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Science and Technology

TTM4165 ICT, organizations and markets

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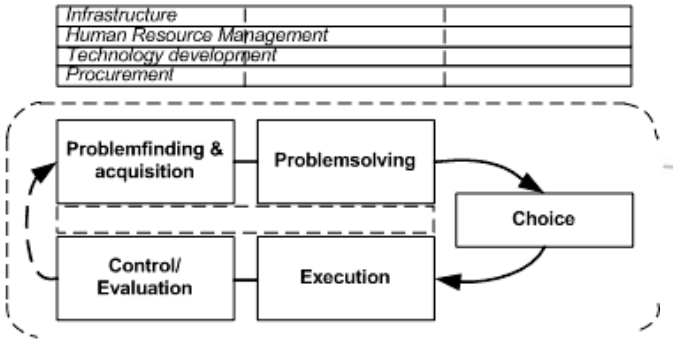
Overview

- Network effects
- Positive feedback
- Free business models
- Social network services

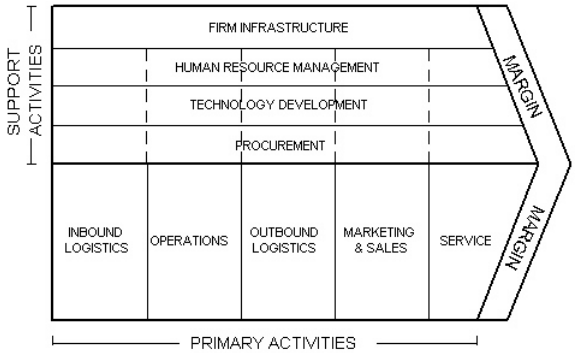
Network effects

Previous lecture

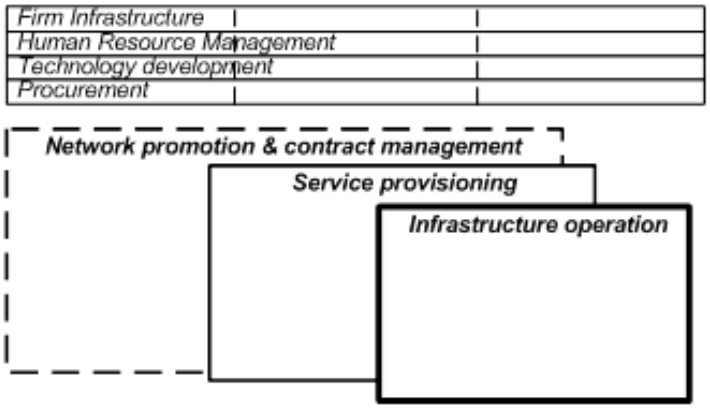
- Value configurations
  - Value chains
  - Value shops
  - **Value networks**



The Value Shop Diagram



The Generic Value Chain
Kilde: Porter: Competitive Advantage. 1998.



The Value Network Diagram

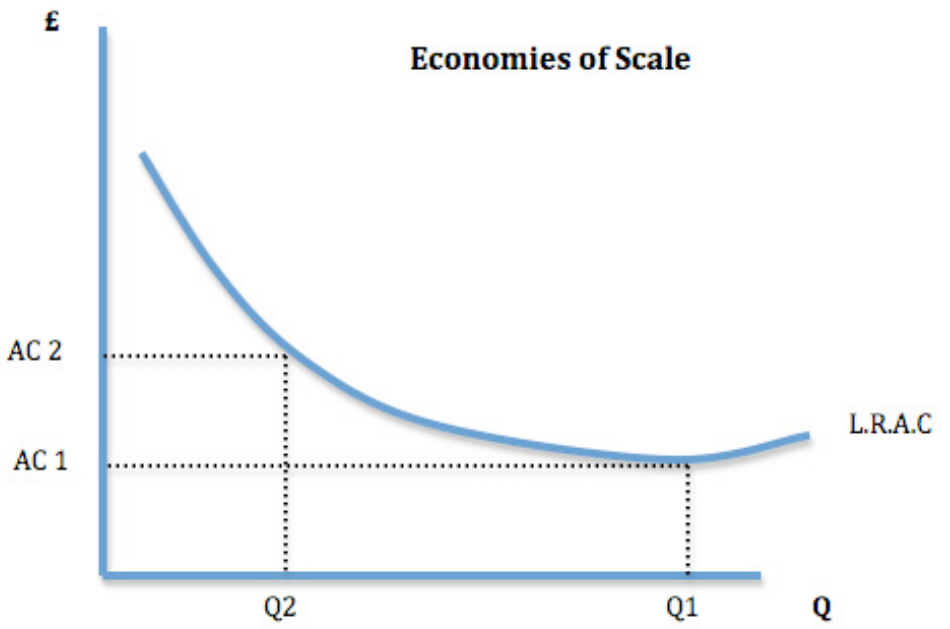
Basic terminology

- Externalities: Cost / benefit not transmitted through a market.
  - Negative and positive
  - Ex. Pollution, Internet, Fax machines, Fire-works
- Economics of scale: Cost / value advantages due to expansion
  - Also diseconomics of scale
  - Supply-side and demand-side economics of scale
- Network effects: demand-side economics of scale

Supply-side economics of scale

- Cheaper to produce goods as production increases
  - LRAC* decreases
  - Often until a certain point (optimal production)
  - After the optimal point LRAC increases

$$AC = \frac{F}{Q} + MC$$



LRAC = Long Run Average Cost
AC = Average Cost
F = Fixed Cost
Q = Units produced
MC = Marginal Cost

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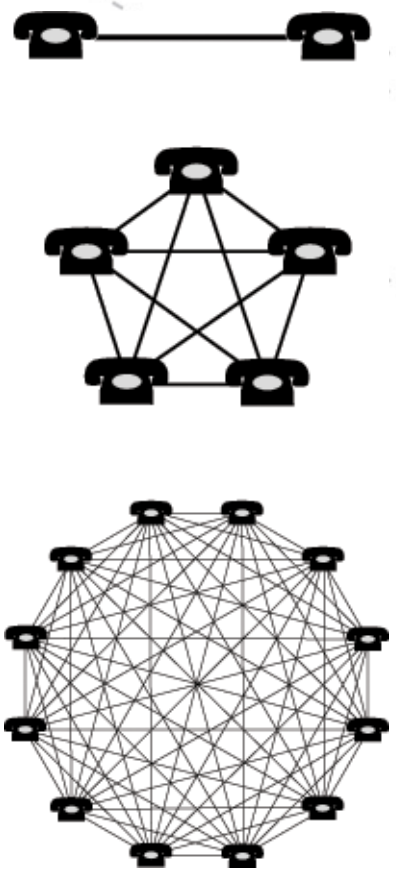
Demand-side economics of scale

- Widespread in the digital economy
- Increased value for users as number of products sold / use increases
  - Also called **network effects**
  - Value is an abstract concept in this context
- The value of a network (n users):
  - Sarnoffs law: $v(n) = n$
  - Odlyzko-Tilly: $v(n) = n \log n$
  - Metcalfe´s law: $v(n) = n(n-1)/2 = O(n^2)$
  - Reeds law: $v(n) = 2^n$



What is value?

- A measure of value can be
  - # Calls @ telephone network
  - # Friends @ Facebook
  - # Postings @ Facebook
  - # Messages @ Twitter
  - # Views @ Youtube
- Are these dependent on the number of users?
  - Yes → Network effects
  - No → No network effects

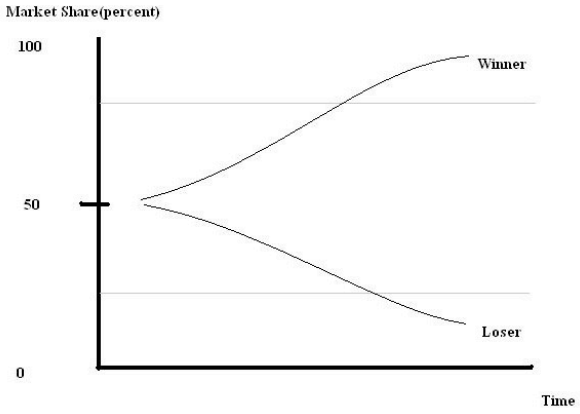
Exercise

- What is the value people place on actual services as a function of users?
- Can the network laws accurately describe the “real world”?

General
$v(n) = n^{\gamma}$

Sarnoffs law: v(n) = n
Odlyzko-Tilly: v(n) = n log n
Metcalfe´s law: $v(n) = n(n-1)/2 = O(n^2)$
Reeds law: $v(n) = 2^n$

Positive feedback



What is so special in the digital economy?

Digital economy

- MC = 0
- Strong Network effects

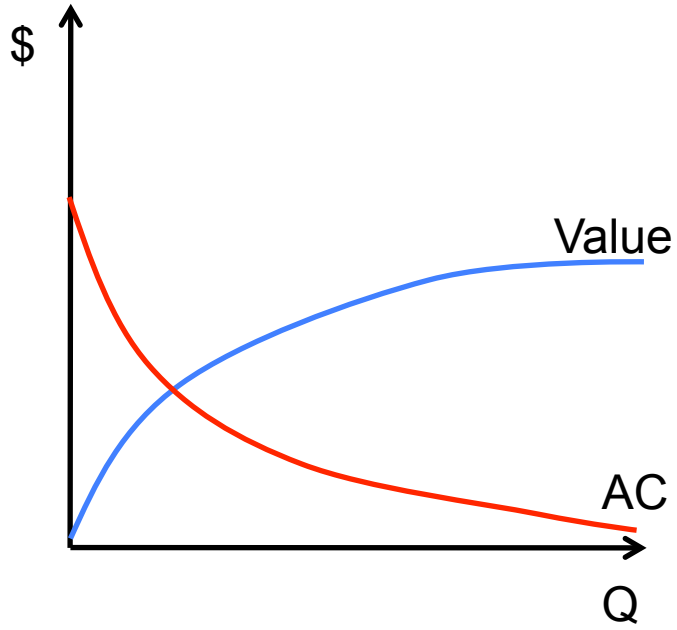
$$AC = \frac{F}{Q} + MC = \frac{F}{Q}$$

Industrial economy

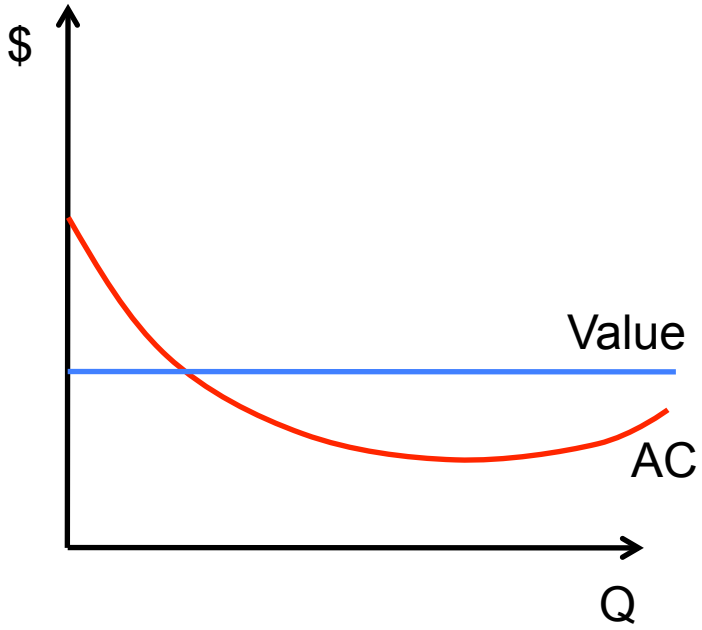
- MC > 0
- dF/dQ > 0
- Small network effects

What is so special in the digital economy?

Digital economy



Industrial economy



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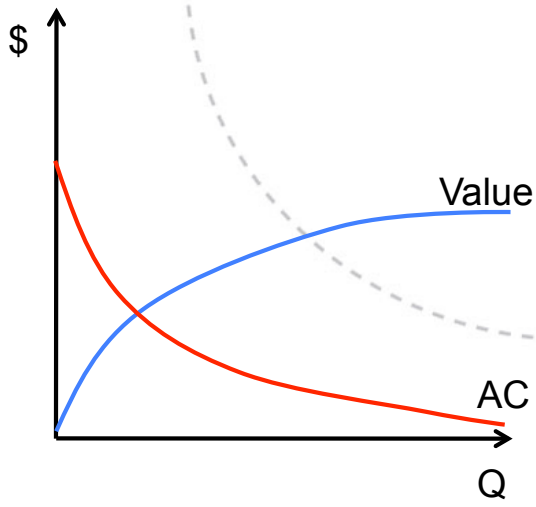
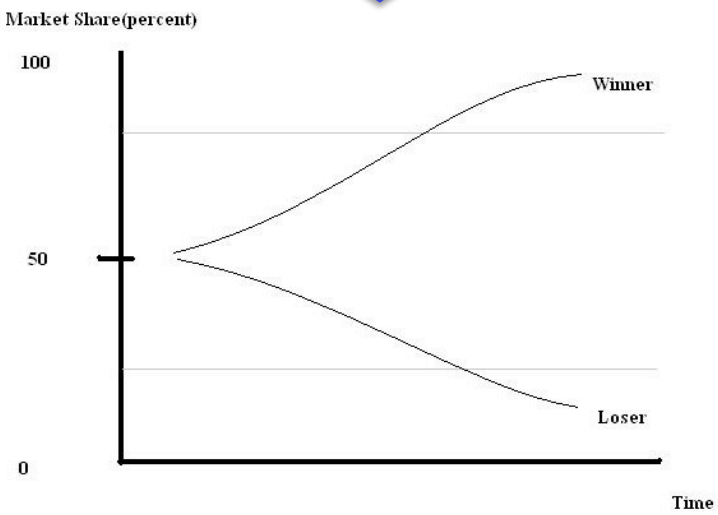
Feedback

- Changes in system state from equilibrium will promote an increase/decrease in system state
- Positive feedback: System state will be forced further away from equilibrium
  - Digital economy
- Negative feedback: System state will return to system state
  - Industrial economy

Positive feedback

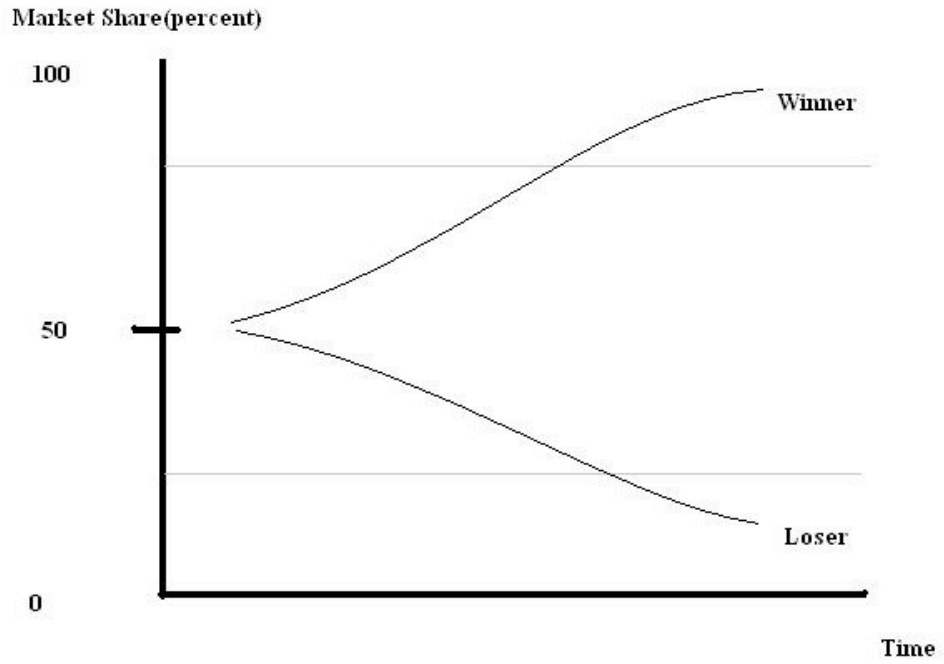
- Magnifies the effect of small economic shifts
- Shared markets may be dominated by a single firm
- **Enabled by**
  - **demand-side economics of scale**
  - **supply-side economics of scale**



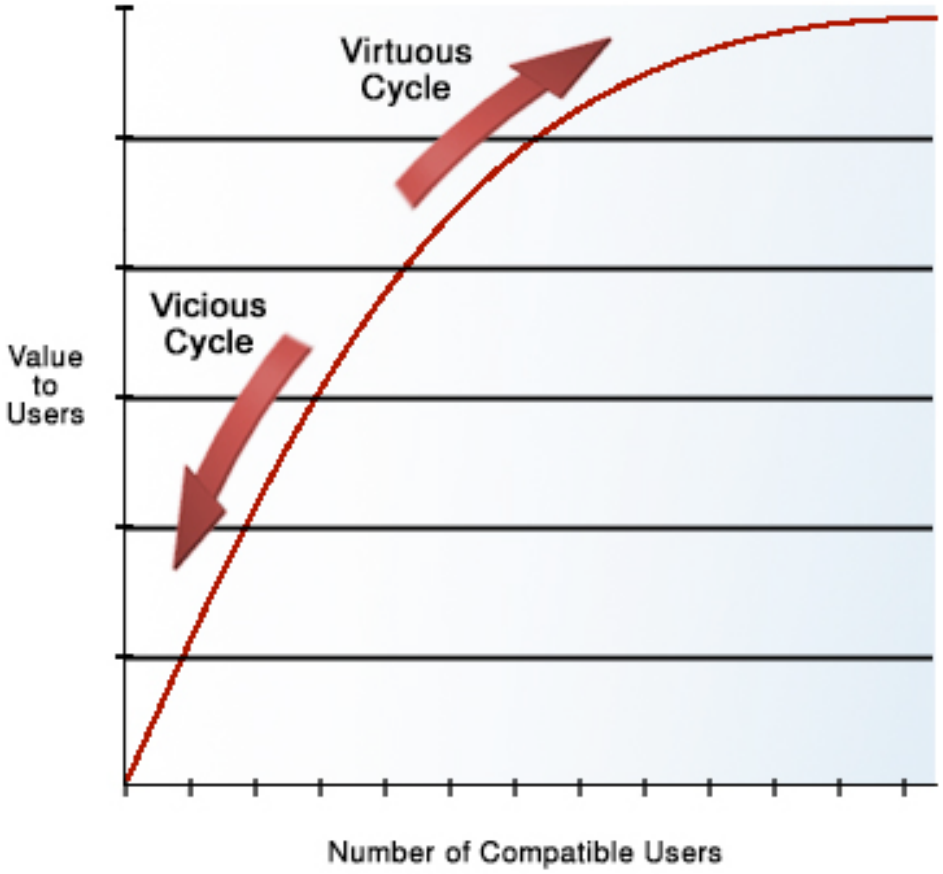


Positive feedback

- Positive feedback for adoption of new technologies
  - VHS vs Betamax
  - AC vs DC power supply
- Positive feedback for competition in markets
  - Mobile telephony subscription (benefits calling users within same network)
  - Word processors
  - Online music streaming services



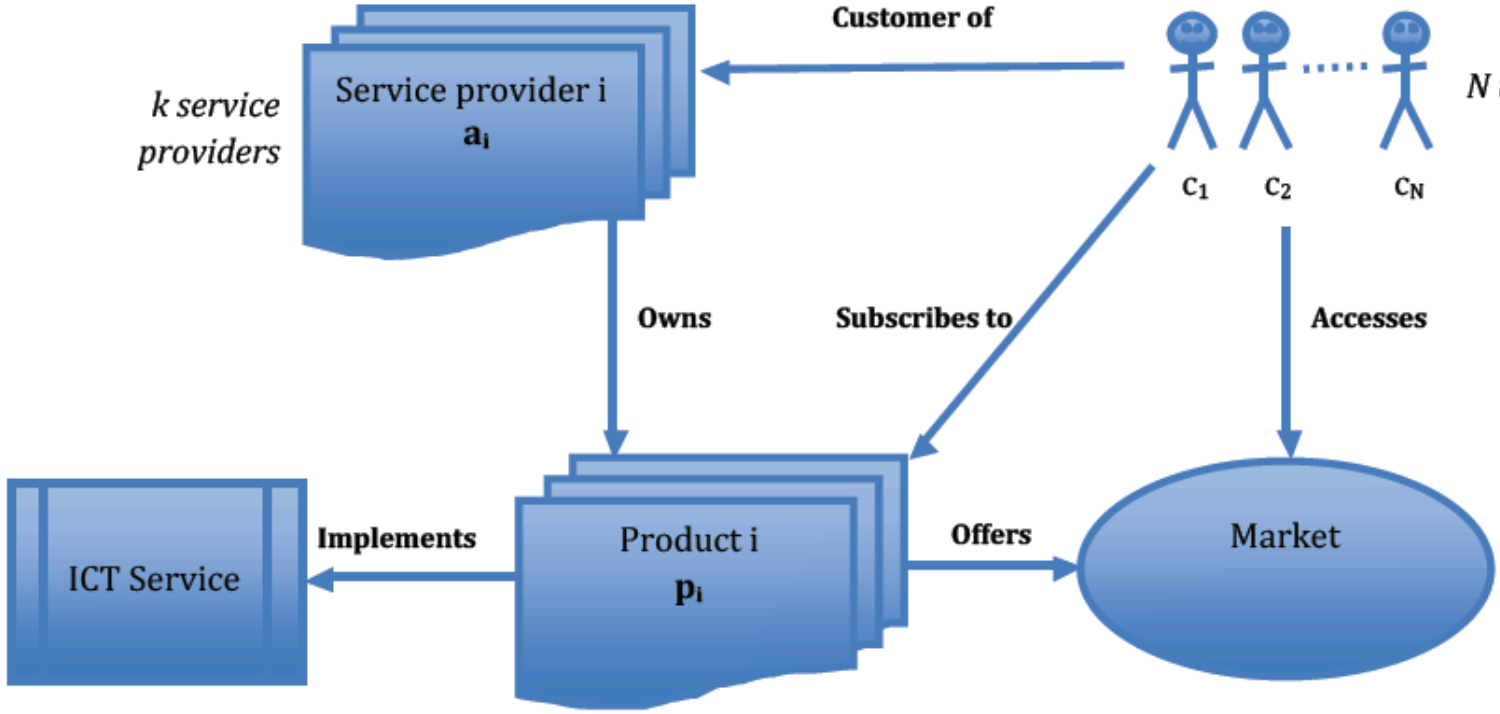
Virtuous and vicious cycle



Not always positive feedback

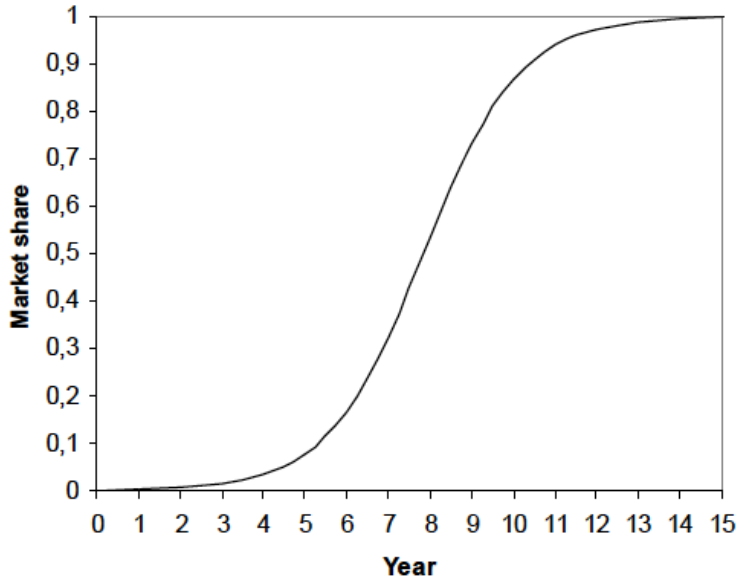
- Not all ICT related industries experience positive feedback
- Standards reduce the magnitude of feedback
  - Big e-mail providers have no advantage (demand side) over small e-mail providers
- Difference between market as whole and within market
  - Big effects in PC game industry
  - Small effects within market for Nintendo consol games

Competition between service providers



Case of two service providers

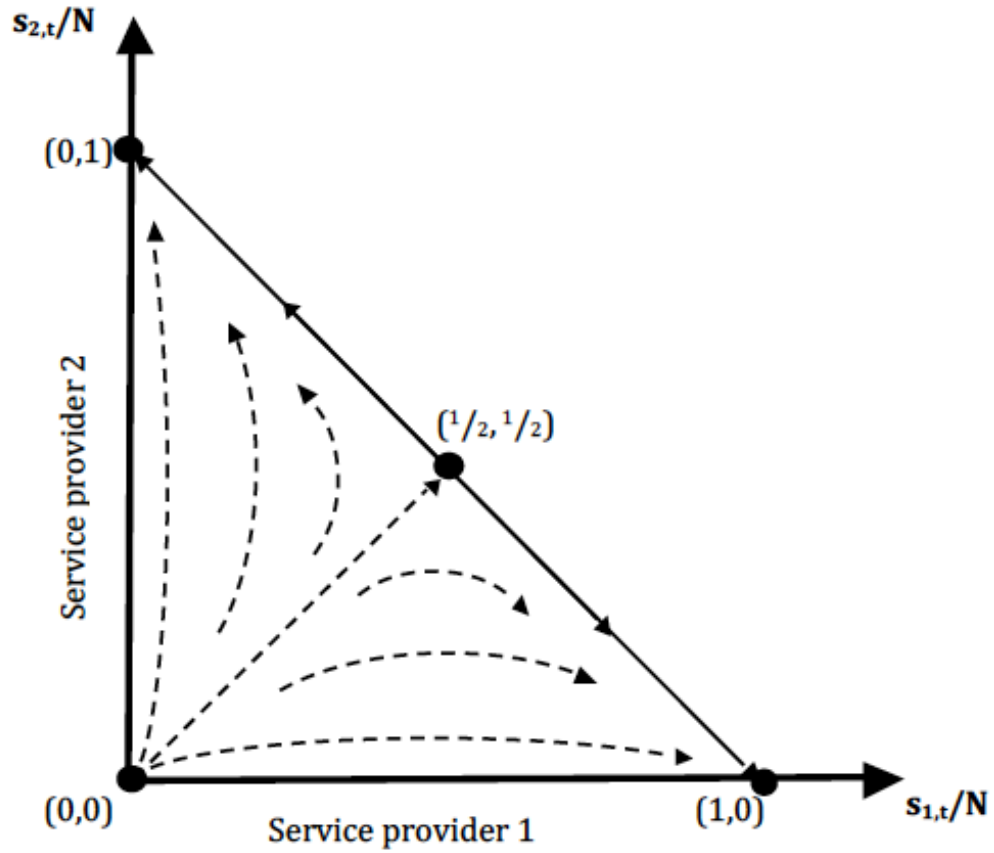
- Starts with an “empty” market, ends with “full” market
- Feedback parameter γ
  - γ<1: Negative feedback
  - γ=1: No feedback
  - γ>1: Positive feedback
- Churning
  - Customers may change provider



Case of two service providers

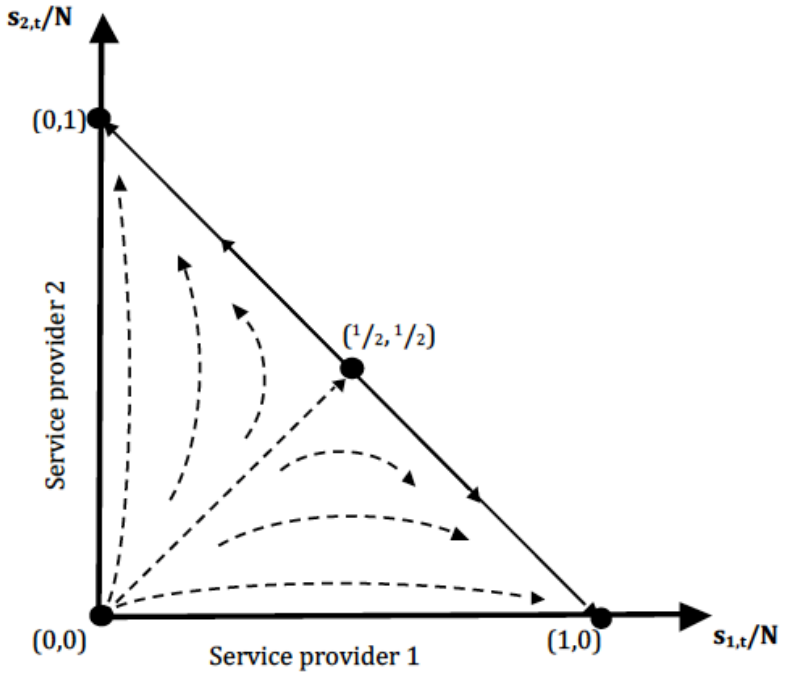
- New customers choose between service providers dependent on no. users already (only)
- Analyze this using
  - Differential equations
  - Simulations (discrete event simulations)
  - Phase plane portraits
    - Describe differential equations

Phase plane portrait, γ>1



Exercise

- Consider two service providers
  - Network effects
  - Positive feedback
- Draw you own phase plane portrait for these scenarios
  1. Positive feedback with no churning
  2. No feedback
  3. Negative feedback



Free business models

Adressa 11.09.2012

Feilslått forretningsmodell

«The Secret World» hadde på det tidspunktet samtalen med Ole Schreiner fant sted solgt litt i overkant av 200,000 eksemplarer. Spillet blir solgt med 30 dagers gratis spilling. Etter dette koster spillet Ca. Kr. 86.- i måneden for å spille på FunCom-serverne.

Forretningsmodellen med månedsbasert abonnement for MMO-spill har i løpet av de siste 2-3 årene blitt avviklet av de aller fleste produsenter av MMO-spill grunnet masseflukt fra spillerne. De fleste spill i denne sjangeren er nå basert på mikro-transaksjoner der det å spille spillet er gratis, men med muligheter til å kjøpe våpen, klær og andre gjenstander inne i selve spillet. Blizzards «World of Warcraft» er nå en av de ytterst få MMO-spill som fortsatt driver lønnsom forretning basert på abonnementsmodellen.

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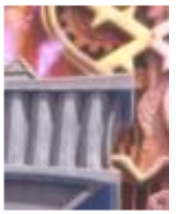

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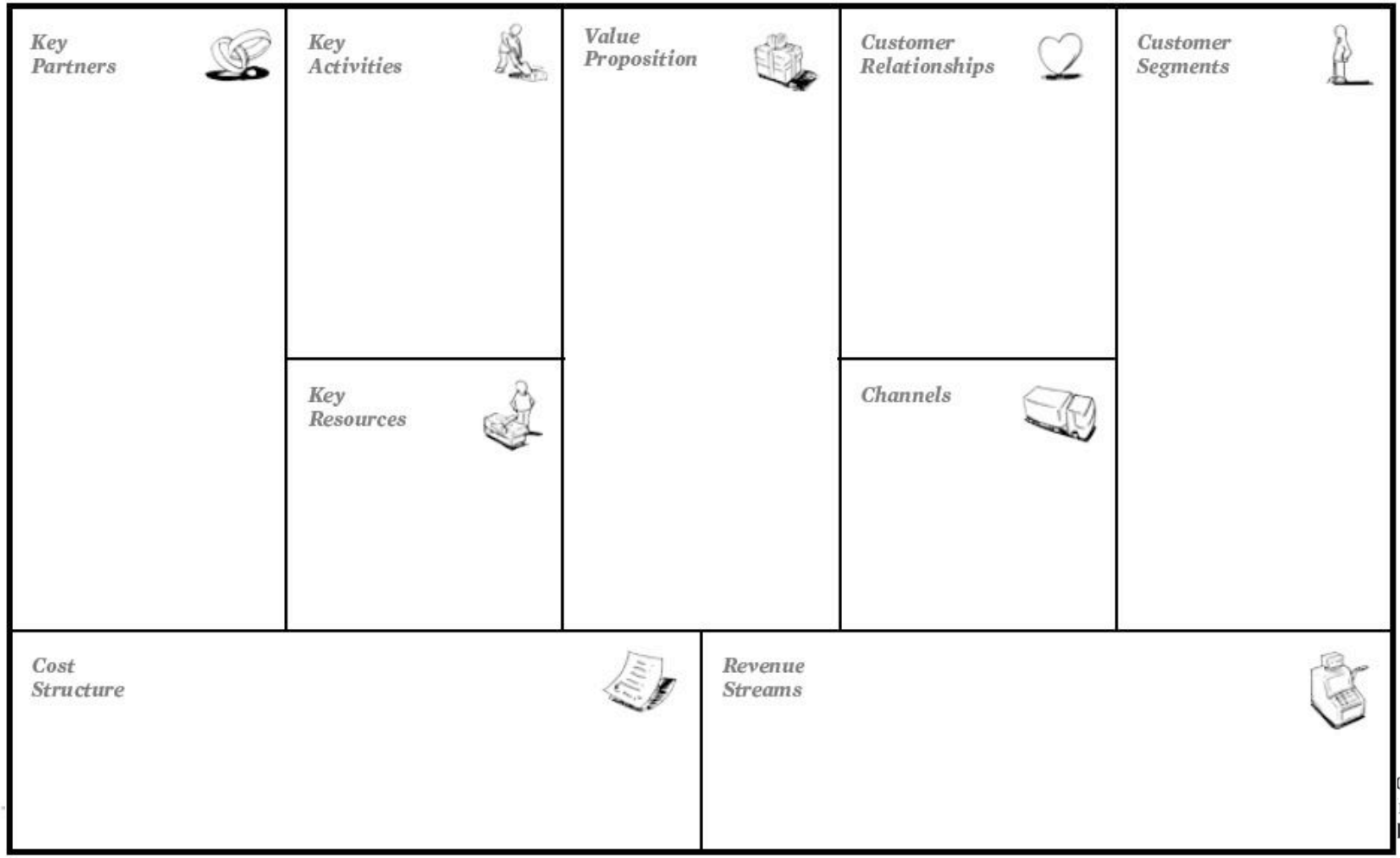
What is a business model?



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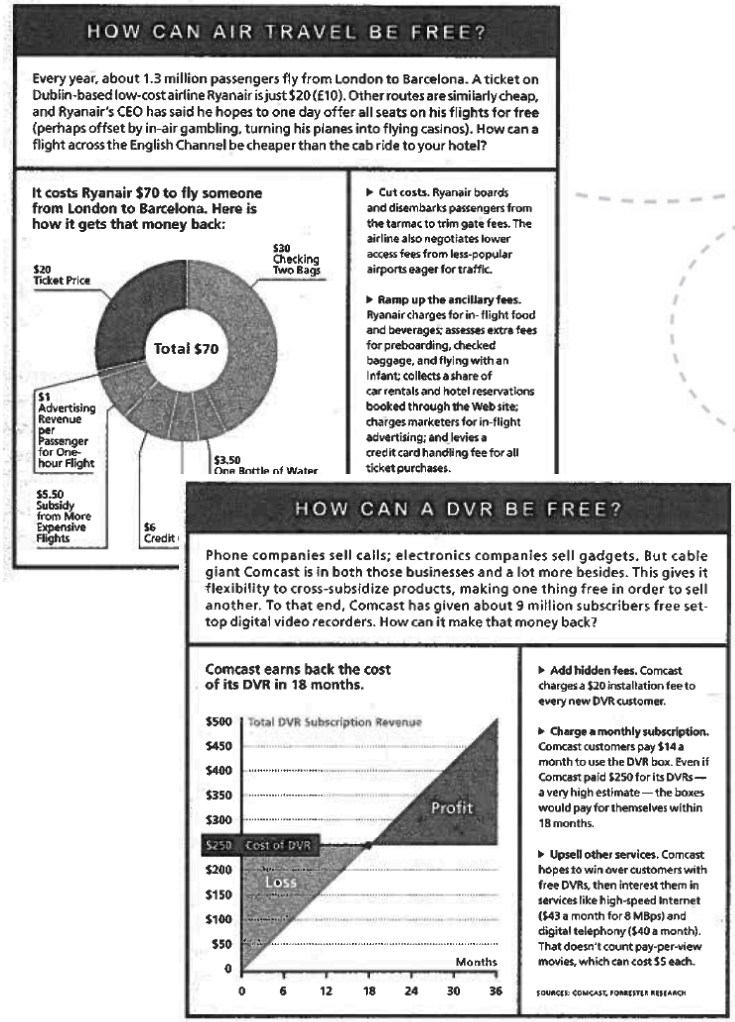
“Free” Business models

- Giving away something for free, with expectations to receive revenue via other means
- Especially attractive for digital products
  - MC=0
  - No marginal revenue loss by giving away
- May be exploited for other industries as well
  - Buy three, get one for free

Basic concept of free

- Cross-subsidies
  - "There is no such thing as a free lunch"
- Money are shifted between
  - Products
  - People
  - Time
  - Nonmonetary markets



HOW CAN AIR TRAVEL BE FREE?

Every year, about 1.3 million passengers fly from London to Barcelona. A ticket on Dublin-based low-cost airline Ryanair is just $20 (£10). Other routes are similarly cheap, and Ryanair's CEO has said he hopes to one day offer all seats on his flights for free (perhaps offset by in-air gambling, turning his planes into flying casinos). How can a flight across the English Channel be cheaper than the cab ride to your hotel?

It costs Ryanair $70 to fly someone from London to Barcelona. Here is how it gets that money back:

▸ **Cut costs.** Ryanair boards and disembarks passengers from the tarmac to trim gate fees. The airline also negotiates lower access fees from less-popular airports eager for traffic.

▸ **Ramp up the ancillary fees.** Ryanair charges for in-flight food and beverages; assesses extra fees for preboarding, checked baggage, and flying with an infant; collects a share of car rentals and hotel reservations booked through the Web site; charges marketers for in-flight advertising; and levies a credit card handling fee for all ticket purchases.

HOW CAN A DVR BE FREE?

Phone companies sell calls; electronics companies sell gadgets. But cable giant Comcast is in both those businesses and a lot more besides. This gives it flexibility to cross-subsidize products, making one thing free in order to sell another. To that end, Comcast has given about 9 million subscribers free set-top digital video recorders. How can it make that money back?

Comcast earns back the cost of its DVR in 18 months.

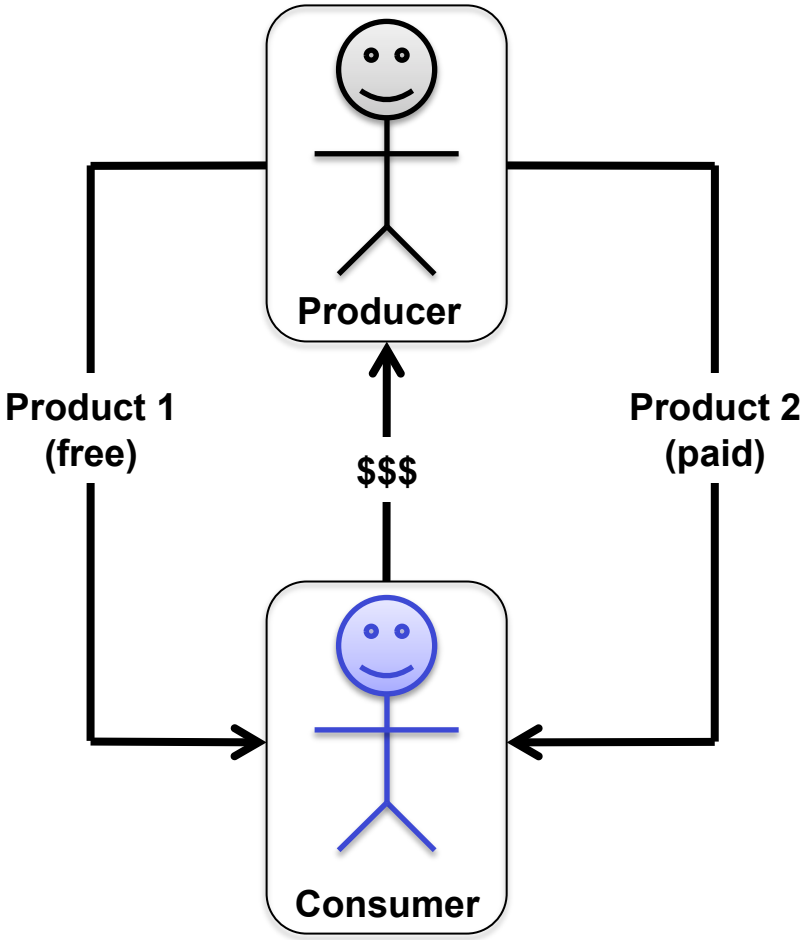
▸ **Add hidden fees.** Comcast charges a $20 installation fee to every new DVR customer.

▸ **Charge a monthly subscription.** Comcast customers pay $14 a month to use the DVR box. Even if Comcast paid $250 for its DVRs—a very high estimate—the boxes would pay for themselves within 18 months.

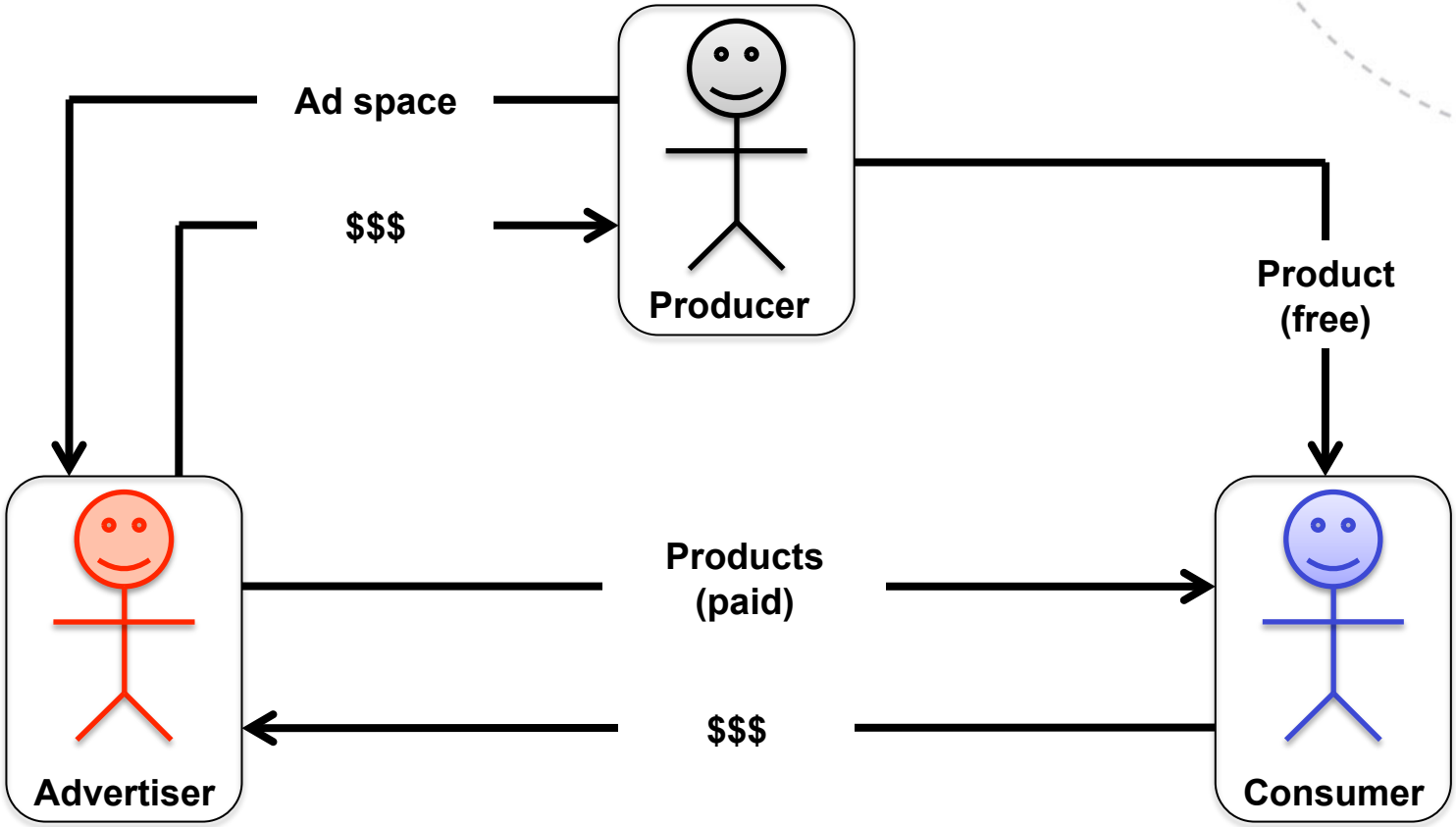
▸ **Upsell other services.** Comcast hopes to win over customers with free DVRs, then interest them in services like high-speed Internet ($43 a month for 8 MBps) and digital telephony ($40 a month). That doesn't count pay-per-view movies, which can cost $5 each.

SOURCES: COMCAST, FORRESTER RESEARCH

1. Direct cross-subsidies



2. Three party market



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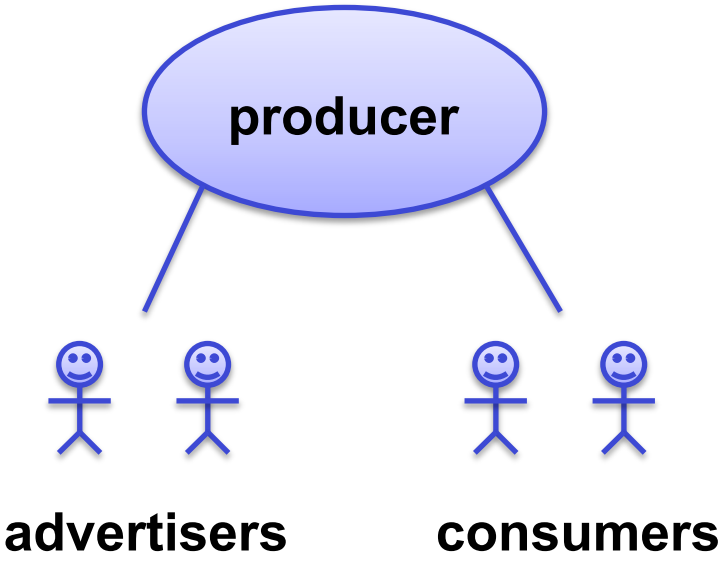
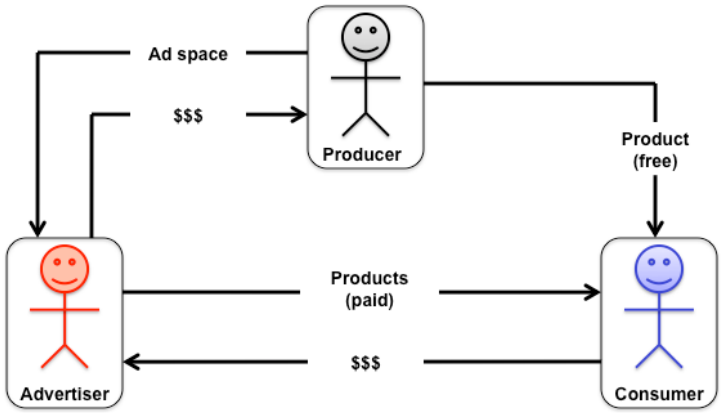
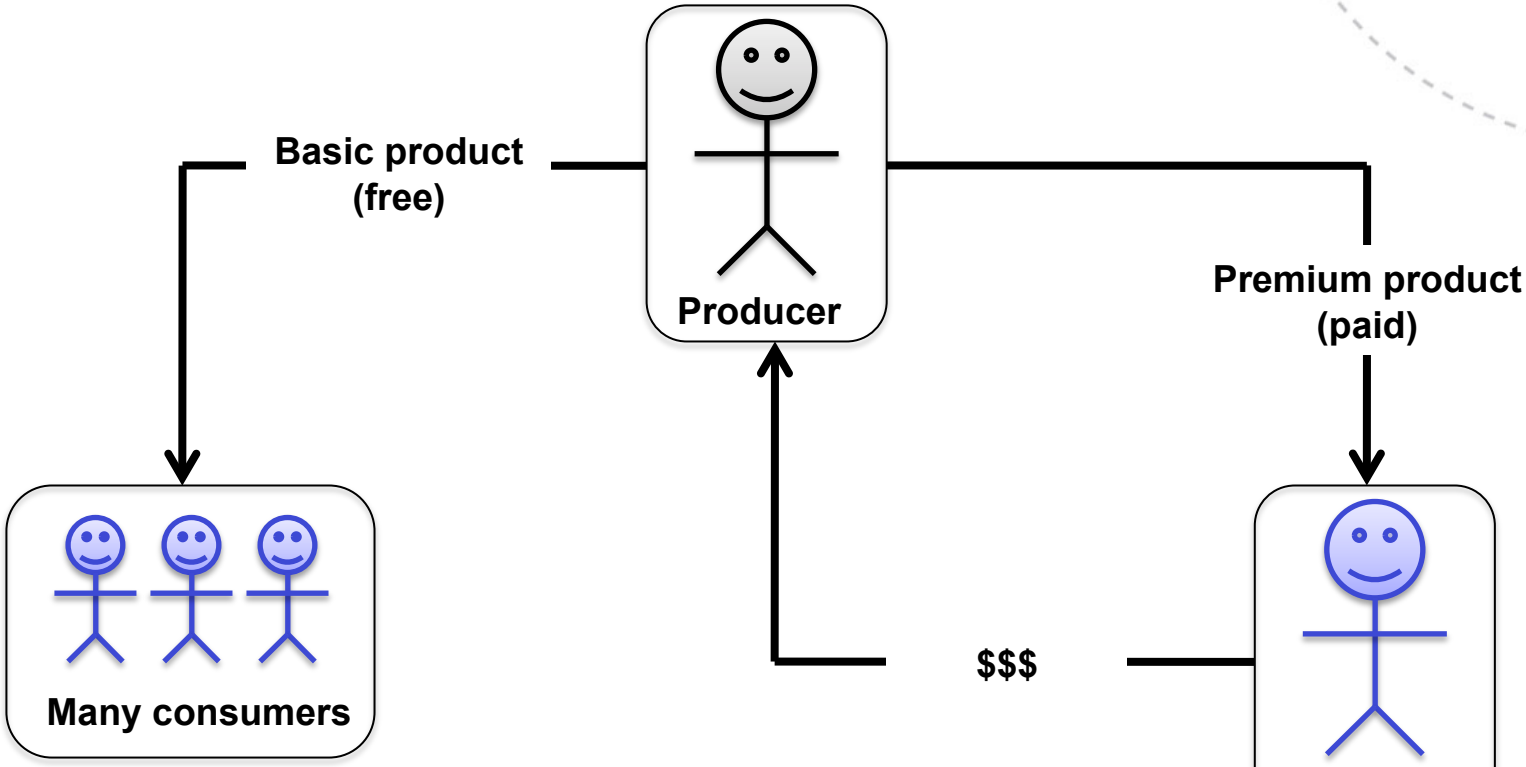
2. Three party market

- Two sided markets





3. Freemium



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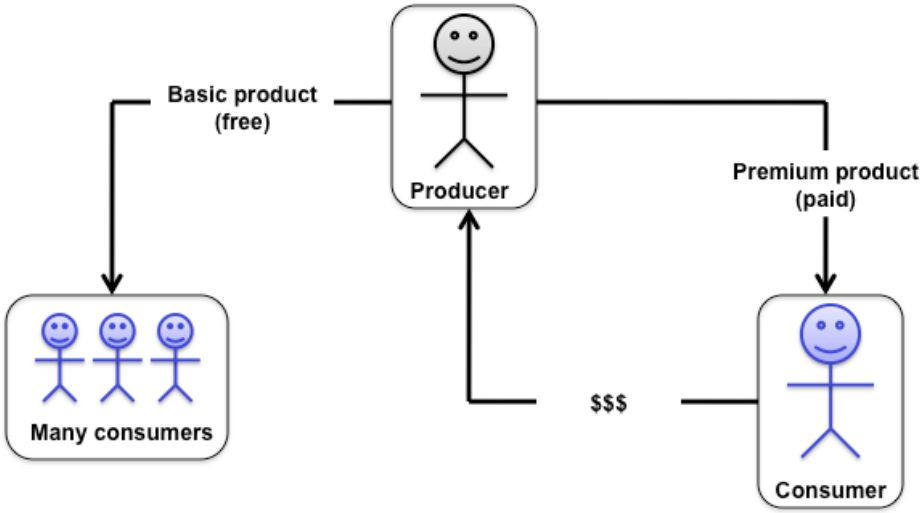
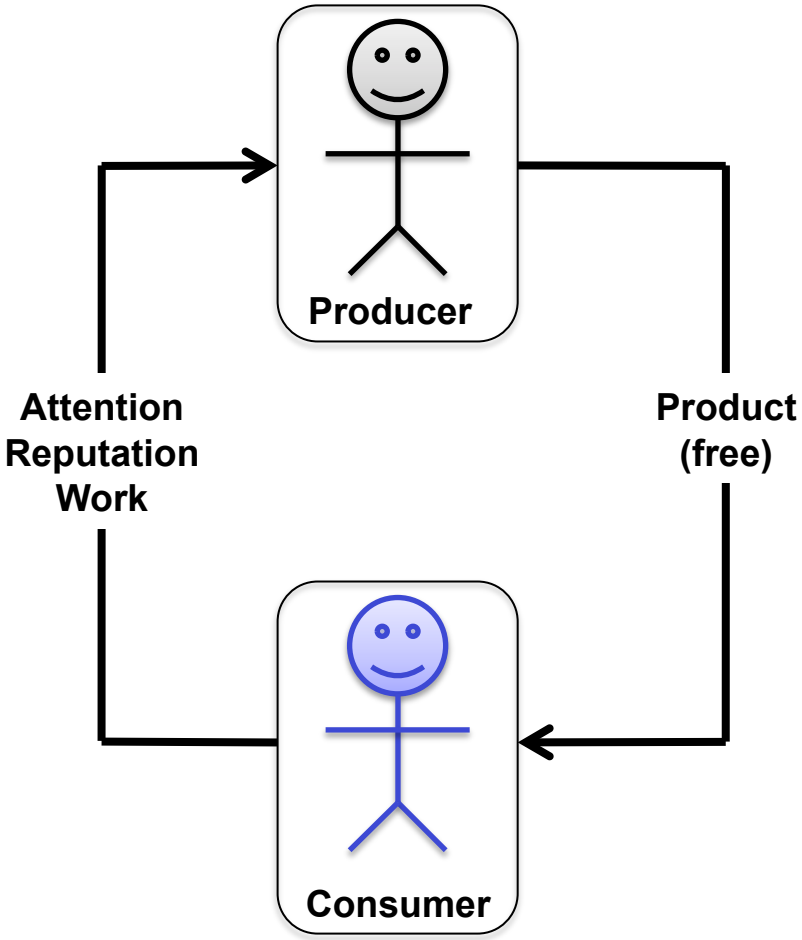
3. Freemium

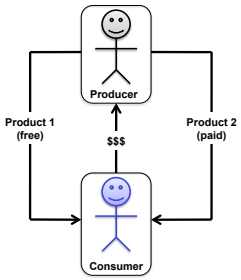
- Possible since MC=0
- “5 % rule”
  - 95 % of consumers receives product for free
  - 5 % paid consumers
- Need to have low expenses on marketing



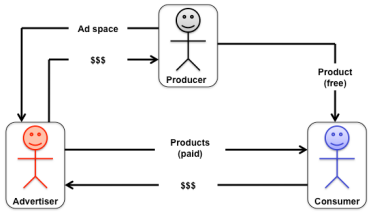
4. Nonmonetary markets



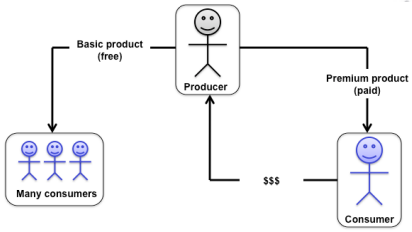
Exercise



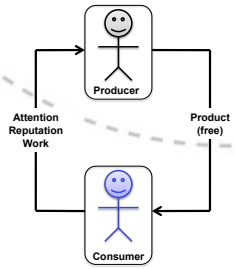
1. Direct cross subsidies



2. Three party market



3. Freemium



4. Non-monetary markets

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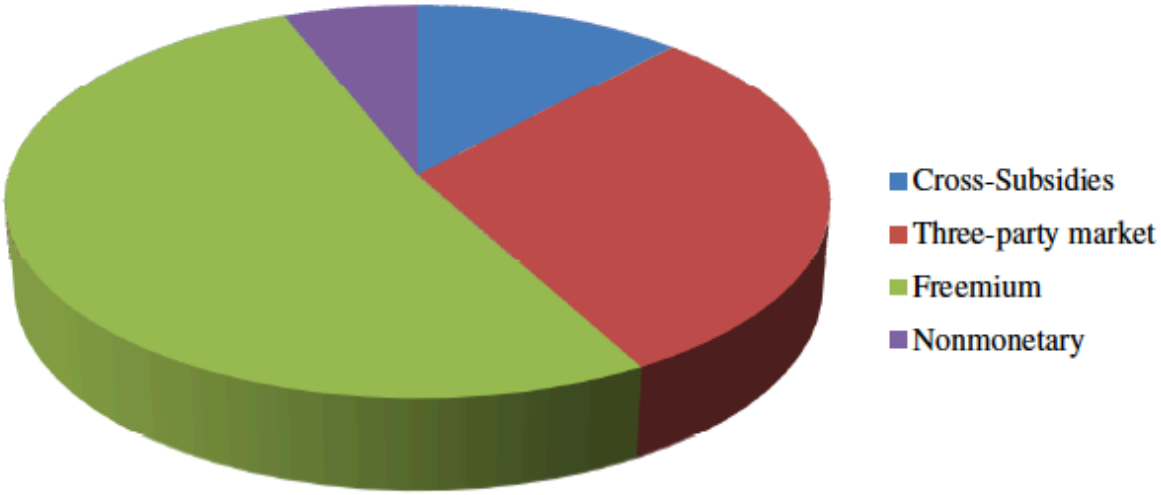
Use of free models



Social network services

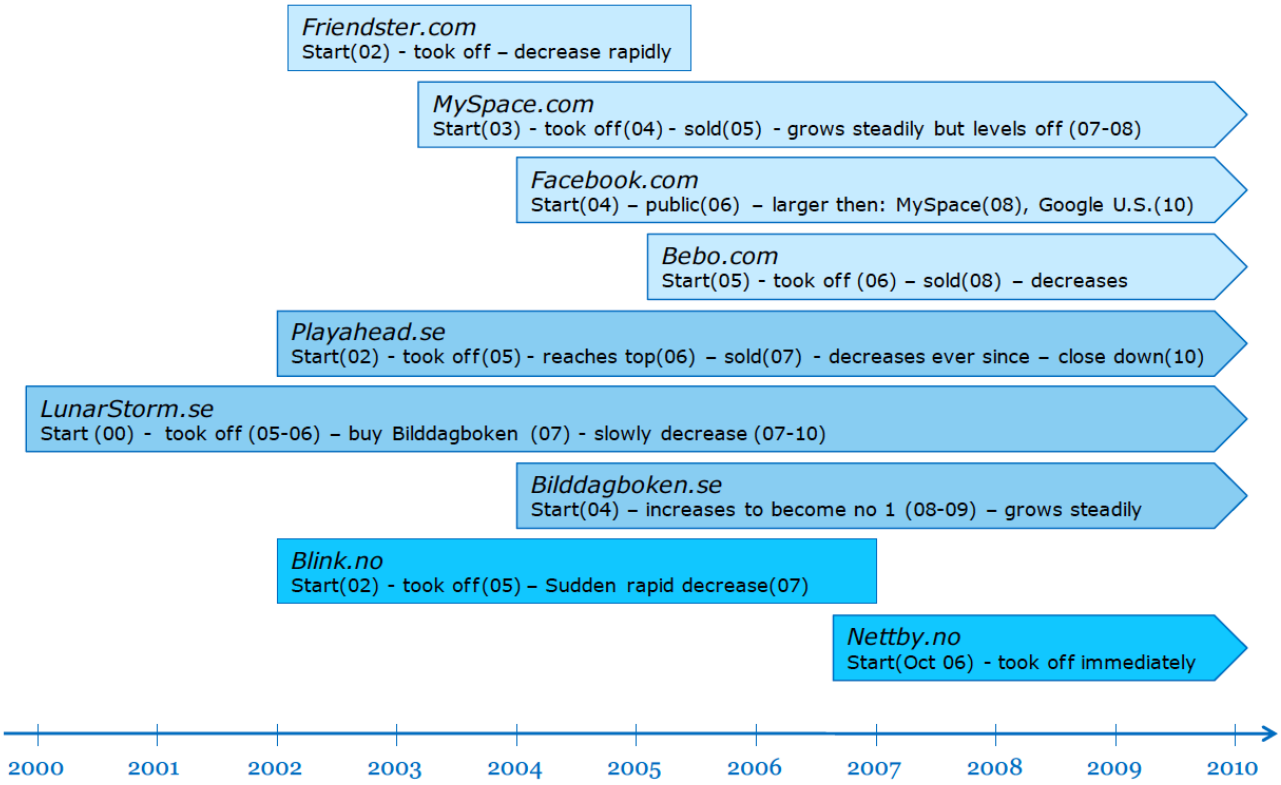
Social networks take-off

- Facebook more visits than Google!
- Communication between users
- Take-off from 2001 →
- Facebook, Myspace, Twitter, Google+, Nettby (Norway), Blink (Norway)
- Network effects in social networks
  - Creation and consumption of information

What is social networks?

- Service enabling virtual communities
  - Chat
  - Share virtual content (music, video, blogs, opinions)
- Create your own list of friends or groups/circles
- Worldwide / regional social networks
- No. of users vary over time, difficult to keep no. 1 position over long time
  - Snob effect
- A question of loyalty

Development of social networks

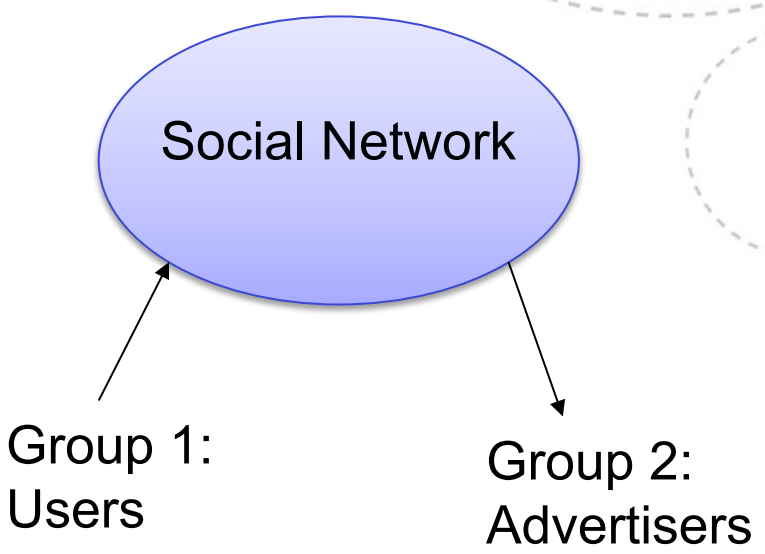


Social networks business model

- No charge for users
  - exception: dating services
- Revenue from advertisement
- Users are both suppliers and consumers of content
- Long tail in production
  - 5-10 % of users produce 50 % content
  - Super users

Two-sided market

- Group 1: Free users reading advertisements
- Group 2: Advertiser paying the network
- Same models as for newspapers
- Both groups are needed
- Positive network effect from group 1 to group 2
- Negative network effects from group 2 to group 1



Concept of super-users

- Trendsetters
- Other users follow super-users
  - Blink: 2 % most popular users received 36.2 % of all visits
- Some social networks give benefits (moderator roles) to super-users in order to make them more loyal
- If super-users leave a social network, other users tend to follow
- Can be modeled as network links with more weight

Network effects

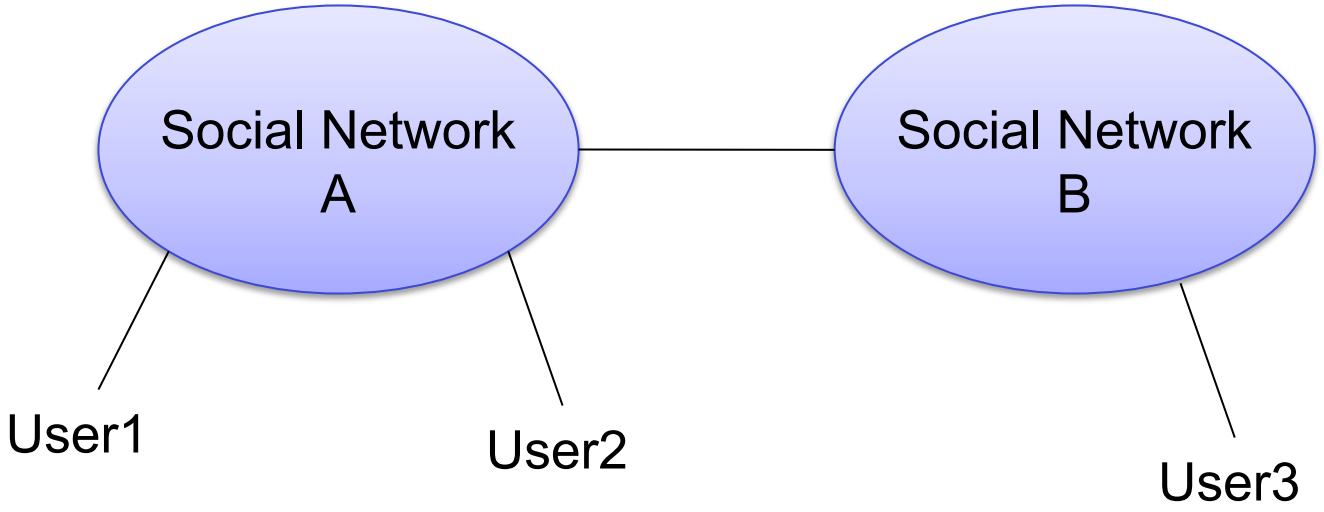
Positive network effects

- Unit value increases as no. of users increases
- Direct network effects
  - New subscriber → increased value of network
- Indirect network effects
  - Playstation 3 (PS3) users → increased demand for PS3 games
- Necessary to reach critical mass
  - First customers see little value
- For social networks, network effects are significant
  - Direct: Communication between users
  - Indirect: Postings, add-on services

Network effects

Compatibility

- **Compatibility** (high/low) is characterized by the **quality** and **price** for communication **between** (social) networks



Network effects

Compatibility

	Quality	Price
High	SMS Telephony	SMS
Medium		Telephony
Low	Social networks (not possible)	

Network effects

Compatibility

- Low compatibility, combined with network effects and positive feedback, makes market tippy
- Difficult to attain critical user mass
- Winner-takes-it-all market

Discuss
Is it possible with an open standard for social network services? How? What are the technical challenges?
•Data storage
•Security issues

Network effects

Negative network effects – snob effects

- Negative network effects
  - Value decreases as the number of users increases
- Users want exclusive and unique products
  - Snob effect – more users, less value
  - Crowded
  - What everyone got has little value
- Analogy to nightclubs

Network effects

Negative network effects – snob effects

- If super users change network, other will follow
  - Super users generate much content
  - Super users generate many views (leads to income from advertisement)
- “Stealing” super-users may be fatal for a social network
- Super users may be the first to migrate
- Illustrated by the competition between two norwegian social networks – Blink and Nettby (next slide)