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IT-enabled transparent electronic markets: the case of the air travel industry

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Abstract The *electronic market hypothesis* predicts that by reducing coordination costs, information technology (IT) will shift industrial organization from hierarchical to market-based forms of economic activity. While academic researchers and practitioners have witnessed these shifts with the advent of the Internet, there is little understanding about the process and the underlying forces that drive them. In this paper, we provide an in-depth analysis of the air travel industry, which has recently experienced significant IT-driven transformations. We conclude that, together with IT, pro-competitive laws and the information-intensive nature of air travel products have triggered competition for consumers with transparent market mechanisms, which is leading to the emergence of more transparent electronic markets in the air travel industry.

1 Introduction

The *electronic markets hypothesis* (EMH) predicts that by reducing coordination costs, information technology (IT) will shift industrial organization from hierarchical to market-based forms of economic activity (Malone et al.

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1987). An example is the emergence of *shopbots* (e.g., www.mysimon.com) and online travel agencies (e.g., www.expedia.com), Internet sites that aggregate product and price information so consumers can search and compare products, at the expense of brick-and-mortar retailers. The advanced information and communication technologies of the Internet are accelerating the pace of transformation of economic organization in some industries, so there is an opportunity to witness, document, and learn from them at this point in time. In this paper, we provide a detailed analysis of the IT-enabled transformation of the air travel industry.

The air travel industry has been at the forefront of IT innovations for product distribution, leading the move from electronic hierarchies to electronic markets. The airlines pioneered business-to-business (B2B) electronic markets in the late 1970s through computer reservation systems (CRS) technology. CRSs were the *de facto* infrastructure for the sale of airline tickets, enabling the electronic transfer of transaction information from the airlines' pricing departments to the sales offices of travel agencies. The air travel industry also led the Internet revolution in the development of business-to-consumer (B2C) electronic markets. In 2003, about 16% of airline tickets were sold online worldwide, led by North America with 40% (O'Toole 2003). In contrast, in most other industries the share of Internet-based sales was still in the single digits.

The EMH predicts that IT-driven industry transformations will occur in stages, from *hierarchies* to *biased electronic markets*, and from biased electronic markets to *unbiased electronic markets*. We show how the development of B2B air travel markets in the 1980s and B2C air travel markets since the 1990s is consistent with these stages. Moreover, we note that suppliers are fueling competition for market share with innovative and transparent market mechanisms that provide unbiased, complete, and accurate information about travel offers and respective prices. The degree to which the air travel market has become more transparent is the unexpected, new development—not only the general move to unbiasedness. This phenomenon motivates the following research questions:

- What forces drive air travel suppliers to compete with transparent market mechanisms?
- What will be the consequence of this battle for consumers on the industry's structure?

To answer these questions, we apply a theoretical framework (Granados et al. 2006) to analyze the competitive and institutional forces that are driving air travel suppliers to favor and implement transparent market mechanisms. We provide the economic rationale to predict that these forces, fueled by the Internet, will ultimately lead to the dominance of transparent electronic markets in air travel.

In the next section we provide a summary of our theoretical framework to analyze IT-driven processes of industry evolution from hierarchies to markets. In the third section, we present the historical developments that occurred in the wake of the information and communication technology innovations in air travel distribution. In the fourth section, we analyze these

historical developments through the lens of our theoretical framework. In the last section we discuss the implications for practitioners and researchers.

2 A framework on the move to transparent electronic markets

We define an *electronic market* as a system that allows market participants to exchange information about product and price offerings electronically, leading to the possibility of a mercantile exchange transaction and value creation for the participants. In this section, we review the theoretical foundations which suggest that the EMH requires augmentation in order to fully explain IT-enabled moves from hierarchies to markets. We then provide a synthesis of the theoretical framework of the move to advanced forms of market organization that brings in the transparency of the related market mechanisms.

2.1 The EMH

Research on the *transaction cost theory* predicts that IT reduces market coordination costs and causes a shift from hierarchical to market-based forms of economic activity. The claim is that IT reduces the costs of information processing related to trading and transaction-making activities, such as selecting suppliers, establishing contracts, and buying supplies in the spot market. IT makes it possible for the transaction-making process to require less asset-specific inputs and to overcome difficulties associated with complex product descriptions. As a result, IT tends to favor market-based organization of economic activities. In this general theoretical context, the EMH posits that moves to e-markets will occur in stages (Malone et al. 1987).

Stage 1 is a move from *electronic hierarchies* to *biased electronic markets*, where suppliers use IT to implement market mechanisms that bias information in their favor. In *Stage 2 unbiased electronic markets* will prevail, where all options for trading are made available and no seller is particularly favored. Finally, in *Stage 3*, the proliferation of information in unbiased markets leads to *personalized markets*, electronic markets with functionality that allows buyers to filter the options available for trading.

Despite the theoretical predictions of the EMH, real world observations point out that IT has not necessarily been leading to market-based forms of organization as rapidly or completely as was previously predicted. For example, Hess and Kemerer (1994) analyzed mortgage markets in the financial services industry to find that the industry had not evolved to market organization in the presence of IT, as would be expected of an information-intensive product.

IS researchers have developed theories to explain why some industries have remained hierarchical or biased. We call these the *biased market theories*. An example is the *move-to-the-middle-hypothesis* in the seminal work of Clemons et al. (1993), which suggests that biased market mechanisms are viable in the presence of IT, due to reductions in the coordination costs that

firms incur in hierarchical or long-term relationships. On the other hand, hierarchies and biased markets are viable when they reduce buyers' trading risks, such as demand and supply uncertainty (Kauffman and Mohtadi 2004) and opportunistic behavior (Bakos and Brynjolfsson 1993). In these environments, biased market mechanisms are attractive to buyers because they reduce the transaction costs associated with these risks.

2.2 Theoretical basis for augmentation of the EMH

The EMH predicts one path in the stage-based evolution of markets, namely the move towards unbiased electronic markets. While the level of bias of a market is an important aspect of its potential evolution, it is not the only one that may be influenced by IT. A broader characterization of the market characteristics that are influenced by IT can be found with the support of *market design theory* (Madhavan 2000). This theory examines the decisions firms and industries face in the *design of market mechanisms*, and their impact on market efficiency, liquidity, immediacy, and transaction costs. Based on an in-depth analysis of this theory, we find that there are four main design dimensions of markets that are influenced by IT, namely market transparency, price discovery, reliance on market-making, and trading protocols (Granados et al. 2005). *Market transparency* is related to the availability and accessibility of information about products and prices. *Price discovery* is the process by which trading prices are established. In advanced markets, price discovery consists of the process by which market prices embed new information. *Reliance on market-making* is the degree to which market intermediaries enable markets. Intermediaries reduce the uncertainty risks of sellers and buyers by centralizing the trading process and providing market information. *Trading protocols* represent the rules of trading and transactional exchange.

In information-intensive industries such as air travel, the strategies of suppliers and intermediaries tend to focus on the design of mechanisms that conceal or reveal information to travelers. Therefore, in order to better understand the impact of IT in the market organization of the air travel industry, we next provide a more in-depth discussion of market transparency (for a more detailed description of the other market design dimensions, see Granados et al. 2005).

Market transparency is the availability and accessibility of information about the trading process and the product being traded. It has three informational elements: price, product, and supplier transparency (Morgan Stanley Dean Witter 2000). *Price transparency* exists when information about prices and the trading process is made available. *Product transparency* is based on the revelation of information about the characteristics of the product. *Supplier transparency* refers to information about suppliers, such as identity and cost structure.

Market transparency is related to *bias*. Consistent with the EMH, we define the *level of bias of a market mechanism* as the extent to which product and price information from all sellers is presented equitably. A biased market mechanism offers information about a seller to its advantage. Other things

being equal, the lower the level of bias of a market mechanism, the higher is the likelihood that the level of market transparency will be high.

Other informational aspects of markets that affect their transparency level are the *completeness of market information* and the *accuracy of market information*. A market mechanism that displays only prices but lacks information about product characteristics is not fully transparent because information is incomplete. On the other hand, a market mechanism that distorts information is not fully transparent because the information is inaccurate. Incomplete or distorted information may be driven by intentional market designs of sellers, or by technological imperatives that limit the quality and quantity of information that can be made available. We define *opaque markets* as those where information is incomplete or distorted. Therefore, in the analysis of the evolution of the air travel industry, we evaluate bias, completeness, and accuracy of market information to assess the full impact of IT on market information.

The Internet has enabled the implementation of innovative market mechanisms that are challenging the *status quo* of biased and opaque markets which favor suppliers. For example, online travel agencies or OTAs like Expedia.com (www.expedia.com) have emerged to compare prices from multiple airlines, and *meta-search agents* have also emerged to offer price comparisons across OTAs (e.g., www.kayak.com, www.mobissimo.com). To assess the long-term consequences on industry structure of this phenomenon, we have proposed an augmentation of the EMH framework which theorizes about the market forces that, together with IT, facilitate or inhibit market transformation in terms of the level of transparency (Granados et al. 2006).

2.3 Augmentation of the EMH

Buyers generally prefer a transparent market mechanism because it offers products from many suppliers rather than just one or a few. In addition, transparent market mechanisms offer buyers more market information with positive effects on their surplus. In contrast, sellers generally prefer to conceal information (Malone et al. 1987; Grover and Ramanlal 1999), because they benefit from information advantages. For example, a hierarchical relationship or a biased market may result in a buyer lock-in effect, to the benefit of the seller. Moreover, despite buyers' general preferences for transparent market mechanisms, biased market theories suggest that sellers can afford to compete with biased market mechanisms if buyers face trading risks.

A move to more transparent electronic markets involves two forces. One set reduces the trading risks buyers face to make biased and opaque mechanisms less attractive to them. IT falls in this first category, as the EMH suggests. By reducing product complexity and asset specificity, IT reduces trading risks that buyers face, making biased mechanisms less competitive. However, although IT reduces the viability of non-transparent markets by making them less attractive to buyers, it alone does not make them less attractive to sellers. Therefore, a second set of competitive forces is necessary

to reduce sellers' incentives to maintain information advantages. In a competitive market environment, sellers with non-transparent mechanisms will be induced by early implementers of transparent market mechanisms to compete by reducing bias or opaqueness. Together, these forces may eventually lead most sellers to forego information advantages in order to attract buyers, rather than incur losses from price competition. This leads to the following main proposition related to the theory we have developed:

Main Proposition (The Transparent Electronic Markets Proposition) *The incentives for sellers to implement transparent electronic market mechanisms increase in the presence of advanced ITs and forces which promote inter-firm competition. Together, these forces will lead to the dominance of transparent electronic markets.*

The Transparent Electronic Markets Proposition reflects our effort to augment the EMH in two ways. First, it recognizes that the move to advanced forms of market organization includes more than just a move from biased to unbiased electronic markets. Other design dimensions of market transparency are relevant, such as the completeness and accuracy of market information.

Second, the proposition highlights the role competitive forces play to facilitate the move to transparent electronic markets. We argue that, without these forces, it will remain in the interest of sellers to bias markets and distort or conceal information to their advantage. More generally, by analyzing the forces that moderate the impact of IT on industrial organization, we will be in a better position to understand why some industries move to advanced forms of market organization, while others advance at a slower pace or not at all. Hence, this theoretical perspective not only guides the analysis of industry moves to advanced forms of market organization, but it also helps explain the variation in the move to markets in different industries.

Based on our theoretical development and case analysis of market transformations, we have identified forces that drive a move to transparent electronic markets. We also classified them into two main categories: *electronic product representation*, and *competitive and institutional forces* (Granados et al. 2006, 2005). We contend that the higher the ability to represent products electronically, the higher is the likelihood that transparent electronic markets will prevail. The rationale is that when a product is easily represented electronically, information about the product can be made widely available, and hence many firms will be able to compete for buyers with market information. In contrast, in settings where product characteristics are intangible (e.g., the personalized services of a fine tailor for a woman) or non-digital (e.g., the smell of high quality cologne for men), sellers will face less competitive pressure to display transparent information to consumers. Also, they will be better able to compete with biased and opaque market mechanisms and to play a sustainable information brokerage role.

On the other hand, the more competitive is an industry, the more pressure sellers will have to compete with market information, rather than incur losses from price competition. In a sense, in competitive markets, product and price information can become a highly valued source of differentiation for sellers

in their battle for buyers. Institutional forces that support a competitive environment will compound this effect, such as consumer protection agencies and lobbying groups, and government agencies that regulate fair competition practices.

Based on this theoretical background, we now proceed to analyze the air travel industry's evolution to advanced market organization, with special consideration given to its transparency features.

3 The move to electronic air travel markets

In the U.S. air travel industry, IT has played a major role in the development of B2B and B2C electronic markets. In this section, we first discuss the background of the industry prior to the Internet, with a focus on B2B market transparency and the disclosure of information from airlines to travel agencies. We then examine the history of OTAs, and emphasize B2C market transparency and the relatively greater availability of information for consumers.

3.1 B2B electronic markets in air travel distribution

Electronic markets were developed beginning in the late 1970s to facilitate transactions between airlines and travel agencies. We next examine the evolution of these electronic markets.

3.1.1 A move to B2B electronic markets

Prior to 1978, the government exerted control over fares and airline routes. In 1978, the airline industry was deregulated and airlines have since been able to set fares and schedules based on competitive and demand forces. To deal with this new competition, the airlines introduced three strategies (Copeland and McKenney 1988). First was the implementation of strategic pricing to increase revenues, which commonly led to fare wars. The second approach was the development of CRSs to automate the distribution of airline tickets. Airline tickets have traditionally been sold via travel agencies, which act as intermediaries for transactions between airlines and travelers. CRSs enabled the electronic transfer of transaction information between the airlines' pricing departments and the sales offices of travel agencies, providing substantial administrative efficiency and cost savings. CRSs were installed by airlines at travel agency locations, accompanied by long-term contractual sales agreements (Duliba et al. 2001).

CRS technology also allowed airlines to electronically construct multiple itineraries for the same city-pair. This information could be more efficiently sent electronically to travel agencies compared to the traditional processing via phone or fax. Airlines were effectively able to submit complete, accurate, and timely information about the travel alternatives and respective prices to travel agencies, which then offered them to their own clients.

3.1.2 Biased B2B electronic markets

The third strategy was to skew market information in favor of the airline owner of a given CRS, which led to biased electronic markets. Airlines used CRS technology to lock in travel agencies and create a “halo effect” for market share in their favor (Copeland and McKenney 1988). This was done through *screen biases*, the act of positioning information on-screen to influence purchase behavior in favor of the airline owner of the CRS (see Fig. 1). CRS owners also developed fee-based agreements with other airlines to provide preferential treatment of their schedules in the screen displays (Global Aviation Associates 2001). Finally, to benefit from economies of scale, CRSs expanded their reach. These extended systems, called *global distribution systems* (GDSs), provided sustainable competitive advantage to their owners (Duliba et al. 2001).

3.1.3 The move to transparent B2B electronic markets

CRSs became a critical asset for airlines and travel agencies to survive in the deregulated environment. By 1983, 80% of tickets were sold by travel agencies through CRS terminals (Global Aviation Associates 2001), which became the *de facto* infrastructure for the sale of airline tickets. Soon, however, allegations emerged suggesting that retail automation of airline tickets had not occurred in the public interest. In June 1983, the Civil Aeronautics Board concurred, concluding that the airlines were demonstrating anti-competitive behavior through built-in screen biases and preferential treatment. Subsequently, CRS business practices were regulated by the government, prohibiting the vendors to employ screen display biases and to charge discriminatory fees to rival carriers (see Fig. 2). In addition, CRSs were instructed to provide data on their flights and ticket prices to com-

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1NNV-WO-1201A MSP LON CT ** 2NX/SGL
MSP SSD AVAIL/EARLY CKIN DUE CONSTR//LEFT CURBSIDE CKIN/C TO G
SKYWAY SEC CKPT AVAIL
1 NN 924 J9 C9 Z9 Y9 B9 M9 H9 Q9 MSP LON 655P 855A|1 D10 D00
  V9 L9 T9 K9
2 NN 758 F9 Y9 B9 M9 H9 Q9 V9 L9 MSPORD 505P 754P 9 D95 0
  T9 K9
3 NN 24 J9 C9 Z9 Y9 B9 M9 H9 Q9 LON 925P1000A|1 333 D00
  V9 L9 T9 K9
4 NN 792 F9 Y9 B9 M9 H9 Q9 V9 L9 MSPORD 457P 746P 9 D95 0
  T9 K9
5 NN 24 J9 C9 Z9 Y9 B9 M9 H9 Q9 LON 925P1000A|1 333 D00
  V9 L9 T9 K9
6 LL9246 J7 C7 Z. S7 B7 M7 H7 Q7 MSPORD 605P 910A D10 D00
  K7 L7 T4 V4
7 LL1929 J7 C7 Z. D7 S7 B7 M7 W7 LHR 1025A1050A|1 737 D00
  H7 Q7 K7 L7 T4 V4
LL6046 OPERATED BY NN

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Fig. 1 Biased screen displays in computer reservation systems. This figure illustrates a *biased CRS screen display prior to CRS regulation*. The itineraries shown are for one airline (i.e., NN) and its partner (i.e., LL). They occur first on-screen, and no other carriers' flights are seen on this page

petitors. Although these measures curbed the alleged discriminatory behavior, industry participants still argued that the measures were not enough to eliminate the anti-trust concerns. By 1992, new regulations were introduced to further discourage anti-competitive practices.

3.2 B2C electronic markets

We earlier pointed out that since the first Internet travel website was launched in 1995, there has been an unprecedented growth in online airline ticket sales. A 2003 industry survey estimated that the percentage of tickets sold over the Internet had reached 16% worldwide and 40% in North America (O'Toole 2003). To provide an idea of how significant this percentage is, online retail spending in 2004 accounted for 1.9% of total retail sales (U.S. Census Bureau 2005). We next describe the environment that led to the consolidation of OTAs, focusing on the innovative market designs that OTAs implemented in the battle for consumers.

3.2.1 A move to B2C electronic markets

In 1995, the Internet Travel Network (ITN) was launched as the very first online travel Web site. In 1996, Sabre Holdings, operator of the CRS formerly owned by American Airlines, capitalized on the technological opportunities offered by the Internet and introduced Travelocity (www.travelocity.com). Soon after that, multiple market players emerged to create competition. The fast early growth in the online travel agency (OTA) industry was facilitated by CRSs, which served as readily available search engines for new entrants based on per-transaction fees. In particular, some non-travel firms took advantage of CRS technology to quickly establish themselves as *e-commerce-only intermediaries* (Chircu and Kauffman 2000). For example, in 1996 Microsoft introduced Expedia (www.expedia.com).

Travelocity and Expedia soon became market leaders, while other key players emerged with innovative selling mechanisms. In 1997, TravelBids

		Stops										Travel time		
15NOV-MO-513P	MSP-LON CT **													
1*S	NW 44	J9	C9	Z9	V9	B9	M9	H9	Q9	MSP-LON	555P	855A	1	010 0
2*A	UA716Z	Y9	B9	M9	H9	Q9	V9	W9	S9	MSP-LAD	505P	835P		CRJ 0
3*A	UA 924	F9	C9	D9	Z9	Y9	B9	M9	H9	LHR-	935P	945A	1	777 0
	UA716Z	OPERATED BY UNITED EXPRESS/MESA										AIRLINES		
4*0	AA1975	F7	S7	V7	W7	B7	H7	M7	N7	MSP-ORD	505P	634P	6	M80 0
5*0	AA 46	F7	J7	S-	V7	W	B7	H7	M7	LHR-	615P	950A	1	777 0
6*S	NW 758	F9	Y9	B9	M9	H9	Q9	V9	L9	MSP-DTW	505P	754P	9	095 0
7*S	NW 32	J9	C9	Z9	Y9	B9	M9	H9	Q9	LON-	925P1000A	1	333 0	
8	BA5020	F9	J9	C9	D9	I9	Y9	B9	H9	MSP-ORD	505P	634P		M80 0
9	BA 298	F9	A9	J9	C9	D9	I9	W9	T9	LHR-	625P1005A	1	772 0	
	BA5020	OPERATED BY AMERICAN												

Fig. 2 Unbiased CRS screen display. This figure illustrates an unbiased CRS screen display, and is representative of what travel agencies could see in the first screen of a travel search request after CRSs were regulated. The itineraries shown are for multiple airlines (i.e., NW, UA, AA, BA), sorted based on the number of stopovers and shortest travel time. There are no limitations on the presentation of favored airlines' offers

was created to offer leisure price quotes. Although it failed to survive during the DotCom downturn, Travelbids was the first OTA to implement a reverse auction mechanism, where travel agencies would bid to earn business from a customer, who laid out a request for quotation with specific travel needs (Chircu et al. 2001; Klein and Teubner 2000).

The OTA industry structurally increased the availability of information to consumers over time. Travelers are now able to observe multiple itineraries and the respective prices in a user-friendly interface, compared to the few options that were provided via phone or in face-to-face interactions with an airline reservation office or a travel agency. Internet technology played a key role in this process. It allowed the translation of the complex CRS screens into user-friendly interfaces that could be accessed by travelers with a PC and Internet access. However, OTAs differed in the degree of information disclosure to consumers.

3.2.2 Opaque and biased B2C electronic markets

In 1998, Priceline.com (www.priceline.com) emerged as the first opaque OTA, by developing a selling mechanism that shielded product and price information from the customer until after the consumer commits to a contract-binding bid. Hotwire (www.hotwire.com), another opaque OTA launched by major airlines to compete with Priceline.com, began its operations in 2000. Hotwire's mechanism consisted of price offers with no pre-purchase information on the airline carrier or the itinerary (see Appendix for several current screen displays of Travelocity, Hotwire, and Priceline.com).

With the proliferation of OTAs, competition became intense. There was an explosion of "look-to-book" visits to their Web sites, which also increased demand by consumers to book online. With these developments came more "comparison shopping," as only 10% of online shoppers bought after visiting just one site (Regan 2001). Moreover, this increase in online travel search also increased offline competition. In 2001, for every dollar of sales transacted via the Internet, OTAs generated an additional 60 cents via phone, fax, or in person (Nielsen Net Ratings 2001). To retain consumers, OTAs offered add-on services, such as Travelocity's "Best Fare Finder" and "Online Trip Review." The latter enabled travelers to view up-to-date information on flight schedules, weather, and travel destination maps. In addition, to increase revenues in this increasingly competitive environment, some OTAs, such as Travelocity and Expedia, pursued agreements with individual airlines to provide preferential display of their travel itineraries, resulting in biased offers to consumers.

In their first stage response to the entrance of OTAs, airlines began to pursue *reintermediation strategies* by attracting consumers to their direct channel *airline portals* (e.g., www.delta.com, www.americanairlines.com), extensions of airline reservation offices that offered online ticket purchasing services. In 1996, airline portals accounted for about 21% of online air travel revenues (Salkever 1999). Development of more service-oriented airline portal Web sites, including new virtual check-in capabilities and

frequent-flier pricing offers, brought the share of airline portal sales in the OTA market to 56% in 2004 (Jupiter Research 2004).

3.2.3 The move to transparent B2C electronic markets

In 1999, five airlines—United, American, Delta, Northwest, and Continental—announced they would create a new OTA (Salkever 1999). Dubbed “Orbitz,” the new Web site (www.orbitz.com) was launched in June 2001, and since then has grown into a technology leader in its quest to update the legacy systems of airline reservations. The airlines claimed that Orbitz would dramatically decrease the high costs of making reservations. For that purpose, Orbitz was designed and powered by ITA Software (www.itaoftware.com), a pricing and airfare shopping technology developer launched by researchers from the Artificial Intelligence Laboratory at MIT. This software obtains fares directly from the Airline Tariff Publishing Company (www.atpco.net), which collects and distributes fares from airlines worldwide, and it obtains airline travel schedules from the Official Airline Guide (www.oag.com). Therefore, by using ITA software, Orbitz avoids reliance on legacy system infrastructures and high CRS and GDS fees. See Fig. 3 for the technological structure of fare distribution in the air travel industry in light of Orbitz.

Orbitz offers a complete matrix-based representation of fares by airline and number of stopovers in just one screen. This *matrix display* effectively increased the structural level of transparency, based on technologies that

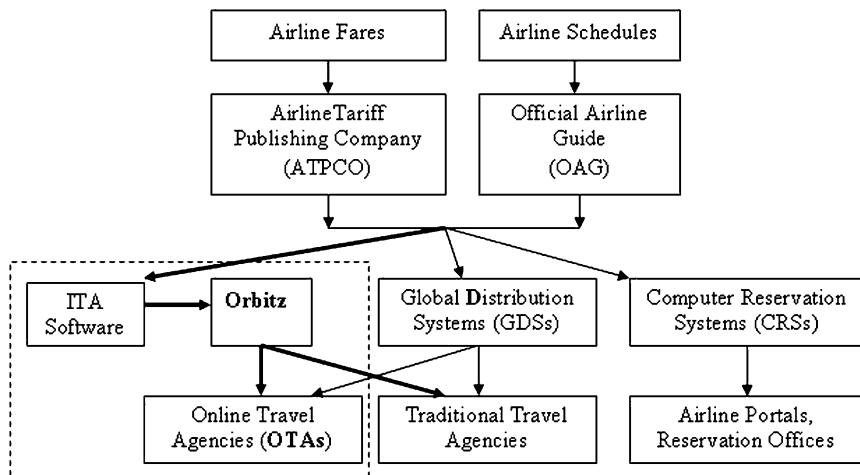


Fig. 3 Technological structure of air travel distribution: traditional sellers and OTAs. Before OTAs, the dominant electronic systems for air travel distribution were GDSs and CRSs. With Internet-based OTAs, however, a new technology-enabled distribution structure emerged (see the *dashed box*). In particular, Orbitz introduced technology to distribute airline tickets directly, without reliance on GDS and CRS distribution (see *arrows in bold*). Orbitz provides these services to other distributors such as travel agencies as well (Regan 2002a, b)

built and displayed travel itineraries beyond what could be normally achieved via GDS systems (see Fig. 4 for a screen display of Orbitz's selling mechanism).

In addition to its state-of-the-art technologies, Orbitz has claimed that it is a price-transparent online travel site. Al Lenza, Northwest Airlines's VP for distribution, claimed that "[Orbitz] will give the lowest published fares anywhere. Anything you find on the Web, we will have..." (Salkever 1999). This was achieved through "most favored nation" agreements, wherein airlines agree to publish through Orbitz any publicly-available fares. Orbitz committed to neutrally display all fares, regardless of whether it had a favorable contract with an airline or whether the airline had ownership interest in Orbitz. On the other hand, the senior management of Orbitz argued prior to its launch that the CRSs and GDSs were continuing the industry's practices of display bias (Global Aviation Associates 2001). Meanwhile, since the prospects of an airline-owned booking mega-portal appeared, the U.S. government began to closely scrutinize the business practices of Orbitz. But it has found no reason to regulate or restrict it (Mead 2002).

Although the value of Travelocity and Expedia was eroded due to the prospects of Orbitz's future success, they continued as the top OTAs, with market shares above 30% in 2002, without the airline portals. Travelocity continued to be a model of customer service, introducing 24-h customer phone support. Expedia continued to grow its niche in the sale of travel

The screenshot shows the Orbitz website interface. At the top, there's a navigation bar with 'Quick Search', 'Flights', 'Hotels', 'Cars', 'Cruises', and 'Vacations'. Below this is a 'DEAL DETECTOR' section with a table of flight options. The table has columns for 'Non-stop', '1 stop', and '2+ stops' and rows for various airlines including Continental, AirTran, ATA, Multiple Carriers, United, American, Delta, Northwest, US Airways, and Midwest. A 'BOOK IT' button is visible for the lowest priced flight. A red box highlights the 'See all 179 flights' link.

Non-stop	1 stop	2+ stops
	\$235	
	\$244	
	\$246	
	\$283	
	\$400	
	\$412	
	\$462	
	\$736	
	\$736	
	\$741	
	\$747	
	\$753	

Fig. 4 Orbitz and its matrix display selling mechanism. Orbitz's matrix display summarizes fares by airline and number of stops. The traveler can click on any option to see further details. In total, 179 travel options were offered in this search. Source: www.orbitz.com, accessed in September 2004

packages as well. By 2002, Orbitz was a close follower, with a share of about 25% (Mead 2002), an indication of the inroads it made just one year after its launch. In addition, Orbitz consolidated its position as a direct competitor of the CRSs and GDSs, becoming the first travel agency to offer technology that bypasses the traditional CRS distribution structure (Regan 2002b).

Based on the developments by 2001, the OTAs can be classified in four major categories (see Table 1). Orbitz is in its own category, as a *fully-transparent Internet-based provider*, with the highest levels of product and price transparency. *Inter-airline Internet portals*, such as Travelocity or Expedia, are second. They offered multiple travel options, but they were limited in the number of options relative to Orbitz due to the technological limitations of CRSs. In addition, these Web sites engaged in preferred arrangements with airlines, analogous to what the CRS firms did in the early stages of biased B2B marketplaces. In a third category are *airline Internet portals*, which are biased to travel itineraries only for a specific airline network. The fourth category is *opaque airline reservation sites*, such as Hotwire and Priceline.com, which conceal product, supplier and price information until the consumer commits to purchase.

OTAs have made moves to match the level of market transparency of Orbitz. Travelocity and Expedia started developing agreements with carriers to obtain the lowest market fares from carriers, analogous to Orbitz's move towards higher price transparency. Priceline.com and Expedia introduced the matrix display selling mechanism to match the level of market transparency of Orbitz. Meanwhile, Orbitz has continued its strategy to be the most transparent, adding functionality for travelers with flexible travel dates, and introducing a lowest fare guarantee of \$50 if a traveler finds a cheaper fare for a given itinerary elsewhere in the Internet.

4 Analysis and discussion

We now analyze the IT-driven competition for market transparency in the air travel industry. We predict that the outcome will be the dominance of

Table 1 OTA levels of market transparency as of 2001

OTA type	Transparency type		
	Price	Product	Description
Orbitz	Very high	Very high	Unbiased, numerous alternatives per request
Inter-airline (e.g., Travelocity)	High	High	Alternatives limited by GDS technology, biased by preferential agreements with airlines
Airline portals (e.g., www.delta.com)	High	Medium	Alternatives limited to airline specific offers
Opaque websites (e.g., Hotwire)	Low	Low	Price and/or product information concealed until after purchase

transparent B2C electronic markets in air travel and offer the economic rationale to support our prediction.

4.1 Analysis of the move to transparent electronic markets for air travel

The changes that have occurred in wholesale air travel distribution due to IT are generally consistent with the stages in the progression from hierarchies to markets predicted by the EMH. In B2B markets, airlines and travel agencies institutionalized electronic transactions in the 1980s through the development of CRSs. While CRSs provided more complete, accurate, and timely information to travel agencies, initially the airlines capitalized on this technology by creating screen biases and preferred contractual arrangements with travel agencies to lock them in, resulting in *biased B2B electronic markets*. Later, competitive pressures and government regulation of CRSs forced airlines to reduce screen bias and eliminate preferential agreements that could hurt smaller players, resulting in *transparent B2B electronic markets*.

We see a similar evolution in the B2C sector. Initially, the market leaders, Travelocity and Expedia, had preferred agreements with certain carriers to display their fares. And due to the technological shortcomings of the CRSs, these OTAs were only able to display a limited number of options, resulting in *biased B2C electronic markets*. Since 2001, this has been curtailed by the competitive pressure of Orbitz's more transparent mechanism. Expedia and Travelocity have matched the transparent matrix display of Orbitz, which gives no preferential treatment to any carrier and displays all low fares by carrier in one screen.

Meanwhile, opaque OTAs have also changed their mechanisms to offer complete and accurate information. Priceline.com added the transparent matrix display used by Orbitz to its opaque "name-your-own-price" mechanism, offering the consumer a low price-low transparency option and a high price transparency option. In early 2005 Hotwire.com introduced a semi-opaque mechanism that offers fares within convenient time frames, and a transparent mechanism that offers CRS-based retail fares (see Appendix). Therefore, with their new three-tier strategy of opaque, semi-opaque, and transparent offers, Hotwire transformed its original opaque business model into a more competitive one for the current market.

Figure 5 shows the evolution of OTAs' transparency strategies since 2001. All of the OTA moves since 2001 are towards higher levels of market transparency. This battle for market transparency has reduced the overall level of bias and opaqueness among OTAs, through the development of innovative mechanisms that equitably display product and price offers from most suppliers. While this trend so far has been extraordinary, the potential for even greater market transparency has not yet been fully exploited by the OTAs.

The availability of new ITs should fuel additional competitive moves on the part of other firms to match the technological leadership that Orbitz has demonstrated. For example, we note the emergence of independent *meta-search agents* that search for the lowest prices across multiple OTAs (e.g.,

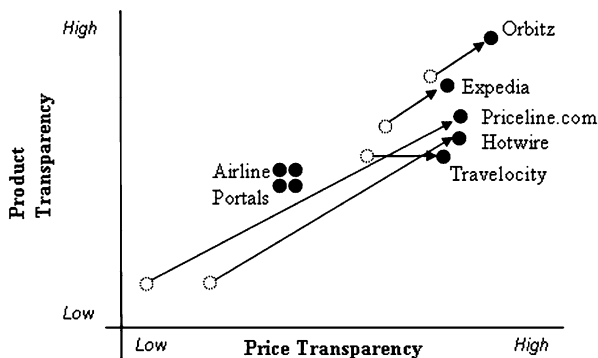


Fig. 5 The evolution of market transparency in online air travel—2001 to 2006. This figure describes the competitive moves of different OTAs in the market transparency space, since the origin of Orbitz in 2001. The *arrows* denote the directional transparency strategies that OTAs took, based on our assessment of their positions relative to each other. All the moves in the market transparency space of major OTAs have been towards a higher level of market transparency, through a reduction in the level of bias or the opaqueness of their market mechanisms (see Appendix for an illustration of the changes for Travelocity, Hotwire, and Priceline.com)

www.kayak.com, www.sidestep.com). We predict that this competition for consumers with market information will lead to the dominance of transparent air travel B2C electronic markets. Next, we provide the economic rationale to support our prediction.

4.2 Drivers of the move to transparent air travel markets

Figure 6 shows the interaction of forces that has created pressures for air travel electronic markets to become transparent.

4.2.1 Link A: From hierarchies to electronic markets

Reservation systems and IT have reduced product complexity in favor of market-based economic activity in the B2B and B2C air travel markets. In B2B markets, e-commerce technologies have made it easier for travel agencies to obtain accurate and timely trip descriptions and prices. Prior to CRS technology, the airline reservations and ticketing process was a cumbersome mix of paperwork and phone calls. The automation of transactions led to accurate and timely information exchange between airlines and travel agencies, although initially the information was biased in favor of the airline owner of the CRS.

In B2C markets, before the new OTAs emerged, travel agencies played an important role as intermediaries to reduce the complexity of CRS-based product descriptions for the consumer. A typical fare availability screen in a CRS was filled with codes for city pairs, inventory availability, and fare types,

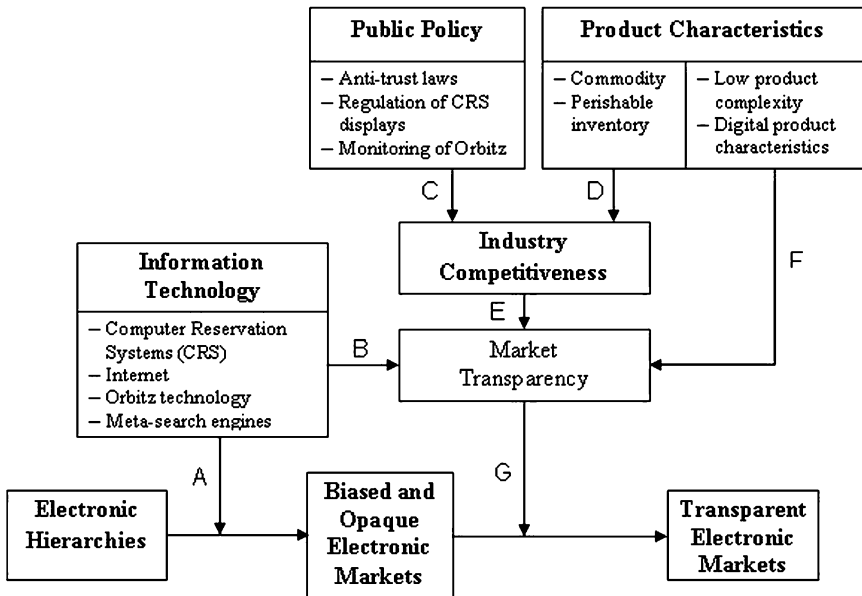


Fig. 6 Drivers of the move to transparent air travel markets. The key forces that influence the move to transparent air travel markets are *IT*, *product characteristics that favor electronic trading*, and *forces that promote industry competitiveness*. The arrows characterize the interactions between these forces. CRSs in B2B air travel markets and Internet-based technologies in B2C air travel markets have fueled the move to transparent electronic markets. The existence of pro-competitive regulations and the commodity nature of the air travel product have triggered competition for consumers with market information, which will eventually lead to the dominance of transparent electronic markets

making it a tool that was mostly for expert users. Consequently, consumers had very little control over the information they were given about possible trips and fares. Instead, they had to rely upon airline reservation offices and travel agents to interpret the results of CRS-based search requests. With a new ability to reach consumers via the Internet, OTAs seized the opportunity to display CRS output in a user-friendly manner (see Appendix). As a consequence, markets were created that bypass the traditional hierarchical relationships between travel agencies and travelers, lowering transaction costs, and enabling the move to electronic B2C air travel markets.

4.2.2 Link B: IT as an enabler of transparent markets

By unleashing the potential for innovative design of electronic markets, advanced ITs created new opportunities to compete with transparent market mechanisms. We observe that OTAs are competing for strategic market transparency positions in the battle for well-informed travelers, taking

advantage of Internet technology. However, the incentive to bias, conceal, and distort information to their benefit remains. Note that initially, in both B2B and B2C air travel markets, most competitors had biased and opaque market mechanisms. Other forces had to be present to inhibit the incentives to implement or maintain non-transparent market mechanisms.

4.2.3 Links C, D, E, and F: Public policy and product characteristics

Strategies to implement transparent market mechanisms are more likely in an environment where incentives by sellers to bias, distort, and conceal market information are reduced. In air travel, attempts to be less transparent were offset by competitive moves to steal market share, which reduced incentives to implement or maintain non-transparent market mechanisms (see link E in Fig. 6). This high level of competition was fueled by public policy that prohibits anti-competitive behavior and regulates CRS screen biases (see link C in Fig. 6), and by the inherent nature of the industry. Because airline inventory is *perishable*, airlines tend to compete aggressively in markets with excess capacity and during low travel seasons, which typically leads to intense price competition. Also, air travel is increasingly becoming a *commodity*, so there are fewer differentiation strategies that airlines can adopt instead of price competition (see link D in Fig. 6). Because price competition can lead to significant losses if competitors use electronic markets to monitor and match fare reductions, these characteristics of the industry have fueled the incentive for OTAs to search for differentiation strategies with innovative selling mechanisms that attract consumers by disclosing market information.

On the other hand, air travel products can be easily represented electronically based on information on the travel itinerary, number of stopovers, and airline carrier, among other informational features. These information-based characteristics of the air travel product facilitate electronic representation, making transparent market mechanisms feasible. Also, the low product complexity of leisure travel further enables OTAs to present information to consumers in a user-friendly format and hence to compete with transparent market mechanisms (see link F in Fig. 6). Together, these factors reduce the incentives for a seller to distort or conceal information, because a competitor can more easily reproduce and disclose the same market information to its advantage.

4.2.4 Link G: Sellers favor transparent market designs

Our analysis so far recognizes the limitations that IT alone exhibits as a force to eliminate the bias and opaqueness in electronic markets. We have made explicit the forces that, together with IT, favor transparent air travel markets. We argue that air travel suppliers and intermediaries have economic incentives to use IT to create and maintain information advantages, so other forces must be present to reduce or eliminate these incentives.

Without these forces, a move to transparent electronic markets would likely be inhibited.

Buyers value transparent markets where relevant product information is made available. On the other hand, while self-interest may encourage sellers to maintain information advantages, the combined effect of IT and competitive forces in information-intensive industries with low product complexity will align suppliers' interest for market transparency to that of buyers. In addition, we argue that in the absence of the possibility for explicit collusion, sellers will avoid price competition by using the transparent selling mechanisms to engage in *tacit collusion*. The rationale for this claim is that the potential losses from price competition among sellers may be higher than the losses from reducing information advantages in favor of buyers. This argument is consistent with the effort of airlines to lead the industry in the adoption of transparent market mechanisms through Orbitz. Transparent OTAs are beneficial to air travel suppliers because they allow competitors to follow each other's moves. This leads to our core prediction regarding the future of the air travel industry:

Proposition 1 (The Tacit Collusion Proposition) *In the absence of the possibility to explicitly collude, airlines and intermediaries will implement IT-enabled, transparent market mechanisms that allow tacit collusion, leading to the predominance of transparent electronic markets.*

The Tacit Collusion Proposition suggests that, in the presence of regulatory forces to curb explicit collusion, air travel suppliers will compete with transparent electronic markets, which will allow them to monitor each other's pricing tactics. This proposition is consistent with game-theoretical models that suggest tacit collusion is a likely outcome in competitive markets where IT provides timely signals for competitors to detect and deter cheating in an implicit pricing arrangement (Campbell et al. 2005; Stigler 1964). It is also consistent with observations in financial markets where electronic trading is prevalent (Christie and Schultz 1995). We next elaborate on this prediction, by showing how the aggregate effect of the Internet and competitive forces has resulted in the emerging dominance of transparent air travel electronic markets.

4.3 How the battle for market transparency has been unfolding

Consider two competitors, Priceline.com and Hotwire in 2001. Hotwire was more transparent than the "name-your-own-price" mechanism of Priceline.com, because it revealed a limited set of price offers up front (see Appendix). Under the assumption that buyers value market transparency, these firms should price based on the relative level of market transparency of their market mechanisms to maximize revenue (Granados et al. 2003). Since Priceline.com was less transparent, it should have a lower price than Hotwire. Therefore, Priceline.com had two possible strategies to improve its competitive position. It could adjust its pricing levels, or alternatively, adjust the level of market transparency of its selling mechanism (see Fig. 7).

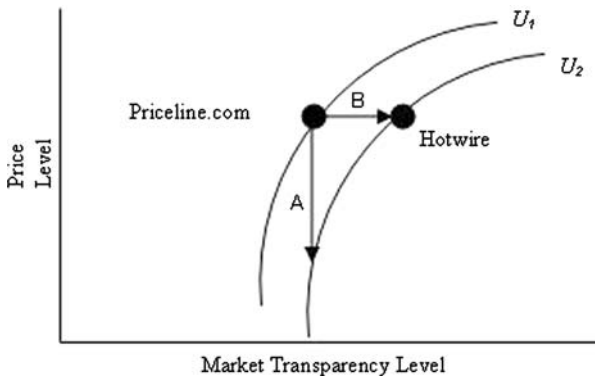


Fig. 7 Strategic alternatives for Priceline.com. The utility of buyers in this price-market transparency space is higher with lower price levels. Therefore, in this figure, a lower indifference curve implies higher utility, such that $U_2 > U_1$. Priceline.com had two options to improve its competitive position relative to Hotwire (or a combination of both): 1 lower its price level (*Arrow A*) or 2 increase the level of market transparency of its selling mechanism (*Arrow B*)

4.3.1 *Arrow A: Adjusting the pricing strategy*

Priceline.com's level of market transparency was fixed due to a technological limitation or a strategic imperative, because it was based on the use of the patented "name-your-own-price" mechanism which is, by its own nature, an opaque selling mechanism. Therefore, Priceline.com must lower its price levels relative to Hotwire to compensate for its lower level of market transparency.

4.3.2 *Arrow B: Adjusting the level of market transparency*

However, in competitive markets such as air travel it may not be an option for the less transparent seller to have lower prices than its competitors. If firms are not allowed to explicitly collude, it is likely that lower price levels will be matched by competitors (Morrison and Winston 1996) in order to elicit tacit collusion or to remain competitive. In addition, fares in air travel are driven by airline pricing strategies, leaving OTAs with a reduced ability to set prices. Even though Priceline.com offered a lower level of transparency than Hotwire, it was likely to receive similar net fares from the airlines as Hotwire does. Therefore, Priceline.com may have been effectively pricing itself out of the market due to a disadvantageous combination of price and market transparency strategies with respect to Hotwire. To wit, in February 2002, when Hotwire announced it had doubled the number of new unique visitors with respect to Priceline, CEO Karl Peterson stated: "We are gaining on our competition fast, because we do not require customers to bid ... our consumer experience is far superior to Priceline, and it shows in the number of new users coming to our site" (Hotwire 2002).

The alternative strategy for Priceline.com to improve its competitive position was to increase the level of market transparency of its selling mechanism. The shift of Priceline.com's transparency strategy to match that of Orbitz, the most transparent competitor, may have been a reaction to its uncompetitive position. Likewise, Hotwire's subsequent move to match Priceline's new level of market transparency can also be deduced from this rationale. This leads to the following proposition:

Proposition 2 (The Market Transparency Competitive Response Proposition) *In response to an uncompetitive market transparency position, opaque sellers will increase the transparency of their selling mechanisms, rather than engage in price competition.*

The Market Transparency Competitive Response Proposition implies that firms which target similar segments must consider their market transparency level relative to competition, or face the threat of a more transparent competitor offering the same price and stealing customers. This outcome is partially driven by the competitive nature of air travel and the regulatory forces that curb explicit, anti-competitive behavior. These forces, together with IT, limit the avenues firms have to remain competitive, leading to competition for market share with transparent market mechanisms.

More generally, we observe that this battle for consumers with market information has trickled down throughout the OTA industry, as Fig. 5 suggests. In particular, major players in the OTA industry have developed strategies to match the transparency level of Orbitz. IT has played a dual role in this process. First, by enabling transparent mechanisms (e.g., Orbitz), it has forced relatively opaque sellers to develop new capabilities to disclose market information and to redesign their selling mechanisms. Second, since prices are available electronically for competitors to view, their ability to monitor each other's pricing moves makes it less feasible for opaque sellers to compete with prices. Hence the alternative has been to match the transparency levels of the more transparent sellers.

We have shown how the interaction between advanced ITs and competitive forces led to a battle for travelers with transparent market mechanisms. We argue that competitive and regulatory forces in the air travel industry have tilted the trade-off sellers face between the benefits of non-transparent market mechanisms and transparent electronic markets in favor of the latter, leading to the emerging dominance of transparent air travel markets.

5 Implications of air travel industry analysis

In this section we derive implications of our analysis of the IT-enabled transformation of the air travel industry. First, we discuss implications in the context of the air travel industry. Thereafter, we discuss more general implications for practitioners and researchers.

5.1 Implications for air travel industry managers

We have shown *how* in the air travel industry “[p]roducers who start out by providing an electronic hierarchy or a biased electronic market will eventually be driven by competitive or legal forces to remove or significantly reduce the bias” (Malone et al. 1987, p 492). In addition, ITs such as CRSs and the Internet will continue to induce airlines and travel agencies to design selling mechanisms that provide complete and accurate market information. We predict that the long-term outcome of these competitive dynamics will be the prevalence of transparent electronic markets.

More generally, from the recognition that IT-enabled market transparency is a key driver of market transformation in the air travel industry, practitioners should monitor transparency moves in the industry to compete effectively. Participants who can leverage their market transparency design choices for air travel distribution will play major roles in the technological and strategic development of the industry. On the other hand, those players who do not acknowledge the strategic nature of market transparency are apt to be left behind and will struggle to survive.

5.2 Implications for practitioners and researchers

We have applied an augmented framework on the move to electronic markets to explore how advanced ITs lead to the implementation of innovative market mechanisms that influence an industry’s structure. At the core of this framework is that IT not only reduces product complexity and asset specificity, but it also greatly expands the ability of firms to strategize in the market transparency space. In this article we have shown how IT has played a role in the evolution of the air travel industry towards higher levels of market transparency. We predict that a similar outcome will occur in other highly competitive industries where IT facilitates electronic product representation. This, in turn, will create pressure for sellers to implement electronic markets that match the highest market-wide level of market transparency. On the other hand, the absence of any of these forces may inhibit the move to transparent electronic markets. This may explain why the convergence to transparent electronic markets has occurred to a lesser extent in other settings, such as the mortgage industry (Hess and Kemerer 1994) and the bond market (Granados et al. 2005).

Furthermore, our analysis of the air travel industry suggests that firms should link their IT, pricing, and transparency strategies to improve their competitive position. While most OTAs have used legacy systems to power their fare search engines and selling mechanisms, Orbitz used new and innovative technologies to offer low prices and high levels of transparency, challenging the status quo of the industry. Also, most major OTAs have matched the matrix display of Orbitz, but the technological limitations of GDS systems have allowed Orbitz to keep an edge in its ability to effectively show complete, unbiased, and accurate information to consumers.

Therefore, the case of Orbitz highlights the need for firms to jointly evaluate IT investments, pricing, and transparency strategies.

Perhaps in the presence of IT, information-intensive industries will tend to strategize on the transparency dimension of market design, as exemplified by the air travel industry. Other industries may concentrate in different dimensions such as price discovery and trading protocols, which may lead to the prevalence of other forms of advanced market organization. For example, in the markets for used products, it is likely that the effective price discovery which sellers and buyers experience with auction mechanisms (e.g., www.ebay.com) may lead to their growing dominance, while market transparency plays a secondary role. We encourage in-depth analysis of other competitive industries to examine their progression to advanced forms of market organization.

The opportunities to witness and document changes caused by the digital revolution are numerous and the IS academic field stands to make some interesting contributions of new knowledge. In particular, the design of market mechanisms in electronic commerce is increasingly playing an important role in the strategic behavior of firms (Anandalingam et al. 2005). A significant research opportunity arises as firms increasingly adopt IT-enabled strategies in addition to the traditional *low cost* or *differentiation* business models. For example, innovative ways of presenting product information creates transparency, which offers the opportunity to explore the impact of systems design on market performance and competition. Mechanism design may also impact price transparency and price discovery, which represents another key direction for research. To explore these IT-enabled strategies for the design of market mechanisms, more in-depth case studies can be performed. Finally, we recommend the development and refinement of analytical models that consider the forces which influence strategic market design choices in the presence of IT.

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6 Appendix: Illustration of OTA market mechanisms

To illustrate the level of transparency associated with different OTAs and how it has changed, we include several screen shots of travel search results for Travelocity, Hotwire, and Priceline.com, one prior to the change and one after the change for each firm.

(A) Travelocity

– Travelocity’s Original Market Mechanism

The screenshot shows the Travelocity website interface. At the top, there's a navigation bar with links for Home, Flights, Hotels, Cars-Rail, Vacations, Cruises, Last Minute Deals, Guides & Advice, My Stuff, and Help. Below this is a search bar and a section titled "Select Your Outbound Flight". The search parameters are: New York, NY to San Francisco, CA, Departing Fri, Aug 22, Returning Thu, Sep 04, 1 Adult. The results are displayed in a table format:

Departure	Arrival	Airline	Travel Time	Price
7:00am Newark, NJ (EWR)	10:00am San Francisco, CA (SFO)	United Airlines Flight 807	Nonstop Travel Time: 6hrs 0min	Roundtrip From USD 301 Select
12:00noon Newark, NJ (EWR)	2:50pm San Francisco, CA (SFO)	United Airlines Flight 21	Nonstop Travel Time: 5hrs 50min	Roundtrip From USD 301 Select

Source: www.travelocity.com, accessed in April 2004.

– Travelocity’s Matrix Display

The screenshot shows a flight matrix on the Travelocity website. The search parameters are: 3 Night + Air from \$229, New York, NY (NYC) to San Francisco, CA (SFO), Departing Mon, Aug 22, Returning Sun, Sep 4. The matrix compares flight options from Independence Air, Frontier Airlines, Airtran Airways, Continental Airlines, US Airways, and Delta Air Lines. The results are as follows:

Flight Type	Independence Air	Frontier Airlines	Airtran Airways	Continental Airlines	US Airways	Delta Air Lines
Nonstops Only (32 flights)	---	---	---	\$374 Total \$397	\$374 Total \$397	\$384 Total \$407
All 78 Flights (displayed below)	\$258 Total \$302	\$268 Total \$312	\$299 Total \$343	\$374 Total \$397	\$374 Total \$397	\$384 Total \$407

Below the matrix, there's a section titled "Select Flight for Mon, Aug 22" with 78 flight options. The first option shown is Independence Air Flight 1033 / 53, departing at 6:35pm from New York, NY (JFK) and arriving at 11:59pm in San Francisco, CA, with a total travel time of 8hrs 24min - 1 Stop. The roundtrip price is \$302.

Source: www.travelocity.com, accessed in June 2005.

(B) Hotwire’s Three-Tier Transparency Strategy

– Hotwire’s Original Opaque Mechanism



Source: www.hotwire.com, accessed in April 2004. In Hotwire’s original opaque mechanism, the airline name and itinerary are only shown after a purchase is made. Only a few travel options were provided.

– Hotwire’s Semi-Opaque and Transparent Mechanisms



Source: www.hotwire.com, accessed in June 2005. In 2005, Hotwire added a semi-opaque mechanism, which provides a time frame for the itinerary but not an exact flight time nor the airline name. For offers with exact flight times and airline name, users have access to “retail fares.”

(C) Priceline.com

– Priceline.com’s Original “Name-Your-Own-Price” Mechanism

The screenshot shows a flight request summary on Priceline.com. The flight is from Minneapolis St Paul Intl (MSP) to Miami Intl (MIA) on Tue, April 20, 2004, returning on Tue, April 27, 2004. The passenger is Rob Kauffman. The flight times are specified as starting between 6 a.m. and 10 p.m. and arriving no later than 12:30 a.m. the next day. The price breakdown is as follows:

Offer Price:	\$170.00 (per ticket)
Applicable Taxes:	\$31.40 (per ticket)
Ticket Cost:	\$201.40 (per ticket)
Processing Fee:	\$6.95 (per ticket)
Subtotal:	\$208.35 (per ticket)
Number of Tickets:	1
Total Charges:	\$208.35

Source: www.priceline.com, accessed in April 2004.

– Priceline.com’s Two-Tier Transparency Strategy: The Matrix Display

The screenshot shows the 'Name Your Own Price and Save More' matrix on Priceline.com. The flight is from Minneapolis, MN (MSP) to Miami, FL (MIA) on Sat, August 27, returning on Sun, September 4. The matrix displays prices for various airlines and stop options:

	All Flights	American Airlines	Delta Airlines	Multiple Carrier	Continental Airlines	United Airlines
Non-Stop	from \$265	from \$265	N/A	N/A	N/A	N/A
1 Stop	from \$281	from \$281	from \$316	from \$321	from \$331	from \$343
2+ Stops	from \$316	N/A	from \$316	from \$326	N/A	N/A

At the bottom, there are filters for Departure Time (Anytime), Return Time (Anytime), Return Airport (MIA (Miami) from \$265), and Airline Preference (All Airlines). A 'Sort' button is also present.

Source: www.priceline.com, accessed in June 2005. In addition to its opaque mechanism, Priceline.com now offers retail fares with a matrix display.

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