# AN ANALYSIS OF AIR TRAVEL AT BOSTON

# In The Post-9/11 Years

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# ABSTRACT

The U. S. airline industry suffered tremendously in the aftermath of the terrorist attacks on September 11, 2001. A number of factors, such as the brief shutdown of service, the fear of flying among the American public, and the inconvenience caused by the enhanced security check at airports, combined to aggravate an already troubled market. Using the Domestic Airline Fares Consumer Report data released by the U.S. Department of Transportation, this article analyzes the post-9/11 air travel activities at Boston Logan Airport. The major findings from this study include: (1.) Logan airport suffered heavily from the 9/11 terrorist attacks in passenger enplanements. It took more than two years for the passenger volume to restore to the pre-9/11 level. (2.) The drop in passenger enplanements in the aftermath of 9/11 was not accompanied by service cuts from the airlines. (3.) The link between air fares and flight distance was weak in the city-pair markets from Boston. The air fare landscape for travel from Boston is not uniform and air travel costs vary significantly among destinations. (4.) Competition at Boston Logan Airport fluctuated in the post-9/11 years. With the increasing presence of JetBlue Airways, the overall competition level increased with more intense competition concentrated in less densely traveled markets. Keywords: Boston, air transportation, air fare, competition

# Introduction

The year 2008 marks the thirty year anniversary of the passage of the Airline Deregulation Act as well as the seventh anniversary of the September 11, 2001 (hereinafter "9/11") tragedy. Both historical events have significantly influenced the progress and condition of the U.S. domestic air transportation market. The passage of the Airline Deregulation Act in 1978 denoted the beginning of airline deregulation which has been commonly considered as the single most important policy reform in the history of civilian aviation (Morrison and Winston 1986, 1995). Numerous studies have been conducted to assess the impact of deregulation (Borenstein 1992; Butler and Huston 1990; Goetz and Dempsey 1989; Goetz and Sutton 1997; Morrison and Winston 1986; Reynolds-Feighan 1998; Ruppenthal 1987). While different opinions exist regarding some specific details like estimation of total savings, deregulation has been widely

hailed as a success (Goetz 2002) – after more than a quarter century of deregulation, air travel passengers in general have enjoyed a larger network of connections, greater service choices, and lower fares (Gong 2006).

However, then came the terrorist attacks on September 11, 2001. No industry has suffered greater damage from the attacks than the U.S. airline industry (Ito and Lee 2005). In addition to the brief shutdown of airline service right after 9/11, the fear of flying among the public and the inconvenience to fly caused by the strengthened security checks at airports led to a sharp decline in air travel demand in the months following the attacks. A number of studies have been conducted to assess the impact (Giglio 2002; Goodrich 2002; Ito and Lee 2005; Lai and Lu 2005).

According to a report (USDOT 2006) released by the Bureau of Transportation Statistics, U.S. Department of Transportation (USDOT), air travel dropped quickly after 9/11 and then continued to drop for the following six months. Highway travel also dropped immediately afterwards but then leveled off in the following four months. In addition, people switched from air travel to highway travel over the six-month period after the terrorist attacks. Further analysis of the impacts on air travel also indicates that the actual Airline Revenue Passenger-Miles began to approach the forecasted values only from December 2004 (USDOT 2006).

While some of the obvious impacts were temporary, there may have been less conspicuous yet profound changes in U.S. travel patterns. To further examine the damage from the 9/11 attacks on U.S. domestic air travel and to attempt to detect any changing patterns at a detailed level, this article focuses on documenting and analyzing the impacts of 9/11 on air travel at one single yet important market – Logan Airport in the City of Boston, Massachusetts. Through analyzing the data of air travel to and from Boston from 2001 to 2007, this research looked into some key elements of air travel such as air fare, passenger volume, competition, and their changes in comparison with pre-9/11 levels.

### Data

Well known as "The Hub" city, Boston is indeed an international hub of transportation. Being one of the busiest airports in the U.S., Boston's Logan airport has played an important role in regional, national, and international air travel. Although it is not a functional hub of any major airlines, it is connected (via direct and non-direct flight) to more than 300 destinations worldwide with more than 20 serving airlines<sup>1</sup>. Besides generating and attracting domestic traffic, Boston also functions as a pivotal international gateway for travel to Europe, Asia, and other parts of the world. With its important role in air transportation, any insight from examining Boston's air travel market in the post-9/11 years could shed light on the development of the entire industry.

The data used in this study were compiled from the 2000-2007 Domestic Airline Fares Consumer Reports released by the U.S. Department of Transportation. The Report is created based on a ten-percent sample of the actual individual passenger tickets information submitted by certificated airlines. It represents a relatively comprehensive and accurate description of air travel activities at the city-pair market level. The report has been issued quarterly since the fall of 1996 and initially for the 1000 largest city-pair markets in the contiguous 48 states. The 1000 largest city-pair markets generally account for about 75 percent of all domestic passengers. Starting in the fourth quarter of 1998, the report coverage was expanded to include every city-pair market with an average of at least 10 passengers per day. Thus the recent data covers nearly all domestic air travelers.

For each city-pair market, the report lists the number of one-way passenger trips per day, the nonstop distance, the average market fare, and identifies the airlines with the largest market share and the lowest average fare; market share and average fares are provided for both airlines.

To examine the post-9/11 air travel activities at Boston, six years of Domestic Airline Fares Consumer Reports (2002- 2007) were obtained from the U.S. Department of Transportation<sup>2</sup>. For comparison with pre-9/11 conditions, the Reports for 2000-2001 were also acquired. All the report data were pre-processed in Excel so that only records containing Boston as Origin or Destination were kept for further analysis.

#### Analysis

#### Passenger Volume

Serving over 28 million passengers in 2007<sup>3</sup>, Logan International Airport at Boston is one of the 20 busiest airports in the U.S. The Boston–Cambridge–Quincy metropolitan statistical area (MSA) ranks among the ten largest MSAs according to 2007 U.S. Census Bureau estimates with a population of 4.48 million. Being the largest city in New England, Boston is unquestion-



Figure 1. Average daily passenger volume at Boston Logan Airport, quarterly 2001-2007.

ably the economic and cultural center of the entire region. In 2008, 18.3 million domestic and overseas visitors were attracted to Boston<sup>4</sup>.

The September 11 terrorist attacks had a serious impact on air travel at Boston Logan Airport. As shown in Figure 1, the number of average daily passengers plummeted abruptly in the third quarter of 2001 (emphasized by a circle in the chart) and the quarter that followed. Throughout the whole year of 2002, the average daily passenger volume failed to reach the level of the first quarter (usually the lowest season in a year) of 2001. Passenger volume in general peaks in the second quarter, but this did not happen in 2002. Compared to the pre-9/11 level (the second quarter of 2001), the second quarter of 2002 experienced a 20 percent drop in air travel passenger volume. During the same time period, other major international gateway cities also witnessed different degrees of falloff in passenger volume. Noticeably, Los Angeles saw a 23 percent decrease while San Francisco had 19 percent. Miami and New York City had relatively small amounts of reduction with 6 percent and 11 percent, respectively.

Figure 1 indicates that the passenger volume at Boston Logan Airport started to recover by the end of 2003. It reached the pre-9/11 level in the second quarter of 2004. In 2007, according to the Massachusetts Port Authority, Boston Logan served 28,102,455 passengers – a new airport record.

#### Accessibility

The number of city-pair markets is a good indicator of a city's accessibility. It measures how well a city is connected to the rest of the world via air transportation. Although the report used by this study only contains markets with a minimum of 10 passengers per day, thus not a complete list, it still reflects the general air travel accessibility of Boston.

As Figure 2 indicates, there has been a seasonal variation in the number of city-pair markets connected to Boston. This largely echoes the pattern observed with passenger volume only with the peak in the third quarter. Different from Figure 1 though, is the surprising lack of visible impact of 9/11 terrorist attacks. Together with the passenger volume pattern shown in Figure 1, it indicates that airline companies did not significantly cut city-pair connections in the aftermath of 9/11, however the consumers chose to travel less or as indicated by the U.S. DOT report (2006), sought the automobile as an alternative.

#### Air Fare

The dynamics of competition in the deregulated market for domestic air travel have given rise to a complex structure of fares (Anderson et al. 2002). In some markets fares are poorly correlated with travel distances and there may be a wide range of fares charged to the same destination even by the same carrier.

Using 2007 second quarter data as an example, Figure 3 plots the average air fares against the flight distance for 169 city-pair markets originating from Boston. Although in general air fares tend to be larger for long-haul flights, the relationship is not strong at all. This verifies the common assertion that in the post-deregulation period the link between air fares and distance



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Figure 2. Numbers of city-pair markets at Boston Logan Airport, quarterly 2001-2007.



has broken down. For any flight distance, there exist a great variety of air fares.

Figure 4 plots the average yields (fare per passenger mile) against the flight distance using the same data. The chart clearly shows an inverse relationship between the two variables. This is consistent with the fact that on longer trips, fixed costs such as terminal charges can be spread over a larger number of miles, thus the average yields tend to be

Figure 3. Average air fare versus flight distance for city-pair markets from Boston, 2<sup>nd</sup> Quarter 2007.

lower (Anderson et al. 2002; Borenstein and Rose 1994; Evans and Kessides 1993). Also worthy of mentioning is the rather sharp change in the slope at approximately 750 miles of distance.



Figure 4. Average yield versus flight distance for city-pair markets from Boston,  $2^{nd}$  Quarter 2007.

This indicates that the effect is most pronounced for relatively short distance markets (less than 750 miles).

Geographically, Figure 5 depicts how expensive it is to fly to other cities from Boston using the fourth quarter of 2007 data as an example. In general costs are higher for longer trips – it costs more to fly to the cities along the west coast of the United States and in the Rocky Mountain region. However, several important exceptions exist. Cities in



Figure 5. Distribution of average air fare for city-pair markets from Boston,  $4^{\rm th}$  Quarter 2007.

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Florida as a group have much lower fares, especially after considering the flight distance. This is largely due to the fact that most Florida cities are tourism destinations. Both passenger volume and competition are usually high. Another significant tourism destination enjoying low air fare is Las Vegas. The average air fare from Boston was only \$218 for a 2381 mile flight. In a sharp contrast, Cincinnati, located only 752 miles away, had an average air fare of \$339. The geographic variation in air fares, especially the "pockets of pain" phenomenon<sup>5</sup>, can be further explained by factors such as competition and congestion.



Figure 6. Average air fare for Short-haul, Mid-haul, and Long-haul city-pair markets from Boston, quarterly 2001-2007.

Figure 6 shows the quarterly variation of air fares from 2001 to 2007. For comparison, all the city-pair markets were first grouped into three categories based on flight distance: short-haul (flight distance less than 750 miles), mid-haul (flight distance between 750 and 1500 miles), and long-haul (flight distance greater than 1500 miles). An average air fare was then calculated for each market category. It is interesting to note from the chart that until the first quarter of 2006, the average fares on all three markets followed a quite similar pattern: fares were dropping before 9/11 attacks, and then remained largely stable in the following four years with minor ups and downs. The biggest change since 2006 was the divergence between short-haul and mid-haul markets: mid-haul trips became more expensive while the prices in short-haul markets dropped.

#### Competition

Competition has been at the core of airline deregulation. It was the promise of competition that prompted the decision to deregulate the airline industry, and whether competition could be sustained has become the key to safeguarding the achievement of deregulation (Gong 2006). Competition exists in multiple forms in the post-deregulation era. Airlines compete at airports, on individual city-pair markets, and in entire service networks. Dominance usually can give the incumbent carriers monopoly-like market power to influence prices and execute predatory practices.

Although several airlines have strongholds at Boston Logan Airport, Boston has never been the fortress hub city of any airlines. As a matter of fact, with more than twenty serving carriers, Boston Logan Airport is one of the most competitive airports in the nation. But even so, many city-pair markets from Boston are still dominated by one or two major airlines. One common measure of competition is airlines' market share. A city-pair market is considered as being dominated when a carrier has more than 50 percent market share.



Figure 7. Competition at Boston airport measured by the percent of the city-pair markets dominated by one carrier and percent of passengers flying in dominated markets, quarterly 2001-2007.

Figure 7 presents the changing competition conditions at Boston Logan Airport from 2001 to 2007. Percent of dominated connections tells what portion of the city-pair markets were dominated by one carrier. Percent of dominated passengers measures the scale of passengers trav-

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elling on dominated markets. The chart shows that the percent of dominated city-pair markets, while varying, fluctuated only between 55 to 65 percent over the study period. The percent of dominated passenger volume, on the other hand, has changed dramatically and fallen significantly below the level of city-pair markets since the first quarter of 2004. This indicates that since 2004 dominance has become more common among less densely travelled markets and/or competition has increased in markets with large traffic volume.

#### Airlines

Many airlines have or had provided services at Boston Logan Airport. During the study period 2001-2007, some airlines (such as Midway Airlines) ceased operation; some airlines (such as Trans World Airlines) were acquired and merged with other airlines; and some others (such



Figure 8. Market shares of major airlines at Boston airport, quarterly 2001-2007

as JetBlue Airways) just started. Among the many airlines serving Boston, most have a relatively small proportion of the total traffic; none of them have established dominant position.

Figure 8 shows the market shares of major airlines at Logan Airport. Two pieces of information can be extracted from this Figure. First, as a low-cost airline, JetBlue Airways has found its niche at Boston and grown steadily since its inauguration in 2004. Second, in general the differences between market shares of major airlines at Boston have become smaller over the past several years, indicating a trend of increasing competition among airlines.

# **Discussion and Conclusion**

This study demonstrated that the Domestic Airline Fares Consumer Report can be a valuable data source for analyzing air travel activities. Its availability at quarter level (compared with annual statistics) makes it particularly useful in studying the seasonal variations in air travel. However, its aggregated form limits its usefulness for analysis at a finer level. For example, the report data cannot be used to study individual airline's behavior or performance in a particular city-pair market. To overcome this shortcoming, it is desirable to complement the report data with other data sources or research results.

As a major focus point for domestic air travel and an important international gateway, Boston suffered heavily from the 9/11 terrorist attacks. Total passenger enplanements dropped sharply. However, as the analysis of total connections indicated, this was not accompanied or caused by large scale service cuts from the airlines. In the aftermath of the terrorist attacks, the general public either reduced their travel activities or switched to automobile as an alternative, or both. Boston Logan Airport showed a slow yet steady recovery process. The passenger volume reached the pre-9/11 level in the second quarter of 2004 and has kept growing ever since.

There is a noticeable controversy in the existing literature regarding the long term impact of 9/11 on the air travel market. Some studies (Blake and Sinclair 2003; Gillen and Lall 2003; Ito and Lee 2005) suggested that 9/11 and its after-effects have had a long-lasting and widespread impact on airline and other related industries. Lai and Lu (2005) and Giglio (2002) on the other hand, found that the effect of 9/11 on air travel was only temporary. The case study of Boston in this paper seems to confirm the second view, but to draw further conclusions would require a comprehensive study of many other airports.

High passenger volume and relatively healthy competition have kept air travel at Boston fairly priced (Gong 2006). However, depending on the characteristics of the destinations, the costs of flying from Boston vary significantly. As widely observed in the deregulation markets, the traditional link between air fare and flight distance has become weaker. Although it still generally costs more to fly to the west coast, travel to destinations like San Diego and San Francisco are nevertheless expensive. In contrast, some cities in the Corn Belt and Rocky Mountain regions, due to lack of competition and/or other reasons, have become unreasonably expensive to access, forming the so-called "pockets of pain". On the other hand, famous tourist destinations are consistently enjoying lower than average air fares.

The existence of a good number of airlines and healthy level of competition are the key for a prospering air travel market. In spite of the destructive impacts of the 9/11 event, the air travel market at Boston remains active, maintaining high capacity passenger volume and attracting new carriers. It is pleasing to see that Boston is heading toward a healthy and strong air travel market in the post-9/11 years.

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# Notes

- 1. Author's calculation based on USDOT's Origin and Destination Survey: Data Bank 1A (2000).
- 2. All Domestic Airline Fares Consumer Reports can be downloaded free of charge from http://ostpxweb.dot.gov/aviation/x-50%20Role\_files/consumerairfarereport.htm
- 3. See http://www.massport.com/logan/about.asp (last accessed 10 June 2009).
- Source: Massachusetts Office of Travel and Tourism. http://www.bostonusa.com/partner/press/pr/statistics (last accessed 10 June 2009).
- 5. "Pockets of pain" refers to airports where average air fares are unusually high (Goetz and Sutton 1997).

# References

- Anderson, W. P., G. Gong, and T. R. Lakshmanan. 2002. Geographical variation in the cost of air travel. *Transportation Research Record* 1788:13-18.
- Blake, A., and M. T. Sinclair. 2003. Tourism crisis management US response to September 11. Annals of Tourism Research 30: 813-32.
- Borenstein, S. 1992. The evolution of US airline competition. *Journal of Economic Perspectives* 6: 45-73.
- Borenstein, S., and N. L. Rose. 1994. Competition and price dispersion in the US airline industry. *Journal of Political Economy* 102: 653-83.
- Butler, R.V., and J. H. Huston. 1990. Airline service to non-hub airports ten years after deregulation. *Logistics and Transportation Review* 26:3-16.
- Evans, W.N., and I. N. Kessides. 1993. Localized market power in the US airline industry. *The Review of Economics and Statistics* 75: 66-75.
- Giglio, J.M. 2002. The impact of September 11. Transportation Quarterly 56:19-25.
- Gillen, D., and A. Lall. 2003. International transmission of shocks in the airline
- industry. *Journal of Air Transport Management* 9: 37-49. Goetz, A.R. 2002. Deregulation, competition, and antitrust implications in the US airline
- industry. *Journal of Transport Geography* 10: 1-19.
- Goetz, A.R., and P. S. Dempsey. 1989. Airline deregulation ten years after: Something foul in the air. *Journal of Air Law and Commerce* 54: 927-63.
- Goetz, A.R., and C. J. Sutton. 1997. The geography of deregulation in the US airline industry. *Annals of the Association of American Geographers* 87: 238-63.

- Gong, G. 2006. Airfare, competition, and spatial structure: New evidence in the U.S. airline deregulation. Unpublished PhD dissertation, Boston University, Boston, Massachusetts.
- Goodrich, J.N. 2002. September 11, 2001 attack on America: A record of the immediate impacts and reactions in the USA travel and tourism industry. *Tourism Management* 23(6): 573-80.
- Ito, H., and D. Lee. 2005. Assessing the impact of the September 11 terrorist attacks on U.S. airline demand. *Journal of Economics and Business* 57(1): 75-95.
- Lai, S.L., and W. Lu. 2005. Impact analysis of September 11 on air travel demand in the USA. *Journal of Air Transport Management* 11(6): 455-8.
- Mason, K.J. 2005. Observations of fundamental changes in the demand for aviation services. *Journal of Air Transport Management* 11(1): 19-25.
- Massachusetts Office of Travel and Tourism. http://www.bostonusa.com/partner/press/pr/statistics (last accessed 10 June 2009).
- Morrison, S., and C. Winston. 1986. *The economic effects of airline deregulation*. Washington, DC: The Brookings Institution.
- Morrison, S., and C. Winston. 1995. *The evolution of the airline industry*. Washington, DC: The Brookings Institution.
- Reynolds-Feighan, A.J. 1998. The impact of US airline deregulation on airport traffic patterns. *Geographical Analysis* 30: 234-53.
- Ruppenthal, K.M. 1987. US airline deregulation winners and losers. *Logistics and Transportation Review* 23: 65-82.
- USDOT. 2006. *Estimated impacts of September 11th on US travel*. Research and Innovative Technology Administration, Bureau of Transportation Statistics. Washington, DC.