

# **The Economics of E-commerce and Technology**

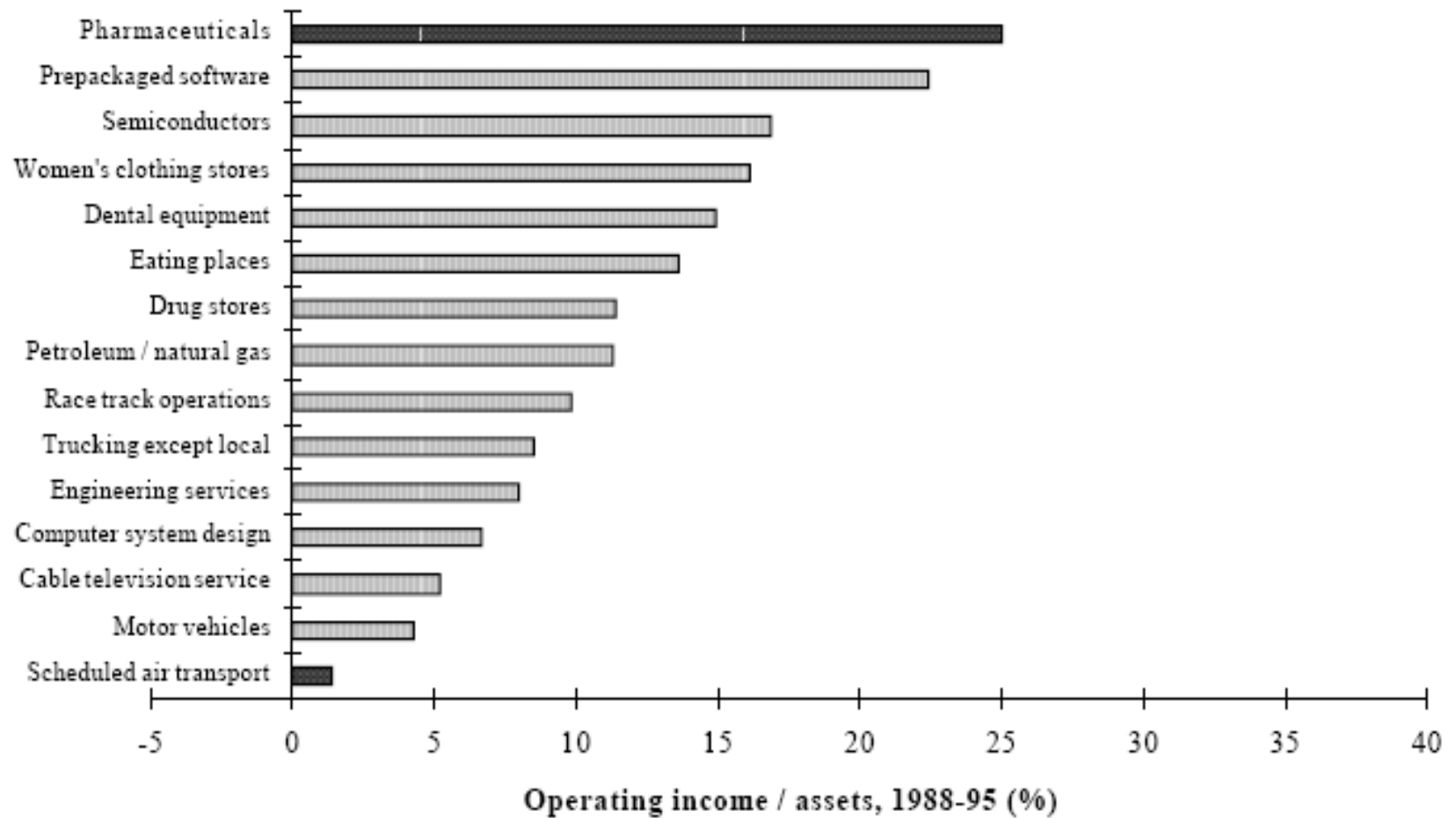
Competitive Advantage

# Industry vs. Firm Analysis

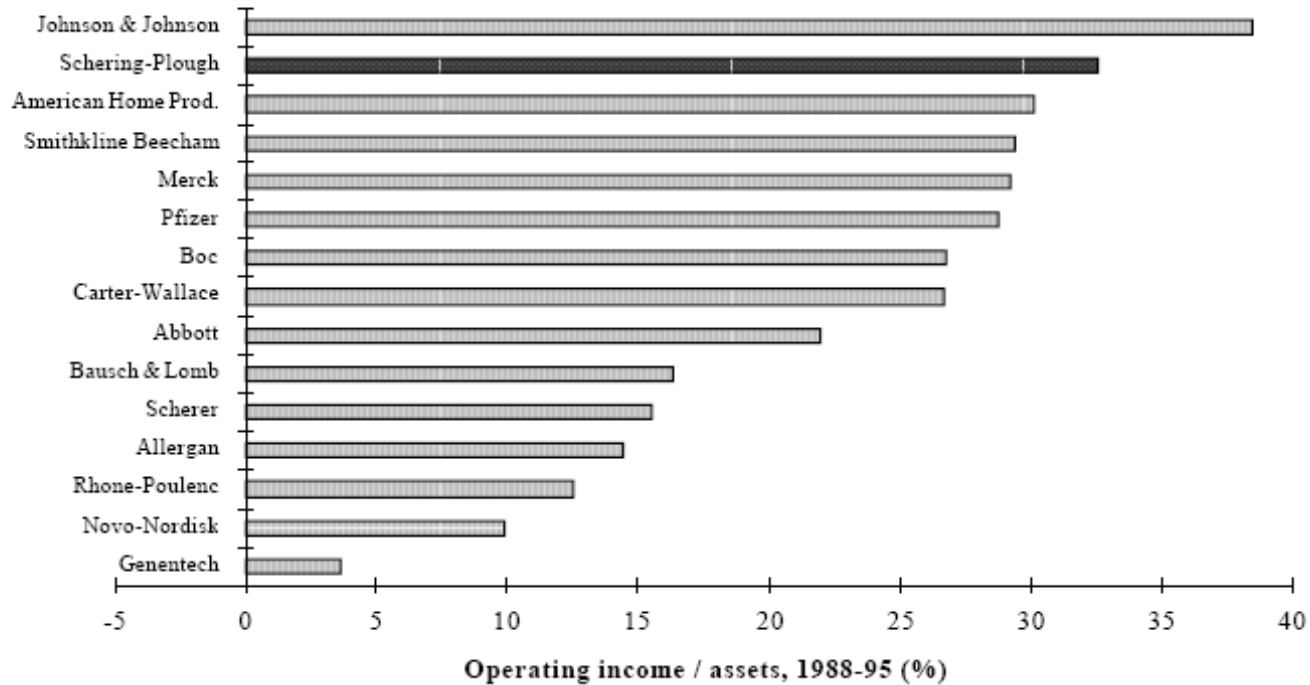
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- ▶ Industry analysis looks at what determined average profitability
- ▶ What makes individual firms within an industry different?
- ▶ To create an advantage, a firm must do something unique and valuable
- ▶ Goal: Understand why some firms earn superior profits, and use this knowledge to evaluate strategic options.
- ▶ Porter: “Competitive Strategy is about being different”

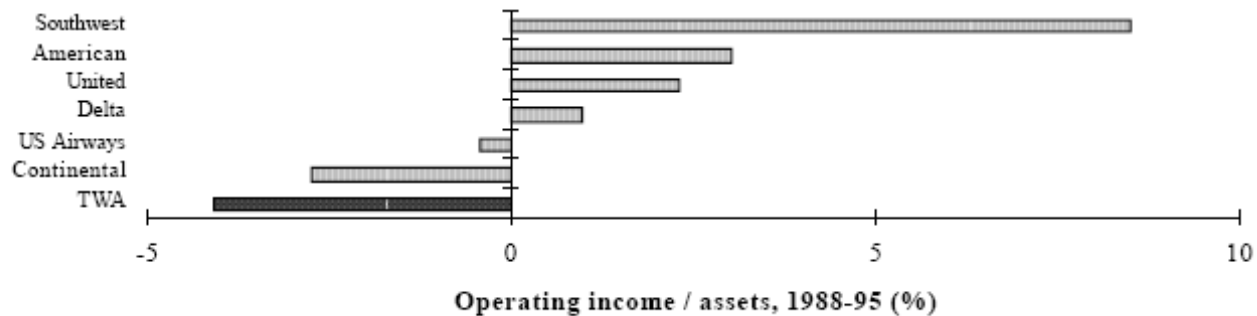
**Figure 1: Profitability Differences Across Selected Industries**



**Figure 2a: Profitability Differences Within the Pharmaceutical Industry**



**Figure 2b: Profitability Differences Within the Airline Industry**



# Two Questions

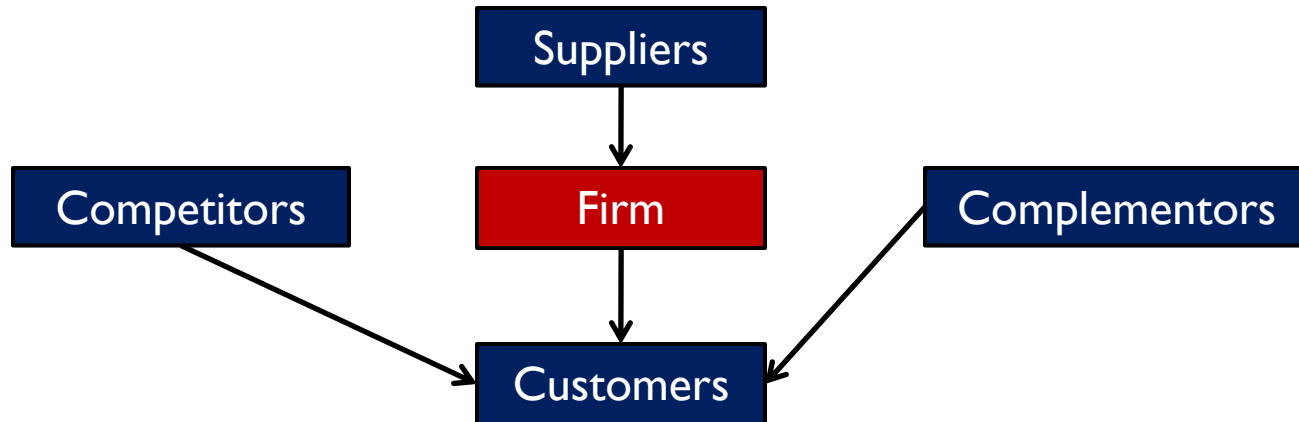
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- ▶ **How does a firm create a competitive advantage?**
  - ▶ How can a firm position itself differently from its competitors?
  - ▶ What activities can a firm adopt that will differentiate itself?
  - ▶ About short-run profitability.
  
- ▶ **What makes a competitive advantage sustainable?**
  - ▶ What assets, resources or capabilities prevent imitation?
  - ▶ How can firm leverage existing assets, resources and capabilities?
  - ▶ About long-run profitability.

# Added Value

# The Value Pie

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- ▶ Total value of industry
  - ▶ Utility of consumer minus opportunity costs of inputs
- ▶ Added value of firm
  - ▶ Reduction in total value of industry if your firm is annihilated.

# Value Creation: Example

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- ▶ In 2009, Ruud Lighting signed deal with city of Los Angeles for 140,000 LED streetlights.
- ▶ Total value
  - ▶ LA saves \$100m by switching to LED
  - ▶ Price is \$57m
  - ▶ Ruud's costs are \$30m.
  - ▶ Total value = \$70m, LA gets \$43m, Ruud gets \$27m.
- ▶ Ruud's added value
  - ▶ What if Ruud is only LED company?
  - ▶ What if ACME can produce \$90m savings for cost \$25m?



# Added Value

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- ▶ **Claim:** A firm's profits cannot exceed added value.
  - ▶ Idea: If firm's profits exceed added value, the other parties can jointly become better off by working around this firm.
- ▶ **Right questions are not**
  - ▶ Is this an attractive industry in general?
  - ▶ Is demand for product growing?
- ▶ **Right questions are:**
  - ▶ Can I make product at lower cost than competitor?
  - ▶ Can I create more value than my competitor?

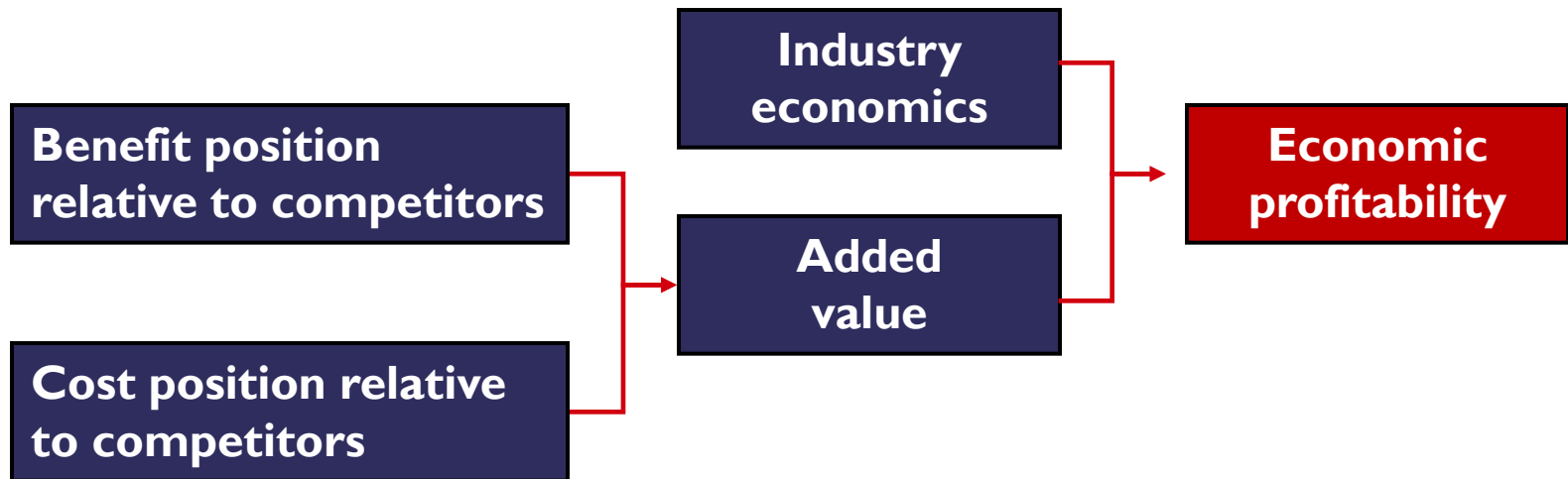
# Example

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- ▶ Verizon, T-Mobile and Apple.
- ▶ Assumptions
  - ▶ 100m smart phone customers.
  - ▶ T-Mobile capacity 40m; Verizon capacity 80m. Marginal cost \$0.
  - ▶ People value T-Mobile at \$40; Verizon at \$50.
- ▶ Question: How much will Verizon get?
  - ▶ Value added is \$3200m, so this is upper bound.
  - ▶ Value added of Apple is \$4800m, so Verizon's lower bound is 0.
- ▶ What if we add Google?
  - ▶ With Android, value T-Mobile at \$30; Verizon at \$40.
  - ▶ Value added Apple \$1000m, Google \$0, T-Mobile \$800m.
  - ▶ Verizon gets at least  $\$4800 - \$1000 - \$800 = \$3000$ .

# Added value and industry economics

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# From added value to strategy

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- ▶ To increase profits firm must increase added value
  - ▶ Drive a bigger wedge between benefits and costs
- ▶ How do we identify what strategic moves will do this?
  - ▶ Break down and analyze the specific activities that make a firm different from its competitors
  - ▶ How do these affect benefits/costs?
  - ▶ How can we change the activity mix to create more benefits or reduce costs?
  - ▶ Given a specific customer niche, what activities should we engage in so as best to serve them?

# Differentiation

# Product differentiation

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- ▶ In the LED example, only one firm (the one with the greatest added value) can earn positive profits
- ▶ Often, consumers are heterogeneous (not just firms)
  - ▶ Some people prefer Android features, others iPhone features
  - ▶ Some people place low value on data plan and have old Nokia
- ▶ Many firms can have positive added value and earn profits
  - ▶ Understanding consumer heterogeneity is key to successful strategy

# Product Differentiation: Classification

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- ▶ Consider two products: A and B
- ▶ Vertical differentiation
  - ▶ If  $p_A = p_B$  then everyone prefers A to B
  - ▶ If people value quality differently, some firms offer high-quality high-price goods; others offer low-quality low-price goods.
- ▶ Horizontal differentiation
  - ▶ If  $p_A = p_B$  then some prefer A and some prefer B.
  - ▶ Firms can carve out niches, targeting specific customers
- ▶ Measuring degree of heterogeneity
  - ▶ When we increase  $p_A$  how many people switch to B?

# Strategy: Horizontal Differentiation I

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## ▶ Hotelling's Model

- ▶ Customers located uniformly distributed on line  $[0, 1]$ .
- ▶ Customers have transport costs  $cd$ , where  $d$  is distance.
- ▶ Firms have zero costs.

## ▶ Minimal differentiation: Both firms located at $1/2$

- ▶ Bertrand competition:  $p_A = p_B = 0$  and both get zero profit.

## ▶ Maximal differentiation: Firms located at 0 and 1

- ▶ Given prices  $(p_A, p_B)$  demand is given by

$$q_A = \frac{1}{2} + \frac{p_B - p_A}{2c} \quad \text{and} \quad q_B = \frac{1}{2} + \frac{p_A - p_B}{2c}$$

- ▶ Tradeoff: If lower price steal marginal customer, but make less money on inframarginal customers.
- ▶ Profit maximizing prices:  $p_A = p_B = c$  and profits  $\pi_A = \pi_B = c/2$ .



# Strategy: Horizontal Differentiation II

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- ▶ Minimal or maximal differentiation?
- ▶ As A moves away from 0
  - ▶ Direct effect: It steals some of B's customers
  - ▶ Indirect effect: Price competition becomes more intense.
  - ▶ Suggests firm might move in a little, but not all the way.
- ▶ Other reasons to cluster
  - ▶ Be where demand is (e.g. Amazon market place).
  - ▶ Attract customers (e.g. malls).
  - ▶ If no price competition (e.g. radio stations, where use adverts).

# Finding a niche market

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- ▶ Usual laptop firms: HP, Dell, Acer, Toshiba, Lenovo
- ▶ Military laptops: Getac, General Dynamics, Trimble
  - ▶ Need to withstand shock, weather, humidity, explosions...



# Strategy: Vertical Differentiation I

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## ▶ Model

- ▶ Customers have valuations  $v \sim U[0, 1]$ .
- ▶ Two firms with qualities  $x_A$  and  $x_B$ , where  $x_A \geq x_B$ .
- ▶ Agents receives utility  $v x - p$ , where  $p = \text{price}$ .
- ▶ **Minimal differentiation: Both firms located at 'x'.**
- ▶ Bertrand pricing  $p_A = p_B = 0$  and both get zero profit.
- ▶ **Differentiation: Firms located at  $x_A > x_B$ .**

- ▶ Given prices  $p_A > p_B$  demand is

$$q_A = 1 - \frac{p_A - p_B}{x_A - x_B} \quad \text{and} \quad q_B = \frac{p_A - p_B}{x_A - x_B} - \frac{p_B}{x_B}$$

- ▶ Tradeoff: marginal vs. inframarginal agents.
- ▶ Firm with higher quality has higher profits.

# Strategy: Vertical Differentiation II

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- ▶ **How much differentiation?**
  - ▶ Producing higher quality is costly
  - ▶ Higher quality raises WTP of agents and thus prices.
- ▶ **What if there is only one firm?**
  - ▶ Insight: care about WTP of the *marginal* agent.
  - ▶ Example: Three agents have values  $v_1=10$ ,  $v_2=7$  and  $v_3=2$ .
    - ▶ Suppose innovation costs \$1 and increases  $v_1, v_2$  by \$1.
    - ▶ Suppose innovation costs \$1/2 and increases  $v_1$  by \$1.
- ▶ **Returning to two firms.**
  - ▶ Competition becomes softer when high firm raises quality and low firm lowers quality.
  - ▶ Obtain some differentiation in equilibrium.

# Generic Strategies

# Generic strategies

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- ▶ The analysis of differentiation leads to a taxonomy of generic competitive strategies along two dimensions
- ▶ **Cost vs. Differentiated strategies**
  - ▶ Cost = Low cost, standardized products.
  - ▶ Differentiated = Target customer segments.
  - ▶ Concerns fit of product to customers.
- ▶ **Broad vs. Focus strategies**
  - ▶ broad = try to serve a wide range of customer segments and/or offer a full line of related products
  - ▶ focus = target a narrow customer segment and/or offer a narrow set of product varieties
  - ▶ Range of products to offer

# Cost vs. Differentiated

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- ▶ **Cost position (e.g. Dell)**
  - ▶ Standardized products, limited customization
  - ▶ Cost conscious culture
  - ▶ High volumes
- ▶ **Differentiated position (e.g. Alienware)**
  - ▶ Differentiated products
  - ▶ Highly targeted
- ▶ **Which is better?**
  - ▶ Are economies of scale exploited?
  - ▶ Are quality improvements valued? (e.g. phone size vs. features)
  - ▶ Are quality improvements easily imitated?

# Broad vs. Focus

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## ▶ Broad strategy

- ▶ Serve full range of customers
- ▶ Can have single low-cost product (e.g. Apple)
- ▶ Can have range of differentiated products (e.g. HTC)
- ▶ Attractive if there are economies of *scope* across products
  - ▶ Can use common components in different products (e.g. batteries).
  - ▶ Can share branding/reputation advantages
  - ▶ Complementarities in consumption (e.g. Mac and iPhone)

## ▶ Focus strategy (e.g. Designer phones)

- ▶ Attractive if consumer heterogeneity is important,
- ▶ Economies of scale in narrow product segments
- ▶ Expertise in product not transferable.



# Sustainability

# Sustainability

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- ▶ **Competitive advantages depend on a firm's**
  - ▶ Resources (things you have): a firm's physical, human, and other intangible assets (knowledge, reputation)
  - ▶ Capabilities (things you can do): organizational routines that transform a firm's resources into goods and services
- ▶ **To be sustainable, a resource must be**
  - ▶ Hard to imitate
  - ▶ Immobile
- ▶ **We'll discuss three special cases:**
  - ▶ Early mover advantages
  - ▶ Networks of activities
  - ▶ Core competencies

# Example: Google

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- ▶ Google has high value added today.
- ▶ Will it have high value added in 5 years? 20 years?
- ▶ List of competitive advantages
  - ▶ Expertise in search
  - ▶ Network of advertisers
  - ▶ Quality of people
  - ▶ Culture of innovation
  - ▶ Range of complementary products (with network effects and switching costs)
  - ▶ Server farms (increasing returns to scale)
  - ▶ Data (about everything and everyone)
- ▶ Are these sustainable?

# Barriers to Imitation

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- ▶ A resource is a source of sustainable advantage if it is difficult / costly for competitors to duplicate.
  1. Competitors cannot access resources
    - ▶ Literal scarcity (diamond mines),
    - ▶ Legal restrictions (patents; trademarks; licenses)
    - ▶ Privileged access to buyers or suppliers (long-term contracts)
  2. Competitors cannot imitate
    - ▶ Causal ambiguity (firm does many things; which are critical?)
    - ▶ Competitor cannot observe parts of strategy (e.g. Google algorithm)
    - ▶ Path dependence (firm succeeded because of historical circumstances that no longer exist)
    - ▶ But hire away key employees?

# Barriers to Imitation

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3. **Not profitable for competitors to imitate**
  - ▶ Large returns to scale mean imitator cannot cover fixed costs
  - ▶ High switching costs create entry cost for imitator
  - ▶ Imitator needs to build up network
  - ▶ Imitator expects harsh price competition
  
4. **By time competitor imitates, firm in better position**
  - ▶ Learning by doing
  - ▶ Continual technological advancement

# Immobility

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- ▶ If perfectly mobile, resources extract all the rents
  - ▶ Lionel Messi should collect value of Champions League win.
- ▶ Example: FIFA has exclusive agreement with EA for soccer video games.
  - ▶ Is this a source of sustainable competitive advantage for EA?
- ▶ Immobility depends on
  - ▶ Contractibility (can you sell a reputation?)
  - ▶ Definability (knowledge may be dispersed throughout firm)
  - ▶ Complementarily with other assets (can't just move one asset)

# Three Examples of Sustainable Advantage

# (1) First Mover Advantage

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- ▶ Many of the barriers to imitation we have discussed suggest an advantage for first movers
  - ▶ Getting a prime location
  - ▶ Securing an exclusive contract
  - ▶ Being the first to pay sunk costs in a natural monopoly
  - ▶ Moving down a learning curve
  - ▶ Capturing consumers in a market with switching costs
  - ▶ Building an installed base for your standard



# But... Late Mover Advantage

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- ▶ First-movers are guinea pigs (e.g. GM EVI car)
- ▶ First mover pays costs that benefit the late comers
  - ▶ Consumer awareness of a new technology (e.g. LCD TVs)
  - ▶ Supply chains and distribution channels (e.g. MP3 and flash)
  - ▶ Complementors (e.g. iPhone and apps)
  - ▶ Investments by consumers (e.g. Blu-Ray and player)

# Apple's iPod

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- ▶ **First into industry**

- ▶ SaeHan's flash player in 1988
- ▶ Compaq's 2.5" player in 1999
- ▶ Design became standardized

- ▶ **Apple launched in Fall 2003**

- ▶ Minimalist design with wheel interface
- ▶ iTunes software
- ▶ DRM enabled deal with record companies
- ▶ Locked in supply of drives/flash
- ▶ Gained 70% market share by Dec 2007

- ▶ **Competition**

- ▶ Sandisk and Zune running WMP had 10% market share each

## (2) Coherent Strategies

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- ▶ **Porter (1996).**
  - ▶ Sustainable strategies rest on doing many interlocking activities
  - ▶ Create fit among activities, doing all well
  - ▶ Make trade-offs. Choose what not to do.
  - ▶ Complementarities increase value added.
- ▶ **Systems of activities hard to imitate**
  - ▶ Causal ambiguity
  - ▶ Have to imitate the entire system
  - ▶ Danger: when growing firm forgets what makes them unique.
- ▶ **A Steve Jobs quote:**
  - ▶ “It comes from saying no to 1,000 things to make sure we don’t get on the wrong track or try to do too much. We’re always thinking about new markets we could enter, but it’s only by saying no that you can concentrate on the things that are really important.”

# Apple's Laptops

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- ▶ **Differentiated from competitors**
  - ▶ Apple is highly differentiated.
- ▶ **Sells complementary lines**
  - ▶ Apple has ecosystem - iPod, iPhone, iPad, iTunes.
- ▶ **Offers few varieties**
  - ▶ Apple sells five versions of MacBook Pro.
- ▶ **Makes in anticipation of orders**
  - ▶ Apple makes computers in China.
- ▶ **Sells via self-branded retailers**
  - ▶ Uses Apple stores rather than online or Best Buy.
- ▶ **Highly branded**
  - ▶ Lots of advertising, recognizable products.

### (3) Core competencies

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- ▶ A small number of key assets or capabilities define a firm's competitive advantage
  - ▶ Google: culture, experience of search
  - ▶ Canon: precision mechanics, fine optics, micro-electronics
- ▶ Seems very different from the Porter formulation
  - ▶ Focus on a few key things instead of a network of activities
- ▶ However, it carries a similar message
  - ▶ Focus on deepening advantages
  - ▶ Look for niches in which current assets give you an advantage

# Jobs / Cook Doctrine

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We believe that we are on the face of the earth to make great products and that's not changing. We are constantly focusing on innovating. We believe in the simple not the complex. We believe that we need to own and control the primary technologies behind the products that we make, and participate only in markets where we can make a significant contribution. We believe in saying no to thousands of projects, so that we can really focus on the few that are truly important and meaningful to us. We believe in deep collaboration and cross-pollination of our groups, which allow us to innovate in a way that others cannot. And frankly, we don't settle for anything less than excellence in every group in the company, and we have the self-honesty to admit when we're wrong and the courage to change. And I think regardless of who is in what job those values are so embedded in this company that Apple will do extremely well.

# Wrap-Up

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- ▶ **Competitive advantage means adding value**
  - ▶ Differentiate your product
  - ▶ Appeal to a particular market
  - ▶ Be more efficient
- ▶ **Is your competitive advantage sustainable?**
  - ▶ Be hard to imitate
  - ▶ Have immobile resources
  - ▶ Have a coherent strategy