Information Rules: A Strategic Guide to The Network Economy

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Information Rules

A Strategic Guide to the Network Economy

by Carl Shapiro and Hal R. Varian

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The "New" Economy

- New technological advances everyday
- New and faster communication technologies
- The public gains access to these technologies
- Unprecedented economies of scale
- Empires rise, fortunes made
- Government demands accountability under antitrust laws
- The old business models seem to no longer apply. Is it time to throw them out?

- This sounds familiar…

The "New" Economy

- We could be describing the current technological revolution and its impact
  - Entrepreneurs using the computer and communications infrastructure to transform the economy

- We could just as well be talking about what happened a century ago with the emergence of the industrial giants
  - Industrialists capitalizing on the emerging electricity and telephone networks

The "New" Economy

"Technology changes. Economic laws do not."

- ◆ Shapiro and Varian insist that we don't need a "New Economics" – a new set of principles to guide business strategy and public policy

- ◆ Existing literature on:
  - ▪ Differential pricing
  - ▪ Bundling
  - ▪ Signaling
  - ▪ Lock-in
 - ▪ Network economics . . .

The Information Economy

- <u>Information</u> – anything that can be digitized, i.e. encoded as a stream of bits
- Certain types of information have different value to different people, for e.g., entertainment or business
- Regardless of what kind of value is placed, people are willing to pay for information
- Examples of **information goods**:
  - Books, databases, magazines, movies, music, stock quotes, sports scores, news, Web pages, …

The Information Economy

- Information is expensive to produce but cheap to reproduce
- In economics terms, production involves high fixed costs but low marginal costs
  - Cost of producing the first copy may be substantial but for later copies essentially negligible
  - No capacity constraints
- Cost-based pricing makes little sense
  - E.g. 10% markup on unit cost, when unit cost ~$0
- Information goods should be priced according to consumer value, not production cost

The Information Economy

- ◆ Value-based pricing leads to differential pricing, since consumers have different *willingness to pay* for information
- ◆ Pricing your product – an example:

Price ($)

60

40

20

1   2   3   Quantity (Millions)

1 million w.t.p. $60

2 million w.t.p. $20
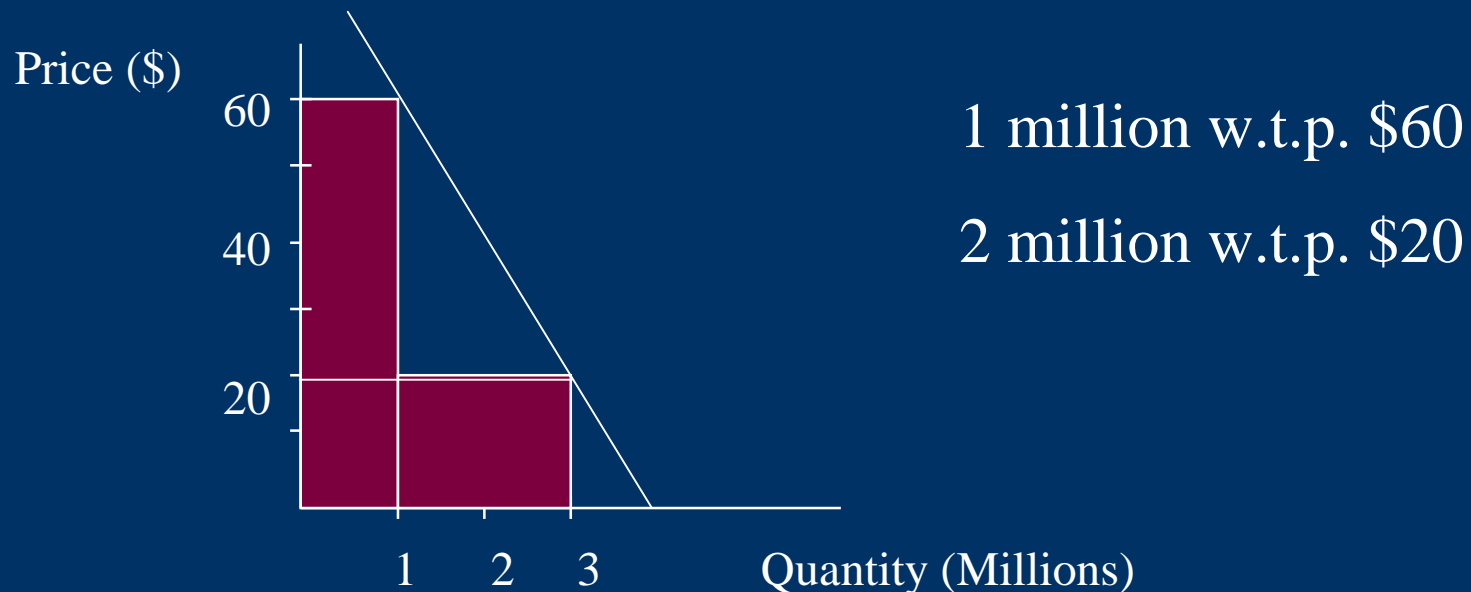
Differential Pricing

- Some problems
  - How does seller know customers' willingness to pay?
  - How to prevent arbitrage?
- In the extreme case, charging each customer exactly what he or she is willing to pay is **perfect price discrimination**
- Some reasons why it is hard to approximate, let alone achieve
  - Hard to determine maximum price someone is w.t.p.
  - Hard to offer product at a lower price to those less willing to pay without providing others the same offer

Differential Pricing

- With the Internet, it's easier to arrange for differential pricing using "point-to-point" technology
- Strategy is currently referred to as "one-to-one marketing"
- But first described by A.C. Pigou in 1920 as "first-degree price discrimination"

- Forms of differential pricing:
    - 1st: Personalized pricing – sell to each user at a different price
    - 2nd: Versioning – offer a product line and let users choose
    - 3rd: Group pricing – based on group membership/identity

Personalized Pricing

- ◆ Traditional industries
  - Print media, mail-order catalogs with "special offers"
    - May be a form of market research to discover price responsiveness
  - Airlines have different fare classes on a single flight
    - Dependent on when you book, what restrictions you are willing to accept, travel history, etc.
  - "Smart" cash registers in supermarkets
    - Customized coupons
    - Discount for those buying a competitor's product
  - May need to invest heavily in expensive infrastructure for gathering and analyzing data

Personalized Pricing

- On the Internet
    - More individualized and interactive
    - Information can be processed quickly
    - Amazon.com tracks purchases of each consumer and recommends related items the next time he/she logs on
    - Prices can be adjusted quickly and excess supply marked down
    - More than moving product, promotional pricing can estimate market response to price changes, discover price points that sell
- Key points
    - Personalize product and personalize pricing
    - Know your customer
    - Differentiate prices when possible
    - Use promotions to measure demand

Group Pricing

- Base prices directly on group identity
- Why sell to groups rather than end users?
  - **Price sensitivity** – systematic difference in
  - **Networks effects** – externalities, value to individual depends on number of users
  - **Lock-in** – increase switching costs for organization
  - **Sharing** – site licenses, selling to end user or rental market
- Key points
  - Consider price sensitivity, desire for standardization, repeat use, and market segmentation of groups

Versioning Information

- We considered the approach of personalized pricing, which requires knowledge about individual consumers
- With **versioning**, we don't need to price by identity
- Offer a product line (menu) of different versions, and observe choices
  - Target different market segments
  - Price accordingly to different segments, design versions that emphasize needs of different groups, emphasizing differences of groups (self-selection)
- Customer reveals value through version selected

Versioning Information

- Case study: Mathematica by Wolfram Research
- A computer program that does symbolic, graphical, and numerical mathematics
- Professional users:
  - Economics, Medical sciences, Engineering, Statistics
  - Speed is critical and thus commands a high value
- Student users
  - Speed is less important but not functionality
- Market segments naturally

Versioning Information

- Wolfram sold the professional version of Mathematica and a student version

- At one time, the student version had essentially all the functionality of the professional version, but had the floating-point coprocessor disabled

    - Slowed down mathematical and graphical calculations
    - To implement strategy, a floating-point library was created at additional cost

Versioning Information

- ◆ Observations
  - ■ Quality deliberately cut at low end (or to create low end product)
  - ■ Value-subtracted versions may cost more to produce than higher-quality version
  - ■ When designing product, it is useful to be able to turn features off
    - ● Design with a top-down approach
  - ■ Low-end version could be a way to "advertise" the high-end product
    - ● Information goods are "experience" goods
    - ● Users get locked-in to product format

Versioning - Examples

- Other examples from hardware:

- IBM LaserPrinter Series E
  - Functionally identical to standard LaserPrinter
  - Printed 5 ppm rather than 10 ppm due to a chip that inserted wait states

- Intel 486SX chip
  - At the time, Intel had a virtual monopoly on computer chips
  - Had integrated math coprocessor that was disabled ($333 in 1991)
  - Original chip with coprocessor enabled was 486DX ($588 in 1991)

Versioning - Examples

- ◆ Does this strategy always work?
  - By offering a lower end product, the potential market is expanded
    - Some users who would not have bought the higher end will buy the lower end
  - But some people who would have bought the high end will buy the low end instead – "cannibalization" of high end
    - Want to avoid since profit margins are higher for high end (higher prices, lower cost)
  - To minimize this, may need to cut price of high end and/or cut quality at low end
  - Success depends on there not being too many who switch

Versioning - Pitfalls

- ◆ Arbitrage
  - ▪ Make sure users can't easily convert the low-end version into the high-end
  - ▪ Windows NT Workstation ($260 in 1998) could run a server and accept 10 simultaneous sessions
  - ▪ Windows NT Server ($730 - $1,080)
  - ▪ A few tweaks turn Workstation into Server

- ◆ Resentment

Versioning - Dimensions

- Designing product line – identify dimensions highly valued by some and of little importance to others
  - Speed of operation (Mathematica, 486SX)
  - Delay (Fed Ex, stock quotes)
  - User Interface (complicated, more powerful or simple)
  - Image Resolution
  - Features and functions
  - Annoyance (nagware)
  - Tech support
  - …

Versioning - Considerations

- How many versions?
  - It really depends, but there are some guidelines
  - One is too few
  - Too many versions
    - Costs of maintaining too many products on supply side
    - User confusion on demand side
  - Analyze your market – natural segmentation? Different behaviors?
  - Analyze your product – consider dimensions with eye on market
- Goldilocks pricing
  - Extremeness aversion
  - Small, Large, and Jumbo

Versioning - Considerations

◆ **Bundling** – two or more distinct products are offered as a package at a single price

	Word processor	Spreadsheet
Carl	$120	$100
Hal	$100	$120

■ Profits: $400 sold separately

$440 bundled ($220 / bundle)

◆ Reducing dispersion in willingness to pay tends to increase revenue

◆ Other considerations – option value, product introduction

Versioning - Example

	Impatient customer's value	Patient customer's value
Immediate version	$100	**$50**
Delayed version	$40	$30
# of customers	40	60

- If offering just 1 version, the best approach is to sell the immediate version, to all customers, at a price of $50
    - Total revenue = $50 (40 + 60) = $5,000
    - Better than setting a price of $100 and only selling to 40 customers
        - Total revenue = $4,000
- Offering only a delayed version is worse

Versioning - Example

	Impatient customer's value	Patient customer's value
Immediate version	**$100**	**$50**
Delayed version	$40	$30
# of customers	40	60

- ◆ Ideally we would like to sell the immediate version to everyone, at $100 to the impatient and $50 to the patient
  - Total revenue = $100 * 40 + $50 * 60 = $7,000
  - This is **perfect price discrimination** and the maximum revenue possible
  - However, we may not be able to identify who is impatient/patient

Versioning - Example

	Impatient customer's value	Patient customer's value
Immediate version	**$100**	$50
Delayed version	$40	**$30**
# of customers	40	60

- ◆ Let's try targeting each version at one group, for a price equal to that group's w.t.p.
  - Price immediate version at $100, delayed at $30
  - Impatient consumers may switch to delayed version since their net benefit is $40 - $30 = $10 as opposed to $0 with immediate version
  - Cannibalization
  - Total revenue = $30 * 100 = $3,000

Versioning - Example

	Impatient customer's value	Patient customer's value
Immediate version	**$100**	$50
Delayed version	$40	**$30**
# of customers	40	60

◆ Discount the immediate version sufficiently so that impatient customers have a net benefit with buying it, that at least matches that of the delayed version

- $90 (or $89.99) for immediate version, $30 for delayed
- Total revenue = $90 * 40 + $30 * 60 = $5,400
- Less than $7,000 with identity pricing, but more than 1 version only

◆ We could also discount the quality of the delayed version

Questions / Comments