

Managing inter- and intra-group externalities on two-sided platforms

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Context

- Many economic and social situations require the interaction among different groups of agents, on some “platform”.
- Interaction often exhibits
 - Positive **inter-group externalities** (*indirect network effects*)
→ agents of one group are better off when the number of agents of the other group(s) increases
 - Negative **intra-group externalities** (*competition effects*)
→ agents within a group compete with each other
- Examples
 - Credit cards, Yellow pages, matchmaking services
 - Computer OS, videogame consoles, smartphones
 - *B2B marketplaces, shopping malls*

} “Multi-sided
platforms”

Context (2)

- Externalities on platforms can be seen as shared resources.
 - *B2B platform*: by joining, a seller helps attracting more buyers, which benefits all sellers → positive externality → public good
- Platforms may, or may not, be run by for-profit intermediaries.
 - Visa, Mastercard ↔ cash system
 - MS Windows ↔ Linux
 - *Proprietary B2B marketplace* ↔ *Decentralized market*
- Pros and cons of intermediaries
 - (+) by internalizing externalities, they manage the shared resource.
 - (-) market power → distortions

Issues

- Can a for-profit platform succeed in an environment where agents have the possibility to interact on a free (public or open) platform? → **Not always**
 - Belleflamme and Toulemonde (2008)
- In the presence of a random-matching market, are there profitable opportunities for intermediaries to operate centralized exchanges? → **Yes**
 - Belleflamme and Peitz (2010), extending Spulber (1999)
- Does the presence of for-profit intermediaries affect sellers' incentives to innovate in B2C interactions? → **Yes**
 - Belleflamme and Peitz (2009)

1. Launching a new for-profit platform

▪ Model

- $N_b \geq 3$ homogeneous buyers and $N_s \geq 3$ homogeneous sellers
- At $t=0$, the 2 groups interact on a 'free' platform.
- At $t=1$, intermediary considers launching a competing platform
- Both sides 'single-home'.
- If there are $1 \leq n_b \leq N_b$ buyers & $1 \leq n_s \leq N_s$ sellers on platform, then the benefits from interaction are:
 - For buyers: $\pi_b(n_s)$ with
 - $\pi_b(n_s+1) > \pi_b(n_s) \rightarrow$ positive inter-group externalities
 - For sellers: $\pi_s(n_b, n_s)$ with
 - $\pi_s(n_b+1, n_s) > \pi_s(n_b, n_s) \rightarrow$ positive inter-group externalities
 - $\pi_s(n_b, n_s+1) < \pi_s(n_b, n_s) \rightarrow$ negative intra-group externalities ('rivalry')

Launching a new for-profit platform (2)

▪ Model (cont'd)

- 3 potential timings for the intermediary
 - Attract buyers and sellers simultaneously
 - Intermediary sets membership fees M_b and M_s .
 - All agents decide simultaneously whether to switch or not.
 - Attract buyers first
 - Intermediary sets membership fee M_b .
 - Buyers decide whether to switch or not.
 - Intermediary sets membership fee M_s .
 - Sellers decide whether to switch or not.
 - Attract sellers first
 - Reverse order

Launching a new for-profit platform (3)

▪ Main results

- Benchmark: *no rivalry among sellers*
 - Always profitable to launch the new platform with appropriate **divide and conquer strategy** (subsidize low-value group and tax high-value group).
- *Rivalry among sellers*. What changes?
 - Willingness to pay of rival sellers \uparrow if only a few move
 - **Good news**: sellers' participation less dependent on buyers' participation
 - **Bad news**: buyers are less willing to participate if only a few sellers come
 - \rightarrow **Intra-group externalities may undermine all attempts to launch the new platform.**
 - If 'intermediate' rivalry, then no way to launch profitably whatever the strategy (i.e., simultaneous or sequential moves with either sellers or buyers moving first)
 - But, profitable launch if rivalry is weak or strong enough.

2. Intermediaries as match makers

- Previous setting: focus on **size** of groups
 - Agents in one group value the matching services all the more that the participation of the other group is large because a large pool is more likely to lead to a successful match.
 - Example: B2B marketplaces
 - \approx two-sided platforms (positive inter-group externalities)
- Here: focus on **composition** of groups
 - Users of matching services do not care so much about the number of matching prospects than about the *characteristics* of their trading partner.
 - Examples: job search, dating or real estate
 - Additional "**sorting**" **externality**: by joining an intermediary, an agent affects the welfare of agents in the other group by changing the composition, and hence the quality, of the pool of participants from its own group.

Intermediaries as match makers (2)

- **Intermediated v. nonintermediated trade**
 - There exists a decentralized market in which buyers and sellers interact freely in the absence of an intermediary.
 - Buyers and sellers are not charged for joining.
 - They are matched randomly.
 - **Claim:** a market maker can buy and sell the product at a price difference so that he makes a profit although consumers have the possibility to participate for free in the random matching market.

Intermediation v. Nonintermediation

- **Model**
 - Unit mass of heterogeneous buyers
 - 50% have high valuation v_H
 - 50% have low valuation v_L
 - Unit mass of heterogeneous sellers
 - 50% have high costs c_H
 - 50% have low costs c_L
 - If no trade → surplus normalized to zero
 - Assume: $v_H > c_H > v_L > c_L$
 - Positive gains from trade for all matches, *except* when a low value buyer meets a high cost seller.
 - Gains from trade are assumed to be evenly split.

Intermediation v. Nonintermediation (2)

Expected net surpluses

High valuation buyer:	$\frac{1}{2}(v_H - \frac{c_L + c_H}{2})$
Low valuation buyer:	$\frac{1}{4}(v_L - c_L)$
Low cost seller:	$\frac{1}{2}(\frac{v_H + v_L}{2} - c_L)$
High cost seller:	$\frac{1}{4}(v_H - c_H)$

- **First best:** all high valuation buyers interact exclusively with low cost sellers
 - Size of trade = 1/2; Welfare = $(v_H - c_L)/2$
- **Matching market is inefficient:** too much trade (3/4) and lower welfare:
 - $(v_H - c_L)/4 + (v_H - c_H)/4 + (v_L - c_L)/4 = (v_H - c_L)/2 - (c_H - v_L)/4$

Intermediation v. Nonintermediation (3)

- **Introducing an intermediary may improve the allocation and even implement the first best.**
 - Intermediary sets profit maximizing bid and ask prices, (w, p)
 - Prices must be such that
 - high value and low cost sellers prefer intermediated exchange
 - other buyers and sellers refrain from migrating to the intermediary.
 - Suppose prices satisfy these conditions.
 - High value buyers know that they encounter only high cost sellers in the matching market → indifference if: $(v_H - c_H)/2 = v_H - p$
 - Low cost sellers know that they encounter only low valuation buyers in the matching market → indifference if: $(v_L - c_L)/2 = w - c_L$
 - Hence: $p = (v_H + c_H)/2$ & $w = (v_L + c_L)/2$ → Profit = $(p - w)/2 > 0$
 - Other buyers and sellers don't join: $v_L - p < 0$ & $w - c_H < 0$ ■

Intermediation v. Nonintermediation (4)

Summary

- Equilibrium in which high value buyers and low cost sellers self-select into the intermediated market.
- The presence of a profit-maximizing dealer leads to endogenous sorting according to type.
- The intermediary makes positive profit since he offers high value buyers and low cost sellers a better deal than what the matching market provides.
- Intermediated trade also improves welfare by avoiding socially inefficient trade.

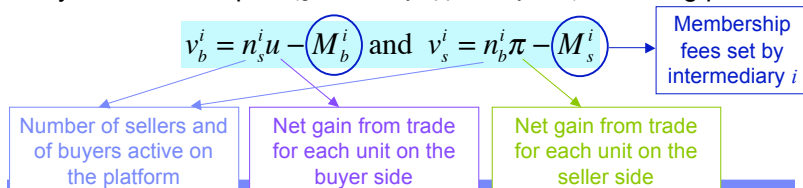
Note

- There is still room for profitable intermediation when the matching market in isolation operates efficiently (i.e., $v_L > c_H$)

3. Sellers' incentives to innovate

Model

- 2 horizontally differentiated platforms (located at the extreme points of $[0,1]$)
 - Either both operated by a for-profit intermediary
 - Or both open (free access)
- Mass 1 of buyers and mass 1 of sellers uniformly distributed on $[0,1]$.
- 3 scenarios
 - Buyers and sellers singlehome
 - Buyers multihome, sellers singlehome
 - Buyers singlehome, sellers multihome
- A buyer at platform i buys 1 unit from each seller on this platform.
- Buyer & seller surplus (gross of any opportunity cost) of visiting platform i :



Sellers' incentives to innovate (2)

- **Model (cont'd)**
 - Sellers can make an investment before joining platform(s)
 - Cost reduction
 - Quality enhancement
 - Demand expansion
 - Improved price discrimination
 - **Objective:** contrast sellers' incentive to innovate under intermediated (2 for-profit platforms) and non-intermediated trade (2 open platforms)
 - **Key argument:** incentives to invest depend on
 - *Structure of intermediation* (proprietary vs. open platforms)
 - *Homing* (can agents only use 1 platform or several?)
 - *Nature of investment* (how does investment affect seller and buyer surplus?)

Sellers' incentives to innovate (3)

- **Main result**
 - Sellers may have stronger incentives to innovate if competing platforms are for-profit and charge membership fees.
 - **Intuition:** due to for-profit intermediation, sellers partly internalize increases in consumer surplus.
 - Suppose both sides singlehome. If investment \uparrow buyers' surplus (u)
 - platforms charge lower fee to sellers
 - Why? If $u \uparrow$, each seller exert a stronger indirect externality on the buyers' side; intermediaries compete thus more fiercely to attract sellers.
 - sellers have extra incentive to innovate w.r.t. free platforms (where this price effect is absent)
 - (Naturally, the opposite prevails when investment \downarrow buyers' surplus.)
 - Condition for stronger incentives under intermediated trade is
 - More demanding if sellers multihome.
 - Less demanding if buyers multihome.

Sellers' incentives to innovate (4)

Application

- Micro foundation of buyer-seller relationship and of different types of investment.

	<i>cost reduc.</i>	<i>quality improv.</i>	<i>price disc.</i>	<i>demand expan.</i>
<i>sellers multihome buyers singlehome</i>	-	-	-	-
<i>both sides singlehome</i>	+	+	-	+/-*
<i>sellers singlehome buyers multihome</i>	+	+	+	+

* "+" if demand sufficiently convex ("-" otherwise)

References

- Belleflamme, P. and Toulemonde, E. (2009), [Negative intra-group externalities in two-sided markets](#), *International Economic Review* 50/1: 245-272.
- Belleflamme, P. and Peitz, M. (2009), [Platform competition and seller investment incentives](#), mimeo.
- Belleflamme, P. and Peitz, M. (2010), *Industrial Organization: Markets and Strategies*, Cambridge University Press: Cambridge (UK). Chapter 22. Markets with intermediated goods.

