must be willing to pay with it

• not internalized by buyers and sellers
• internalized by card firm/association
Two-sided markets: the literature

• General:

• Competition Policy:
Fallacies from a single-sided approach to a two-sided market

Profit-maximizing prices:

- A high-price cost margin indicates market power
- A price below marginal cost indicates predation

Welfare maximizing prices:

- An efficient price structure reflects relative costs (in mature networks)

The role of competition:

- Higher competition results in a more balanced price structure
- Higher competition results in a more efficient price structure (only price level)
A model of membership

• A monopolist 3-party scheme, membership

\[
\max_{F^b, F^s} F^b N^b + F^s N^s - C(N^b, N^s)
\]

Armstrong (2006)

\[
N^b = N^b (F^b, N^s) \quad N^b = n^b (F^b, F^s)
\]

\[
N^s = N^s (N^b, F^s) \Rightarrow N^s = n^s (F^b, F^s)
\]

then \( \frac{\partial n^b}{\partial F^b} = \ldots \) and
\[
\max_{F^b, F^s} \left( F^b n^b(F^b, F^s) + F^s n^s(F^b, F^s) - C(n^b(F^b, F^s), n^s(F^b, F^s)) \right)
\]

\[
\frac{F^b - c^b}{F^b} = \frac{1}{\left| \varepsilon^b_{F^b} \right|} \left( \frac{F^s - c^s}{F^s} \right) \varepsilon^s_{F^b} \frac{F^s n^s}{F^b n^b} \frac{1}{\varepsilon^b_{F^b}}
\]

\[
\frac{F^s - c^s}{F^s} = \frac{1}{\left| \varepsilon^s_{F^s} \right|} \left( \frac{F^b - c^b}{F^b} \right) \varepsilon^b_{F^s} \frac{F^b n^b}{F^s n^s} \frac{1}{\varepsilon^s_{F^s}}
\]

Mark-up depends on own elasticity and cross-elasticity (indirect network effect)

Markup on one side maybe negative! (then other higher than standard monopoly)
A model of usage

- A monopolist 3-party scheme, use

\[
\max_{p^b, p^s} (p^b + p^s - c) T(p^b, p^s)
\]

\[
\frac{p^s + p^b - c}{p^b} = \frac{1}{\mathcal{E}_{p^b}^T} \quad \frac{p^s + p^b - c}{p^s} = \frac{1}{\mathcal{E}_{p^s}^T} \quad \frac{p^s}{p^b} = \frac{\mathcal{E}_{p^s}^T}{\mathcal{E}_{p^b}^T}
\]

\[
\frac{p^s + p^b - c}{p^s + p^b} = \frac{1}{\mathcal{E}_{p^s}^T + \mathcal{E}_{p^b}^T}
\]

Intuition?

Note: \(T(p^b, p^s) = T(D(p^b), D(p^s))\), but how?

Rochet & Tirole (2006)
Some mathematical intuition:
the profit maximizing $p^*$ price level is determined by the total elasticity of
transactions
price structure is then determined by maximising number of transactions
given

$$p^* = p^b + p^s$$

$$\max_{p^b, p^s} T(p^b, p^s)$$

s.t.

$$p^* = p^b + p^s$$
A model of usage and adoption

- A monopolist 3-party scheme, adoption+use

\[
\max_{F^b, F^s, p^b, p^s} \quad F^b N^b + F^s N^s - C(N^b, N^s) + (p^b + p^s - c) T(p^b, p^s, N^b, N^s)
\]

If

\[
N^b = N^b (F^b, p^b, N^s) \quad \Rightarrow \quad N^b = n^b (F^b, F^s, p^b, p^s)
\]

\[
N^s = N^s (N^b, F^s, p^s) \quad \Rightarrow \quad N^s = n^s (F^b, F^s, p^b, p^s)
\]

then

\[
\frac{\partial n^b}{\partial F^b} = \ldots \text{ and}
\]
\[
\max_{F^b, F^s, p^b, p^s} F^b n^b (F^b, F^s, p^b, p^s) + F^s n^s (F^b, F^s, p^b, p^s) + \\
- C(n^b (F^b, F^s, p^b, p^s), n^s (F^b, F^s, p^b, p^s)) + \\
+ (p^b + p^s - c) T(p^b, p^s, n^b (F^b, F^s, p^b, p^s), n^s (F^b, F^s, p^b, p^s))
\]

\[
\frac{F^b - c^b}{F^b} = \frac{1}{\varepsilon_{n^b}^F}
\]

\[
\frac{F^s - c^s}{F^b} \varepsilon_{n^b}^F \left| MREV^s \right| \frac{p^s + p^b - c}{p^b} \varepsilon_{n^b}^F \left| MREV^b \right| \frac{P^s + p^b - c}{p^s} \varepsilon_{n^b}^F \left| MREV^b \right| UREV^s \varepsilon_{n^b}^F \left| MREV^b \varepsilon_{n^b}^F \left| MREV^b \right|
\]

\[
\frac{p^s + p^b - c}{p^b} = \frac{1}{\varepsilon_{p^b}^T} + \frac{F^b - c^s}{F^b} \varepsilon_{p^b}^T \left| UREV^b \right| \frac{F^s - c^s}{F^s} \varepsilon_{p^b}^T \left| UREV^b \right| \frac{P^s + p^b - c}{p^s} \varepsilon_{p^b}^T \left| UREV^b \right| UREV^s \varepsilon_{p^b}^T \left| UREV^b \varepsilon_{p^b}^T \left| UREV^b \right|}
\]

and so on...
Issues in Competition Policy

- Market Power
- Total welfare
- Market Definition
- Assessment of Market Power
- Merger evaluation
- Incentives to collude
- Predation
- Tying
Market Definition in 2-Sided Markets: The Literature

- Argentesi & Ivaldi (2005) – media, review of cases, elasticities used should include network effects
- Emch & Thomson (2006) - payment cards, raise price level adjusting the price structure, no implementation, usage only
- Evans & Noel (2005, 2008) – media, critical loss analysis, raise price on one side keeping fixed the price on the other side, membership only
- Filistrucchi (2008)
- Tilec & Howrey (2010)
The SSNIP Test in 2-Sided Markets: the Issues

Key questions for 2-sided markets:

- How many markets need to be defined (together)?
- Which price should the hypothetical monopolist be thought of as raising?
- Which profit changes and feedbacks should be taken into account between the two-sides of the market?
How many markets?

- Observing that
  - In a non-transaction market, a product can be on one side of the market but not on the other (example...)
  - In a transaction market, a product is either on both sides of the market or on none (example...)

- Then
  - In a non-transaction market, two interrelated markets need to be defined
  - In a transaction market, only one market needs to be defined
Which price?

- Remembering the rationale behind the SSNIP test

- defining the market as the smallest set of products on which a monopoly would find it profitable to exercise market power

- -> the hypothetical monopolist should be allowed to adjust optimally the price structure

- Therefore

- In a market of the media type, first one of the two prices should be raised and then the other price, each time allowing the hypothetical monopolist to adjust optimally the price structure (≠Evans&Noel(2008))

- In a market of the payment card type, first one of the two prices should be raised and then the other price, each time allowing the hypothetical monopolist to adjust optimally the price structure (=Emch&Thomson(2006))
Which profit changes and feedbacks?

Remembering the rationale behind the SSNIP test:

  defining the market as the smallest set of products on which a monopolist would find it profitable to exercise market power

Observing that

  A monopolist will take into account

Then:

  total profits (i.e. profits from both sides) should be considered
  all feedbacks should be considered

(=Emch&Thomson(2006) and Evans&Noel(2008))
Objections and Answers:

Antitrust authorities worried that if two positive externalities and all feedbacks considered, market much wider than single-sided market

But that is exactly the point: it is a two-sided market and in a two-sided market an hypothetical monopolist is concerned about feedbacks

Lawyers worried that the practical benchmark for “enough substitution” is changed (e.g. with positive externalities you need lower substitution in the initial market to have a loss in profits and therefore a wider market)

True, but the market still defined as the minimum set of products it is worth monopolising
Some worried that feedbacks may not be instantaneous

True, but irrelevant, as the test requires a “non-transitory” increase in price and a period of one or two years is usually considered; during such a period feedbacks should have taken place
The SSNIP Test: Feedbacks

Positive externalities

Normal Market:
Does total $\pi_A$↑?
If yes, market not wider
The SSNIP Test: Feedbacks

Positive externalities

For given $p_{1_B}^1$

Normal Market:
Does total $\pi_A^1$ rise?
If yes, market not wider

Feedback to market B

$\pi_B^1$
The SSNIP Test: Feedbacks

Positive externalities

For given $p^1_B$

Normal Market:
Does total $\pi_A^1$? If yes, market not wider

Feedback to market B

Should we take this into account?

\[ p_A^1 \uparrow \rightarrow q_A^1 \downarrow \rightarrow \pi_A^1 \uparrow \rightarrow \pi_A^1 \uparrow \rightarrow q_B^1 \downarrow \rightarrow \pi_B^1 \downarrow \]
The SSNIP Test: Feedbacks

Positive externalities

For given $p_B^1$

Feedback to market B

Feedback to market A

Normal Market:
Does total $\pi_A^1$? If yes, market not wider
The SSNIP Test: Feedbacks

Positive externalities

For given \( p^1_B \)

Should we take this into account?

\[ p^1_A \uparrow \rightarrow q^1_A \downarrow \]

\[ \pi^1_A \uparrow \rightarrow \pi^1_A \downarrow \]

Normal Market: Does total \( \pi^1_A \uparrow \)? If yes, market not wider

Feedback to market B

\[ q^1_B \downarrow \rightarrow \pi^1_B \downarrow \]

Feedback to market A

\[ \pi^1_A \downarrow \]
The SSNIP Test: Feedbacks

Positive externalities

For given $p_B^1$

Normal Market: Does total $\pi_A^1$? If yes, market not wider

Feedback to market B

Feedback to market A

and so on
The SSNIP Test: Feedbacks

Positive externalities

For given $p^2_A$, $p^1_B$, $p^2_B$

Normal Market: Does total $\pi_A$↑? If yes, market not wider

Feedback to market B

Feedback to market A

$\pi_A$↑

$\pi_A$↓

$\pi_B$↓

$q_A^1$↑

$q_A^2$↑

$q_A^1$↓

$q_B^1$↓

$q_A^1$↓
The SSNIP Test: Feedbacks

Positive externalities

For given $p_A^2$, $p_B^1$, $p_B^2$

Normal Market:
Does total $\pi_A^1$?  
If yes, market not wider
The SSNIP Test: Feedbacks

Positive externalities

For given \( p^2_A, p^1_B, p^2_B \)

Normal Market:
Does total \( \pi_A \)↑?
If yes, market not wider

Feedback to market B

Feedback to market A

Should we take these into account?
The SSNIP Test: Feedbacks

Positive externalities

For given $p_A^2$, $p_B^1$, $p_B^2$

Normal Market:
Does total $\pi_A^1$? If yes, market not wider

Feedback to market B

Feedback to market A
The SSNIP Test: Feedbacks

Positive externalities

For given $p^2_A, p^1_B, p^2_B$

Normal Market:
Does total $\pi_A^1$?
If yes, market not wider

Feedback to market B

Feedback to market A

Should we take these into account?
The SSNIP Test: Feedbacks

Positive externalities

For given $p_A^2, p_B^1, p_B^2$

Feedback to market A

Feedback to market B

Normal Market: Does total $\pi_A$? If yes, market not wider

and so on
The literature on mergers in two-sided markets

Mergers in two-sided markets
- Chandra and Collard-Wexler (2009)
- Lionello (2010)

Merger simulation in two-sided markets:
- Fan (2010)
- Van Cayseele and Vanormelingen (2010)
- Filistrucchi, Klein & Michielsen (2010)
- Song (2011)
Mergers in two-sided markets

A merger in a two-sided market, absent (productive) efficiency gains, would lead to a higher price level but not necessarily higher prices on both sides.

Indeed a merger might decrease the price on one side and increase the one on the other side.

Most importantly, it might increase consumers’ welfare even if it increases the price consumers pay.

The necessary condition is that at least on one side customers’ enjoy after the merger a higher utility from the network effect.
Incentives to collude-1

Evans & Schmalensee (2008)

More difficult than in one-sided market because
- you need to collude on both sides (otherwise collusive gain on one side washed out by competition on the other side)
-then you need to coordinate on the two sides

Probably ok if no institutional constraint (and two network effects?)

Argentesi & Filistrucchi (2007)

Collusion on the cover price in Italian newspapers

Boffa & Filistrucchi (2010)

In order to sustain collusion you may want to collude above the two-sided monopoly price (preliminary)
Incentives to collude-2

Izabel Rhumer (2010)

higher indirect network externalities have two opposing effects on the sustainability of a cartel.

-the gain from collusion increases (collusive profits increase and punishment profits decline) - this makes collusion more desirable.

-the gain from deviation increases.

Latter effect dominates and collusion becomes harder to sustain with stronger indirect network externalities.

Also, higher asymmetry in network effects reduces the incentive to collude.
Tying and bundling

Maybe a profit maximizing strategy
May increase not only total welfare but also consumers surplus

The larger the network externalities across sides, the more likely it is that tying will be a profit maximizing strategy and benefit consumers

The more asymmetric the network externalities, the more likely it is that subsidizing the low externality side of the market will benefit consumers on both sides.

Multi-homing may reduce the negative effects of tying