Introduction to Network Economics, Antitrust, and Standard Setting Organizations

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Boston, August 2013

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CPRC CONSUMER PAYMENTS Research Center

Speaking of standard setting organizations: Sept. 3, 1967 Swedish people switch to driving on the RHS of the road

Consumption Network Effects

Consumer preferences are said to exhibit positive (negative) network externalities or network effects or adoption externalities if consumers utility is enhanced (reduced) when more consumers use the same or a compatible brand.

- Examples for positive network effects: Telephone, social networks, e-mail, fashion, driving side (left or right), languages, manners, uniform ratings of products, money (units of exchange)

- Examples for negative network effects: Vanity behavior: buyers seek to isolate themselves from the "rest-of-us" (buying a Ferrari that most of us don't have), shop at expensive malls to avoid mixing with the crowd, join exclusive clubs.
  Note: This is the reason why we observe "limited" editions. Painters label copies by 1/50, 2/50,...,50/50 to convince snobbish art buyers that no more than 50 copies exist in the entire universe

Demand for network goods may exhibit extreme "jumps"

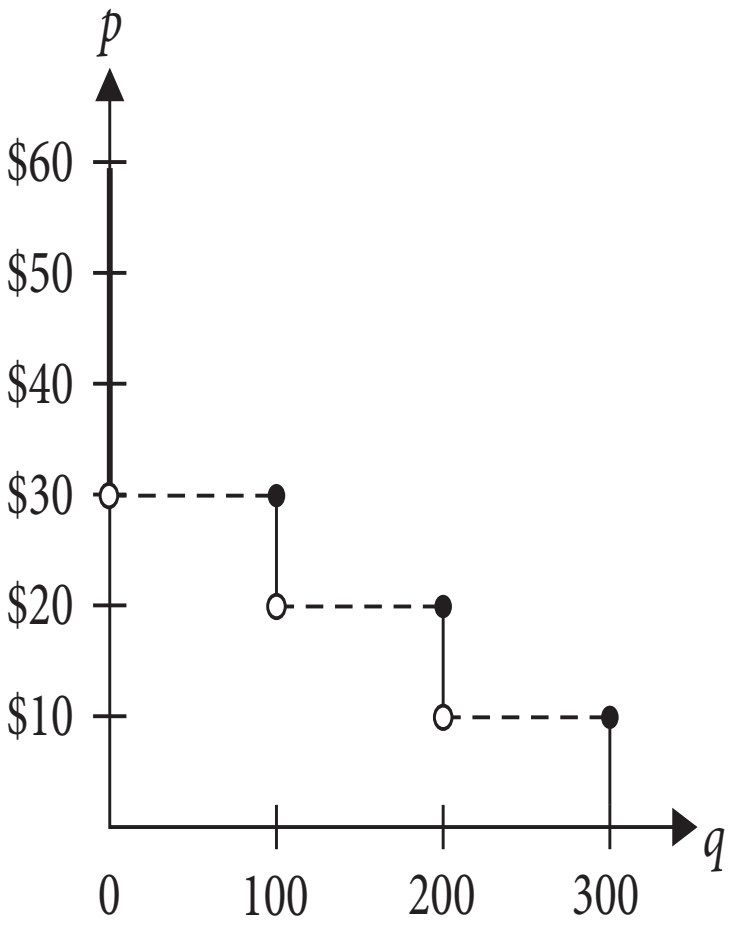
Common observation: There is a critical mass demand level below which no one buys (subscribes); above it "all" consumers buy (subscribe)

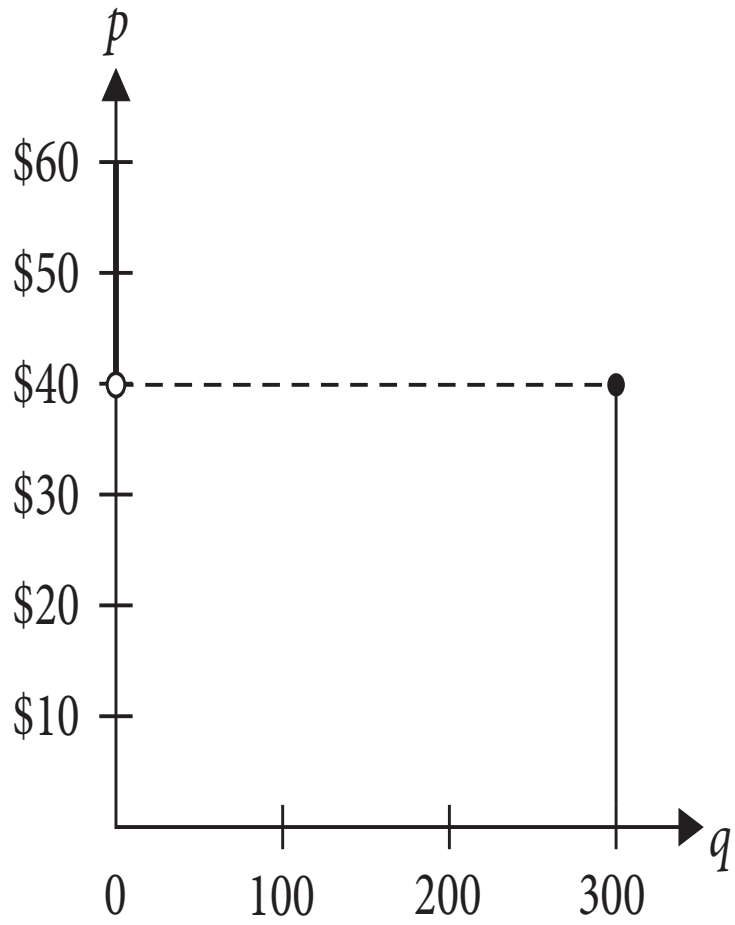
Non-network Good		Network Good		
Price	Quantity demanded	Price	Quantity demanded	
\$ 60	0	\$ 60	0	
\$ 50	0	\$ 50	0	
\$ 40	0	\$ 40	0	
\$ 30	100	\$ 30	300	(Critical mass!)
\$ 20	200	\$ 20	300	
\$ 10	300	\$ 10	300	

Observe what happens when the price drops from \$40 to \$30 :

Left: Gradual (smooth) demand increase. Right: Drastic demand increase.

Consumer adoption externalities generate all-or-nothing demand





Either "all" buyers adopt, or "no one"

Important Concepts

Compatibility: Competing brands are said to be compatible if they can "work together." For example:

- Android apps are *incompatible* with iOS (Apple) apps
- NTSC television sets were *incompatible* with PAL TV sets
- Javascript and HTML are *compatible* with most Web browsers
- FedWire's transfer protocol is *incompatible* with the ACH protocol

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Standards: Competing brands are said to be using the same standard if they are compatible. For example:

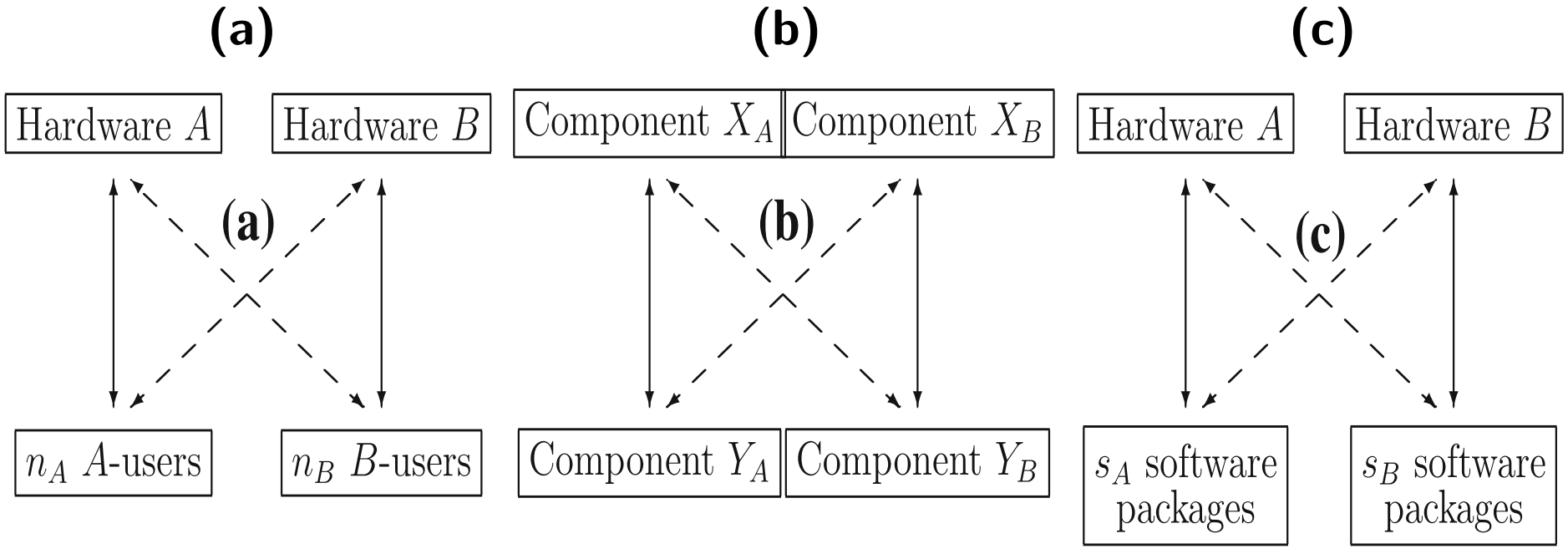
- U.S. Voltage is 110V 60MHz; most of the world uses 220V 50MHz
- FTP (file-transfer-protocol) standard is widely accepted
- CompactCassette (1966) and CD-ROM (1989) are standards

Production Network Effects

Network effects: Producers: Production technologies are said to exhibit network effects if a firm's profit is enhanced when more firms adopt the same or compatible technologies.

- Examples for industries where firms choose uniform standards Shared ATMs (common in Europe), shared frequent-flier program (joint reservation systems), code sharing, compact disks, USB, ISO–9000, floppy diskette 1.44MB
- Examples for industries where firms choose incompatible standards Apple vs. Windows OS, Apple iTunes vs. MP3, SONY's Beta vs. VHS, GSM vs. CDMA
- The key question for producers: Can competing firms enhance their profit by choosing compatible technologies?

3 approaches to compatibility & standardization:



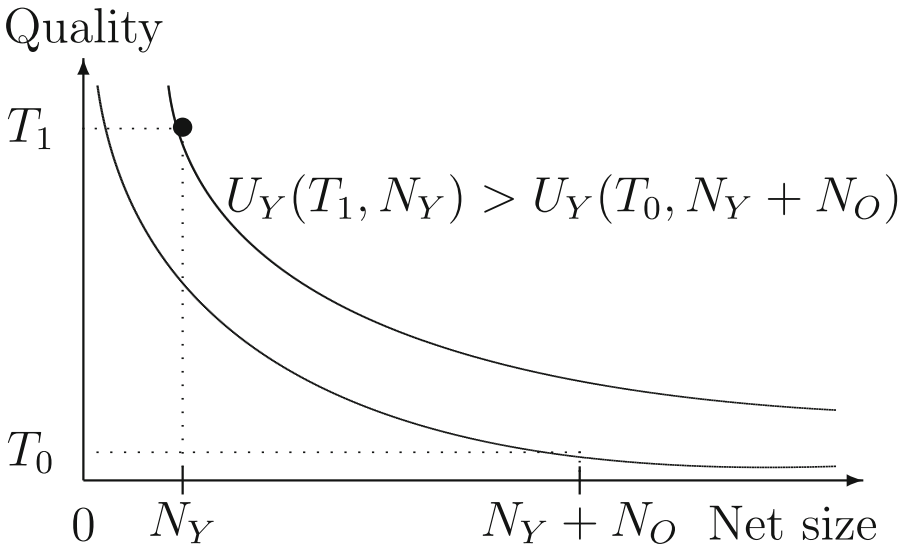
(a) Network externalities: A user's utility is enhanced with the total number of users who buy identical or compatibility hardware (e-mail, social networks)

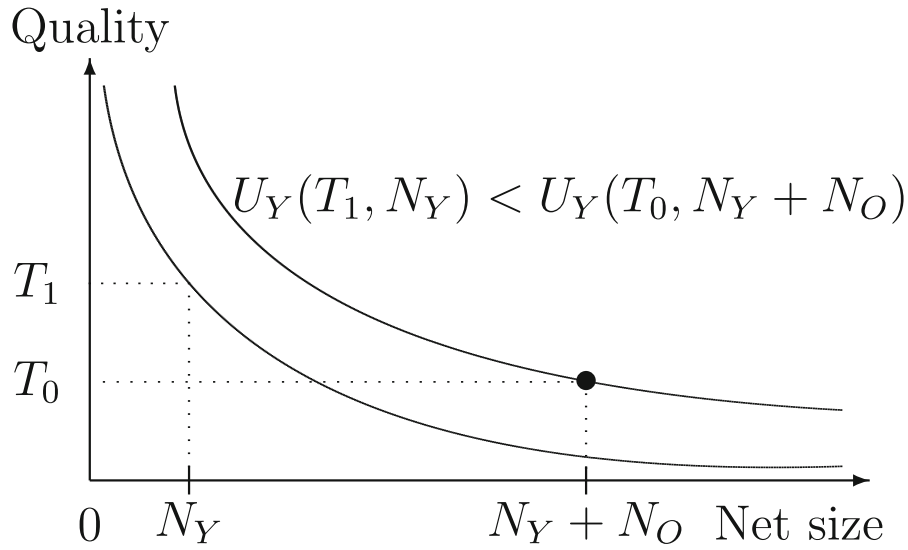
(b) The components approach: Assembling systems from different manufacturers (Can Apple printers be connected to Dell machines?)

(c) The software-hardware approach: Will the software industry support 2 incompatible standards? (Mac software & Windows software; SONY's Blue Ray vs. HD; Android & iOS)

Introduction of new incompatible technologies

New consumers choose between:

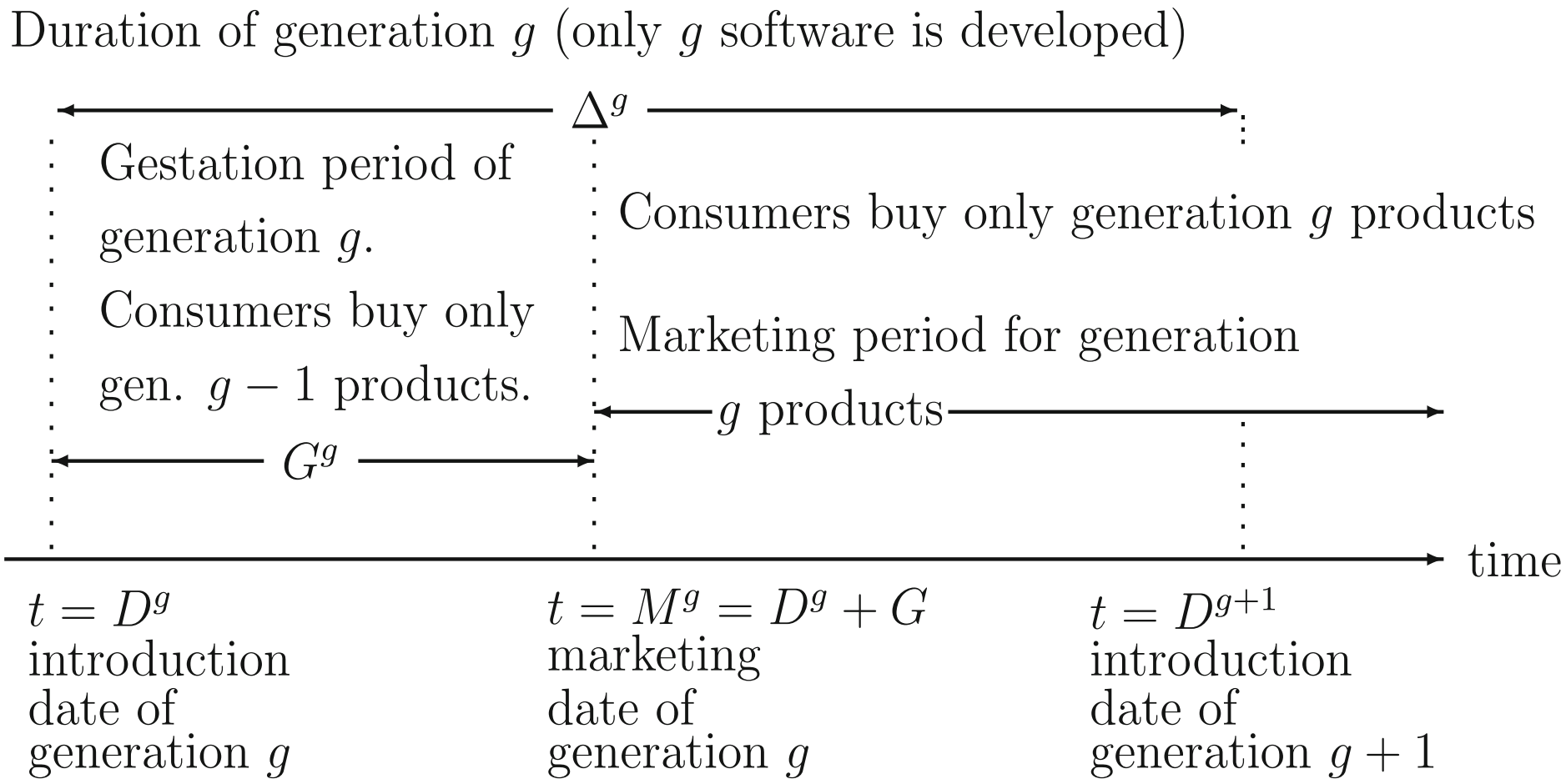




Left : Choose the newly-introduced technology
(higher quality but smaller network of new-users only)

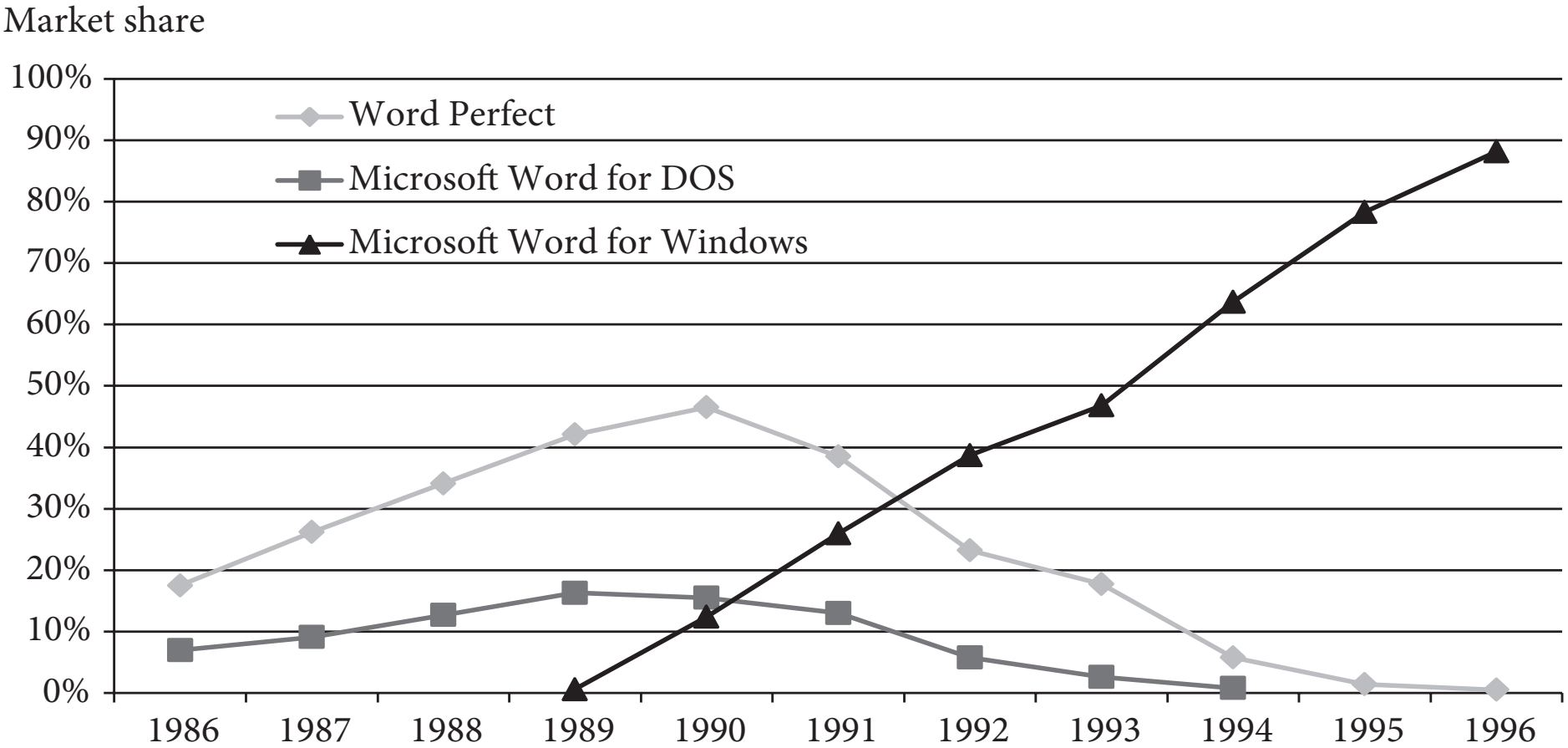
right : Choose old technology
(lower quality large network of old-users)

Introduction of new incompatible technologies (con'd)



Lag between introduction and marketing due to slow software development

Compatibility with the MS-Windows OS can explain the rise and fall of word processors



"Word for Windows" (used until this very day) wiped out "Word Perfect" (dominant player during the DOS era) because WP was not Windows-compatible in the early 1990s

How Are Standards Set?

1. Market-determined:
   - No formal coordination
   - May result in multiple standards
2. Market leader-followers:
   - Requires licensing (Samsung's VHS format)
   - Possible abuse of market power
3. Industry standard committees:
   - CD and Compact Cassette (1960s); Fed's MICR
4. Government mandated:
   - Can the government force a standard?
   - Not always! Color TV in 1950 (Government chose the CBS standard, and was "forced" to switch to NBC's NTSC after public pressure)
   - In Sweden, the government mandated a shift from driving on the left-side to driving on the right-side of the road (September 3, 1967)

What's better? Single- or Multiple Standards?

The answer to this question depends on

1. Consumer welfare: Market prices
2. Incentive to further innovate: e.g., speed improvement
3. Consumer preference: "Love" for variety

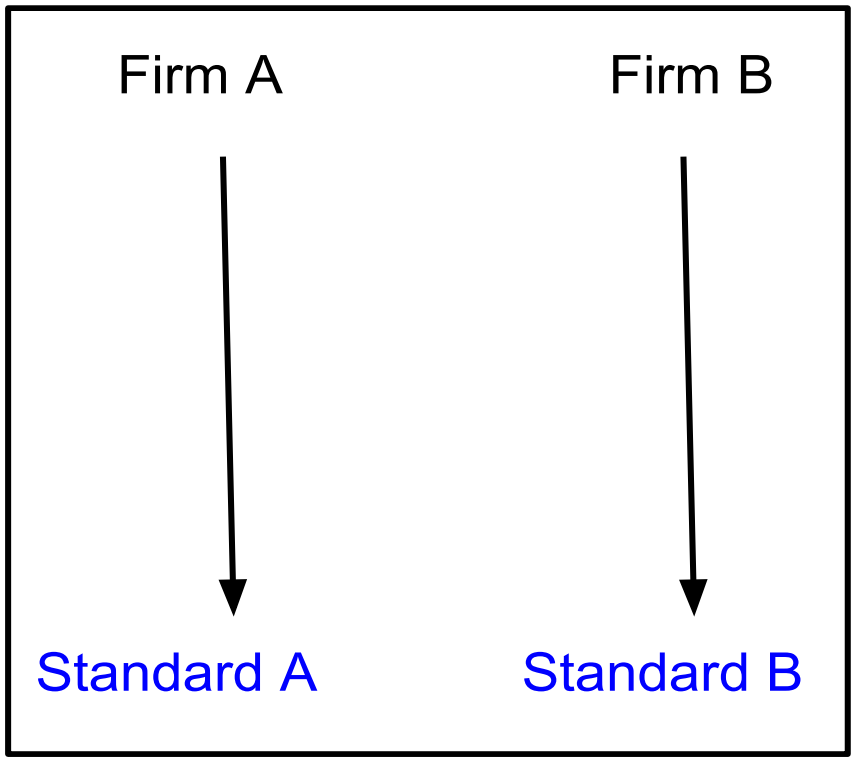
Circumstances when it is desirable to have multiple standards

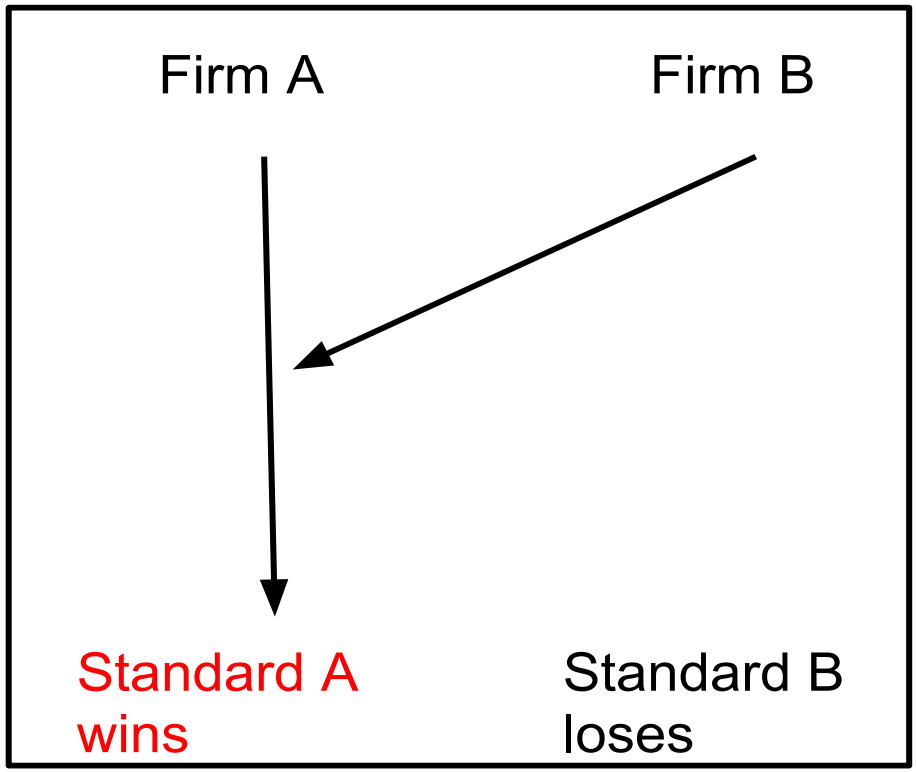
(a) Having, both Android and iOS competing is welfare-improving because it induces faster innovation of add'l features

(b) some users prefer Mac interface, some prefer Unix interface. Some prefer iOS, some prefer Android. This is called "preference for variety"

(c) Unknown future: Some regulators in the analog era failed to predict the emergence of digital technologies (digital convergence)

Standardization war (no Standard Setting Organizations)





Left: Multiple-standard equilibrium

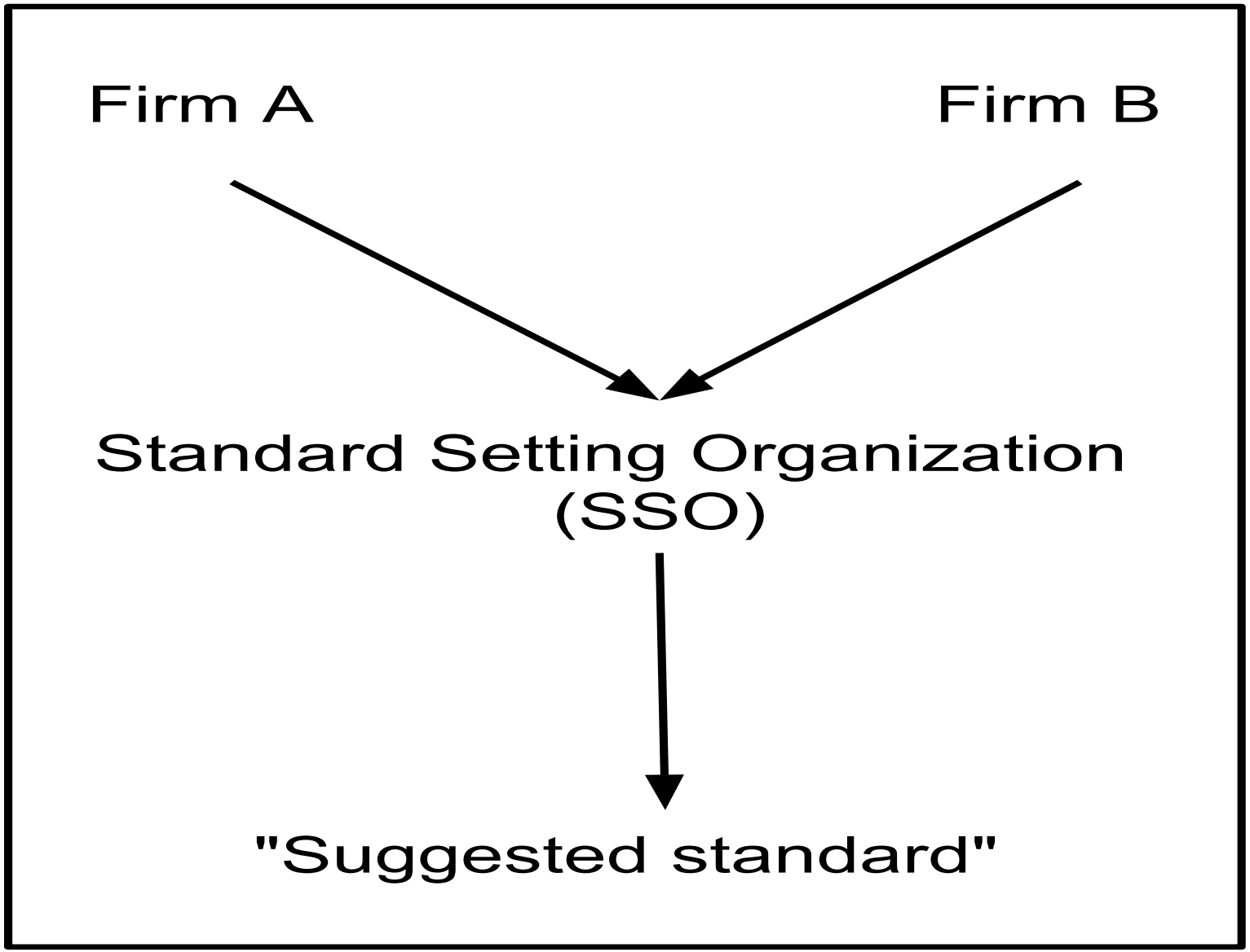
Right: Single-standard equilibrium:

Firm A *licenses* its standard to firm B (and others) for a fee

Example: Samsung licenses its VHS for $10 per VCR

(thereby killing SONY's Beta)

Standard Setting Organization



Conclusion: Discussion of antitrust issues

Markets for network goods/services make antitrust enforcement more difficult. Why is that?

1. Standard coordination among competitors may be needed. Standard-forming committees may engage in semi-collusion (implicit pricing agreements among competitors)
2. May require separation of production from transmission. Example: Gas/electricity may be transmitted via lines maintained by a competitor, hence
3. The regulator may need to set "access prices" (fee paid by a mobile phone operator to a land-line operator to terminate a call originated via a mobile phone)
4. Reducing switching costs may enhance competition via consumer switching (phone number mobility, bank account mobility, bank account mobility in England)
5. Standard-forming committees may result preemptive patenting (forcing potential competitors who are not members to pay licensing fees)