

Value of a Platform to a Seller:
Case of American Airlines and Online Travel Agencies

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Abstract

We examine the financial consequences of a reseller excluding a certain supplier. We take advantage of a recent conflict between American Airlines and two leading U.S. online travel agencies (Expedia and Orbitz), which led to the suspension of American Airlines fares during the first quarter of 2011. We analyze price data for the first quarter of 2010 and 2011, employing a simple difference-in-differences identification strategy to evaluate changes in American Airlines' domestic fares due to this conflict. After controlling for across market heterogeneity, carrier-specific time-invariant effects, and time-specific carrier-invariant effects, American Airlines' domestic fares during the conflict were 2.7-4.2 percent lower than similar fares charged by American's main competitors (United, Continental, Delta, and US Airways). The fare effect is most pronounced in the sub-sample of one-stop itineraries, where competition is stronger, and customers are more likely to have to rely on travel agents – rather than carriers' own web-sites – for flight bookings. While American's fares may have dropped, we find minimal impact on passenger counts and load factors. In sum, we find between a \$35 to \$40 million short-term reduction in American's revenue due to this online travel dispute. The long-term impact on American's profit, however, is unclear because the carrier may have gained some bargaining power and negotiated more favorable terms in their most recent confidential contracts with Expedia and Orbitz.

Keywords: value of platforms, online travel agents, natural experiment, airfares

JEL: D4; L4; L93

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1. Introduction

This study addresses the issue of financial consequences of a reseller excluding or “squeezing” a certain supplier. We do not often see cases where large firms in a vertical relationship have severe disputes that lead to one player being excluded as a punishment. This is an important issue given the many ongoing conflicts in vertical relationships between cable networks and television channels over fees. For example, the U.S. television network CBS was blacked out by Time Warner Cable in the Los Angeles, California and New York media markets in 2013 in a dispute over programmer fees. A similar fee dispute in 2014 has led U.S. satellite television provider DirecTV to pull the Weather Channel off its network. Carriage disputes are not limited to the United States, as a dispute between BT Group and British Sky Broadcasting (BSB) over the pricing of premium sports programming had to be resolved by the British Court system in 2014 – which required the BSB to offer premium sports channels at a price set by the regulator. Unlike with the U.S. cable networks disputes, however, the conflict we are studying allows us to evaluate the financial consequences of the row for some of the players involved.

This paper examines a vertical supply chain problem in which an upstream firm (American Airlines) sells its services via both its own channel (AA.com), and other downstream outlets (travel agents). Due to concerns about American Airlines launching a competing ticket delivery system (“AA Direct Connect”), main online travel agents (Expedia and Orbitz) stopped displaying all American Airlines fares during the first quarter of 2011. Expedia and Orbitz are major players in the U.S. airline ticket distribution segment, collectively selling about one in six airline tickets on the U.S. market. American’s access to the ticket distribution platforms was further restricted by Sabre, the largest U.S. computer reservation system in the industry, which announced that it would display American Airlines’ fares less prominently in its system. Given the wealth of airline pricing and revenue data, the American Airlines-Expedia-Orbitz fee dispute provides an excellent venue to analyze the financial impact of a severe dispute between large firms in a vertical relationship. We examine whether this dispute had a significant impact on American Airlines domestic passengers and fares.

American Airlines lawsuit (filed in April 2011 and settled out of court by the time of this writing) alleged that Expedia, Orbitz, and Sabre conspired to restrict access to their ticketing platforms in retaliation for the American’s marketing a competing ticket delivery platform for travel agents, designed to bypass the existing global ticket distribution systems and connect their systems directly with American servers. The exact amount of compensation American Airlines received from this settlement has not been disclosed, but Edelman (2013a) notes that “American fourth-quarter [2012] earnings statement reported \$280 million of revenue from settlement of a commercial dispute”.

We postulate that American Airlines’ response to a restricted access to ticket delivery platforms any display bias imposed by Sabre involved (a) promotions designed to lure customers to AA.com and make its offers more conspicuous on platforms which continued to display them; and/or (b) lowering prices to move tickets. Our analysis of the price data during this period yields evidence consistent with American Airlines lowering their one-stop fares by four percent as compared to what it would have charged absent the conflict. We estimate this ticketing platform dispute resulted in a \$35 to \$40 million reduction to American’s revenue during the first quarter of 2011. This figure comprises between 1.1% to

1.3% of American Airlines' quarterly total revenue. We have found, however, no evidence to suggest that the dispute has had any appreciable impact on the airline's load factor or route-level passenger volumes.

We note, however, that there are many confounding factors in our analysis, most importantly a potential American Airlines endogenous response to being excluded by the major online travel agencies. Hence our point estimates should not be viewed as causal effects, but rather as a reduced form equilibrium outcome of all the observed and unobserved forces. The results suggest that there may have been some (limited) impact on American Airlines. We do not observe any adverse effect on passengers, suggesting that either the travel agents do not have a huge influence on how customers buy tickets, or that American Airlines was successful in countering any negative effects of this dispute using a variety of means discussed in more detail later in the paper. We do find some evidence that American Airlines had lower fares as a result of this dispute, perhaps suggesting that such actions were needed to prevent a loss of passengers.

The remainder of the paper is organized as follows. Section 2 provides a brief review of the literature. Section 3 describes the airline ticket distribution platforms. Section 4 provides an overview of the dispute between American Airlines and the ticket delivery platforms. Section 5 presents the data analysis methodology, along with a discussion of the results. Section 6 concludes.

2. Relevant Literature

Related theoretical literature that examines the value of a platform comes from research done on two-sided markets. Recent papers that provide an excellent overview of these studies include Rysman (2009), Rochet and Tirole (2003, 2006). Generally, two-sided markets are defined as industries where two sets of agents interact through an intermediary or a platform; and decisions of each set of agents affect the outcomes of the other set of agents, typically through a network externality (Rysman, 2009). Due to network externalities inherent in these industries, theoretical studies of two-sided markets have mostly focused on how platforms set access prices for both sides of the market. One important insight that comes from this literature is that a platform might set prices below cost to the more price elastic side of the market, effectively subsidizing participation of the more price sensitive side, hoping to recoup the losses via increased participation – due to the network externality – on the less price elastic side.

Several applied theoretical studies focus on specific two-sided markets. Anderson and Coate (2005) examine advertising in the television industry. In this two-sided market users exert a positive externality on advertisers, while the advertisements create a negative externality for consumers. Reisinger (2012) analyzes a media market model where platforms compete both for advertisers and users, and shows that platforms have positive economic profits even though there is Bertrand competition for advertisers. The applied theoretical studies on competition between platforms have covered the rivalry between the payment schemes (Guthrie and Wright, 2007) and technology platforms (Economides and Katsamakas, 2006).

Empirical literature on two-sided markets is understandably less developed. Prior empirical studies have focused on pricing and market power in the newspaper industry (other empirical studies of two-sided industries include credit cards (Rysman, 2007) and video games (Derdenger, 2011)). Kaiser and Wright (2006) analyze magazine data from Germany: their results are consistent with magazines subsidizing readers, recouping the corresponding losses from higher advertising revenue. Argentesi and Filistrucchi (2007) examine a structural model of Italian newspaper industry with the aim of estimating the firms' market power. Chandra and Collard-Wexler (2009) find that mergers in the Canadian newspaper industry do not lead to higher prices for either subscribers or advertisers, consistent with their theoretical model. Most recently, Affeldt *et al.* (2013) model effects of a potential merger in the Dutch newspaper industry. Our study thus provides an empirical investigation, which examines two-sided markets from a different angle. Instead of focusing on pricing by the platforms (which remains unobservable to us), we examine an incidence of a seller losing access to an important platform, and evaluate how this affected the seller's revenue.

Previous studies of the U.S. travel distribution services industry (Bilotkach and Pejcinovska, 2011; Chen, 2006; Clemons *et al.*, 2002) have compared price quotes across travel agents. These studies did not view travel services distribution industry as platforms in a two-sided market. Bilotkach and Rupp (2013) provide the first empirical analysis of buyer subsidy by a ticket distribution platform in a two-sided market context. Their findings are consistent with the buyer subsidy leading to an increase in seller participation with the platform. The contribution of our empirical study is to determine the value of a platform in the airline ticket distribution market by examining the financial consequences of two resellers excluding a certain supplier. This issue has not previously addressed in the literature.

3. Travel Agents and Distribution Systems

In the early days of commercial passenger aviation, ticket distribution presented formidable challenge to the airlines (see Edelman, 2009, for a relevant discussion). As computing technology improved, airlines developed what is now known as the Global Distribution Systems (GDS) – platforms that allow travelers to quickly and efficiently book travel with the airlines. Yet, large air carriers still spend hundreds of millions on ticket distribution – American Airlines, for instance, paid more than \$424 million of GDS fees in 2001 (Edelman, 2009).

The visual scheme of the distribution of airline travel services appears on Figure 1. An airline sells its tickets either directly (using its call-center and web-site) or via travel agents, by posting fares on one or more Computer Reservation Systems (CRS), which travel agents access to book tickets on behalf of their customers. The CRS's were launched by airlines in the 1970s. Since that time, the CRS companies have taken a life of their own as independent entities. The four major CRS companies are: Sabre (with about 45 percent U.S. market share and over 30 percent global market share), Worldspan (over 25 percent U.S. market share and 15 percent worldwide), Galileo and Amadeus (share of these two systems on the U.S. market keeps declining while they remain larger players on the worldwide arena, with combined market share exceeding 50 percent).

Airlines are currently free to choose which systems to participate in and at what level to do so.² Most U.S. carriers actively participate in multiple systems. An exception is Southwest Airlines, which only participates in Sabre, and does so at a low level.³ Consequently, Southwest Airlines consumers can only book tickets directly through the carrier's website, call center, or via some brick-and-mortar agents.

The Internet has altered the travel services industry dramatically. Emergence of online travel agents was a major innovation in this market. Airlines also saw potential in selling their tickets via their own web sites. As late as in 1990s, the brick-and-mortar travel agents sold over three quarters of all airline tickets; with the remaining 25 percent retailed directly by the airline operated call centers. By 2002, online travel agents captured about 15 percent of the U.S. market from brick-and-mortar agents. The estimate by Citigroup Investment Research, quoted by Forbes, states that in 2005 online travel agents have over 25 percent U.S. market share in the airline ticket distribution industry; the airlines still sell about a quarter of all tickets, primarily via their web sites.⁴ In the U.S. market, the online travel agent segment of the airline ticket distribution market is dominated by the three major players, collectively responsible for over 80 percent of all the tickets sold online by agents: Travelocity (owned by Sabre, currently a privately held company), Expedia (founded within Microsoft in 1995, and an independent publicly traded company since 2005), and Orbitz (started through a partnership of several major airlines in 2001, currently a subsidiary of Travelport, owned by the Blackstone Group – a private equity company).

We should further note that online distribution platforms appear to have achieved a higher degree of penetration into sales of U.S. airline tickets compared to other segments of the worldwide travel distribution market. Looking at the travel services distribution industry as a whole, online travel agencies currently account for only 11% of the \$1.2 trillion dollars spent on worldwide travel bookings (Salzman, 2013). In addition to the effect online sales have had on the competition on the services distribution market, recent evidence suggests that the Internet has had its effect on the airlines' on-time performance (Ater and Orlov, 2012) and capacity utilization (Dana and Orlov, 2010).

In context of two-sided market literature, we consider the four major CRS (also known in the industry as global distribution systems or GDS) platforms. The value of a GDS or travel agent to airlines and travelers is higher the more agents from the other side of the market use a particular platform. Further, travel agents – especially online ones – effectively subsidize the buyer side of the market, by allowing customers to book airline tickets without imposing a booking fee. Airlines have been trying to establish their own ticket distribution platforms (by steering passengers to book travel via the airlines' websites instead of using travel agents) with the aim of reducing their distribution costs. In addition, this strategy makes it more difficult for passengers to directly compare price quotes across airlines (Bilotkach, 2010).

Airlines enter into individual agreements with the large distributors of their services. While small brick-and-mortar agents typically deal directly with a CRS; large on-line agents enter into direct agreements

² Initial CRS regulation, adopted in 1984, stipulated that an airline owning or marketing a CRS must participate in competing systems. This rule was scrapped in 2004.

³ The other important low-cost player on the U.S. market, JetBlue Airways, tried emulating Southwest's strategy in its early years. The airline has however since moved to a more traditional model of participating in multiple CRS.

⁴ *Online Travel Gets Personal*, Forbes.com, accessed 02/17/2006.

with the airlines. These agreements, which typically span a three to five year period, specify the commission paid by the airline to the travel agents and the conditions for travel agent's access to the airline's seat inventory. While these contracts are confidential, the travel research firm PhoCusWright indicates that airlines pay very low commission rates for online airline tickets - ranging from 2% to 3% (Salzman, 2013)⁵. The crucial parameters which affect the structure of commissions paid by the airlines are known in the industry as content and participation.

Content refers to the seat inventory that the airline makes available to the agent. Airlines prefer to offer relatively low level of content to the agents, meaning that carriers seek to keep the lowest fares to themselves rather than selling those tickets via intermediaries. The agents clearly prefer to obtain full access to the airlines' inventory – this is known as full content. In negotiations, the agents offer the airlines commission discounts for full content access.

Participation refers to whether the agents are able to access the airline's seat inventory in real time. When participation is asynchronous, the fare quoted on the agent's first screen may differ – in either direction – from the actual fare upon booking the flight. Clearly, agents prefer real-time participation, since it increases their price reliability.

4. The Conflict

4.1. Timeline

The conflict between American Airlines (AA) and three main players in the ticket distribution industry was precipitated largely by American's attempt to market "AA Direct Connect" – its own ticket distribution platform, which would link travel agents directly to the American's inventory, bypassing existing Global Distribution Systems. As an added bonus, agents subscribing to "AA Direct Connect" would be able to also directly sell AA's additional services – such as preferred seating, checked luggage, and priority boarding (Edelman, 2013b). Of the significant players in the U.S. online ticket distribution segment, only Priceline adopted this platform by January 2011. Orbitz and Expedia, however, retaliated against this move by blocking AA access to their platforms and refusing to show the carrier's tickets on their websites. American continues to market "AA Direct Connect"; however, recent assessment by some of the industry experts suggests these efforts have not been fruitful.⁶

Just before Christmas in 2010, American Airlines announced that it was pulling its inventory out of Orbitz – one of the big three U.S. online travel agents – upon failing to renegotiate the agreement with the distributor. Shortly afterwards – on the New Year's Day of 2011 – Expedia announced it was removing American Airlines' tickets from its website. Sabre – the owner of the largest Global Distribution System in the United States – notified American Airlines on January 5, 2011 that Sabre "has taken a set of punitive actions against the airline", including "biasing its shopping displays" in its system for American

⁵ Salzman further asserts that travel agents' commission for hotel bookings can be as high as 25 percent.

⁶ "AA's direct connect is a walking corpse", *Travel Weekly*, posted online February 6, 2013.

Airlines fares.⁷ Sabre is the owner of the third largest U.S. online travel agency (Travelocity). Further, many travel agents (both brick-and-mortar and online) use inventory provided by Sabre to book travel for their clients. Sabre also filed a suit against American in early January 2011 alleging that the carrier was forcing travel agents to use the AA Direct Connect ticket distribution platform. American countersued Sabre on January 10, 2011, alleging exclusionary conduct by the GDS. Two weeks later, (January 24, 2011), American and Sabre called a truce – agreeing to put all litigation on hold until June 1st, 2011 and both parties agreed to return to operating as they were prior to January 5th in terms of Sabre displays, American Airlines content and economic terms. The issue of the GDS biasing American’s fares, however, re-surfaced later in 2011.⁸

American Airlines’ flight options remained unavailable on Expedia until April 4, 2011, at which time the airline reached an agreement with the company, and the agent resumed selling American tickets. Having failed to reach a deal with Orbitz, American sued its parent company Travelport on April 13, 2011. Eventually, Sabre was also added to the lawsuit. On June 1, 2011, a judge ordered American Airlines to resume selling American tickets via Orbitz. Eventually, American and Sabre settled on October 31, 2012; the American-Travelport case was settled on April 1, 2013. Additionally, US Airways has also filed a similar lawsuit against Sabre, alleging exclusionary conduct by the GDS. Unlike American Airlines, US Airways has not faced exclusion from any of the ticket distribution platforms.

In addition to litigation, American did not sit idle when their tickets were dropped from the existing distribution platforms, as they took multiple steps to mitigate the potential impact of the dispute on its revenue. During the first quarter of 2011, American initiated several marketing/advertising campaigns to reach its customers and drive traffic to their web site. These include the February 2011 launch of Facebook and Twitter channels, which provided followers with opportunities to earn additional miles and receive notification of American fare promotions. In March 2011 American offered a million frequent flier miles sweepstakes to customers who watch a testimonial video that promotes the AA.com web site for booking tickets. American also offered incentives (free tickets) for small/medium size California businesses that increased the number of tickets booked through AA.com.

In sum, the timeline of the relevant events is as follows. During the first quarter of 2011, American Airlines’ fares were unavailable for purchase via both Expedia and Orbitz. Between April 4, 2011 and June 1, 2011, customers could purchase AA’s tickets via Expedia, but not Orbitz. After June 1, 2011, all the major online travel agents resumed selling American Airlines’ tickets. During the first and second quarters of 2011, we have reason to suspect that American Airlines’ travel options could have been obfuscated by Travelocity and other agents linked to Sabre.

4.2. Potential Effects and Preliminary Evidence

Given the conflict timeline outlined above, we believe that the largest impact on AA’s sales should have occurred during the first quarter of 2011. Indeed, both Orbitz and Expedia (which comprise more than half of all U.S. online travel agent ticket sales) were not selling American tickets during this time period.

⁷ American Airlines press release on January 5, 2011, www.aa.com accessed April 2, 2013. For more details of this dispute see “Dogfight Erupts in Plane Ticket Sales”, *The Wall Street Journal*, January 6, 2011.

⁸ “Court permits American to seek injunction if Sabre biases fares”, *Travel Weekly*, posted online June 24, 2011

While the share of U.S. airline tickets sold via online travel agents is difficult to assess; available estimates put it at 25-40 percent⁹. Using one-third as a consensus estimate of the online travel agents' share in terms of the number of trips sold, this suggests that about one-sixth of American Airlines' tickets were at risk of not being available for purchase during the first quarter of 2011. The total revenue at risk exceeded \$500 million, given American's average domestic quarterly revenue of \$3.25 billion in 2010. Using the 11% share by online travel agencies of worldwide travel bookings (Salzman 2013) implies that about 6% of American Airlines' tickets were at risk of not being available for purchase during that same quarter. The total revenue at risk implied by that estimate is about \$200 million. These at "risk" revenue figures serve as conservative estimates, given that we are excluding any impact to American's revenue due to three weeks of Sabre's bias in displaying AA flights in January 2011.

The actual extent of damages sustained by American Airlines as a result of this GDS conflict (as measured by the lost revenue) depends on the actions taken by the airline. These could include (a) reducing the number of flights or aircraft size; (b) diverting passengers to the airline's website and agents still offering the carrier's travel options (some large online agents that continued selling AA's tickets include Travelocity and Priceline); and (c) offering lower fares to mitigate the display bias and to sell more tickets via other online agents which continued to list AA fares. The extent of any adverse impact on AA's revenue would likely vary by city-pair market and depend upon the degree of market competition.

In particular, we make a distinction between non-stop and one-stop services, since potential travelers are more likely to be aware of availability of American Airlines' flights if non-stop routes are missing from search requests. This is especially true if American is the only provider of non-stop service in the market. Such an outcome, would likely prompt a passenger to conduct an additional search on AA's website. In comparison, one-stop markets are more competitive than non-stop routes (descriptive statistics appear in the next section to back this claim). A potential traveler searching for quotes on a one-stop journey on Expedia in the first quarter of 2011 would in most cases obtain several one-stop options (e.g., from Delta, Continental, United, and US Airways), hence the absence of American Airlines' fares is less noticeable. Finally, we note that the market for one-stop tickets is considerably smaller than non-stop tickets, as one-stop ticket purchases comprise about one-sixth of all domestic tickets sold.

An aspect of the travel distribution market, which could work to mitigate the effect of the conflict on American Airlines' revenue, is the existence of meta-search travel sites which allow prospective travelers to compare fare quotes across different sources. Kayak.com is the most important player among the meta-search travel sites. Even if Expedia or Orbitz do not show American Airlines' fare quotes directly, such quotes will be visible via kayak.com (from which the customer will be taken to AA.com or an agent offering the fare). The extent to which this channel could have mitigated the effect of the conflict is not clear, as there are no reliable publicly available estimates as to how many customers use such agents.

As a first rough assessment of potential effects of the conflict, Table 1 compares operating results (passenger counts, flight operations, load factor, and revenue) of American Airlines with its primary

⁹ We noted in Section 3.1 an estimate of 25% market share of online agents from 2005, which could have increased since.

competitors¹⁰ for the first three quarters of 2011. As a basis for comparison we use the corresponding quarters from 2010 to determine the year-over-year percentage changes. For each of these four operating measures, Table 1 shows that the year-over-year percentage changes indicate that the operating results for American Airlines declined in the first quarter of 2011 and steadily improved across all performance measures during the second and third quarters of 2011. Compared to other airlines, the year-over-year percentage changes in operating results for passenger counts, number of flights, and load factors of American Airlines were on par with its competitors during the first quarter of 2011. The only operating performance metric where American experienced the lowest year-over-year growth among the four major carriers listed in Table 1 occurred for revenue as American's increase (4.6 percent) lagged the competition which ranged from revenue increases of 7.6 to 11.3 percent.

In terms of passenger counts, Table 1 shows that American carried almost two percent fewer passengers in the first quarter of 2011 compared to 2010. American was not the only network carrier to have lower passenger counts in the first quarter of 2011, as United/Continental had a 7.6 percent reduction in passengers. The substantial decline in passenger numbers reported by United/Continental is likely related to their merger (completed in October 2010) as the airline adjusted its flight network. Whereas, during the same quarter in 2011, Delta and US Airways managed to increase their passenger count on the U.S. domestic market by 3.6 and 5.1 percent, respectively. The number of flights during the first quarter of 2011 fell for American (2 percent) and United/Continental (6.8 percent), while it increased for both Delta (2.7 percent) and US Airways (4.8 percent).

In the first quarter of 2011, American Airlines' load factor also declined (-0.5%), however, this change was in line with its competitors as Delta also registered a drop in load factor (-1.3%), while United/Continental (1.1%) and US Airways (1.3%) both managed slight increases in this indicator.

As mentioned above, the revenue results were the most troubling for American during the first quarter of 2011, compared to its peers as American registered 4.6 percent quarterly increase, while its three primary competitors all fared better with larger revenue gains - United/Continental (7.6%), Delta (10.4%), and US Airways (11.3%). Had AA's revenue grown by the average revenue increase rate of 9.8% registered by its three primary competitors (UA/CO, AA, US), then the carrier would have collected \$154 million more in revenue during the first quarter of 2011. This back of the envelope calculation does not, however, take into account other possible carrier-specific and market-specific effects, nor does it include cost savings from lower payments of travel agency commissions.

¹⁰ We defined American Airlines' primary competitors based on the extent of the carrier's multimarket contact with other airlines. See next Section for more details.

5. Effects of the Conflict on American Airlines' Prices and Revenue

5.1. Data and Methodology

5.1.1. General

The discussion in the previous section of the paper and aggregate data from Table 1 suggests that the American-GDS conflict may have placed a substantial share of American Airlines' revenue at risk. The lower revenue for American is based on aggregate data, which does not include controls for carrier-specific or market-specific heterogeneity. The purpose of this section is to carry out the data analysis with the appropriate controls.

We suggest that American may have used ticket prices to both attract customer traffic to its website and mitigate any display bias applied by the leading GDS (Sabre). Hence the main part of our data analysis involves evaluating the potential price effects of this conflict. Moreover, we also consider the potential effects of this conflict on Americans' load factors and passenger volumes for non-stop flight segments. In either case, the methodological approach we employ involves a difference-in-differences estimator in the context of reduced-form market level fixed effects specifications.

5.1.2. Price Effects

The primary source of our price data is the U.S. Department of Transportation (DOT) Origin and Destination Survey, databank DB1B. The DB1B is a 10 percent sample of actual domestic itineraries, compiled quarterly by the U.S. DOT. Each entry in the DB1B includes fare paid (net of taxes and fees), class of service¹¹, and detailed information on routing, including the marketing carrier (airline that sold the ticket), and operating carrier for each flight segment, distance traveled, and all intermediate airports visited. The destination of the trip is coded through the directional break in an itinerary. For our analysis, we have used DB1B dataset for the first quarter of 2010 and 2011. We consider the first quarter of 2011 as the peak of the conflict between American Airlines and travel services distributors, since this is the period when both Expedia and Orbitz did not provide American fares to potential buyers, and Sabre imposed a temporary display bias for American fares. The first quarter of 2010 is used as the baseline comparison time period to avoid any potential seasonality issues.

We retained both non-stop and one-stop roundtrip single airline itineraries, originating and terminating at the same U.S. airport. We re-assigned regional carriers to the corresponding major airlines.¹² Consistent with other studies using these data, itineraries flagged in the dataset as questionable are dropped. We only retained restricted economy class itineraries (except for Southwest Airlines, which classifies all its tickets as "restricted first class"). The restricted economy classification is used most frequently in the DB1B dataset (over 85 percent of the sample); and restricted economy fares appear to

¹¹ Services as classified as first unrestricted, first restricted, business unrestricted, business restricted, economy unrestricted, and economy restricted.

¹² Regional carriers mostly operate the flights, leaving marketing and ticket sales to the major airlines. To assign regional carriers to major airlines, annual 10K reports filed each year with the U.S. Securities and Exchange Commission by all major and regional airlines are analyzed to identify partnerships. Assignments are subsequently checked for accuracy by cross-checking regional carrier route maps with schedules of their major carrier partners to ensure that routes are properly assigned. The resulting assignments appear in the Appendix.

span the expected range of economy class fares rather well. In line with previous studies (e.g., Lee and Luengo-Prado, 2005), we drop all itineraries with fares of less than two cents per mile (about \$100 for a coast-to-coast roundtrip ticket) and we only include markets with 100 or more passengers during the quarter.

From the DB1B, we calculate the natural logarithm of passenger weighted average airfares at the airline-quarter-origin-destination level. In situations where an airline offers both non-stop and one-stop services, we compute passenger-weighted mean fares separately for nonstop and one-stop flights. One-stop mean fares are computed without regard to the connecting airport (e.g., American Airlines flights stopping in either Chicago or Dallas hubs – are lumped together for the purposes of computing passenger weighted mean fare for one-stop itineraries).

Our methodology involves estimating the following reduced-form price specification:

$$P_{ikt} = \alpha_i + \beta X_k + \phi X_k C_t + \psi C_t + \gamma Z_{ikt} + \varepsilon_{ikt}$$

Where the dependent variable P_{ikt} is the natural logarithm of passenger weighted airfare charged by airline k on market i at time t ; α_i represent market fixed effects; X_k is the vector of airline-specific effects; C_t is the conflict indicator variable for first quarter of 2011 (when the conflict initially occurred); Z_{ikt} is the vector of control variables; and ε_{ikt} is the error term.

The airline-conflict time interactions are the key variables of interest. Specifically, the effect of conflict on American Airlines' prices is identified by:

$$\phi_{AA} - \phi_{competitor}$$

When this difference is negative and statistically different from zero, then such a result constitutes evidence consistent with the conflict having an impact on pricing by American Airlines. In addition to the negative and significant difference between ϕ_{AA} and corresponding coefficient for the carrier's main competitors; we also verify that the difference $\phi_{C1} - \phi_{C2}$ is statistically close to zero for any pair of competitors C1 and C2 that does not involve AA (e.g., Delta and United). Table 7 shows that this is indeed the case for all one-stop tickets. There are, however, a few instances for the entire sample where United's ticket prices differed from its competitors.

We determine the close competitors for American by measuring the extent of multimarket contact between American Airlines and the seven largest U.S. carriers. We use the DB1B dataset and count the number of airport-pair markets in which both American and another airline offer services in a given quarter. Presence of a single itinerary is sufficient to record "contact" between the two carriers in a market. Table 4 presents a count of overlapping U.S. markets between American and its competitors – we find that Delta, United, and Continental compete with American Airlines in the largest number of markets. The carrier with the fourth highest level of multimarket contact with American is US Airways. The multimarket contact level of US Airways is substantially behind that for the largest three carriers. Southwest Airlines lags further. We should note, however, that Southwest Airlines serves several key

metropolitan areas (most notably, Dallas-Fort Worth, San Francisco and Chicago) via a secondary airport.¹³ Hence, our multimarket contact count underestimates the actual extent of competition between the two carriers since these carriers are serving the same market via different airports. We find little multimarket contact between American and JetBlue or Alaska. Given the differences in the recorded level of multimarket contact, we separate American Airlines' competitors into two broad groups: close competitors and distant competitors. For the purposes of our analysis, we consider Delta, United, Continental, and US Airways as American Airlines' close competitors, while all other airlines (Southwest, JetBlue, Alaska, etc.) are classified as distant competitors.

We also note that two of American's close competitors, Continental Airlines and United Airlines, merged in October of 2010 – hence, Table 1 presents a single company-wide entity which combines the operations for the two airlines. In the DB1B data, however, Continental Airlines flights appear under its own flight code until October 2012, when the two carriers' operating certificates were merged. For the purpose of this data analysis, we follow the lead of the DB1B data and consider Continental Airlines' as a separate carrier from United Airlines in all subsequent tables and figures.

As control variables in our regressions, we use natural logarithms of the airline's market share; Herfindhal-Hirschman index as the conventional measure of concentration; and total roundtrip distance in the itinerary. Note that the coefficient for the distance variable is identified in the market fixed effects specifications involving one-stop itineraries due to these itineraries being routed through different hubs (which provides within cross-section variation in this variable). Since the carrier's route market share and market concentration are a function of the carrier's prices, there are legitimate concerns about endogeneity. To address the endogeneity concerns of market share and market concentration measures we employ conventional instrumental variable techniques. We use instruments proposed by Borenstein (1989), and applied in several other studies in the literature (see Escobari and Gan, 2007). The instrument for market share is the ratio of geometric average of the airlines' total passenger enplanements at origin and destination airports, and the sum of such geometric averages across all the carriers in the sample. This instrument is reasonably well correlated with the airlines' market shares, whereas its correlation with the error term is very limited, as its variation can be driven by changes on any of the markets originating at either the origin or the destination airports.

Tables 2 and 3 present some descriptive statistics of the key variables used in the price regressions. We have a total of about 50,000 airline-market-quarter level observations, with about three-quarters of the sample being one-stop itineraries. The sample contains fares for single-airline itineraries operated by twenty different airlines. To save space, we present a distribution of sample fares for the eight largest carriers in the U.S. market. Table 2 reveals that one-stop markets are less concentrated than non-stop routes. The distribution of sample observations by airlines roughly corresponds to the size ranking of U.S. carriers by domestic passenger volumes. Discrepancies can easily arise due to differences in the

¹³ Primary airports in Dallas, Chicago and San Francisco areas are Dallas-Ft.Worth International, Chicago O'Hare and San Francisco International, whereas Southwest predominantly serves the areas from Dallas Love Field, Chicago Midway and Oakland International airports, respectively.

extent of airlines' networks, since we include one observation per airline per market per quarter. For example, an airline that carries its traffic in only a few markets will have fewer observations compared to a carrier operating an extensive network, even if the former might serve more passengers than the latter. Table 3 shows that all airlines increased their fares between first quarter 2010 and 2011, at the rate exceeding the change in CPI over the same time period.¹⁴ We note that the non-stop mean fares for U.S. Airways were virtually unchanged, registering less than a one dollar increase.

Comparing the percentage changes in American Airlines' fares to those of its competitors, we find only United, Continental and JetBlue exhibit larger percentage increases in mean nonstop fares compared to American. Among one-stop itineraries, it is evident that all of American's close competitors increased fares to a greater extent than American Airlines. We find that the relative price changes in American Airlines' mean one-stop fares are similar to those of Southwest, JetBlue and Alaska (all of which we consider more "distant" competitors). Given that three-quarters of the sample involve one-stop itineraries, it's not surprising that we find similar differences in relative growth of American Airlines' fares for the entire sample – American year-over-year fare increases for the entire sample are similar to its more distant competitors (Southwest, JetBlue, and Alaska), while its closer competitors (Delta, United, Continental, and US Airways) register larger fare increases. These findings are consistent with the revenue results reported in Table 1.

5.1.3. Load Factor and Quantity Effects

Information on load factors and passenger volumes on non-stop flight segments is taken from the T100 database of the U.S. Department of Transportation. This database is effectively a census of all commercial flights on the U.S. market. The data is collected monthly at the airline-route-aircraft-type level, and is available for download from the U.S. DOT website. We use data for scheduled passenger operations in the first quarter of 2010 and 2011. The information was then collapsed to the quarter-airline-route level. The same reassignment of regional carriers to the corresponding major airlines was performed as previously employed for the price data.

The methodology we use to evaluate the possible effects of the American – Global Distribution Systems conflict on load factors and passenger volumes of American Airlines is similar to the analysis of price effects. Specifically, we estimate market fixed effects models with natural logarithm of the load factors and passenger volumes as the dependent variables. As before, we implement a simple difference-in-differences estimation strategy. The only control variable used is the route-level Herfindahl-Hirschman Index (HHI); we employ the same instrument as Borenstein (1989) when estimating a two-stage least squares regression.¹⁵ In this analysis we continue classifying American Airlines' competitors into "close" and "distant" groups.

Table 5 presents descriptive statistics for load factors and route-level passenger volumes for the eight largest U.S. airlines over the first quarters of 2010 and 2011. Strikingly, the load factor averages from

¹⁴The cumulative U.S. inflation rate in 2010 was 3.2%; whereas airlines in our sample increased fares by 5%-9%.

¹⁵ This instrument uses fitted market share from the corresponding first stage regression that uses the market share instrument as described above.

T100 data reported in Table 5 differ from the load factors found in Table 1. We attribute these load factor differences between the tables to the fact that while Table 1 reports operating results for the parent companies; Table 5 also includes regional affiliate operations by the major carriers. Apparently, the regional airlines' flight load factors are considerably lower. Nonetheless, we conclude that the information in Table 5 indicates that American's conflict with the travel distribution industry had minimal impact on the carrier's load factor. Further, American has been able to increase average passenger volume across its network. We observe substantial disparity across the carriers between first quarter 2010 and first quarter 2011: as average passenger volumes per route declined for Delta and Continental, yet increased for US Airways and JetBlue. Note that declining average here does not mean that the airline itself is in decline – one can get declining mean passenger volumes per flight segment if an airline expands its network to include thin markets, serving these routes with smaller aircraft.

5.2. Results and Discussion

5.2.1. Price Effects

Estimation results for the reduced form price regressions are presented in Table 6. We use market fixed effects two stage least squares estimation, with standard errors that are robust to heteroscedasticity and autocorrelation, since both may be present in the data. Six specifications are presented, two each for the entire sample, and the sub-samples of nonstop and one-stop itineraries. We have made a clear distinction between American Airlines' close and more distant competitors (as defined in the previous section of this paper). Specifications (2), (4) and (6) estimate the carrier-first-quarter-2011 interaction effects (ϕ using the terminology from Section 4) for both American Airlines and each of their four "close" competitors. Whereas specifications (1), (3) and (5) combine all "close" competitors to create a single interaction variable during the conflict period. All specifications also include individual airline fixed effects, which are not reported here to save space.

Table 7 supplements the price regressions presented in Table 6 by providing estimates of differences between American Airlines and Competing Airline Q1 2011 interaction variable ($\phi_{AA} - \phi_{competitor}$) for carriers identified as "close" competitors with American. Estimates of the differences in interaction effects for other carrier pair combinations are also reported. We include estimates for both the entire sample and the sub-sample of one-stop itineraries, based on specifications (2) and (6) from Table 6, respectively. We do not report the corresponding estimates for the sub-sample of nonstop itineraries, since these results do not show any effect of the conflict on AA fares – but then, we have previously outlined that we are skeptical that this effect may be present in this sub-sample. Further discussion of this issue will follow in the next section.

The results from Tables 6 and 7 suggest that, keeping other things constant, American's fare increases were considerably smaller than those reported by its "close" competitors (Delta, United, Continental, and US Airways). This is clearly visible in the sub-sample of one-stop itineraries. From the results reported in Table 7, we see that the differences between American Airlines and competitors' interaction terms suggest that American has significantly lower fares. The size of this effect is 2.7% to 4.7%. We should also note that American saved on GDS and travel agency commissions (which range from 2% to

3% of the ticket price), if passengers booked tickets directly through American Airlines at AA.com. Hence the savings from playing lower travel agency commissions partially offset the lower fare revenue.

Moreover, Table 7 also reveals that for one-stop fares no other pairs of carriers had differences which were statistically distinguishable from zero. Results for the entire sample appear consistent with the conflict having an adverse effect of American Airlines' revenue, since all of the relevant $\phi_{AA} - \phi_{competitor}$ differences are negative. Yet only two of these differences are statistically different from zero. Also in the entire ticket sample, half of the other carrier pairs $\phi_{c1} - \phi_{c2}$ register significant differences. In particular, results for United Airlines suggest that this carrier increased its fares by a larger magnitude than its competitors.

Further, we conduct a robustness check of our results by grouping Southwest Airlines among the set of American Airlines' close competitors. After re-running all of the specifications reported in Table 6, the results appear in the Appendix Table A.2. We observe two findings. First, our main results are not affected by this re-classification of Southwest Airlines. Second, American Airlines' price effect is quite similar to that of Southwest and exceeds the new set of distant competitors (which now consists of small carriers). The lack of discernible price difference between American and Southwest should not be considered to depreciate our findings. Rather, it brings to light the fact that Southwest Airlines does not distribute any of its tickets via the travel agents involved in this dispute.

Overall, the price regression results paint the following picture. One-stop markets are generally more competitive than non-stop routes, since consumers have more potential one-stop routing options. Also, as mentioned earlier, the prospective traveler searching for a price quote in a market without non-stop service is likely to obtain a sufficient number of fare options even if American Airlines' fare quotes are not offered. We believe that the absence of American Airlines fares in one-stop markets is less noticeable. Hence it is not surprising to learn that this travel agency dispute had the largest impact on American Airlines' revenue for one-stop itineraries.

More specifically, our fare estimations suggest that the American – Global Distribution System conflict in the first quarter of 2011 had an adverse impact on American Airlines' revenue. Our results also imply that the loss of revenue is attributed to one-stop rather than non-stop itineraries. American Airlines' average one-stop fare in the first quarter of 2011 is \$425.78. Our estimation results from Table 7 suggest that absent the conflict American Airlines would have been able to charge up to four percent (about \$17) more for these tickets. For passengers who would have booked their ticket on Expedia/Orbitz and instead chose to use AA.com, American saved an estimated \$8.50 to \$12.75 in travel agency commissions per ticket. Given that Expedia and Orbitz jointly sell one in six U.S. airline tickets, this translates to 2.5 million of the 15.2 million American Airlines customers in the first quarter of 2011 (see Table 1). Assuming that half of the 2.5 million Expedia/Orbitz consumers eventually could have bought airline tickets directly through AA.com during the first quarter of 2011, then American had a cost savings of between \$10.8 and \$16.2 million from lower travel agency commission payments.

Since about 20 percent of American Airlines' passengers in our dataset involve one-stop itineraries,¹⁶ and given the passenger counts from Table 1, we infer that three million American passengers were potentially affected by this conflict. Hence losing \$17 per passenger from three million customers translates into a potential revenue impact of \$51.6 million. To find the net effect on American's bottom line, we subtract the travel agency commission savings (\$10.8 to \$16.2 million) from \$51.6 million lower revenue which translates to \$35.4 to \$40.8 million net revenue effect. This revenue loss estimate for American in the first quarter of 2011 is about one-fourth of our initial rough estimate of \$154 million loss presented in the previous section.

5.2.2. Effects on Load Factor and Passenger Volumes

In addition to airfares, we also examine the impact of the American-Global Distribution System conflict on both load factors and passenger volumes. Table 8 presents separate regression results for the entire sample and for the sub-sample of non-monopoly routes (defined as segments with an HHI less than 0.9). We note that even in markets where American Airlines is the only provider of non-stop service the conflict could still have an adverse effect on passenger counts since transfer passengers may be using this flight segment as part of their journey.

Our estimation results in Table 8 indicate lack of any discernible load factor or quantity effects of the conflict on American Airlines. The results for the first quarter year over year (2010/11) time period show that some airlines (Delta and Continental) decreased their load factor beyond the general industry time trend, while another carrier (United) registered higher load factors in the first quarter of 2011. Changes in passenger volumes are largely explained away by market-specific and carrier-specific heterogeneity, except for Continental Airlines. We attribute the negative and significant coefficient for the Continental-first-quarter-2011 interaction variable in the passenger volume regressions to the effect of its merger with United. As noted above, the merger was completed in October of 2010, so during this transition period some Continental Airlines flights may have been incorporated into United Airlines' network by the first quarter of 2011, and are hence being reported as United Airlines' flights in the T100 dataset. It is our understanding that when these two carriers' networks were integrated, United began the integration process by first incorporating the larger aircraft operated by Continental Airlines.

In addition to load factor and passenger volume regressions reported in Table 8, we have also estimated both route-level flight frequency and average aircraft size specifications. We find very little differences for American Airlines for the year-over-year comparisons for both flight frequency and aircraft size.¹⁷ In sum, our analysis failed to detect any adverse effects of this conflict on the number of American Airlines tickets sold. We do note, however, that the previous section indicates that American experienced smaller year-over-year price increases compared to its "close" competitors. This suggests that American Airlines effectively implemented yield management (i.e., pricing) techniques to ensure that reduced

¹⁶ Note that Berry and Jia (2010) document a decrease in share of American Airlines' connecting passengers from about 35% in 1999 to close to 25% in 2006. Since the share of one-stop passengers did not change from Q1 2010 to Q1 2011, this suggests that American has been able to effectively sell one-stop tickets via different distribution channels.

¹⁷ Results are available from the authors upon request.

visibility of its travel options on the main distribution platforms did not reduce the volume of tickets sold.

6. Concluding Remarks

This study examines the consequences of a reseller excluding a certain supplier. We take advantage of a “natural experiment” in the airline ticket distribution industry to investigate what happens when a supplier (American Airlines) has its inventory removed from important ticket resellers (Expedia and Orbitz online travel agents). This enables us to estimate the value of the ticket distribution platform to a supplier. Our findings not surprisingly indicate that access to major buyer platforms is of considerable short-term value to a supplier. Specifically, we estimate that the ticket distribution dispute during the first quarter of 2011, when American Airlines lost access to the-Expedia/Orbitz platform, resulted in \$52 million lower revenue. After considering cost savings from lower commission payments, we estimate the net revenue effect on American during the first quarter of 2011 to be between \$35 and \$40 million. These revenue reductions are attributed to lower ticket prices rather than a reduction in the number of tickets sold. Apparently, the seller’s yield management techniques (lowering prices) were successful in attracting buyers to its own platform (airline’s website) which mitigated the compound effects of (i) not having fares appear on major ticket delivery platforms (Expedia and Orbitz); and (ii) the alleged display bias introduced by another ticket distribution system (Sabre). Note that we initially evaluated the revenue at risk due to losing access to the key platforms to be close to \$500 million – ten times the realized revenue effect. We also note that American and Expedia/Orbitz reached a confidential agreement and in the subsequent quarter of 2011 and thereafter, American Airline fares have returned to these online travel agencies. The terms have not been disclosed, however, it is possible that American was able to gain more favorable terms from these travel agents following this dispute.

There are several caveats that apply to our findings. First, we do not have perfect information in regards to every action taken by resellers (Expedia, Orbitz, Sabre) and suppliers (American Airlines and its main competitors). For example, between January 5 and January 24, 2011 Sabre took punitive actions against American Airlines by implementing display bias towards American Airlines’ fares. This analysis assumes that the peak of the American-Sabre conflict coincided with the first quarter of 2011, (the period when both Orbitz and Expedia failed to display American Airlines’ fare quotes). Sabre’s actions could have biased American’s fare offers, which subsequently would affect other travel agents using this Global Delivery System. Hence we cannot disentangle the fare effects of removing American tickets from the Expedia and Orbitz platforms from the display bias implemented by Sabre. We, however, can confidently state that our baseline period (first quarter of 2010) is free from both access restrictions and display biases.

The second caveat relates to proper interpretation of our findings. Indeed, this study looks at the short-term value of a reseller network to a large supplier. We note, however, that not all large suppliers rely on a ticketing platform to the same extent. For example, American and Delta tend to sell a substantial share of their tickets via travel agents, and generally make their entire inventory available to the global distribution systems. On the other hand, Southwest Airlines relies predominantly on its own website to sell the tickets, and hence does not participate in all of the ticket distribution systems. Hence, the value

of the platform to a seller depends on how reliant the seller is on the platform to distribute tickets. Further, a potential alternative explanation of our findings is that instead of American Airlines lowering its prices, AA's close competitors could have increased their fares, knowing that one of the key competitor's options were not reported by some of the distribution platforms. A piece of evidence in support of this suggestion is that American changed its fares in line with its more distant competitors.

Third, some of our data analysis results did not quite confirm our expectations. In particular, we find that this ticket delivery dispute lowered one-stop itinerary fares for American, yet left non-stop American fares unchanged. This result is a bit puzzling since we would expect both sets of fares to be adversely affected by this dispute. We attribute this finding to the more competitive one-stop market where passengers have more available substitutes, so American needed to lower ticket prices to maintain passenger volumes in these markets. The price regression estimates for the sub-sample of nonstop itineraries suggest lower first quarter 2011 fares for US Airways (not American). These findings then are consistent with a conflict of US Airways and the ticket delivery platforms. In fact, US Airways is currently in litigation with Sabre, alleging that Sabre implemented display bias for US Airways tickets.

Fourth, our main conclusion relies on the classification of carriers in the U.S. market into "close" and "distant" competitors of American Airlines. The former group essentially consists of the large network carriers, while the latter includes low-cost airlines and smaller network carriers. While we believe this delineation is intuitive based on both the extent of multimarket contact between American and respective carriers, and/or differences between the airlines' business strategies and reliance on travel services distribution platforms; we should keep in mind that the effect of this conflict on American Airlines' revenue has been identified relative to the other large network carriers rather than the entire universe of airlines operating on the U.S. market. Had we used the universe of airlines as the comparison group, then the stated reduction in revenues would have been considerably smaller.

Finally, we employ a difference-in-differences estimation strategy to quantify the effects of this American-Global Delivery Systems conflict; however, there may also be other changes in the market structure during this time period, which could have produced the observed result. For example, between the first quarter 2010 and first quarter 2011 two large "close" competitors merged (United and Continental). Our price regressions do not appear to point to any anomaly which could have been related to this event. In addition, American Airlines experienced extreme financial difficulties both during and after the conflict, ultimately filing for Chapter 11 bankruptcy protection in November 2011 – about six months after what we have defined as the peak of the conflict. Hence our difference in difference estimation is unable to separate the conflicting effects of financial difficulty from this ticket delivery conflict. Busse (2002) indicated that airlines under financial stress are more likely to initiate price wars. Yet, if American did start a price war in the first quarter of 2011, we would probably see it more clearly across all the price regressions, not only in the sub-sample of one-stop itineraries. Also, while American did lose about \$250 million in the first quarter of 2011; the carrier finished 2010 in the black. If anything, American would be more likely to have initiated a price war in the first quarter of 2010, immediately after losing \$1.1 billion in 2009.

Overall, our study provides some evidence which suggests that platforms provide significant value to a seller. We don't often see situations where large firms in a vertical relationship have a severe dispute that leads to one player being excluded as punishment. Yet, this is exactly what happened in the airline ticket distribution market when Expedia and Orbitz opted to punish American Airlines by removing American fares during the first quarter of 2011. American took many actions to mitigate these damages. Nonetheless, we find that this exclusion of selling American Airlines tickets led to an estimated \$35-\$40 million lower profit for American in the first quarter of 2011. The long run impact of this dispute on American's profit, however, is unclear since American may have gained some bargaining power and negotiated more favorable terms in their most recent confidential contracts with Expedia and Orbitz.

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Figure 1. Airline ticket distribution

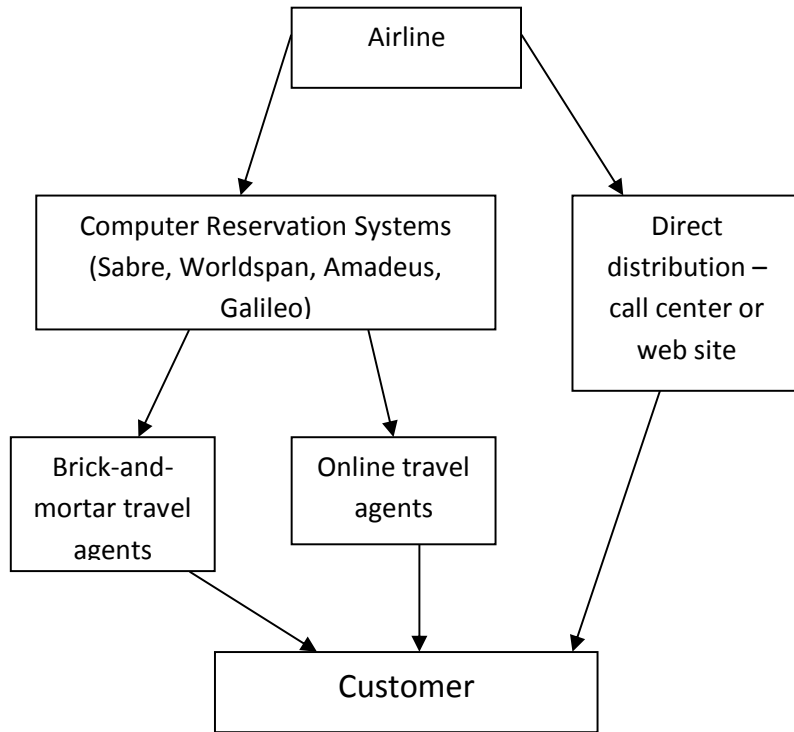


Table 1 Operating Results of American Airlines and Main Competitors (U.S. Domestic Market)

Indicator	Time	American		United/Continental		Delta		US Airways	
		Value	Δ%, YOY	Value	Δ%, YOY	Value	Δ%, YOY	Value	Δ%, YOY
Passengers	Q1 2010	15,485,273	-1.9%	10,036,924	-7.6%	19,863,748	+3.6%	10,396,613	+5.1%
	Q1 2011	15,185,016		9,271,773		20,583,542		10,930,636	
	Q2 2010	17,051,100	-0.07%	11,243,421	-8.6%	23,480,271	+3.9%	11,542,221	+3.1%
	Q2 2011	16,923,734		10,276,679		24,395,692		11,909,781	
	Q3 2010	16,896,375	+1.0%	11,549,142	-7.2%	24,185,540	+3.5%	11,673,674	-0.1%
	Q3 2011	17,071,982		10,710,121		25,042,992		11,661,808	
Flights	Q1 2010	132,650	-2.0%	81,858	-6.8%	165,843	+2.7%	95,261	+4.8%
	Q1 2011	130,005		76,277		170,422		99,902	
	Q2 2010	133,643	-0.3%	85,911	-8.9%	183,520	+1.7%	100,801	+1.7%
	Q2 2011	133,132		78,243		186,779		102,521	
	Q3 2010	135,507	-0.1%	88,648	-8.3%	190,916	+0.04%	103,048	-2.8%
	Q3 2011	135,398		81,281		191,002		100,143	
Load Factor	Q1 2010	0.79	-0.5%	0.82	+1.1%	0.81	-1.3%	0.81	+1.3%
	Q1 2011	0.78		0.83		0.80		0.82	
	Q2 2010	0.86	-0.2%	0.87	+1.3%	0.87	-0.4%	0.85	+0.8%
	Q2 2011	0.86		0.88		0.86		0.86	
	Q3 2010	0.85	+0.8%	0.87	+1.8%	0.86	+1.3%	0.84	+2.9%
	Q3 2011	0.86		0.89		0.87		0.87	
Revenue, thousand USD	Q1 2010	3,038,501	+4.6%	2,736,886	+7.6%	4,642,172	+10.4%	2,116,504	+11.3%
	Q1 2011	3,181,125		2,944,715		5,124,733		2,355,327	
	Q2 2010	3,410,254	+4.8%	3,262,597	+5.4%	5,411,121	+10.1%	2,401,135	+9.2%
	Q2 2011	3,575,021		3,438,023		5,960,970		2,623,830	
	Q3 2010	3,345,577	+7.1%	3,343,912	+7.0%	5,510,909	+8.4%	2,310,640	+8.1%
	Q3 2011	3,584,428		3,578,115		5,976,645		2,483,836	

Notes:

- Computed based on DB1B data provided by U.S. Department of Transportation
- Operating results for parent companies only – regional carriers not included
- United Airlines merged with Continental Airlines in October 2010; Continental was dissolved in March 2012. U.S. DOT combines the data for the two carriers in both 2010 and 2011.

Table 2 Descriptive Statistics, Price Regressions

Variable	Entire Sample	Nonstop Itineraries	One-stop Itineraries
Price, \$	392.15 (160.50)	371.86 (159.55)	399.60 (160.20)
Market Share	0.1992 (0.3202)	0.5134 (0.4055)	0.0838 (0.1740)
HHI	0.6495 (0.2511)	0.7116 (0.2360)	0.6268 (0.2526)
Roundtrip Distance (miles)	2884.6 (1607.3)	2006.2 (1329.5)	3207.2 (1579.8)
Total Observations	50,212	12,614	37,598
Distribution of Observations by Airlines			
American	0.1394	0.1207	0.1488
Delta	0.1943	0.1684	0.2073
United	0.1650	0.1667	0.1677
Continental	0.1084	0.0745	0.1222
US Airways	0.1531	0.1165	0.1689
Southwest	0.1298	0.2324	0.0970
JetBlue	0.0234	0.0390	0.0185
Alaska	0.0291	0.0529	0.0214

Note: values reported here are un-weighted averages at the airline-market-quarter level. Standard errors appear in parentheses.

Table 3 Mean U.S. Domestic Airfares by Airlines – Restricted Economy Class

	Entire Sample		Nonstop Itineraries		One-stop Itineraries	
	Q1 2010	Q1 2011	Q1 2010	Q1 2011	Q1 2010	Q1 2011
American	396.01 (139.31)	420.75 (138.97)	373.06 (114.87)	402.80 (126.29)	402.49 (144.83)	425.78 (141.94)
Delta	404.62 (162.15)	436.63 (162.58)	430.36 (148.51)	451.84 (170.09)	397.22 (165.14)	432.43 (160.22)
United	394.47 (178.06)	435.51 (189.92)	413.10 (191.42)	467.33 (199.02)	388.55 (173.22)	423.61 (185.04)
Continental	396.38 (162.55)	430.00 (216.20)	428.14 (167.22)	475.10 (199.69)	389.60 (160.77)	420.56 (218.37)
US Airways	412.75 (146.93)	449.78 (147.32)	411.08 (157.15)	411.94 (140.66)	413.17 (144.28)	458.38 (147.47)
Southwest	331.23 (89.28)	351.65 (89.28)	304.74 (85.31)	324.02 (84.76)	353.06 (86.55)	374.82 (86.36)
JetBlue	349.02 (141.95)	376.73 (132.63)	281.15 (69.49)	308.34 (80.83)	399.99 (160.09)	425.10 (140.67)
Alaska	414.61 (223.44)	442.69 (231.60)	361.30 (152.96)	386.21 (174.37)	463.89 (263.66)	487.46 (260.07)

Note: values reported here are un-weighted mean fares at the airline-market-quarter level (standard errors in parentheses).

Table 4 American Airlines Multimarket Contact on U.S. domestic routes

Time	Alaska	JetBlue	Continental	Delta	United	US Airways	Southwest
Q1 2010	296	320	5084	6673	5106	3045	2160
Q1 2011	425	392	4998	7700	5692	3469	2345

Note: The above values represent a count of the directional origin-destination markets in which both American Airlines and the respective competitor offered service. These DB1B data involve only single-airline itineraries.

Table 5 Load Factors and Passenger Volumes by Carrier

	Load Factor		Passengers	
	Q1 2010	Q1 2011	Q1 2010	Q1 2011
American	0.732 (0.190)	0.728 (0.161)	24,624 (49,945)	33,916 (55,949)
Delta	0.729 (0.154)	0.702 (0.164)	35,944 (52,250)	29,489 (49,424)
United	0.645 (0.234)	0.668 (0.216)	22,299 (39,216)	20,954 (37,470)
Continental	0.715 (0.144)	0.718 (0.174)	41,224 (47,672)	22,512 (39,001)
US Airways	0.656 (0.233)	0.655 (0.234)	20,829 (36,557)	28,371 (42,890)
Southwest	0.745 (0.117)	0.764 (0.109)	55,535 (44,977)	57,404 (44,809)
JetBlue	0.751 (0.091)	0.794 (0.078)	41,073 (35,681)	45,199 (37,744)
Alaska	0.622 (0.189)	0.644 (0.212)	23,787 (39,570)	25,866 (42,271)

Note: The above values are computed from T-100 database of the U.S. DOT. Average load factor and passenger counts are calculated at the airline-route-quarter level and include flights operated by parent company and regional affiliates. Standard errors appear in parentheses.

Table 6 Price regressions using two-stage least squares estimation with market level fixed effects – Natural logarithm of average fares for U.S. domestic flights by eight largest carriers (Q1 2010 and Q1 2011)

	All itineraries		Non-stop itineraries		One-stop itineraries	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.1533** (0.0954)	5.1437** (0.0956)	5.5842** (0.0577)	5.5973** (0.0580)	4.7894** (0.1192)	4.7788** (0.1200)
Log(Market share)	0.0529** (0.0021)	0.0530** (0.0022)	0.0117** (0.0022)	0.0124** (0.0022)	0.0922** (0.0048)	0.0929** (0.0049)
Log(HHI)	-0.1516** (0.0239)	-0.1546** (0.0239)	-0.3312** (0.1106)	-0.2949** (0.1118)	-0.1511** (0.0221)	-0.1521** (0.0221)
Log(Distance)	0.0977** (0.0124)	0.0985** (0.0125)	---	---	0.1683** (0.0163)	0.1700** (0.0165)
Non-stop itinerary	-0.1377** (0.0085)	-0.1383** (0.0086)	---	---	---	---
Q1 2011 indicator	0.0218** (0.0069)	0.0279** (0.0061)	0.0374** (0.0157)	0.0539** (0.0118)	0.0281** (0.0088)	0.0290** (0.0082)
AA*(Q1 2011)	0.0436** (0.0088)	0.0376** (0.0081)	0.0476** (0.0196)	0.0317** (0.0159)	0.0221** (0.0111)	0.0211** (0.0106)
(CO or DL or UA or US)*(Q1 2011)	0.0662** (0.0074)	---	0.0440** (0.0153)	---	0.0603** (0.0094)	---
CO*(Q1 2011)	---	0.0520** (0.0102)	---	0.0448** (0.0235)	---	0.0614** (0.0133)
DL*(Q1 2011)	---	0.0571** (0.0079)	---	0.0527** (0.0138)	---	0.0478** (0.0102)
UA*(Q1 2011)	---	0.0789** (0.0092)	---	0.0500** (0.0179)	---	0.0683** (0.0122)
US*(Q1 2011)	---	0.0504** (0.0079)	---	-0.0607** (0.0167)	---	0.0632** (0.0100)
Distant*(Q1 2011)	0.0322** (0.0081)	0.0301** (0.0078)	0.0411** (0.0150)	0.0212* (0.0124)	0.0189* (0.0113)	0.0231** (0.0111)
Adjusted R-squared	0.4149	0.4135	0.7270	0.7327	0.3028	0.3007
Observations	50,212		12,614		37,598	

Notes:

- White robust standard errors appear in parentheses
- Market share and HHI are instrumented as in Borenstein (1989)
- Only includes markets with at least 100 passengers per quarter in DB1B
- “Distant” competitor is an indicator variable for the airlines: Southwest, JetBlue and Alaska
- Each specification includes individual airline dummies(not reported)
- * and ** indicate statistical significance at the 10% and 5% level, respectively.

Table 7 Differences in Airline-Q1 2011 Interaction Coefficients, Price Regressions

(a) All Itineraries

	American	Continental	Delta	United	US Airways
American	---	-0.0144	-0.0195*	-0.0413**	-0.0128
Continental		---	-0.0051	-0.0269*	0.0016
Delta			---	-0.0218*	0.0067
United				---	0.0285**
US Airways					---

Note: Estimated coefficients are based on specification (2) in Table 6

(b) One-stop Itineraries

	American	Continental	Delta	United	US Airways
American	---	-0.0403**	-0.0267*	-0.0472**	-0.0421**
Continental		---	0.0136	-0.0069	-0.0018
Delta			---	-0.0205	-0.0154
United				---	0.0051
US Airways					---

Note: Estimated coefficients are based on specification (6) in Table 6

Coefficient differences are calculated by subtracting carrier-Q1 2011 interaction coefficient for the airline in the row from the corresponding airline in the column. * and ** indicate statistical significance at the 10% and 5% level, respectively.

Table 8 Load Factor and Passenger volume regressions using two-stage least squares estimation with market level fixed effects – U.S. DOT T100 database (Q1 2010 and Q1 2011)

	Load Factor		Passenger Volume	
	All Routes	Non-monopoly routes	All Routes	Non-monopoly routes
Constant	-0.3437** (0.0467)	-0.2106 (1.0478)	10.120** (0.2459)	8.9434 (8.0399)
Log(HHI)	0.2378* (0.1503)	0.2529 (1.5491)	0.9137 (0.7212)	-1.7283 (11.847)
Q1 2011 indicator	0.0194** (0.0093)	0.0158 (0.0153)	0.0398 (0.0440)	0.0150 (0.1100)
AA*(Q1 2011)	-0.0042 (0.0103)	0.0044 (0.0855)	-0.0247 (0.0551)	-0.1312 (0.6554)
CO*(Q1 2011)	-0.0330** (0.0117)	-0.0295 (0.0301)	-0.2386** (0.0915)	-0.4665* (0.2696)
DL*(Q1 2011)	-0.0236** (0.0108)	-0.0254 (0.0409)	-0.0474 (0.0589)	-0.3129 (0.6599)
UA*(Q1 2011)	0.0275* (0.0166)	0.0132 (0.0812)	-0.1036 (0.1049)	-0.0880 (0.3224)
US*(Q1 2011)	0.0045 (0.0136)	-0.0280 (0.0251)	0.0649 (0.0594)	0.0883 (0.1830)
Distant*(Q1 2011)	0.0230** (0.0099)	0.0223* (0.0130)	0.0354 (0.0432)	0.0727 (0.0697)
Adjusted R-squared	0.7970	0.6633	0.7759	0.6033
Observations	5985	2745	5985	2745

Notes:

- Dependent variables are natural logarithms of load factor and passenger volumes, at route-airline-quarter level
- White robust standard errors appear in parentheses
- HHI is instrumented as in Borenstein (1989)
- “Distant” competitor is an indicator variable for the airlines: Southwest, JetBlue and Alaska
- Each specification includes individual airline dummies (not reported)
- * and ** indicate statistical significance at the 10% and 5% level, respectively.

Appendix

Table A.1 Assignment of Regional Carriers

Major Carrier	Regional Carrier
American Airlines (AA)	American Eagle* Executive Airlines* Regions Air Chautauqua Airlines Trans States
Alaska Airlines (AS)	Horizon Air*
Continental Airlines (CO)	ExpressJet Commutair Colgan Skywest
Delta Air Lines (DL)	ASA/ Atlantic Southeast Airlines* Comair* Skywest Chautauqua Airlines ^a Republic Freedom ^b
Northwest Airlines (NW)	Mesaba Airlines Express Airlines
United Airlines (UA)	Air Wisconsin ^c GoJet Shuttle America Trans States Skywest ^d Mesa Chautauqua Airlines Colgan ^e
US Airways (US)	Air Wisconsin Chautauqua Airlines Mesa PSA Airlines Piedmont

*Regional carriers that serve multiple majors are assigned based on hub identities.

Notes:

^a Only routes involving cities in Florida and Raleigh-Durham (RDU)

^b Only routes involving Orlando, FL (MCO)

^c Only routes involving Chicago O'Hare (ORD) and Washington Dulles (IAD)

^d Only routes involving Portland, OR (PDX), Medford, OR (MFR), and Eureka-Arcata, CA (ACV)

^e Only routes involving Washington Dulles (IAD)

Table A.2 Price effects with Southwest considered as a “close” competitor of American Airlines

	All itineraries		Non-stop itineraries		One-stop itineraries	
	(1)	(2)	(3)	(4)	(5)	(6)
Constant	5.1495** (0.0957)	5.1459** (0.0957)	5.5843** (0.0577)	5.6082** (0.0592)	4.7843** (0.1193)	4.7793** (0.1200)
Log(Market share)	0.0531** (0.0021)	0.0532** (0.0022)	0.0116** (0.0022)	0.0125** (0.0022)	0.0928** (0.0048)	0.0930** (0.0049)
Log(HHI)	-0.1506** (0.0239)	-0.1534** (0.0239)	-0.3310** (0.1107)	-0.2869** (0.1125)	-0.1490** (0.0221)	-0.1519** (0.0222)
Log(Distance)	0.0984** (0.0124)	0.0987** (0.0125)	---	---	0.1695** (0.0164)	0.1700** (0.0165)
Non-stop itinerary	-0.1382** (0.0086)	-0.1387** (0.0086)	---	---	---	---
Q1 2011 indicator	0.0215** (0.0069)	0.0218** (0.0069)	0.0374** (0.0157)	0.0329** (0.0159)	0.0275** (0.0088)	0.0276** (0.0088)
AA*(Q1 2011)	0.0437** (0.0088)	0.0436** (0.0088)	0.0476** (0.0196)	0.0530** (0.0197)	0.0224** (0.0111)	0.0225** (0.0111)
(CO or DL or UA or US or WN)*(Q1 2011)	0.0613** (0.0072)	---	0.0424** (0.0148)	---	0.0561** (0.0092)	---
CO*(Q1 2011)	---	0.0580** (0.0107)	---	0.0667** (0.0271)	---	0.0628** (0.0137)
DL*(Q1 2011)	---	0.0631** (0.0085)	---	0.0726** (0.0150)	---	0.0491** (0.0106)
UA*(Q1 2011)	---	0.0849** (0.0098)	---	0.0713** (0.0212)	---	0.0697** (0.0127)
US*(Q1 2011)	---	0.0564** (0.0087)	---	-0.0398** (0.0197)	---	0.0646** (0.0106)
WN*(Q1 2011)	---	0.0361** (0.0083)	---	0.0421** (0.0158)	---	0.0245** (0.0114)
Distant*(Q1 2011)	0.0223* (0.0132)	0.0222* (0.0132)	0.0474** (0.0174)	0.0500** (0.0172)	0.0063 (0.0207)	0.0063 (0.0207)
Adjusted R-squared	0.4133	0.4132	0.7271	0.7337	0.3012	0.3006
Observations	50,212		12,614		37,598	

Note: Except for treating Southwest Airlines as a “close” rather than a “distant” competitor of American Airlines, all specifications reported here are identical to those reported in Table 6.