

# DIGITAL BUSINESS - LECTURE 2

# LEADERSHIP MOMENT

*The most difficult  
work of  
leadership  
involves learning  
to experience  
distress without  
numbing yourself*

-ron heifetz



# Objectives & Reminders

## Objectives for today

1. *Conclude one-sided market simulation network effect*
2. *Two-sided market simulation effect*
3. *E-Commerce Business Models*
4. *The Long-Tail Effect*
5. *On-Line Ads Revenue Models*

## Reminders:

- ⊙ Form groups –
- ⊙ SCRATCH (3) – group submission
- ⊙ Market basket – individual submission
- ⊙ Kickstarter (5) – group submission
- ⊙ Purchase Mednet Case for Discussion on Jan 27
- ⊙ Lab Jan 16
- ⊙ Lab Jan 23
- ⊙ SCRATCH due by Jan 23 @ 23:55
- ⊙ Lab Feb 6
- ⊙ Lab Feb 13
- ⊙ Market Basket due by Feb 14<sup>th</sup> @ 23:55
- ⊙ Midterm – Feb 27<sup>th</sup> @ 6:30
- ⊙ Lab Mar 6
- ⊙ Lab Mar 13
- ⊙ Quiz Mar 31
- ⊙ FINAL project Update due by Mar 6<sup>th</sup> @ 23:55
- ⊙ FINAL Project due by Apr 7 @ 23:55
- ⊙ Final Presentations Apr 7 & 9
- ⊙ FINAL exam - TBD

# NETWORK EFFECTS / EXTERNALITIES AND TWO-SIDE MARKETS

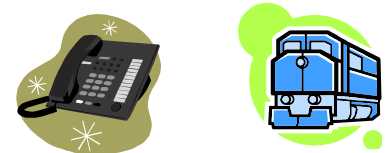
**You Task:**

To understand network effects and two-side markets

# TYPES OF NETWORKS

## Physical:

- ⊙ nodes connected by **physical links**
- ⊙ Examples:
  - ⊙ landline telephone and railroad networks



## Virtual:

- ⊙ connections between nodes are **intangible** and **invisible**
- ⊙ nodes are usually people
- ⊙ Examples:
  - ⊙ iTunes (developers, users)
  - ⊙ eBay networks (buyers, sellers)
  - ⊙ MS Office and Adobe Acrobat user networks (users)



# VIRTUAL NETWORKS

- ⊙ Generally sponsored by an organization or technology that enables it, controls access to it, and manages its evolution.
- ⊙ Value (to users):
  - ⊙ Shared information
  - ⊙ Shared expertise
  - ⊙ Direct function of size (number of nodes)
- ⊙ Example: eBay, Amazon, Apple

# NETWORK ECONOMICS: VALUE CREATION

## Traditional Goods

- ⊙ **Value in scarcity** of the product category

## Networks

- ⊙ **Value in plentitude**, i.e. value is a function of the number of connected nodes



## NETWORK ECONOMICS: VALUE CREATION NETWORK EFFECTS / EXTERNALITIES

Networks built around using or providing a product / service

When a new user joins the **installed base** (existing users) of **product A**, if s/he generates:

- value for the existing users of product A *from consuming product A* – **direct network effect (A on A)** (eg: online gamers)
- value for the existing users of another product B *from consuming product B* (potentially in association with product A) – software/products **indirect network effect (A on B)**



## NETWORK ECONOMICS: VALUE CREATION NETWORK EFFECTS / EXTERNALITIES

### Network Effect: Metcalfe's law

- ⦿ The value/utility of a participant gained from a network is proportional to  $n^2$ , where  $n$  is the total number of participants in the network
  - ⦿ Consequently, the value to the company becomes higher, too

#### Examples:

- ⦿ direct network effects: MS Office Word adopters can collaborate amongst each other
- ⦿ indirect network effects: apps/software titles for iPhone or Xbox help customers derive more value from the hardware

# NETWORK ECONOMICS: VALUE CREATION

## NETWORK EFFECTS / EXTERNALITIES

Network effects can be:

### Positive:

- ⦿ Example: MS Office Word, cell phone networks
- ⦿ For New and Existing Consumers: the product value increases with network size
- ⦿ For Firms: catalyst (accelerator) for adoption – positive reinforcing feedback effect – more sales

### Negative:

- ⦿ Example: antivirus software

### Hybrid (switch between positive and negative):

- ⦿ Example: massive multiplayer online games – positive network effects when congestion is low (no lag), negative otherwise

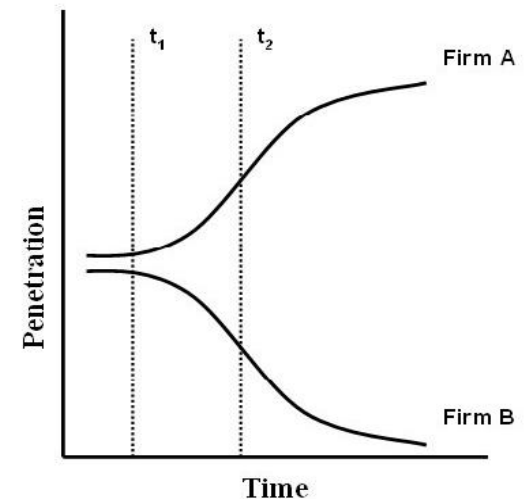
# HOW NETWORKS OPERATE

## Positive Feedback

- ◎ The self-reinforcing mechanism by which the strong gets stronger and the weaker gets weaker.

## Economies of scale

- The stronger gets stronger.
- The weaker gets weaker.



# HOW NETWORKS OPERATE

## ⊙ Negative Feedback

- ⊙ The opposite of positive feedback
  - The stronger gets weaker
  - The weaker gets stronger
- ⊙ Past a certain size, the dominant firm encounters difficulties, such as coordination costs and increasing overhead, that limit further growth.

- ⊙ **Positive feedback dynamics** that occur in networks go under the name of network effects, network externalities.

# TIPPING POINT AND TIPPY MARKETS

## Tippy market:

- ⊙ Subject to **strong positive feedback**
- ⊙ **Tips** in favor of the firm that first reaches critical mass
- ⊙ Winner-take-all outcomes – eBay

## Tipping point:

- ⊙ Moment in market evolution when one organization or technology reaches the necessary critical mass (market penetration) to become dominant
- ⊙ Point of no return - winners and losers are defined

# TWO-SIDED NETWORKS

- ◎ Single-sided network
  - Telephone, fax (all participants are similar)
- ◎ Two-sided network
  - Networks that include **two types** of agents (e.g., buyers and sellers)
  - The value of the network to one type of agent depends on the number of agents of the other type that participate
  - Examples:
    - Users of content and suppliers of content (i.e., Adobe PDF files)
    - eBay (the two sides are different – customers and sellers)

# NETWORK ECONOMICS: IMPLICATIONS

- ⊙ Network effects are associated with:
  - ⊙ technology standards
  - ⊙ virtual networks
  - ⊙ communities of interest
- ⊙ **Innovation** and/or **first move** – can be important in markets with strong positive feedback
- ⊙ Controlling a dominant network provides sustainable competitive advantage (e.g., iTunes).

- ⦿ When there are sufficient vendors to attract buyers to the Internet, it is called?
- ⦿ Critical Mass





# NETWORKING SIMULATION

## INTUITION OF THE GAME

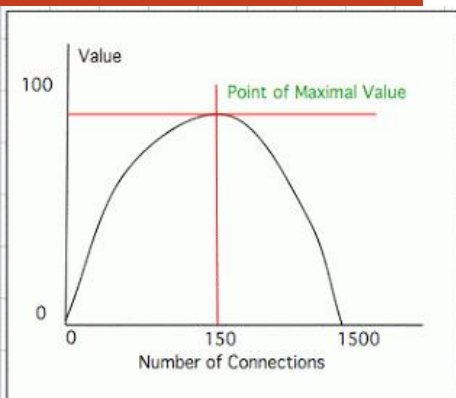
- ◎ Two factors can influence the attractiveness of your network:
  - ◎ Price
  - ◎ Network size
- ◎ Assume that the switching cost is so high that once a customer joins the network, he/she becomes captive (can't leave the network)
- ◎ The goal should be to achieve the highest cumulative profits after 6 rounds

- ② Organize into your project groups
- ② Figure out what your strategy is
- ② Play the game

# RULES OF THE GAME

- Initially, each group has 15 customers.
- Roughly 100 new potential subscribers will join the market each month. They will be divided according to the relative attractiveness of your message board.
- Each round your company will set a price. This price will be integer dollar amounts \$0 to \$100.
- The average total cost to serve a customer is \$10 in each round for all customers (new and existing).
- Previous customers are captive.
- Any company that has not recovered its costs by round 4 will be declared bankrupt.
- The goal of this simulation is to have the highest cumulative profits after 6 rounds.
- Incentive: Group that profits the most wins and receives 5 points/marks towards any assignment this semester.

# DISCUSSION AFTER SIMULATION

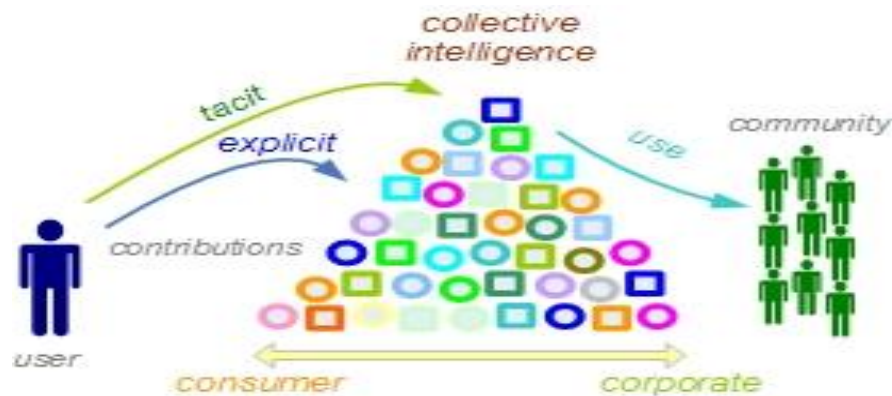


- ⊙ What may influence your cumulative profits the most?
  - ⊙ Price offers in the initial rounds
  - ⊙ Network sizes in the initial rounds
  - ⊙ Expectation about other companies' price offers
- ⊙ Best Strategy?
  - ⊙ All depends on expectations of competitors' moves
  - ⊙ Sub-game perfect (short term to medium term gains) vs. Final outcome oriented
  - ⊙ Trade-off between price and size
    - Consistent high price
    - Focus on size first, then raise price

In the network economy, the connections are as important as the nodes

# IT SYSTEMS THAT GET BETTER THE MORE PEOPLE USE THEM

- ◎ The rise of the network effect is the key difference



- ◎ **WHEN is the Network Effect Present:**
  - ◎ **When the value or utility of it depends on the number of people inside or connected to the network.**

# MANAGING A TWO-SIDED DIGITAL MARKET

## Instructions

Your group is the sponsor of a digital platform. You develop software that sells to the two sides of the market: suppliers of apps (i.e., creators of content) and consumers (i.e., consumers of content). Your group is competing with other groups in the same market. Suppliers are more attracted to this market as: 1) the number of consumers increases (strong effect) and 2) the supplier price decreases (weak effect). Similarly, consumers are more attracted to this market as: 1) the number of suppliers increases (weak effect) and 2) the consumer price decreases (strong effect). Specifically,

$$q_s[t] = \left( \frac{Q_c[t-1]}{Q_c[t-1]} \right)^2 * \max \left( 1 - \frac{p - \bar{p}}{p}, 0 \right) * 10$$

$$q_c[t] = \left( \frac{Q_s[t-1]}{Q_s[t-1]} \right) * \max \left( 1 - \frac{p - \bar{p}}{p}, 0 \right)^2 * 100$$

where

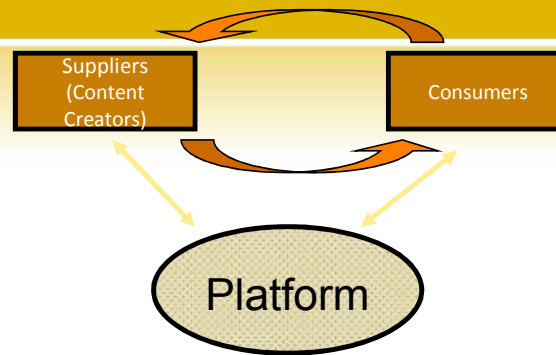
- $q_s[t]$ ,  $q_c[t]$  is the number of new suppliers and customers added during period  $t$  and
- $Q_s[t-1]$ ,  $Q_c[t-1]$  are the cumulative numbers of suppliers and customers your group has obtained through period  $t-1$ .



# TODAY'S GAME: TWO-SIDED MARKETS

$$q_s[t] = \left( \frac{Q_s[t-1]}{Q_c[t-1]} \right)^2 * \max \left( 1 - \frac{p - \bar{p}}{\bar{p}}, 0 \right) * 10$$

Content creators care about price but they care even more about the size of the consumer audience



$$q_c[t] = \left( \frac{Q_s[t-1]}{Q_c[t-1]} \right) * \max \left( 1 - \frac{p - \bar{p}}{\bar{p}}, 0 \right)^2 * 100$$

Consumers care about the number of content creators but they care even more about price

## Rules:

- ❑ Initially, each group has 10 suppliers and 100 consumers.
- ❑ In each round you release a new version; you are able to sell new releases of the software to all existing customers (suppliers and consumers).
- ❑ In each round your group will charge two prices: one price for the supplier and another price for the consumer. The Price effects all suppliers/consumers
- ❑ The supplier and buyer price shall be an integer from \$0 to \$40.
- ❑ Assume the average cost for each customer (suppliers and consumers) is \$10.
- ❑ The goal of this game is to have the largest cumulative profit after 5 rounds.

1. *Introduce E-business/Digital business*
2. *What is a Network Effect*
3. *Simulation of a one-sided network effect*

# DILBERT ON...



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# BUSINESS MODELS

**Your Task:**

**To understand business models and revenue models**

# BUSINESS MODELS

- ⊙ Captures firm's **concept** and **value proposition**
- ⊙ Conveys:
  - ⊙ The market **opportunity**
  - ⊙ What **product** or **service** the firm offers
  - ⊙ What **strategy** the firm will follow to seek a dominant or sustainable position
- ⊙ Identifies organizational **capabilities** the firm plans to leverage on to turn the concept into reality
- ⊙ The business model tells us what the firm does for its customers, how it does it, and how it is going to be compensated for what it does

Note: The network economy creates opportunities for new business models.

# ECommerce

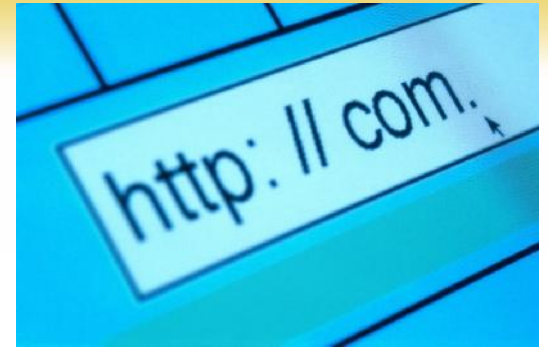
## REVENUE MODELS - HOW THE FIRM MAKES \$

A component of the Business Model

- ◎ **Pay for service:** Firm offers a product or a service for sale
- ◎ **Subscription:** Customers pay for the right to access the content (in a limited or unlimited manner)
- ◎ **Advertising support:** Firm provides content or service free for a large audience and then sells access to its audience to interested advertisers
- ◎ **Referral / Affiliate:** Firm collects revenue from a third-party based on traffic it sends to the partner web site.

# ECommerce / EBUSINESS DOMINANT BUSINESS MODELS

- ⊙ **Online retailing**
- ⊙ **Infomediaries**
- ⊙ **Content providers**
- ⊙ **Online communities**
- ⊙ **Exchanges (marketplace services)**
- ⊙ **Infrastructure providers**



# ONLINE RETAIL

## 2012- AMERICAN CUSTOMER SATISFACTION INDEX

		<u>2012 ACSI score</u>
1.		- 85
2.		- 84
3.		- 83
4.		- 81

Feb 26, 2013 Report: [link](#)



# INFOMEDIARIES

## Information intermediaries:

- Use the Internet to provide specialized information on behalf of product or service providers
- Do not sell the goods / services – link to providers
- Revenue model - referral or advertising

## Examples:

- Consumer electronics: NexTag.com
- Autos: Edmunds.com
- <http://www.clickbank.com/>

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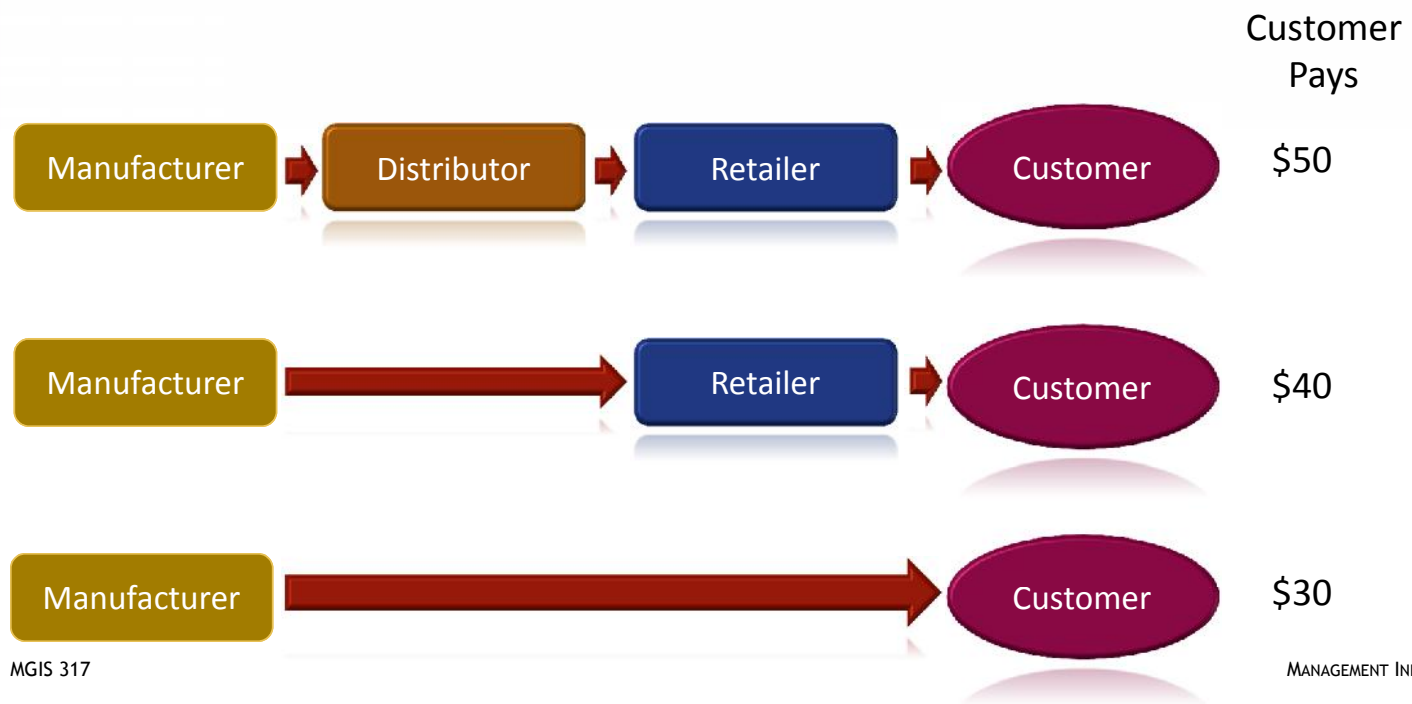
\*\* Infomedaries do not create content



MANAGEMENT INFORMATION SYSTEMS

# DISINTERMEDIATION

The elimination of organizations or business process layers responsible for certain intermediary steps in a value chain, reducing costs to the consumer



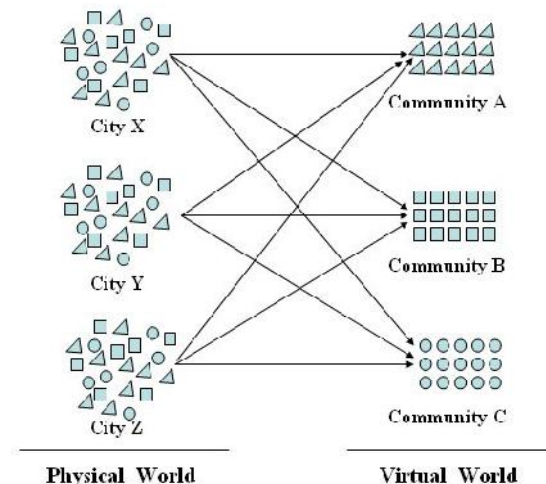
# CONTENT PROVIDERS

- ◎ Content providers **publish content**
- ◎ Sources of contents
  - Owned: Generated by the organization's staff
  - Not owned: User-generated
- ◎ Revenue model:
  - ad supported, subscription, pay per download
- ◎ Examples:
  - News: Reuters.com
  - Gossip: Eonline.com
  - Travel tips and info: TripAdvisor.com
  - Historical and reference information: Britannica.com



# ONLINE COMMUNITIES

- ⊙ A group of people brought together by a **common interest** or **goal**.
- ⊙ The community is virtual and alleviates the physical constraint.
- ⊙ Revenue model:
  - ⊙ mostly ad supported
- ⊙ Example:
  - ⊙ Yahoo! Answers
  - ⊙ Harley Chat Group



# EXCHANGES

- ◎ Organizations that create a **marketplace** for buyers and sellers to come together and transact.
- ◎ Provide *market-making* service
- ◎ Revenue model - pay for service
- ◎ Examples:
  - ◎ eBay, uBid, Elance, InnoCentive

# ECommerce IMPLICATIONS

***Disintermediation***: Shortening the supply chain by eliminating intermediaries and establishing direct relationship with customers

***Re-intermediation***: Creating opportunities for new intermediaries to exist alongside their brick and mortar counterparts

***Market efficiency***: Reducing search costs increases difficulty in profiting from strategies rooted in asymmetry of information or high search costs

***Channel conflict***: The dilemma of firms facing the choice between disintermediation or re-intermediation

***Customer and employee self-service***

- ⦿ Creating opportunities for new intermediaries to exist alongside their brick and mortar counterparts is known as
  - ⦿ *Re-intermediation*:

# THE LONG TAIL

Your Task:  
To understand long tail effects



# Why do consumers shop on the Internet?

- ⊙ Convenience?
- ⊙ Lower prices?
- ⊙ Larger product selection?

# Popular products

- ◎ heavily promoted, advertised, and displayed at featured locations
- ◎ Examples?
  - ◎ NYTimes Bestsellers
  - ◎ New release DVDs
  - ◎ Billboard top 40 hits

# What is Pareto Principle?

- ⊙ Suggested by Vilfredo Pareto in his study of wealth distribution
- ⊙ a.k.a. 80/20 rule (*80% of your sales come from 20% of your clients*)
- ⊙ Widely used in
  - ⊙ product sales distribution,
  - ⊙ sales force management,
  - ⊙ city population distribution
- ⊙ Implication for managers:
  - ⊙ A few are vital, many are trivial
  - ⊙ Identify and focus on the 20% that matters

# Larger product selection

- ◎ Supply side: why retailers supply obscure products on the Internet?
- ◎ Demand side: why consumers buy obscure products on the Internet

# Product variety comparison

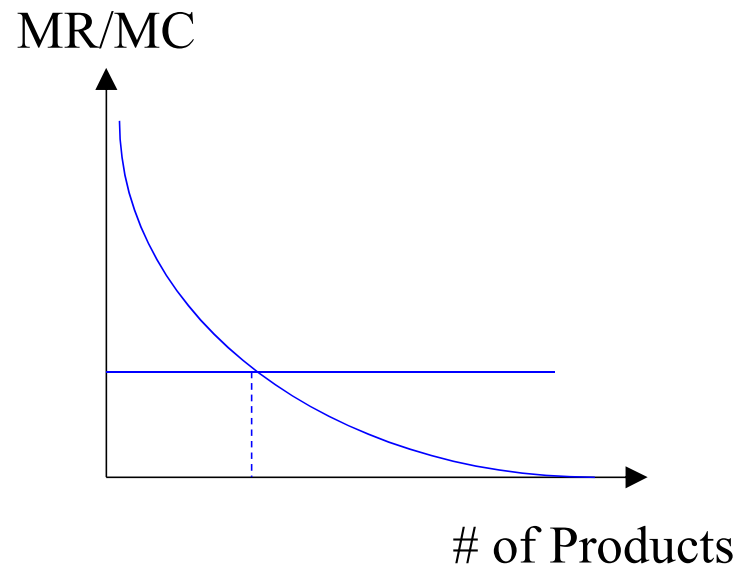
<i>Product Category</i>	<i>Amazon.com</i>	<i>Typical Large Brick-and-Mortar Store</i>
Books	3,000,000	40,000 – 100,000
CDs	250,000	5,000 – 15,000
DVDs	18,000	500 – 1,500
Digital Cameras	213	36
Portable MP3 players	128	16
Flatbed Scanners	171	13

Wal-Mart stocks 600,000 SKUs online versus 100,000 offline

Source: Brynjolfsson, Hu and Smith (2003)

## Supply side: why retailers offer increased product variety online?

- ⊙ Cost
- ⊙ Benefit



# Reducing marginal cost

- ⊙ Centralized warehouse, inexpensive real estate
- ⊙ Drop-shipping
- ⊙ Electronic delivery of products
- ⊙ Print-on-demand at \$3 per copy, instead of in volumes of 1,000
- ⊙ IT lowers production, distribution, promotion costs
  - ⊙ Guru.com
  - ⊙ CNN
  - ⊙ MySpace.com

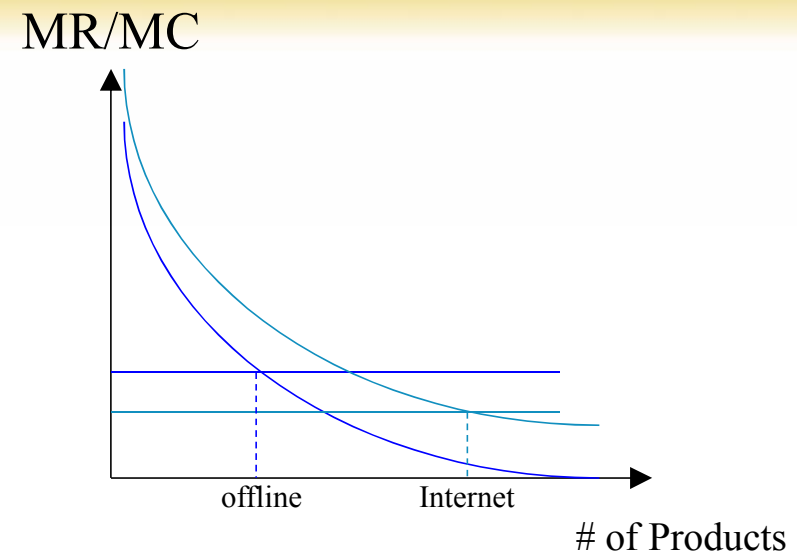
# Increasing marginal revenue

- ◎ Local store serves a market within a radius
  - ◎ grocery
  - ◎ car
- ◎ Internet markets serves the whole country, or the whole planet



# Supply-side drivers of long tail

- ② Cost
  - Virtual shelf-space
  - Make-to-order production
  - Electronic delivery
- ② Benefit
  - Aggregation of consumers



# Demand side: why consumers buy obscure products online?

- ◎ Active tools
  - ◎ search tools
  - ◎ North Americans made 10.6 billion searches in 2013
- ◎ Sampling tools
- ◎ Passive tools
  - ◎ recommendation system
  - ◎ advisors
  - ◎ dynamic/personalized storefronts
- ◎ Product reviews, product-focused blogs
  - ◎ Bathys Hawaii Watch featured at Gizmodo.com
  - ◎ “Our sales and Web site hits went through the roof...”

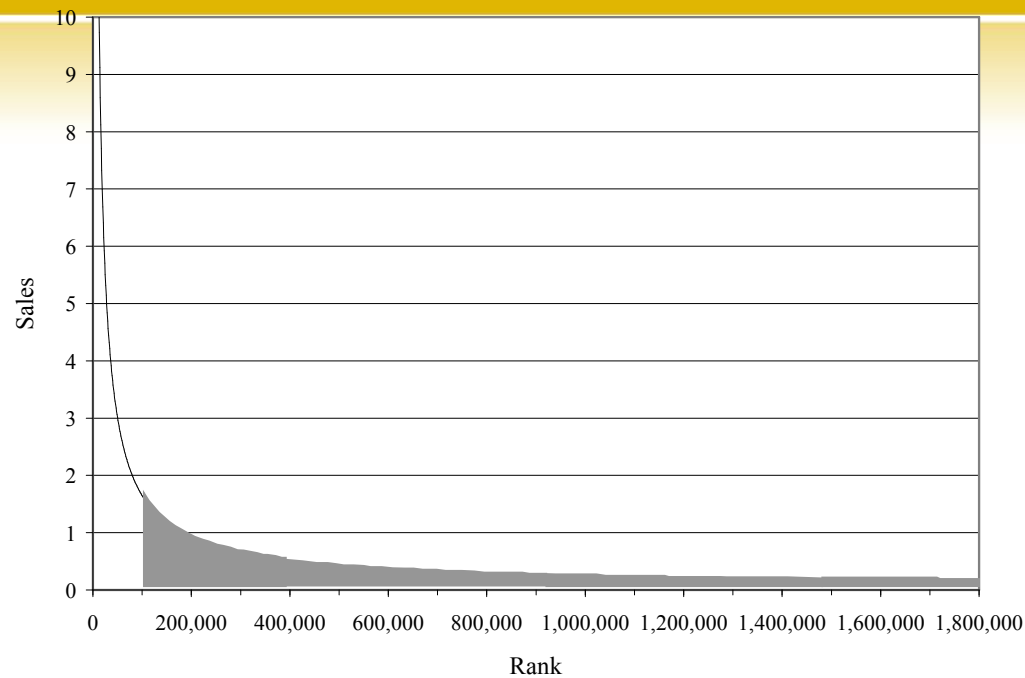
<http://www.huafu.org/>

# What is Long Tail?

- ⦿ Electronic markets greatly lower search cost, and facilitate discovery of niche products
- ⦿ Shift from popular, mass-market products to niche, previously obscure products
- ⦿ Lowers competition with local stores
  - ⦿ No competition between local stores and Internet retailers for Niche products

Brynjolfsson, E., Hu, Y. J., & Smith, M. D. (2006). From Niches to Riches: Anatomy of the Long Tail. *Sloan Management Review*, 47(4), 67-71.

# Proportion of sales in obscure



<i>Sales Rank</i>	<i>Proportion in Total Sales</i>	<i>Standard Error</i>
>40,000	46.0%	2.3%
>100,000	36.9%	2.1%
>250,000	26.6%	1.7%

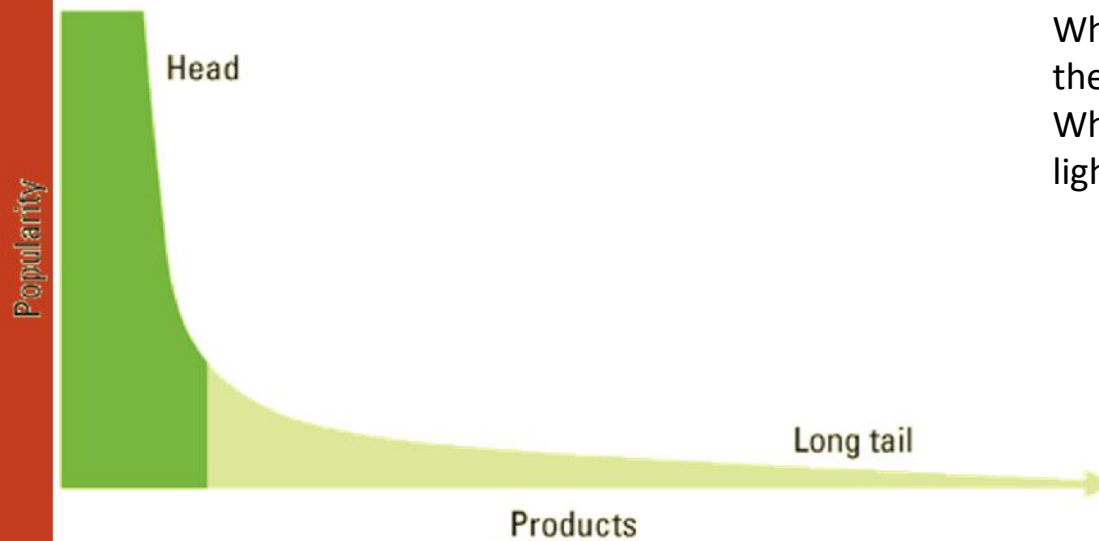
# Sales of obscure books

- ④ 40% of Amazon's book sales come from obscure books
- ④ \$590 million in yearly sales
- ④ Consumer welfare = \$756 to 971 million / year

<http://www.alibaba.com/>

# LONG TAIL

- **The Long Tail** – Refers to the tail of a typically sales curve



What products would be in the deep green band?  
What products would be in the light green band?

## WHAT FACTORS CREATE THE LONG TAIL EFFECT?

- ◎ Lowered marginal costs
  - Shipping, printing, warehousing, real estate
- ◎ Electronic markets greatly lower search cost, and facilitate discovery of niche products
- ◎ Lowers competition with local stores
  - No competition between local stores and Internet retailers for niche products
- ◎ Shift from popular, mass-market products to niche, previously obscure products

- ◎ Long Tail reflects both supply (e.g. shelf space, product variety) and demand (e.g. search costs of finding obscure products)
- ◎ Implications
  - ◎ Companies should pay more attention to niche obscure products on the Internet
    - Make them available, develop even more



- ◎ *The 80/20 rule is also known as*
  - ◎ *The Pareto Principle*