

Monetizing Information: Competition in Online Markets

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4/2/2008

What's this about...

- > Economics based design and management of systems
 - Business Processes
 - Technology and Infrastructure
 - As a driver
 - As a support mechanism
 - Mechanisms
 - B2C
 - B2B

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Rationale Belief...

Online Prices Should converge, resulting in little or no price dispersion!

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Why is This Important?

Online Shopping by Product Category

Clothing and accessories	67%
Books/Magazines	67%
Music/DVD/Video	65%
Computer HD or SW	55%
Toys, Video games	50%
Consumer Electronics	48%
Tickets (movies, concerts, theatre)	43%
Gifts and Collectables	42%
Health & beauty items	38%
Gift Card/Certificates	38%
Furniture, home & garden	29%
Pet supplies	26%
Sporting goods	23%
Jewelry/watches	22%
Food	22%
Other	9%

Source: DoubleClick (www.performics.com)

Theory and Reality

Theory

- > Individuals can easily search the price information and everything else being equal price should converge (Bakos, 1997)
- > The “law of one price” is no law at all (Varian, 1980)
 - > Firms use randomization strategy
 - Making it difficult for individuals to search

Reality

- > Greater than 50% price dispersion exists due to
 - > Retailer heterogeneity
 - Branding
 - Awareness
 - Trust
 (Brynjolfsson and Smith, 2000)
- > Price dispersion persists over time, though
 - > Number of firms decline
 - > The range of prices tightens
 (Baye et. al., 2002)

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Is Price the Most Important Factor?

FEATURES BRINGING SHOPPERS BACK TO A WEB SITE

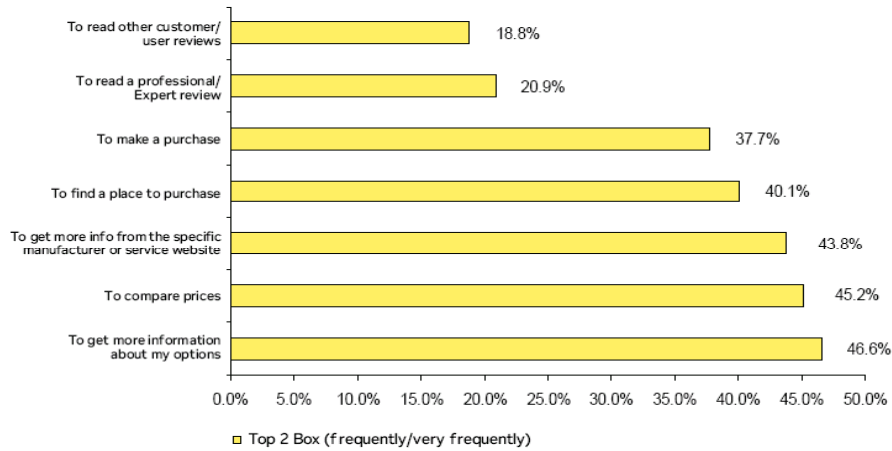
	top box		top-2 boxes
Free/Flat Shipping	66%	Free/Flat Shipping	92%
Privacy Policies/Guar	61%	Privacy Policies/Guar	83%
Order Tracking	56%	Order Tracking	88%
Rebates/Coupons	43%	Rebates/Coupons	76%
Online Outlet	39%	Online Outlet	75%
Customer Reviews	37%	Customer Reviews	74%
Comparison Capabilities	30%	Comparison Capabilities	73%
Price/Product Alerts	30%	Price/Product Alerts	63%
Live Help	30%	Live Help	58%

Source: DoubleClick (www.performics.com)

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Small Business Patterns

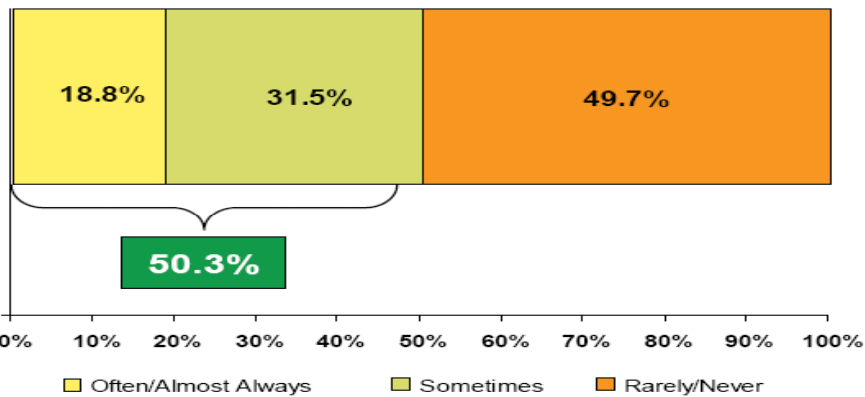
How often do you use search engines to do each of the following for your business?
 (Rate on a Scale of 1-5 where 5 means "very frequently" and 1 means "not at all frequently") (N=292)



Source: DoubleClick (www.performics.com)

The Value of Information

How frequently do you discover new/relevant products/services for your business that you weren't aware of, but learned as a result of your searches?



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Competing with Information!

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Information...

- > Is the competitive tool for the Internet
 - > Facilitation (google, froogle, BizRate, etc.)
 - > Organization (Amazon, Yahoo Pipes, mashups...)
 - > Derivation (DoubleClick, Google Analytics, etc.)
 - > Transparency and monetization
 - Understand consumers'
 - needs
 - Usage patterns
 - Importance/Valuation

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My Contention

- > Web based commerce will evolve to competition based on “information transparency.”
 - > Firms need to compete by developing focused information revelation strategies and appropriately pricing their product.

“Before, companies guarded and filtered information, now, we are all naked.”

Eugene Polistuk, Former CEO Celestica

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An Illustrative Example

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Orbitz
Hotwire

Search Results for Minneapolis, MN to Atlanta, GA

Depart: Mon, Nov 17, 2003
MSP Minneapolis/Saint Paul Intl. Airport

Return: Sat, Nov 22, 2003
ATL Atlanta Hartsfield Intl.

Stops: **Nonstop or 1 connection**

Round-trip ticket: **\$176**
Booking fee per ticket: \$25
Total cost per ticket: \$181

Search Expires at 2:51PM PDT on 10/18/03 - Ref No. 8650404272

Priceline

Please Review Your Request

Depart: Mon, November 17, 2003
Return: Sat, November 22, 2003

Departing Airport: Minneapolis St Paul Int (MSP)
Arrival Airport: Atlanta - Hartsfield Intl (ATL)

Flight Times: The airlines will choose your flight times. Your trip will start between 6 a.m. and 10 a.m. and you will arrive no later than 12:30 a.m. the next day.

Passengers: Rob Kaufman

Connections: Maximum of 1 connection each way (layovers will be no longer than 3 hours)

Aircraft: Jet aircraft
Delivery: Electronic Ticket

Offer Price: \$130.00 per ticket
Application Fee: \$40.00 per ticket
Ticket Cost: \$170.00 per ticket
Processing Fee: \$6.95 per ticket
Subtotal: \$176.95 per ticket
Total Charges: \$176.95

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Hotwire: Airline Tickets, Hotel Reservations, Car Rentals - Discount Travel Deals, Last-Minute Travel Tool! - Mozilla Firefox

http://www.hotwire.com/air/results.jsp?lid=air/searching.jsp;search:loc:0:search

DVD rentals delivered to you
Only \$9.99 a month [Click here](#)

Welcome - Have an account? [Sign in](#) [My Trips](#) | [My Account](#) | [Customer Care](#)

Home
Flights
Hotels
Car Rentals
Packages
Cruises
Deals & Destinations

Change your search

Departing: MSP - Minneapolis
01/27/06

Returning: BDL - Hartford
01/28/06

Tickets: 1

[Search again](#)

[Start a new search](#)

Shopping Tips

- Leave a week later (02/03/06 - 02/04/06)

Need exact flight times?

Minneapolis, MN (MSP) to Hartford, CT (BDL)
Prices below include all taxes and fees, and are quoted in US dollars. Prices not guaranteed until booked.

[Need exact flight times or a specific airline? Find Regular Fares from \\$560](#)

\$369 roundtrip per person [Clearance Fare](#)

Any time of day outbound departure Minneapolis (MSP) to Hartford (BDL) [Hotwire Airline Supplier](#)
Fri, Jan 27 not a red-eye [0 - 1 Stops](#)

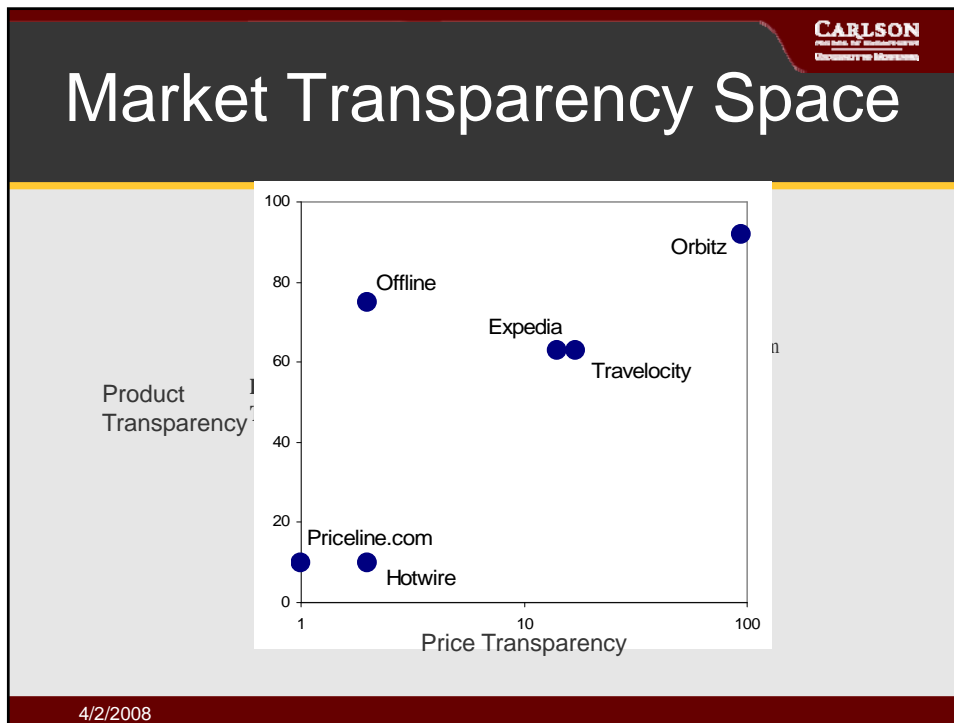
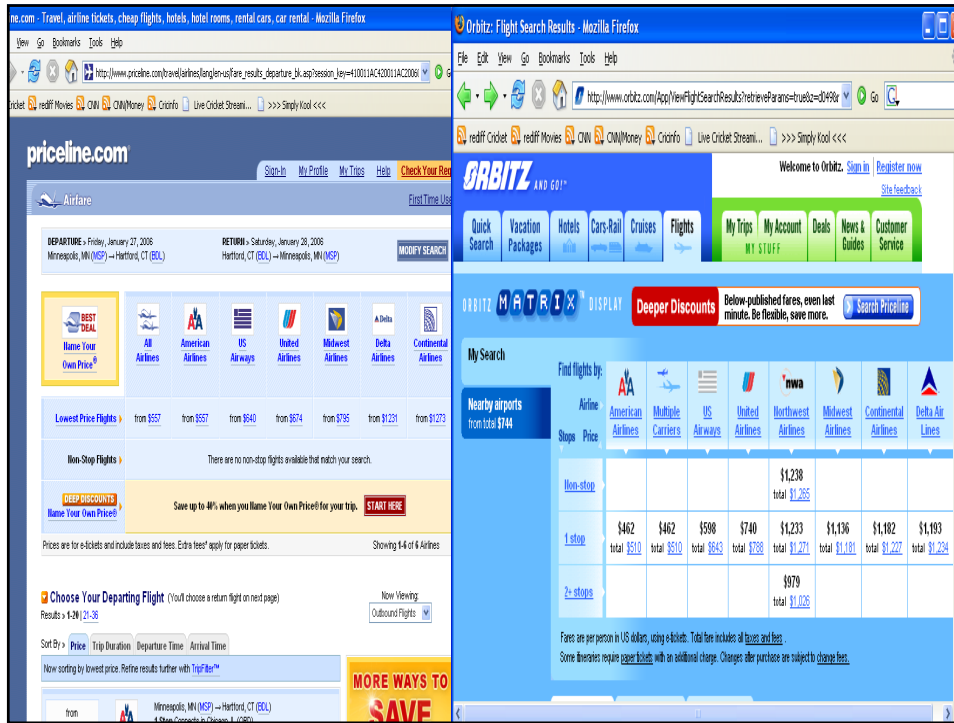
Any time of day return departure Hartford (BDL) to Minneapolis (MSP) [Hotwire Airline Supplier](#)
Sat, Jan 28 not a red-eye [0 - 1 Stops](#)

[Continue >](#)

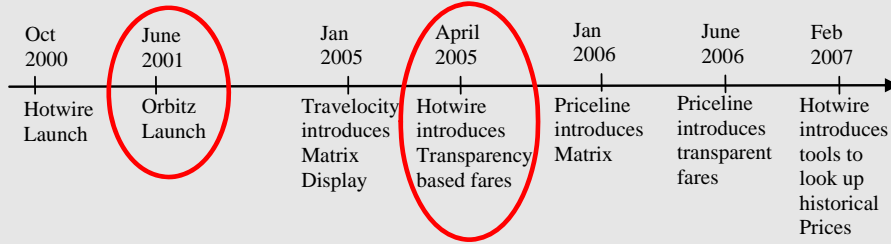
\$560 roundtrip per person [Regular Fare](#)

Regular Fares offer exact flight times and airline names. [View regular fares](#)

7



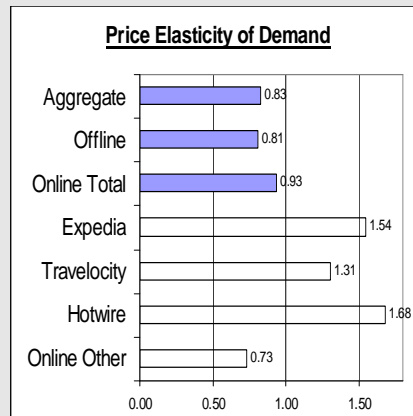
Timeline



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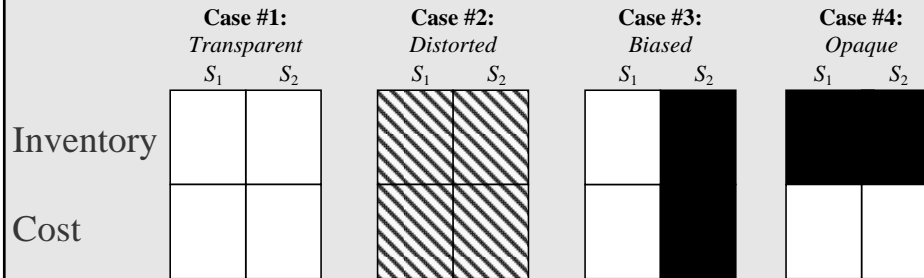
Effect of Transparency

- > Combined booking data and ticketed price data for 2.15 MM tickets.
 - > 46 Origin/Destinations
 - > Economy class
 - > Offline and online agencies
 - > 1 year period: 09/2003-08/2004



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Market Transparency Strategy



Information revelation to consumers, competitors, intermediaries, suppliers

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Consumable Information, Complex Mechanisms and User Behavior

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FCC Auctions

- > In March 2008, FCC auctioned 700 MHz band which currently carries on-air television broadcasts; this band will be freed up after February 17, 2009 when all broadcasts will become digital.
- > Verizon and AT&T won most of the auctions.
- > These auctions were for various bands (frequencies) and geographical locations.
- > The process took several auctions; in a given auction, several frequencies over several territories were sold together.
- > Such auctions are called Combinatorial Auctions.

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Transparency in Complex Trading Mechanisms

- > Combinatorial Auctions
 - > Multiple items (goods) or units are auctioned simultaneously
 - > Bids on item combinations are allowed, e.g.,
 - \$400 on (TV, DVD player, speaker set)
 - > Motivation: complementarity and substitutability
 - Complimentarity -- Such as TV and DVD Player
 - Substitutability – A portable TV v/s DVD player

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Original Motivation

- > PQT Auctions – iterative multi-unit, no partial fulfillment auctions
 - > Bidder bewilderment
 - “I wasn’t in the winner list but ultimately I won without changing my bid...”
 - “What new bid do I place for x units? I bid higher than the highest winning bid but still wasn’t included in the winner’s list...”

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Practical applications

- > FCC spectrum auctions (McAfee and McMillan 1996; Banks et al. 2003)
- > Rights to use railroad tracks (Brewer & Plott 1996)
- > Delivery routes (Caplice 1996, Sandholm 2000)
- > Airport time slots (Rassenti et al. 1982)
- > Procurement of school meals (Epstein et al. 2002)

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Complexity of combinatorial auctions

- > Challenges:
 - > The number of possible packages increases exponentially with number of items
 - Winner determination is NP-hard
 - Participation is cognitively complex
- > Earlier solutions
 - > Discrete bidding rounds with rules and restrictions

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An Example

- > Auction set: { A, B, C, D }
- > Bids:

1. \$50 on { A }	WIN: \$50 (1)
2. \$70 on { A, B }	WIN: \$70 (2)
3. \$80 on { B, C }	WIN: \$130 (1, 3)
4. \$65 on { C, D }	WIN: \$135 (2, 4)
5. \$10 on { D }	WIN: \$140 (1, 3, 5)
6. \$30 on { B }	WIN: \$145 (1, 4, 6)

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Our Focus: Bidder Support

- > Questions:
 - > Is my bid *currently* winning?
 - > Is it *possible* for my bid to win?
 - > I want to bid on itemset *X*. How much should I bid to be among the currently winning bids?
 - > Which bids are winning right now?
- > Facilitate: combinatorial auctions on eBay

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Our Approach

Google it!

- > Analysis of problem complexity revealed that if solutions could be maintained then change in solution due to a new bid can be computed in real-time.
- > Designed and mathematically defined some fundamental concepts such as *dead* & *live* bids, and *sub auctions*.
 (Adomavicius and Gupta, *ISR* 2005)

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Level of Transparency

- > What is appropriate level of transparency that
 - > Provides high efficiency
 - To create higher societal wealth
 - > Is fair
 - To create incentives for adoption

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Real-time Bidder Support Infrastructure – Outcome Feedback

- > Based on bid classification scheme developed in

The screenshot shows a bidding interface with the following elements:

- Elapsed Time:** 00:01:11 (hh:mm:ss)
- Time since last bid:** 00:00:13 (hh:mm:ss)
- Refresh** button
- Select lots:**
 - A \$50.00
 - B \$100.00
 - C \$50.00
 - D \$25.00
 - E \$12.50
 - F \$25.00
- Your valuation:** \$165.00
- Specify your bid (\$):** (no decimals)
- Submit Bid** button
- Bid History (Reverse chronological):**

Bid No.	Bid Set	Bid Amount	Bid Time
6.	A	\$75.00	00:00:57
5.	BC	\$80.00	00:00:48
4.	ABC	\$140.00	00:00:42
3.	BC	\$80.00	00:00:32
2.	C	\$50.00	00:00:19
1.	AB	\$100.00	00:00:10

Below the screenshot is a table summarizing bid outcomes:

4.	[BC; \$15]	<i>Live and Winning</i>
5.	[AB; \$13]	<i>Live but not Winning</i>

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Real-time Bidder Support Infrastructure - Process Feedback

Elapsed Time: **00:01:44** (hh:mm:ss) Time since last bid: **00:00:09** (hh:mm:ss)

The winning bids are in bold red

(The highlighted bids are yours)

Select lots:

A \$50.00 Specify your bid (\$): (no decimals)

B \$100.00

Your valuation:

C \$50.00

D \$25.00

E \$12.50

F \$25.00

To at least stand a chance of winning, bid:

To be currently winning, bid:

Bid History (Reverse chronological)			
Bid No.	Bid Set	Bid Amount	Bid Time
6.	A	\$75.00	00:01:35
3.	BC	\$80.00	00:00:42
2.	C	\$50.00	00:00:29
1.	AB	\$100.00	00:00:14

b. [AB; \$13] *Live but not Winning*

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Effect of Transparency

- > Overall Economic Impact
 - > Transparency increases efficiency (or reduces waste) thereby increasing the overall wealth created by the transaction.
- > Participant Benefits
 - > Auctioneer Benefit
 - Larger with partial transparency
 - > Bidder Benefits
 - Larger with complete transparency
- > Bidder Behavior
 - > Much more closer to typical auctions with complete feedback
 - > More strategic behavior with partial transparency

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Likelihood of Acceptance

	Level 1	Level 2	Level 3
Promoters	25%	41%	54%
Detractors	19%	13%	6%
NPS	6 points	28 points	48 points

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Final Word

- > Design of customer-oriented systems need to take economic impact into account
- > By understanding its users and controlling the transparency of appropriate information, systems can
 - > Provide control over the process/economic activity
 - > Control/provision of incentives
- > Transparency needs to be explicitly considered in system design
 - > Not just provision of data but provision of 'useful data'
 - > Need to understand user behavior

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Thank You!