

The Economics of Two-Sided Platform Markets

Competitive Strategies Within and Between Platform Markets

Lecture 2

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But first, some *very* simple economics...

Imagine your firm sells coffee (1)

You would be looking to maximize

$$Y_{1q} = P_{1q} - C_{1q}$$

The **profit** you make from product 1 at **output level** q is a function of the **price** you can charge minus the **total costs** at that output level.

By taking into account

$$\eta_1 = -\frac{\left(\frac{\Delta Q_1}{Q_1}\right)}{\left(\frac{\Delta P_1}{P_1}\right)} \quad \text{and} \quad TC_{1q} = FC_{1q} + VC_{1q}$$

η_1 is consumers' **price elasticity** measured as the relative change in demand $\frac{\Delta Q_1}{Q_1}$ for a certain change in price $\frac{\Delta P_1}{P_1}$

TC_{1q} is your firm's **total costs** broken out by fixed costs FC_{1q} and variable costs VC_{1q}

Now, imagine you also sell coffee syrup (2)

You would be looking to maximize

$$Y_{1q} = P_{1q} - C_{1q} + Y_{2q} = P_{2q} - C_{2q}$$

The **total profit** you make is the combined profits from products 1 and 2, each at their own optimal levels of production/output (q_1 and q_2).

However, what if products 1 and 2 are complements?

$$\eta_{1,2} = \frac{\left(\frac{\Delta Q_1}{Q_1}\right)}{\left(\frac{\Delta P_2}{P_2}\right)}$$

If $\eta_{1,2} < 0$ two products are **complements** to each other

If $\eta_{1,2} > 0$ two products are **substitutes** to each other

If $\eta_{1,2} = 0$ two products are **unrelated** to each other

$\eta_{1,2}$ measures the **cross-price elasticity of demand** for product 1 as it relates to product 2.

In this case we expect $\eta_{1,2} < 0$ as some, but not all, consumers will use both products in conjunction.

What if the cross-elasticities for products 1 and 2 are uneven?

Consumers (barring those with a real sweet tooth) will only consume coffee syrup if they also consume coffee whereas consuming coffee syrup is not a prerequisite for consuming coffee (at least for most), such that: $\eta_{1,2} \neq \eta_{2,1}$

Consequently, consumers of coffee syrup have a higher cross-price elasticity for coffee than consumers of coffee for coffee syrup, such that: $\eta_{1,2} < \eta_{2,1}$

In sum, your firm cannot simply set prices P_{1q} and P_{2q} independently.

In order to maximize profits you need a price structure that takes into account consumers' price elasticity (η_1, η_2) for both products, as well as their individual cross-price elasticities ($\eta_{1,2}, \eta_{2,1}$) for the other product you sell!!!



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The economics behind multi-sided platforms are complex. Multiple customer groups and cross-side network externalities call for multifaceted price structures that vary across time and space. [#BMME086](#)
[#platformcompetition](#)

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In 2014, Professor **Jean Tirole** won the Nobel Prize in Economics, in part for his work on **two-sided markets** (co-authored with Jean-Charles Rochet).

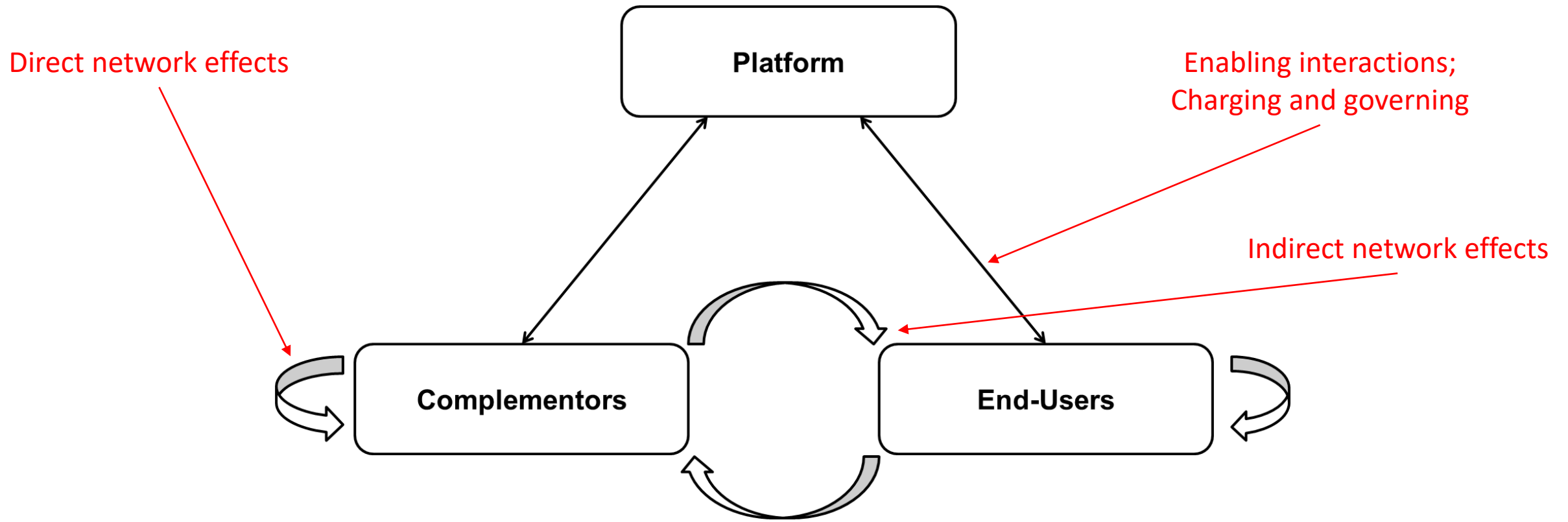


Two-sided platform markets



What are two-sided platform markets?

- Markets in which one or several platforms enable interactions between two or multiple user groups (e.g., ads and readers) and try to get them “on board” by **appropriately charging** and **governing** users on each side of the platform (Rochet & Tirole, 2006)
 - Presence of network externalities: The effect that one user of a good or service has on the value of that product to other users (Katz & Shapiro, 1985)
 - The volume of interactions between user groups depends on the *price structure* of the fees charged by the platform (Rochet & Tirole, 2003)
- Two-sided markets create value by reducing search costs or by reducing transaction costs (or do both) on each side (Hagiu, 2014)



Platform	Complementor	End-user
Magazine publisher	Advertisers	Consumers
VCR producer	Content producers	Consumers
PDA producer	Application developers	Consumers
Console manufacturer	Game publishers	Consumers

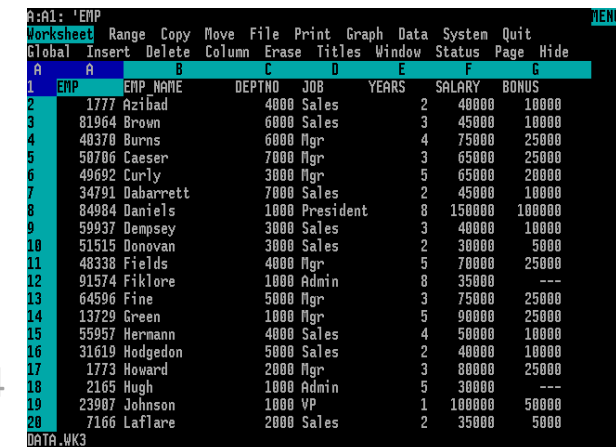
Network externalities explained

- *Direct, or same-side, network externalities*: Increasing the number of users on one side of the network, makes it either more or less valuable users on the same side (Parker & Van Alstyne, 2005)
 - Mostly **positive for end-users**: compatibility, dominance, sharing
 - Mostly **negative for complementors**: competitive crowding
- *Indirect, or cross-side, network externalities*: Increasing the number of users on one side of the network, makes it either more or less value to users on the other side (Parker & Van Alstyne, 2005)
 - Mostly **positive for complementors**: potential consumer base
 - **Positive**, but can be **negative for end-users**: clutter, noise, devaluation

Case in point: Network FX in spreadsheet software

- In the 1980s and 1990s there was still fierce competition between developers of spreadsheet application packages (e.g., Excel, Lotus)
- Network externalities, as measured by installed base, significantly increased the price of spreadsheet products:
 - **1% increase in installed base correlated with a 0.75% increase in price**
 - Products that adhered to the dominant standard, Lotus interface at that time, commanded 46% higher prices than non-dominant standards
- Added value resides in dominance and compatibility
 - Explains dominance of MS Excel/Office nowadays

Brynjolfsson & Kemerer, 1996; Gandal, 1994



The image shows a screenshot of a Lotus 1-2-3 spreadsheet. The menu bar at the top includes options like Worksheet, Range, Copy, Move, File, Print, Graph, Data, System, and Quit. Below the menu bar, there are tabs for Global, Insert, Delete, Column, Erase, Titles, Window, Status, Page, and Hide. The spreadsheet itself has columns labeled A through G. The data is organized into rows, with the first row (row 1) containing headers: EMP, EMP NAME, DEPTNO, JOB, YEARS, SALARY, and BONUS. The subsequent rows (rows 2 through 20) contain employee data. The spreadsheet is titled 'DATA.WK3' in the bottom left corner.

EMP	EMP NAME	DEPTNO	JOB	YEARS	SALARY	BONUS
1777	Azibad	4000	Sales	2	40000	10000
81964	Brown	6000	Sales	3	45000	10000
40370	Burns	6000	Mgr	4	75000	25000
50706	Caeser	7000	Mgr	3	65000	25000
49692	Curly	3000	Mgr	5	65000	20000
34791	Dabarrett	7000	Sales	2	45000	10000
84984	Daniels	1000	President	8	150000	100000
50937	Dempsey	3000	Sales	3	40000	10000
51515	Donovan	3000	Sales	2	30000	5000
48338	Fields	4000	Mgr	5	70000	25000
91574	Fiklore	1000	Admin	8	35000	---
64596	Fine	5000	Mgr	3	75000	25000
13729	Green	1000	Mgr	5	90000	25000
55957	Hermann	4000	Sales	4	50000	10000
31619	Hodgedon	5000	Sales	2	40000	10000
1773	Howard	2000	Mgr	3	80000	25000
2165	Hugh	1000	Admin	5	30000	---
23007	Johnson	1000	VP	1	100000	50000
7166	Laflore	2000	Sales	2	35000	5000

Price structures in two-sided markets

- The volume of interactions between user groups depends on the *price structure* of the fees charged by the platform (Rochet & Tirole, 2003)
- One user group's price affects the other group's willingness to pay
 - “Subsidy side”: Prices below the level of what would have been charged in an independent, or single-sided, market
 - “Money side”: Prices above the level of what would have been charged in an independent, or single-sided, market
- Why? To generate cross-side network externalities
 - Oftentimes one side has a higher cross-side elasticity than the other
 - If the platform can attract enough subsidy-side users, money-side users will pay handsomely to reach them (Parker & Van Alstyne, 2005)

Case in point: German magazines

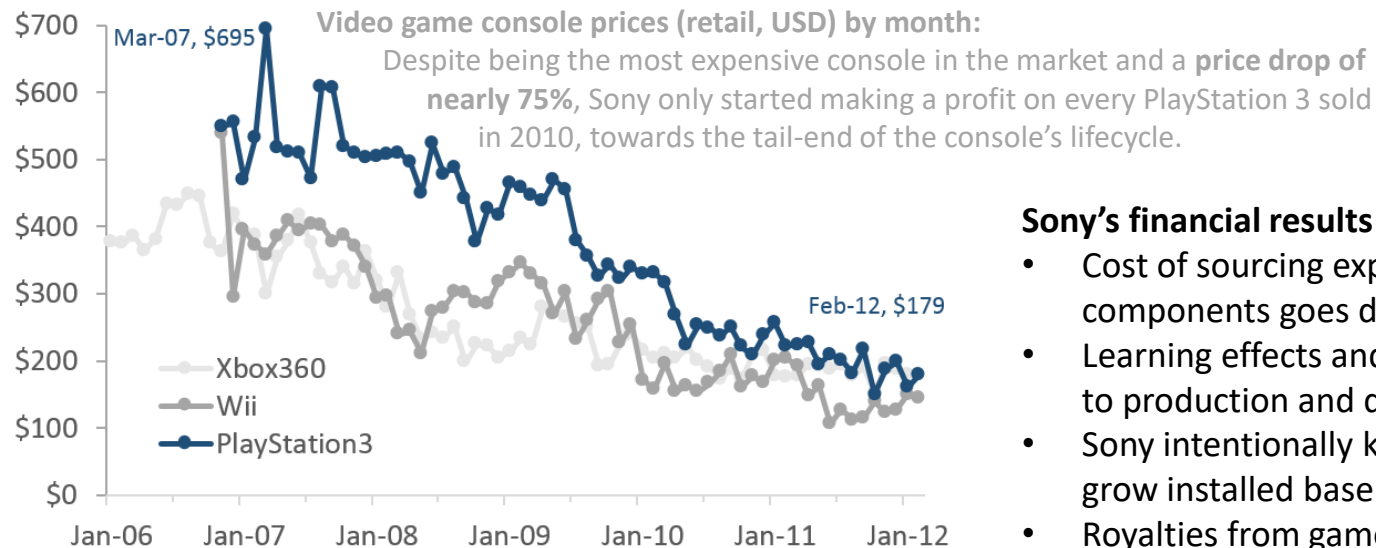
- Publishers incur a loss an annual loss of €2m the reader side
 - Mean cover price for magazines = €2.85
 - Actual printing and paper costs $\approx$ €4.00
- However, ads bring in €7m in profits each year
 - On average, 25% of all pages are advertisements
 - Mean price for advertisements = €10,512
- Evidence of uneven cross-side elasticities
 - Readers are willing to pay €10,671 extra for 1% increase in content
 - Readers are willing to pay €19,286 extra for 1% increase in ads
 - Advertisers are willing to pay €51,380 extra for 1% increase in readers
- Without ads, cover prices would increase to €9,50!



Kaiser & Wright, 2003

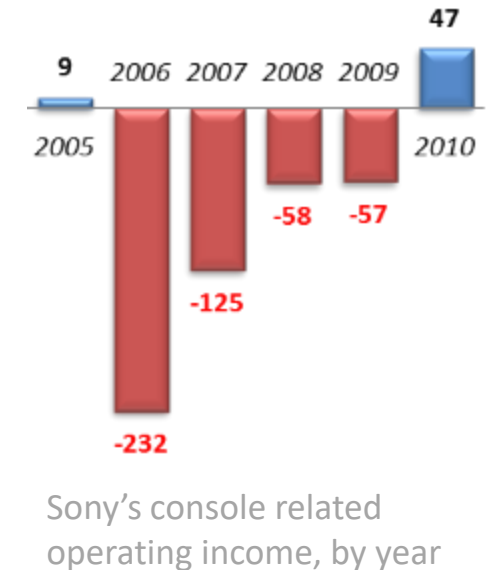
Case in point: Video game consoles

In a 2010 interview, Shuhei Yoshida, president of Sony's Worldwide Studios, said the company is finally making money on every PS3 sold: *"This year is the first time that we are able to cover the cost of the PlayStation 3. We aren't making huge money from hardware, but we aren't bleeding like we used to."*



Sony's financial results explained:

- Cost of sourcing expensive technology components goes down
- Learning effects and scale advantages to production and distribution kick in
- Sony intentionally keeps price low to grow installed base
- Royalties from game devs drive profits



Which side should you subsidize?

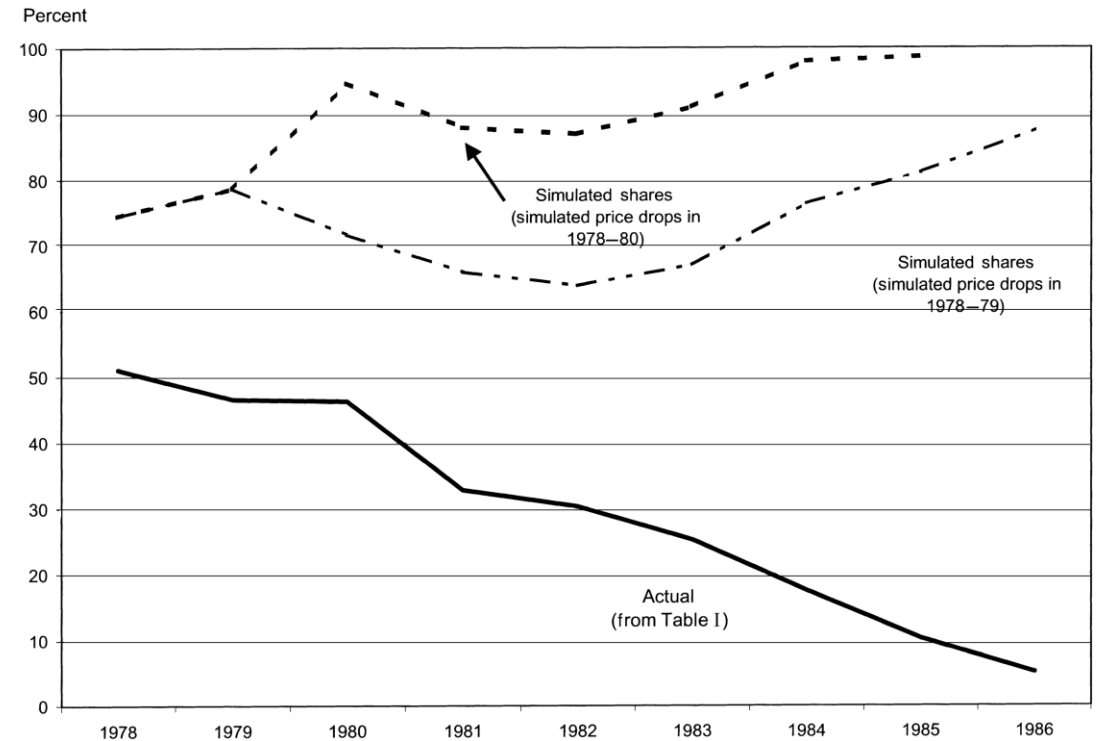
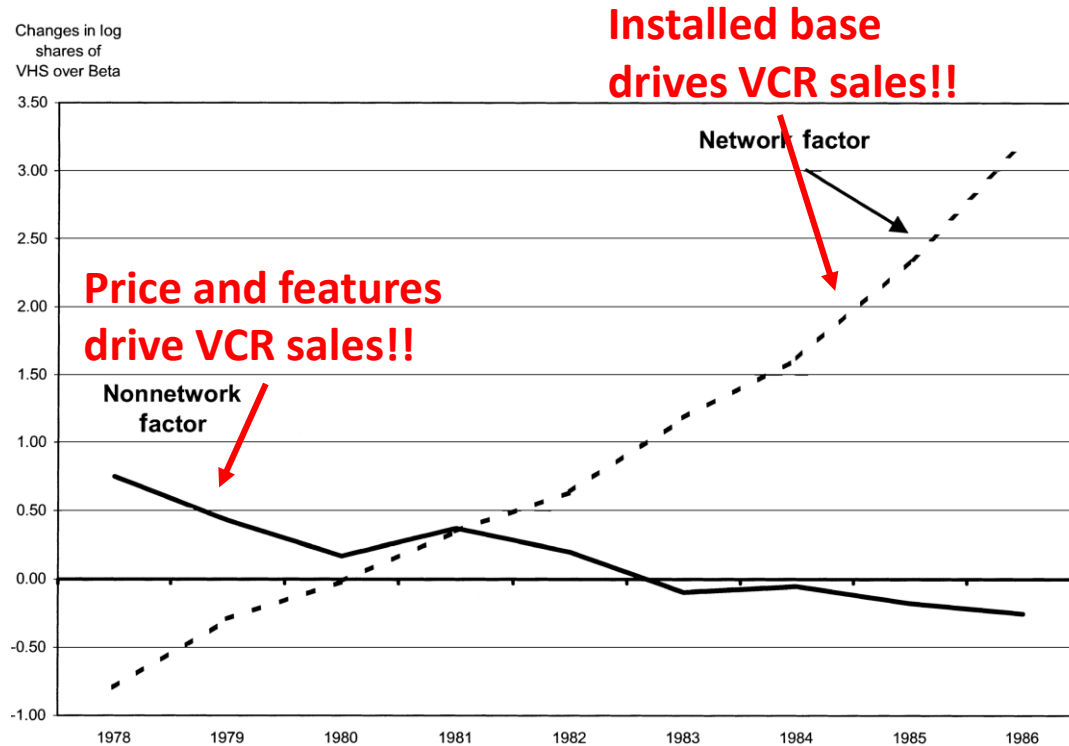
- Subsidize the side with the **lowest likelihood of multi-homing** (i.e. supporting multiple platforms) (Rochet & Tirole, 2003)
- Subsidize the side with the **strongest price elasticity or the lowest cross-elasticity** (Rochet & Tirole, 2003)
- Subsidize the side with the **highest sensitivity to quality** (entry barriers + larger base for amortization) (Eisenmann *et al.*, 2006)
- Subsidize the side with the **lowest marginal membership costs**
- Subsidize the side with the **lowest negative same-side network effects** (i.e. competitive crowding) (Boudreau, 2012)

How to solve the “chicken-and-egg problem”

- Platforms are faced with a “chicken-and-egg problem”: Neither side will join without the other side joining first (Caillaud & Jullien; 2003)
- How to solve this problem:
 - Heavily subsidize platform users early in the platform lifecycle
 - Waive membership fees and/or discount usage fees
 - Subsidize complementors’ production fees
 - Engage in platform-complement production
 - Envelop existing platform (Eisenmann, Parker & Van Alstyne, 2011)
- Since the value of a platform is largely determined by user base, it can be a good strategy to endure losses for sustained period of time

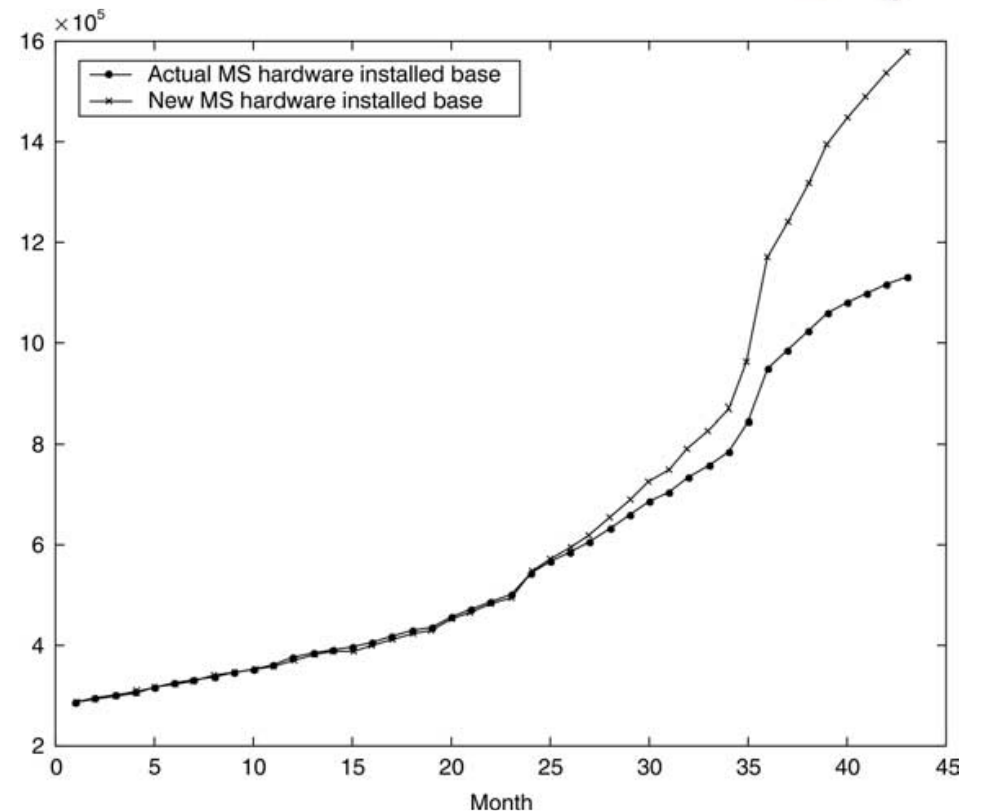
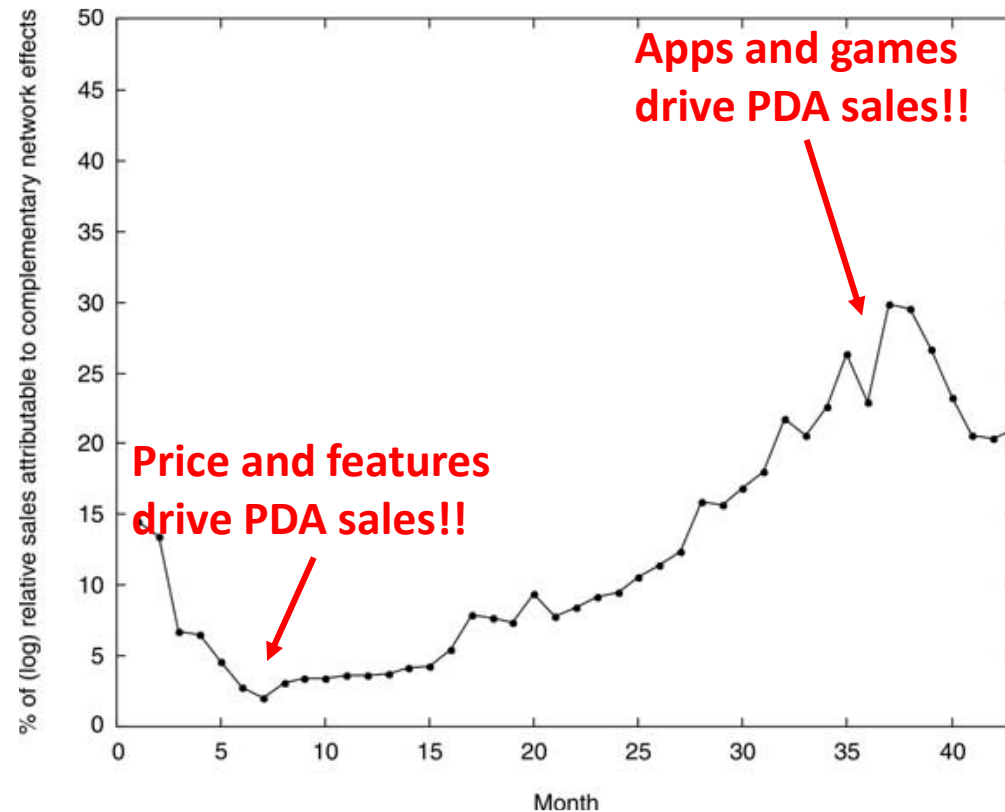


Case in point: Video cassette recorders



- The number of consumers owning a VCR becomes a more salient factor for buying a VCR format over time, early on price and product features matter more (Ohashi, 2003; 474);
- If Sony had discounted Betamax' launch price by \$147 in 1979, it would have had a 98% market share in 1985 instead of the actual 10% market share (Ohashi, 2003; 480).

Case in point: Applications for PDAs



- The network effect of compatible applications becomes a more salient factor for consumers buying a PDA format over time, early on price and features matter more (Nair *et al.*, 2004);
- If there were no compatible software applications for Palm OS, Microsoft OS compatible PDA sales would have increased by 38% (Nair *et al.*, 2004).

Competition in two-sided markets

- What happens when a disruptive competitor enters a two-sided market and tries to “steal” one side of the market?



Following Craigslist entry in different US states from 1997 to 2007:

- *Local newspapers decreased their classified ad prices*
- *Local newspapers increased their subscription prices*
- *Circulation decreased and newspapers changed their positioning*
 - *Diversification to increase appeal to readers and enhance advertisers' cross-side network externality*
- In two-sided markets prices can increase in the face of competition(!!)



When do “winner-take-all” dynamics arise?

- Markets are likely to be served by a dominant platform when:
 - Multi-homing costs are high for at least one side of the platform
 - Same-side externalities are positive and strong, at least for the side of the platform with high multi-homing costs
 - Neither side of the platform have a strong preference for special features

Case	MH costs for cons.	MH costs for compl.	SSNFX for users	SSNF for compl.	Demand heterogeneity	WTA?
Magazines	Low	Low	No	Positive	Consumers (++)	-
VCRs	High	High	Positive	Negative	Both sides (++)	+++
Consoles	High	High	Positive	Negative	Both sides (++)	++
Mobile OS	High	Low	Positive	Negative	Both sides (+)	+



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Thank you!



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