Session 11: Why are Two-Sided Markets Special

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HBS

June 30th 2009

Agenda

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  - strategic interactions
  - strategic spin-offs

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  - aren't "open platforms" always better?

- Not *per se*!

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- Competition: n rivals $\Longrightarrow p^C(n) \geq c$, where $p^C(.)$ decreasing
  - More competition (i.e. higher n) increases social surplus ($W\left(p^C(n)\right)$ increasing in n)

Social efficiency in two-sided markets

- Two-sided demands: $n_1 = D_1(n_2, p_1)$ and $n_2 = D_2(n_1, p_2)$. Total social surplus:

$$W(p_1, p_2) = \int_{p_1}^{\infty} D_1(n_2, p)\, dp + \int_{p_2}^{\infty} D_2(n_1, p)\, dp + (p_1 - c_1)\, n_1 + (p_2 - c_2)\, n_2$$

  maximized for $\left(p_1^W, p_2^W\right)$ such that $p_1^W < c_1$ and $p_2^W < c_2$ (accounts for indirect network effects)

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- Competing platforms: $p_1^C \lesseqgtr c_1$ and $p_2^C \gtreqless c_2$

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- Quite possible that $W\left(p_1^M, p_2^M\right) > W\left(p_1^O, p_2^O\right)$ and $W\left(p_1^M, p_2^M\right) > W\left(p_1^C, p_2^C\right)$. Why?

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- Application: current "Net Neutrality" debate in the US:
  - Should ISPs be allowed to also charge content providers (not just users)? Should they be allowed to discriminate based on quality of service to content providers?

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  - If Microsoft and Sony lose money on console sales (which they do), both Microsoft and Sony *may* benefit from a decrease in Sony's costs!

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  - Stage 2: Firm B *observes* K_A and decides whether or not to enter market
  - Stage 3: If B has not entered, A chooses strategic variable x_A (e.g price or quantity) to maximize monopoly profits; if B has entered, A and B simultaneously choose x_A and x_B $\left(\left(x_A^*(K_A), x_B^*(K_B)\right)\right.$ Nash equilibrium)

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    - example: prices are strategic complements; quantities are strategic substitutes
- K^A makes firm A "tough" ("soft") if $\frac{d\Pi^B}{dK_A} < 0$ (> 0)

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- "Puppy Dog": stay small in order to look soft (inoffensive)
- "Fat Cat": be big in order to look soft (inoffensive)

Strategic Configurations For One-Sided Markets

		Investment K_A is:	
		Tough	Soft
Actions are:	Strategic complements	**A**: *Puppy Dog* **D**: *Top Dog*	**A**: *Fat Cat* **D**: *Lean and Hungry*
	Strategic substitutes	**A**: *Top Dog* **D**: *Top Dog*	**A**: *Lean and Hungry* **D**: *Lean and Hungry*

Application

- If "actions" are prices (i.e. *strategic complements*) and K_A is an investment reducing A's marginal cost c_A, then K_A *is always tough:*

$$\frac{d\Pi^B}{dK_A} = \frac{d}{dK_A}\left((p_B - c_B)\, n_B\right) = \underbrace{(p_B^* - c_B)}_{>0} \underbrace{\frac{\partial n_B}{\partial p_A}}_{>0} \underbrace{\frac{dp_A^*}{dc_A}}_{>0} \underbrace{\frac{dc_A}{dK_A}}_{<0} < 0$$

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- $\frac{dp_A^*}{dc_A} > 0$ because of FOC: $\left(p_A^* - c_A\right)\frac{\partial n_A}{\partial p_A} + n_A\left(p_A^*, p_B^*\right) = 0$

Animal Strategies in Two-Sided Markets

- A and B now competing in a two-sided market:

$$\Pi^A = \left(p_1^A - c_1^A\right) n_1^A + \left(p_2^A - c_2^A\right) n_2^A$$

$$\Pi^B = \left(p_1^B - c_1^B\right) n_1^B + \left(p_2^B - c_2^B\right) n_2^B$$

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- Actions p_i^A, p_i^B are prices and *strategic complements* across platforms: $\frac{\partial p_i^B}{\partial p_j^A} > 0$.

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- Actions p_i^A, p_i^B are prices and *strategic complements* across platforms: $\frac{\partial p_i^B}{\partial p_j^A} > 0$.

- Focus on investment K_A reducing marginal cost on side 1 for platform A: $\frac{dc_1^A}{dK_A} < 0$

- Assume A and B are symmetric:

$$\frac{\partial \Pi^A}{\partial p_i^B}\left(p_1^{A*}, p_2^{A*}, p_1^{B*}, p_2^{B*}\right) = \frac{\partial \Pi^B}{\partial p_i^A}\left(p_1^{A*}, p_2^{A*}, p_1^{B*}, p_2^{B*}\right)$$

for $i = 1, 2$.

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  for $i = 1, 2$.

- Also assume two-sided concavity and $\frac{dp_i^{A*}}{dc_j^A}, \frac{dp_i^{B*}}{dc_j^B} > 0$ for all $i, j \in \{1, 2\}$

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- Again, focus is on *strategic effects only*: K^A only impacts profits through influence on $\left\{p_1^{A*}, p_2^{A*}, p_1^{B*}, p_2^{B*}\right\}$

- Strategic effect of K^A on B:

$$sign\left\{\frac{d\Pi^B}{dK^A}\right\} = sign\left\{\frac{\partial\Pi^B}{\partial p_1^A}\frac{dp_1^{A*}}{dK_A} + \frac{\partial\Pi^B}{\partial p_2^A}\frac{dp_2^{A*}}{dK_A}\right\}$$

$$= sign\left\{\begin{array}{c} \underbrace{\left[\left(p_1^B - c_1^B\right)\frac{\partial n_1^B}{\partial p_1^A} + \left(p_2^B - c_2^B\right)\frac{\partial n_2^B}{\partial p_1^A}\right]}_{<>0}\underbrace{\frac{dp_1^{A*}}{dK_A}}_{<0} \\ + \underbrace{\left[\left(p_1^B - c_1^B\right)\frac{\partial n_1^B}{\partial p_2^A} + \left(p_2^B - c_2^B\right)\frac{\partial n_2^B}{\partial p_2^A}\right]}_{<>0}\underbrace{\frac{dp_2^{A*}}{dK_A}}_{<0} \end{array}\right\}$$

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$$sign\left\{\frac{d\Pi^B}{dK^A}\right\} = sign\left\{\frac{\partial \Pi^B}{\partial p_1^A}\frac{dp_1^{A*}}{dK_A} + \frac{\partial \Pi^B}{\partial p_2^A}\frac{dp_2^{A*}}{dK_A}\right\}$$

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- Recall B's profits are: $\Pi^B = \left(p_1^B - c_1^B\right) n_1^B + \left(p_2^B - c_2^B\right) n_2^B$

- Note that $\left(p_1^B - c_1^B\right) \frac{\partial n_1^B}{\partial p_i^A} + \left(p_2^B - c_2^B\right) \frac{\partial n_2^B}{\partial p_i^A}$ can be negative for $i = 1$ and/or 2, while B's profits are positive, i.e.:

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- By the same token, cost reduction by A may decrease A's profits
- Different than strategic interactions in adjacent one-sided markets (cf. BGK 1986)

- Necessary condition for "softness" with subsidization on side 2 $(p_2^{B*} - c_2^B < 0)$:

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- Intuition: two-sidedness makes cost-differentiation work like vertical differentiation

Strategic Configurations For Two-Sided Markets

- Set of strategic configurations strictly larger in two-sided context:

Prices are strategic complements Entry accommodation regime		Effect of K_A on platform B:	
		Tough	Soft
Effect of K_A on platform A:	Self-serving	*Top Dog*	*Fat Cat*
	Self-harming	*Puppy Dog*	*Lean and Hungry*

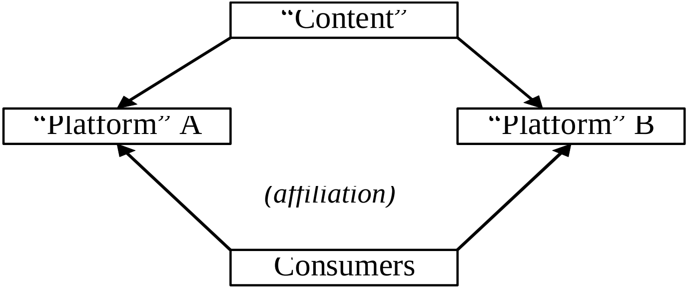
Strategic Configurations For One-Sided Markets

		Investment K_A is:	
		Tough	Soft
Actions are:	Strategic complements	**A**: *Puppy Dog* **D**: *Top Dog*	**A**: *Fat Cat* **D**: *Lean and Hungry*
	Strategic substitutes	**A**: *Top Dog* **D**: *Top Dog*	**A**: *Lean and Hungry* **D**: *Lean and Hungry*

- Do you believe this story?

Strategic spinoffs (Hagiu and Lee 2008)

- Context:



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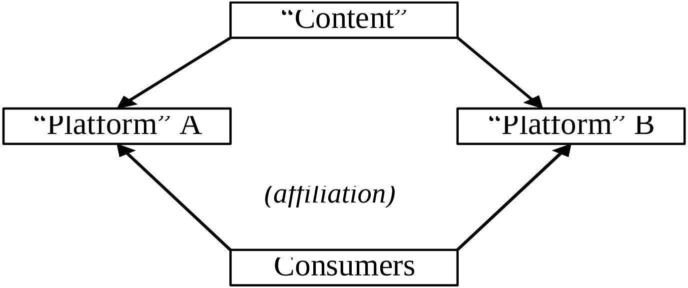

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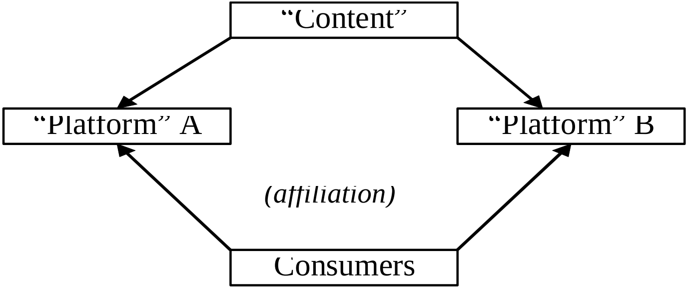

- Examples: videogames, media (movies, music) Internet portals, TV channels, DVD standards, etc.
- Timing: I) platforms compete for content (exclusive or multihomes); II) platforms compete for consumers

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- Examples:
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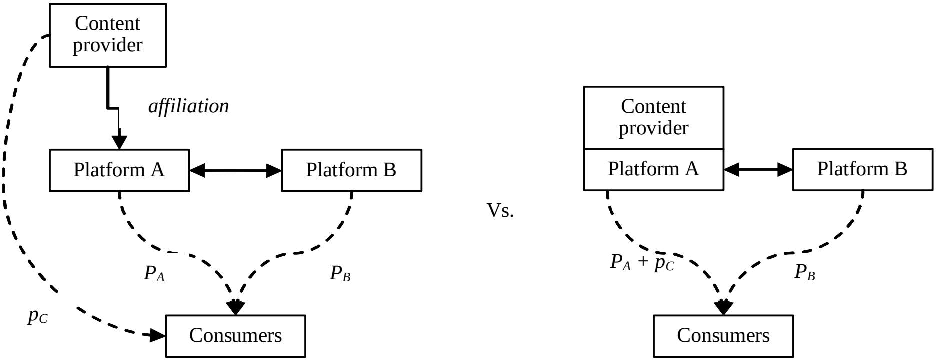
Platform/Distributor	*Content Provider*	*Exclusivity*
Syrius, XM	Howard Stern	Yes
TNT	NBA	Yes
ABC, CBS, NBC, ESPN	NFL	No
Blurray, HD-DVD	Paramount, Warner Bros	No
	Sony, Disney, MGM	Yes
Xbox, PlayStation	Electronic Arts, Square Enyx	No
iTunes, Real Rhapsody	BMG, Columbia, EMI	No

Question 2: Does a platform owning exclusive content ever want to spin it off? (maintains exclusivity but gives up control AND associated revenues)?



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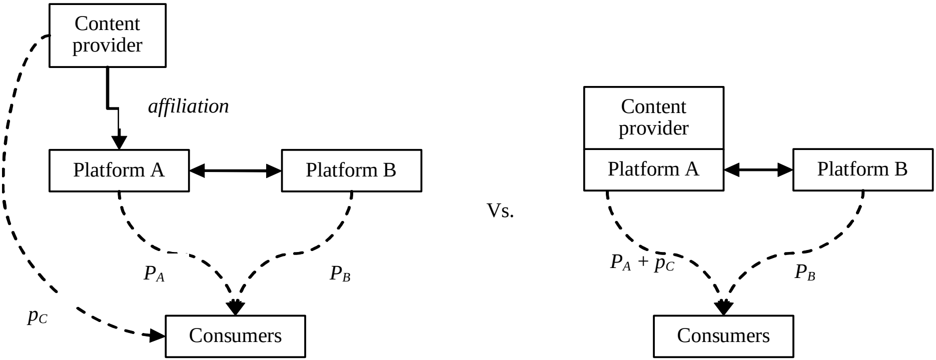

- Example: would Nintendo want to spin off one of its internal game development studios?
- Key point: need strategic pricing interaction between platforms and spin-off company

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- P_A and P_B are *strategic complements;* P_A and p_C are *strategic substitutes*; P_B and p_C are...?

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- Do you believe this story? Would Nintendo spin off its internal game development unit to relax platform competition against Sony?

Conclusions: what makes two-sided markets different?

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- Presence of indirect network effects: social efficiency does not just depend on pricing, but also on internalization of network effects
- Possibility of subsidization of at least one side (rational, not anti-competitive)
- Space of strategic interactions larger -> counterintuitive scenarios
- Counterintuitive business strategies (e.g. spinoffs in order to reduce competitive intensity at platform level)

Thank you for your attention.