EFFECT OF CHAPTER 11 BANKRUPTCY PROTECTION ON AIRFARES IN THE U.S. DOMESTIC AIRLINE INDUSTRY

A Thesis
Submitted to the Graduate Faculty
of the
North Dakota State University
of Agriculture and Applied Science

By

Narendra Dhananjaya Kumara Malalgoda

In Partial Fulfillment of the Requirements
for the Degree of
MASTER OF SCIENCE

Major Department:
Agribusiness and Applied Economics

November 2015

Fargo, North Dakota

North Dakota State University
Graduate School

Title

EFFECT OF CHAPTER 11 BANKRUPTCY PROTECTION ON AIRFARES IN THE U.S. DOMESTIC AIRLINE INDUSTRY

By

Narendra Dhananjaya Kumara Malalgoda

The Supervisory Committee certifies that this ***disquisition*** complies with North Dakota State University's regulations and meets the accepted standards for the degree of

MASTER OF SCIENCE

SUPERVISORY COMMITTEE:

Dr. Siew Hoon Lim
Chair

Dr. Ryan Larsen

Dr. Alan Dybing

Approved:

11. 19. 2015
Date

Dr. William Nganje
Department Chair

ABSTRACT

I empirically examine the effects of bankruptcy protection (Chapter 11) on airfares in the U.S. domestic airline industry using cross sectional air tickets data from 2001:Q1 through 2012:Q4. A hedonic price model was developed to identify the determinants of airfares. The results indicate that, airfares charged by a bankrupt airline are approximately 4% lower than airfares of other airlines that are not in bankruptcy, *ceteris paribus*. Individually, bankrupt airlines lower their airfares as much as 16-19% during bankruptcy protection. Furthermore, it is evident that low cost carriers (LCCs) have significantly lower airfares than legacy carriers. This confirms the high degree of price competition in the industry.

ACKNOWLEDGMENTS

My sincere appreciation goes to my advisor, Dr. Siew Hoon Lim, for her guidance and advice provided throughout this research. I thank her for her patience and motivation, which helped me immensely during the progression of this study. My thanks also goes out to my committee members, Dr. Ryan Larsen and Dr. Alan Dybing, for their insightful comments and encouragement. I would like to extend my gratitude to the Upper Great Plains Transportation Institute for funding this research. I am grateful to Enrico Sassi, Director of the Graduate Center for Writers, for his graduate academic writing class and for the countless number of hours he spent outside the classroom coaching me. Finally, I would like to thank my parents for their support and my wife for the encouragement that she provided throughout this study.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

1. INTRODUCTION

The airline industry, one of the industries to breakout from tight economic regulation in 1978, has been facing increased intra-industry competition in the decades following deregulation. Since the passage of the U.S. Airline Deregulation Act of 1978, carriers became free to enter or exit any domestic markets, and were given more freedom to price their services. The deregulation was intended to introduce more competition in the industry.

Over the past three decades, while the U.S. airline industry's output and productivity have grown tremendously, its financial performance has been dismal, leading to over 25 bankruptcy filings (GAO, 2014). According to Borenstein (2011), since deregulation the airline industry had lost $60 billion (2009 dollars) in domestic markets, and the industry has reported negative net income in 23 of 31 years post 1978. The lackluster financial performance can be explained by a number of reasons, such as high fuel costs, entry and expansion of low cost carriers (LCC's) and severe demand shocks as a result of the 9/11 terrorist attack (Borenstein, 2011).

Financial distress has been proven to have a significant effect on the pricing behavior of airlines as well as bankruptcy filings (Hofer et al., 2009). Carriers can slash costs drastically during Chapter 11 reorganization, allowing them to renegotiate contracts and reduce debts, and giving them an edge over other financially stronger competitors in the industry. Thus, financially distressed carriers are more likely to lower airfares (Barla and Koo, 1998; Hofer et al., 2009).

When it filed for Chapter 11 bankruptcy in 2011, American Airlines reported that "several air carriers have reorganized in recent years under Chapter 11, including United, Delta, and US Airways. These cost reduction efforts, bankruptcy reorganizations and subsequent consolidations (e.g., United/Continental; Delta/Northwest) have allowed carriers to decrease

operating costs. Lower cost structures have generally resulted in fare reductions. Over the past several years, the Company [American Airlines] has been unable to offset its substantial cost disadvantage through increases in passenger traffic, changes in the mix of traffic that improve yields and/or cost reductions. Consequently, the Company filed the Chapter 11 Cases to become a more efficient, financially stronger and more competitive airline" (AMR Corporation, 2012, page 3). However, Borenstein and Rose (1995) suggest that airfares are not affected when airlines file for Chapter 11, although they might slash airfares prior to filing for bankruptcy.

In this thesis, I analyze how airfares in general are impacted by carrier's bankruptcy in the U.S. domestic airline industry as well as how bankrupt airlines adjust their airfares at the time of bankruptcy. I collect tickets data from the DB1B and T-100 databases maintained by the United States Department of Transportation (U.S.D.O.T.) and airline financial data from the Airline Data Project of the MIT Global Airline Industry Program. My sample contains over 24 million observations on passenger air tickets of eleven major U.S. domestic airlines which include, Delta Air Lines, American Airlines, United Airlines, US Airways, America West Airlines, Continental Airlines, Hawaiian Airlines, Northwest Airlines, Frontier Airlines, Jet Blue Airlines and Southwest Airlines, representing network carriers, regional carriers and LCCs respectively. Seven bankruptcy filings during the period 2001-2012 will be taken into consideration in this study.

The results indicate that, airfares charged by bankrupt airlines are approximately 4% lower than airfares of other airlines that are not in bankruptcy, *ceteris paribus*. Additionally when examining individual bankrupt airlines, my results show that US Airways and Hawaiian Airlines reduced their airfares by approximately 16 to19 percent during bankruptcy. These are

the largest fare reductions seen among fares charged by bankrupt airlines. Northwest Airlines was the only exception' the company increased airfares at the time of bankruptcy.

The rest of the thesis is structured as follows: Chapter 2 contains a thorough background review about the impact of the Airline Deregulation Act of 1978, financial and economic performance of the airline industry, bankruptcy in the industry, collective agreements, and finally the concept of strategic bankruptcy filings; Chapter 3 contains a detailed discussion on the data used for the study; in Chapter 4, I conduct a regression analysis to determine the effect of bankruptcy on airfares; Chapter 5 presents the results of the analysis; Section 6 contains the conclusions.

2. LITERATURE REVIEW

2.1. Airline Deregulation Act of 1978

The U.S. airline industry was tightly regulated between 1938 and 1978. The Civil Aeronautics Board (CAB) was in charge of overseeing both economic and safety matters in the industry until the late 1950s, when its authority over aviation safety was transferred to the Federal Aviation Administration (FAA). Under the CAB regime, price and entry regulations in the airline industry were deliberately designed to promote the financial stability of airlines. By removing regulatory control from the CAB, the expectation was that the markets would operate more efficiently and carriers could offer a wider range of service options through competition (Goetz and Vowles, 2009).

According to Brock (2009), the CAB had four key powers with regard to the airline industry: (1) the power to grant or deny the certificates of public convenience and necessity; (2) the power to approve or reject the fares charged by carriers; (3) the power to approve or deny airline mergers; (4) the power to approve or disapprove collusive agreements among carriers.

The United States Airline Deregulation Act of 1978 is a dramatic event in the history of economic policy which enabled the U.S. airline industry to be one of the first few sectors to breakout from tight regulation. The Act was intended to introduce more competition in the airline industry, and steer it away from monopoly and oligopoly. The deregulation was expected to attract new airlines to enter the market and increase competition, which in turn would benefit consumers by reducing airfares and improving service quality. Since the passage of the Act, carriers are free to enter or exit any domestic markets, and given more freedom to enter and serve any domestic market they preferred and to price their services. The deregulation made free entry possible by 1980 and free pricing by 1983, while abolishing the CAB by 1985 (GAO, 2006).

Following the deregulation, the airline industry experienced five major changes. (1) Fare structure was very important for airlines. In light of the abolition of price regulation, firms had to come up with innovative pricing strategies (such as frequent-flyer programs) to keep up with increased competition. (2) Route structure had to be redesigned from the point-to-point route system to the 'hub-and-spoke' system due to the fact that the later proved to be cost effective. (3) Fleet composition became a major determinant of cost since firms only wanted to bear minimum costs possible to slash airfare, whereas before deregulation 'size and comfort' of the plane were the more important factors. (4) Labor costs had to be cut substantially to reduce airfares and airlines were able to compete aggressively in the industry. This even tempted some firms to file for bankruptcy in order to renegotiate with labor unions. (5) Traditional air ticket distribution patterns such as going through travel agents have been replaced since the customers embraced the internet distribution which has provided them with cheaper, flexible airfares and routing options (Harteveldt, 2012). Furthermore, these channels have supported airlines to exhibit their unique features in order to attract more customers and build loyalty (Kole and Lehn, 1999).

As Morrison and Winston (1990) explained, air carriers that were "fit, willing and able" could serve any route and charge fares up to any level which they considered appropriate. They argued, however, that the deregulation of the U.S. airline industry produced mixed results. More people are flying than ever before due to the reduced airfares and more routing options. However the U.S. airline industry has also experienced earning volatility (Vasigh et al., 2008). This volatility has resulted in many airline bankruptcies, labor layoffs, employee pay cuts, reduction of shareholder wealth, and immense uncertainty in the market. The financial returns are considered inherently volatile especially due to key demand and cost characteristics that make it impossible for airlines to reduce capacity in periods of declining demand at a rush. For example,

airlines have high fixed costs and are unable to adjust either flight schedules or labor costs when demand for air travel declines, mainly due to commitments to and collective bargaining agreements with other parties. Prior to deregulation, the financial performance of airline industry was stable with minimal losses and satisfactory profits. However, this was due to the government regulation which prevented competition in the industry (Vasigh et al., 2008).

2.1.1. Market Structure and Competition

According to Brock (2009), the basic elements of the market structure in the airline industry are: (1) the nature of demand, (2) the relative size and concentration of carriers, (3) the proliferation of alliances and cooperative agreements, and (4) the barriers to effective competition.

The consumer demand for air travel has minimal substitutes with regard to its speed, and consumer demand is sensitive to changes in the cost of air travel, income and trip flexibility. The degree of price sensitivity (demand elasticity) varies by a number of factors (Smith and Pearce, 2008). For example, airlines face two groups of travelers in general. Leisure travelers are more sensitive towards price changes but have more flexibility in terms of travel time, compared to business travelers who are less sensitive to price changes and are less flexible. In order to extract maximum profit possible, airlines practice price discrimination.

Prior to 1978, the market had a limited amount of airlines, and air travel routes were regulated. Inefficient carriers were protected from competition since the CAB controlled prices and entry. After the Deregulation Act there was substantial entry of new competitors; as a result, the airline industry moved closer towards increased competition. Airfares declined, productivity boomed, and airline services expanded. However, this process gradually turned into a different

path with many of the new entrants merging with major carriers or filing for bankruptcy and exiting the industry (Liu and Lynk, 1999).

Kim and Singal (1993) write that the surviving carriers were handed a substantial amount of market power, which led to price increases in some situations. They argue that the tendency of moving back towards less competition has raised questions about the long-run structure of airline markets.

Relative size and concentration of carriers is another important factor in the market structure. The U.S. passenger airline industry is primarily composed of network carriers, LCCs and regional airlines. Network carriers functioned even before the 1978 deregulation act, and they carry out complex hub-and-spoke operations at a wide variety of domestic and international destinations, with thousands of employees and hundreds of aircrafts. Since 40% of network airlines' revenue depends on international service, domestic service is often aligned with their international networks (GAO, 2014).[1] According to the United States Department of Transportation (U.S.D.O.T., 2014), out of approximately 120 certified air passenger carriers which operated within the U.S., 78% of them were legacy carriers, and the rest were LCCs and regional carriers.

[1] Most of the major U.S. passenger airlines have been using the hub-and-spoke system since the year 2001. Hubs are special nodes that are part of a network, located in strategic locations to facilitate connectivity between airports, and spokes are the routes that planes take out of the hub airport (O'Kelly, 1998). The main purpose of the hub-and-spoke system is to manage cost effectiveness of airlines and to provide passengers with better routes to destinations. For example, Delta Air Lines has hubs in many cities including Atlanta, Detroit, Minneapolis-St. Paul, New York-LaGuardia, New York-JFK, Salt Lake City, and Seattle (http://news.delta.com/Stats-Facts).

Table 2.1. Airline Domestic Market Shares October 2013 - September 2014
(Market share based on revenue passenger miles).

Airline	Share
Delta	16.7%
Southwest	16.6%
United	15.3%
American	12.5%
US airways	8.4%
Jet Blue	5.1%
Alaska	4.2%
Express Jet	2.4%
Sky West	2.3%
Sprint	2.1%
Other	14.4%

Source: U.S.D.O.T. (2014)

According to Table 2.1, Delta Air Lines and Southwest Airlines have captured the most market share out of all the domestic airlines in the U.S. By the end of 2014, the top five airlines were able to capture 70% of the domestic market share and the rest was distributed over 100 air carriers.

LCCs entered the market after deregulation and operated less costly point-to-point service using fewer types of aircrafts. For example, Southwest Airlines uses the traditional point-to-point system, hauling people short distances with few or no connecting flights. Southwest has been very successful in capturing the domestic market share despite the heavy competition in the industry. Furthermore, Southwest Airlines has grown in to being the world's largest LCC within a short span of time. LCCs, such as Allegiant Air and Spirit Airlines are referred to as ultra-low-cost carriers because they provide service often to leisure destinations at discount fares, but charge higher optional fees, such as carry-on and checked baggage charges. As Hüschelrath and Müller (2011) conclude, LCCs should be considered as the driving force of competition in the domestic U.S. airline industry. Despite the advantages which the legacy airlines may have, such as the size of network and the quality of services, LCCs have competed well enough by

introducing themselves to medium and long haul markets and by selecting legacy dominant routes and thereby creating a close substitute to the legacy carriers (Hüschelrath and Müller, 2011).

Regional airlines operate much smaller aircrafts, turboprops or regional jets with up to 100 seats, and generally provide their services to communities whose willingness to pay is lower compared to network carrier customers. Some regional airlines are owned by network airlines, while others are independent. Approximately 22% of all airline passengers in the U.S. market are served by regional carriers (GAO, 2014).

Large network operators have operating agreements with smaller regional airlines. For example, Delta has operating agreements with Sky West, Chautauqua Airlines, Shuttle America, and Freedom Airlines for feeder services. Others like United-Continental and US Airways have entered in to cooperative scheduling, ticketing and marketing partnerships. Also, there are instances where these airlines have formed strategic alliances with leading foreign airlines (Brock, 2009).

Legacy airlines established prior to the Airline Deregulation Act of 1978 were significantly impacted by the emergence of LCCs. Legacy carriers were considered to provide higher quality service when compared to the LCCs (GAO, 2014).

Following the deregulation in the early 1980s, the industry was able to raise the load factors with peak load pricing strategies, and it was able to set airfares that closely reflect the cost of service. Some airlines were tempted to exercise the price setting power in concentrated markets, but the entries of the LCCs cast a negative effect on airfares indicating the fact that the industry was increasingly becoming more competitive (Graham, Kaplan and Sibley, 1983).

Although deregulation introduced more competition, industry competition has never been rising steadily and consistently at all times. New airlines entered the industry between 1978 and 1983, these included People Express, New York Air, Midway, Muse, and former interstate and charter airlines. These new carriers created direct competition to the 10 major airlines at that time (United, American, Delta, Eastern, TWA, Western, Pan Am, Continental, Braniff, and Northwest). As a result, the combined market share of the major carriers declined from 87% to 75% (Goetz and Sutton, 1997). However, by the mid-80s a fair amount of mergers, acquisitions and bankruptcies occurred, and consolidation and firms' exits reduced competition. In the late 1980s the combined market share of the nine largest airlines, which included American, United, Delta, Northwest, Continental, US Air, TWA, Pan Am, and Eastern, added up to 92 % of domestic revenue passenger miles (Williams, 1993). The industry sustainability was very unpredictable at this time period. From 1992 to 1996, the industry observed another wave of new airlines, which included ValuJet/AirTran, Spirit, Kiwi, Vanguard, Midway, Frontier, Reno, and Western Pacific (Goetz, 2002).

To keep up with increased competition, airlines had to come up with innovative strategies to meet the increased consumer demand. Some of the strategies include, the adoption of computerized reservation systems, loyalty marketing schemes such as frequent-flyer programs, travel agent commission overrides, and corporate discounts (Borenstein, 1992; Goetz, 2002).

2.1.2. Service Quality

Prior to deregulation, customers paid a premium price and received high service quality in return. Air carriers were financially capable of providing high quality service due to the lack of competition in the industry. After the deregulation, consumers searched for lower airfares, and

airlines resorted to cost-cutting and lowering service quality to provide low airfares (Chang and Yeh, 2002).

Lower service quality in the industry was exacerbated by the entering of LCCs, which basically offered a lower quality product to a niche market where the consumers were searching for lower airfares. This appeared to be a very successful approach as the LCCs have been able to capture about 40% of the industry market. Legacy carriers were the most affected because most of their costs were fixed and large. They were not able to reduce their service quality to match LCCs' prices. As a result, they had to consider other options to compete in the industry (Borenstein, 2011).

Although the CAB established minimum service standards prior to 1978, after deregulation, market forces signaled information on price, routes, and service levels. There are two general methods used by the industry to measure the airline service quality: (1) the consumer survey research and (2) secondary data from the Airline Quality Rating Report (ATCR). At present, especially with the wide spread of digital technologies and social media, consumers have the opportunity to punish those airlines that fail to provide the expected and necessary service quality levels (Waguespack and Rhoades, 2014).

2.1.3. Mergers and Acquisitions (M&A)

Despite a large number of new entrants in the airline industry following the deregulation which resulted in increased competition, many of the firms were short lived (Goetz and Dempsey, 1989). The reason is that legacy airlines were able to run most of them out of business initially. At the same time, mergers and acquisitions (M&A) occurred with the intention to eliminate competition for specific routes and hubs, or to expand geographical coverage. These airline mergers are a product of deregulation, and they had a significant effect on the industry.

Merging has been used as a strategy by airlines to remain competitive or to prevent bankruptcy (Shaw and Ivy, 1994).

Airlines seek to merge with or acquire other air carriers with the intention of increasing profitability and financial sustainability, although in most instances they have to weigh potential benefits of M&A against increased operational costs, regulatory costs, and operational challenges. Airlines expect to reduce costs through combining complementary assets, eliminating duplicate activities, and reducing capacity. In addition to seeking the U.S. Department of Justice's (U.S.D.O.J.) approval, and managing increased operational costs of integrating workforces, aircraft fleets and systems must also be considered by airlines to make M&A a success. As part of its analysis, the U.S.D.O.J. uses the Herfindahl-Hirschman Index (HHI) [2] to assess if a merger is likely to significantly increase concentration and raise anti-competitive concerns in the markets in which the airlines operate (GAO, 2008).

Two M&A waves were noted in the airline history. First wave of U.S. airline mergers was in the 1980s and it was introduced by Borenstein (1990) from his paper on "Airline mergers, airport dominance, and market power". The second wave of U.S. airline mergers was in the late 1990s (Bilotkach et al., 2013). According to Fan et al. (2001), there are few forces which influence the structure of airline alliance and consolidation: (1) increased globalization in trade and air transportation, (2) increased intra-regional interaction, (3) economic incentives for airline consolidation, (4) pace of liberalization in air transport industry, and (5) anti-trust concerns. They also state that the airline industry at that time period was facing the second wave of consolidation.

[2] This is a commonly accepted measure of market concentration. The U.S.D.O.J considers a market with a result of less than 1,000 to be a competitive marketplace, a result of 1,000-1,800 to be a moderately concentrated marketplace; and a result of 1,800 or greater to be a highly concentrated marketplace. Generally, mergers that increase the HHI by more than 100 points in concentrated markets raise antitrust concerns (U.S.D.O.J., 2014)

Airline consolidation emerged since the 1980s and has gradually increased through the years. According to the U.S.D.O.T (2014) , the U.S. airline industry has been restructured with a notable number of mergers which involve the top industry airlines in the past decades. The first wave included 8 M&A among major airlines in the industry between 1985 and 1988. Two of these mergers, Northwest-Republic and TWA-Ozark, were highly criticized by the U.S.D.O.J because the merging airlines shared the same primary hub[3], which later resulted in increasing airfares in the dominant, primary airports (Borenstein,1992). The rest of the M&A included Delta-Western, American-Air California, US Air-Piedmont, and US Air-Pacific Southwest airlines. However, these M&A only created minor positive effects on the airfare according to Morrison and Winston (1990).

In 2005, 11 airlines including American, Delta, United, Continental, Northwest, Southwest, US Airways, America West, Alaska, Jet Blue, and AirTran captured 96% of the domestic market, whereas by 2014 the number of airlines dominating the market was reduced to 6 (Delta, Southwest, United, American, US Airways and JetBlue). The following mergers occurred in the 2000s. American merged with US Airways in 2013; AirTran merged with Southwest in 2011; United merged with Continental in 2010; Northwest merged with Delta in 2009, and US Airways merged with America West in 2005.

According to the Airport Council International (ACI, 2013), airline M&A are lengthy and complicated processes, which include a complex flight integration involving other affiliates. Although M&A allow airlines to enter new markets and strengthen existing market destinations, not all newly acquired destinations will be profitable. For example, United acquired 36 new

[3] Northwest and Republic airlines shared the same primary hub which is Minneapolis. After the Merger in 1986, it is said to have created airport dominance which resulted in prices rising 23% faster than the national average (Borenstein, 1990).

international markets but cut 22 existing destinations in favor of utilizing resources for entries into destinations with higher demand. Southwest's acquisition of AirTran led to cuts in services to several cities.

As a result of this consolidation, about 85% of passengers in the U.S. flew on four domestic airlines in 2013. Certain industry observers have raised concerns that consolidation could have adverse effects on airline competition, such as higher airfares and reduced service. Others argue that consumers stand to benefit from recent changes in the industry as profitable airlines reinvest in new planes and expand their networks (GAO, 2013).

Table 2.2. Airline Mergers and Acquisitions from 1978-2014

Title	Announced	Closed	Resulting Entity
Pan Am / National Airlines		1/7/1980	Pan Am
North Central Airlines / Southern Airways / Hughes Airwest		7/1/1979	Republic Airlines
Republic Airlines / Hughes Airwest		10/1/1980	Republic Airlines
Continental Airlines / Texas Air Corporation		10/31/1982	Continental Airlines
Southwest Airlines / Muse Airlines	6/25/1985	12/12/1985	Southwest Airlines
Northwest Airlines / Republic Airlines	1/23/1986	10/1/1986	Northwest Airlines
TWA / Ozark Air Lines	3/1/1986	10/27/1986	TWA
Delta Air Lines / Western Airlines	9/9/1986	12/16/1986	Delta Air Lines
Continental Airlines / People Express / New York Air / Frontier Airlines		2/1/1987	Continental Airlines
Alaska Airlines / Jet America		10/1/1987	Alaska Airlines
American Airlines / AirCal	11/18/1986	4/30/1987	American Airlines
US Air / Piedmont Airlines		8/4/1989	US Air
American Airlines / Eastern Air Lines: Latin Routes		7/1/1990	American Airlines
American Airlines / TWA: Heathrow Routes		5/2/1991	American Airlines
Delta Air Lines / Pan Am Airlines (Shuttle and Atlantic Routes)	7/27/1991	11/1/1991	Delta Shuttle
United Airlines / Pan Am: Latin & Caribbean Routes	12/9/1991	5/16/1992	United Airlines
Southwest Airlines / Morris Airlines	12/13/1993	12/31/1993	Southwest Airlines

Table 2.2. Airline Mergers and Acquisitions from 1978-2014 (continued)

Title	Announced	Closed	Resulting Entity
AirTran Airways / Valujet	7/11/1997	11/17/1997	AirTran Airways
Delta Air Lines / Atlantic Southeast Airlines	2/16/1999	3/22/1999	Delta Air Lines
American Airlines / Reno Air	11/19/1998	2/1/1999	American Airlines
American Airlines / TWA	1/10/2001	4/9/2001	American Airlines
Republic Airways / Shuttle America	4/22/2005	5/9/2005	Republic Airways
US Airways / America West Airlines	5/19/2005	9/27/2005	US Airways
Republic Airways / Midwest Airlines	6/23/2009	7/31/2009	Republic Airways
Republic Airways / Frontier Airlines	8/14/2009	10/1/2009	Republic Airways
Delta Air Lines / Northwest Airlines	4/14/2008	12/31/2009	Delta Air Lines
United Airlines / Continental Airlines	5/3/2010	10/1/2010	United Airlines
Southwest Airlines / AirTran Airways	9/27/2010	5/2/2011	Southwest Airlines
SkyWest / Atlantic Southeast Airlines	8/15/2005	9/8/2005	SkyWest / ASA
SkyWest / Atlantic Southeast Airlines / ExpressJet Airlines	8/4/2010	11/15/2010	SkyWest / SureJet
Delta Air Lines / Comair	10/18/1999	10/22/1999	Delta Air Lines
Alaska Airlines / Horizon Air	11/19/1986	12/31/1986	Alaska Airlines / Horizon Air
US Air / Pacific Southwest Airlines		5/29/1987	US Air
Alaska Airlines / Alaska Coastal Airlines		4/1/1968	Alaska Airlines
Pinnacle Airlines / Colgan Air	1/18/2007	1/18/2007	Pinnacle Airlines / Colgan Air
Pinnacle Airlines / Mesaba Airlines	7/1/2010	7/1/2010	Pinnacle Airlines / Mesaba Airlines
US Airways/AMR/American Airlines	2/14/2013	12/9/2013	American Airlines (AAL)
Southwest Airlines / ATA Airlines	11/19/2008		Southwest Airlines
US Airways/AMR/American Airlines	2/14/2013	12/9/2013	American Airlines (AAL)

Source: UCLA-LoPucki Bankruptcy Research Database

Table 2.2 displays the flow of the airline industry M&A, which followed straight after the deregulation in 1978. It clearly shows the two U.S. merger waves in the airline industry which were the late 1980s and the period after 2000 which was laid out by Borenstein (1990) and Fan et al., (2001). Although there were a high number of new entrants to the airline industry especially

after the deregulation process, it is clearly seen by the number of increasing M&A that it must be challenging for the airlines to survive with the heavy competition and highly volatile input costs (GAO, 2013).

2.1.4. Labor

The pre-deregulation era was quite a favorable time period for the labor unions in the U.S. airline industry. Seventeen out of nineteen major airlines in the U.S. had unionized labor, and unionization was considered very powerful. The unions had the capability of shutting down major carriers at any point if their demands were not met (Thornicroft, 1989). Since most of the jobs related to the airline industry were unique, it was almost impossible to find replacements during a strike. Thus, keeping up air service demand during a strike was difficult if not impossible for an airline carrier (GAO, 2006).

Airline labor relations were covered by the Railway Labor Act of 1936. Airline unions' bargaining structure was highly decentralized and also separated by crafts such as pilots, mechanics, etc. Prior to deregulation, labor unions and airline management had to negotiate in carrier-by-carrier bargaining, which followed pattern bargaining.[4] During this time frame, labor relations within airlines were healthy since airlines were allowed to pass on the increased labor costs to the airfare through the CAB's fare-setting. Another important element which prevailed was the Mutual Aid Pact,[5] a strike insurance plan created in 1958 to increase the bargaining power of airlines. This too was eliminated with the deregulation, giving more power to labor unions in contract renegotiations (GAO, 2006).

[4] The last contract signed by one carrier served as the starting point for the next airline.
[5] Strike-struck airlines were compensated by non-struck airlines based on increases in traffic the latter received during a strike (GAO, 2006).

After the deregulation, there was an increase in the labor costs mainly due to the developments of hubs and the increasing number of airline carriers (Kahn, 1988). Bankruptcies, poor financial performance, and corporate restructuring during the deregulation era put a lot of attention on labor cost management. With increased competition airlines tried to reduce airfares through reducing labor costs (Borenstein and Rose, 1994). Pay cuts became quite normal in this industry, and they varied between 4% and 18% at times. Additionally, it was difficult to bargain directly with the powerful unions, and one option the carriers had may have been filing for bankruptcy, which indirectly gave them the opportunity to renegotiate the labor wages (Bamber et al., 2009).

Pay gap between the unionized labor and non-unionized labor showed a significant disparity in earnings. Hirsch and Macpherson (2000) explain that unionized labor had high bargaining power since airlines' earnings depended highly upon employees' skills and service quality.

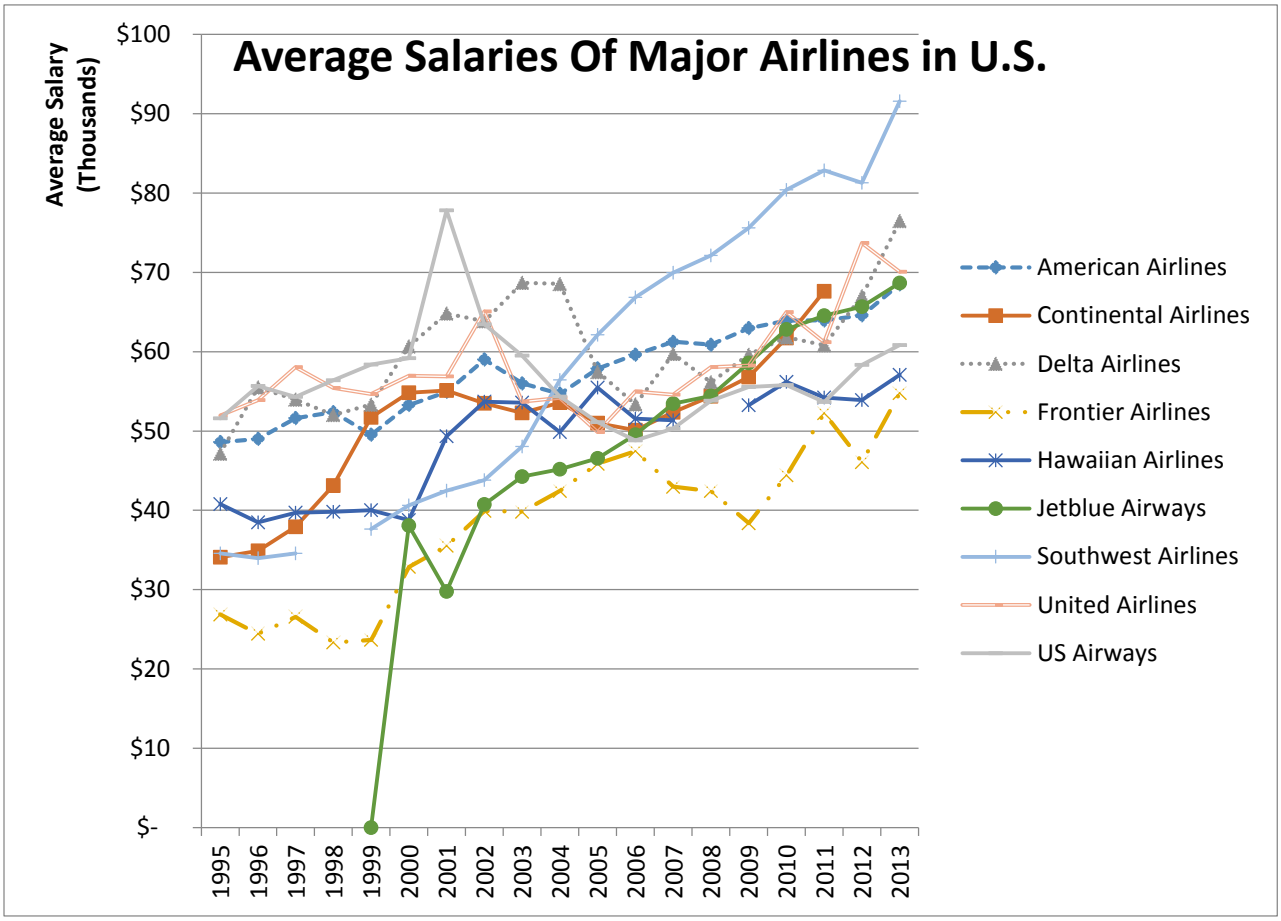

Figure 2.1. Average Labor Wages of Major Airlines in U.S

Source: MIT Global Airline Industry Program

When considering the labor wage distribution of the major U.S. airlines in Figure 2.1, it is shown that the carriers have reduced the labor wages drastically, just after filing for bankruptcy protection. Chapter 11 bankruptcy filings of Delta Air Lines (2005), Frontier Airlines (2008), Hawaiian Airlines (2003), United Airlines (2002), and US Airways (2002 and 2004) have all resulted in substantial labor cost reductions. Only American Airlines deviated from this by being able to gradually increase the labor costs after filing for bankruptcy in 2011.

Figure 2.2. American Airlines Average Labor wages

Figure 2.2 clearly displays how American Airlines average labor wages have gradually increased even though it filed for bankruptcy protection in 2011, making it the only airline which did not respond to bankruptcy through its labor wages.

In Figure 2.3, United Airlines displays a drastic drop in labor wages after it filed for Chapter 11 bankruptcy protection.

Figure 2.3. United Airlines Average Labor Wages

2.2. Financial and Economic Performances in the Airline Industry

The structure–conduct–performance paradigm explains that the market environment has a direct, short term impact on the market structure, and the market structure has an influence over the firm's economic conduct which in turn affects the market performance of the firm itself. The market performance may or may not affect the market structure or the economic conduct. However, Liu and Lynk (2010) suggest that in the post-deregulation era (between 1984 and 1991), airlines actively tried to influence the market structure. For example, Liu and Lynk (2010) find that airlines were able to enhance market dominance through gains in economies of scope and economies of density; aviation technology enabled economies of network size, and predatory pricing became possible through scheduling and frequent-flyer programs.

Some of the major practices in the industry include reduction of operating costs, increased load factors, increased availability of discounted tickets, and increased number of

flights without decline in services to comparatively smaller communities (AMR Corporation, 2012).

These practices enable the creation of the hub-and-spoke method of delivery, complex pricing methods, dominance of many airports by a single carrier, emergence of computer reservation systems, and customer loyalty programs such as frequent flyer programs and travel agent commissions (Borenstein, 1992).

After deregulation, while some consumers may still have to travel on a few airlines the consumers in general now have a larger choice of airlines on a particular route. Under the hub and spoke system, it is possible to decrease operating costs for airlines by increasing load factors on route segments, allowing the air carriers to expand their scope of operation and also increasing the number of city pair routes, with less direct flights between cities (Evans and Kessides, 1993).

2.2.1. Airfares

Prior to deregulation, all airfares and routes were determined by the CAB and price increase requests took a longer time period to be processed and generally were not approved. Additionally, when the CAB was in control, airlines had to operate under fixed prices for specific routes regardless of operating costs (Belobaba et al., 2009). Since deregulation, stringent routes and fare regulations were eliminated, and airlines began to engage in price competition, and they had to compete with many LCCs (Kole and Lehn, 1999). Borenstein and Rose (1994) concluded that price dispersion in the airline industry is larger in a competitive market than in a monopoly; this suggests that firms price-discriminate more in a competitive setting.

Consumers benefited from reduced airfares with deregulation. According to Gaynor and Trapani (1994), the greatest gains to consumers were in the long-haul markets where real price

reductions were the greatest. Therefore, when comparing the airfares in 1978 and 2006, a clear price drop around 40% can be observed (Smyth and Pearce, 2006). Borenstein (1991, 1992), and Graham et al., (1983) show that airfares do respond to the level of competition in the market as a direct result of the deregulation.

LCCs which normally operate in point-to-point networks tend to reduce airfare through cost saving strategies such as not providing meals, no advanced seat selections, and by not providing any airport lounges. They offer a restricted product but have been successful in gaining market power due to very low airfares which the legacy airlines have not been able to compete with due to high operational costs (Tsikriktsis, 2007).

2.2.2. Price Discrimination

Price discrimination is a common strategy used in the airline industry. The airline sells the same product at different prices. Arthur C. Pigou (1920) made a distinction between different levels of price discrimination[6] in his book "*The Economics of Welfare*". The main principle behind price discrimination is that a firm tries to exploit different price elasticities of demand to extract maximum profits. When consumers have an inelastic demand the firm can set higher prices for these consumers. Whereas customers who are more sensitive to prices (or have more elastic demand) will respond more drastically to a price cut or a price increase. The firm can

[6]According to Carlton and Perloff (2005), first-degree price discrimination is a situation in which the seller charges a different price for each unit of good or service, such that the price of each unit is equal to the consumers' willingness to pay. First-degree price discrimination is commonly known as personalized pricing. Second-degree price discrimination refers to a situation in which each consumer faces the same non-linear pricing schedule whereby different prices are charged for different amounts of the good purchased. Prices are lower with increased quantity purchased. Sellers could also vary prices according to the quality of the product consumers buy. Second-degree price discrimination is thus known as menu pricing. Third-degree price discrimination refers to the case in which different consumers are grouped or separated based on observable characteristics that enable the seller to charge the same price within same group but different prices across groups, but each consumer pays a constant price for each unit of the good bought. Third-degree price discrimination is also known as group pricing.

benefit if it can separate these consumers and therefore reduce their consumer surplus (Borenstein and Rose, 1994).

Second degree and third degree price discriminations are very common in the airline industry. Under second degree price discrimination, the airline charges different prices to different customers or at different times depending on the quality of service chosen by the consumer as well as the quantity of purchase. Second degree price discrimination relies on a self-selection mechanism by which the airline offers a price schedule and lets customers select from a menu of product categories. The product's attributes may differ by quality, time, convenience, flexibility and quantity (Stavins, 2001). The consumers' choice of product reflects their willingness to pay. The frequent-flyer program is another example of second degree price discrimination, where the consumers are rewarded for large purchases, and they receive a special kind of quantity discount (Steen and Sørgard, 2002). Airlines also offer business-class, first-class, and economy or coach class seats to travelers with varying degrees of willingness to pay. The menu of choices is a sorting mechanism that allows travelers to self-select the product category that best reflects their willingness to pay. For example, business travelers with low demand elasticities for air travel choose business-class and pay a full fare, but leisure or discretionary travelers with high demand elasticities choose economy or coach class and pay a discounted fare (Borenstein and Rose, 1994).

Third degree price discrimination involves charging different prices to different groups of customers. Airlines must be able to directly observe and identify the different groups of customers, and members within each group are charged the same price that maximizes the firm's profit in the group, but prices vary across groups. The most common way of segmentation for

this type of price discrimination is by geographical location. Other common forms of such price discrimination include discounts such as those for students or senior citizens (Borenstein, 1985).

2.2.3. Airfares Since 2008

The airline industry and the U.S. economy as a whole was severely affected by the recent recession in 2008. Demand for air travel has been recovering ever since, leading to higher airfares despite the low jet fuel prices. Consumers have been paying approximately 4% more on airfares on average in 2014 compared to 2007.

As per the U.S.D.O.T. (2014), the average one-way, inflation-adjusted domestic airfare in U.S. was $366 in 2007 and it increased to $381 in 2014. According to Figure 2.4, airfare follows the same path of the drastic drop of the GDP growth rate in year 2008 resulting in lower airfares for the consumers. Since then the airfare has been gradually increasing with minimal fluctuations up until 2014.

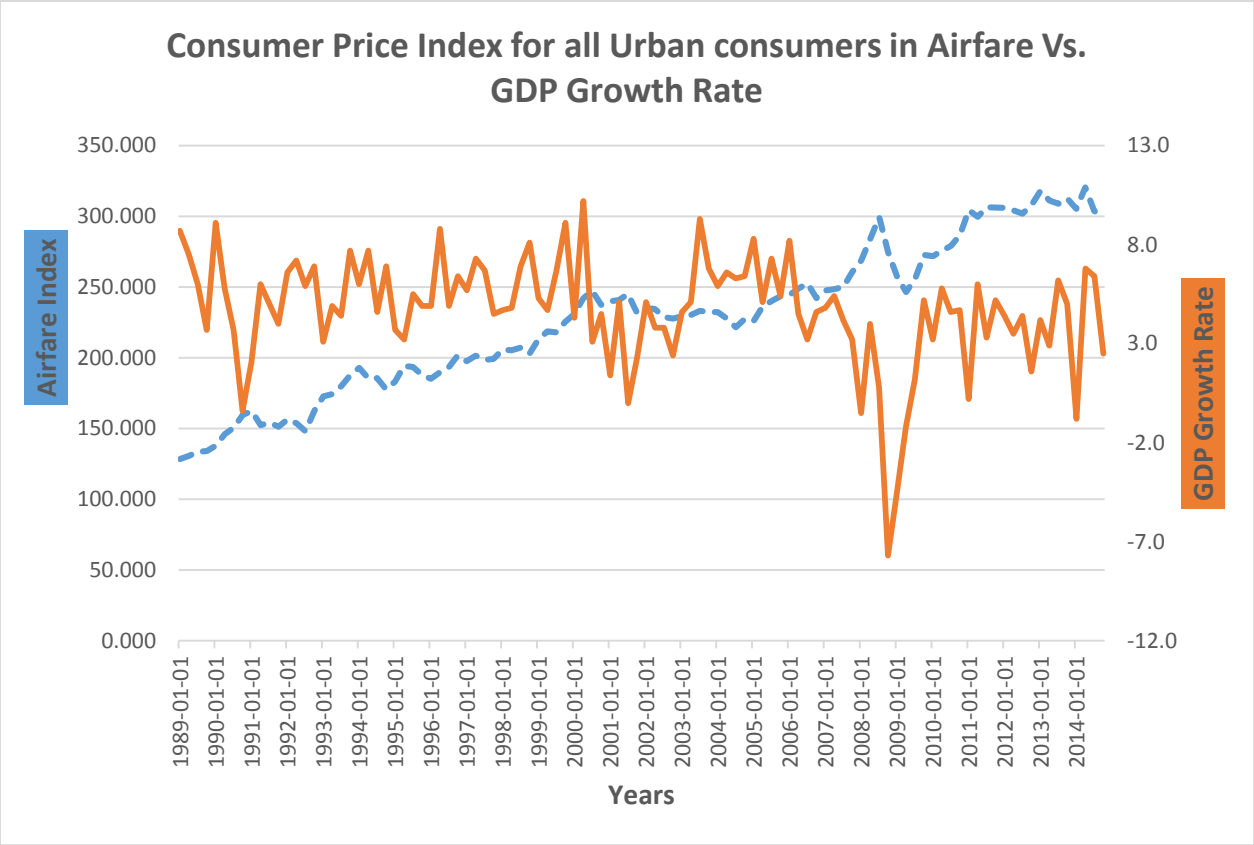

Figure 2.4. Consumer Price Index for all Urban Consumers: Airfare vs. GDP Growth Rate

Source: U.S. Bureau of Labor Statistics and Federal Reserve Economic Data

GAO (2014) gives two reasons for the notable average airfare hike between 2007 and 2012. First, network airlines reduced domestic capacity in 2007 due to unfavorable economic conditions. The reduced capacity affected the industry in 2009 when the economy began to recover because the ASM did not bounce back immediately despite the increased demand in air travel. Second, although the LCCs had the reputation of offering lower airfares than network airlines, GAO (2014) suggested that it is no longer true and that recent trends also showed that the fare-reducing effect of the LCCs is declining. Another study conducted at the Massachusetts Institute of Technology (MIT) found that Southwest Airlines, a major LCC airline in the U.S., no

longer has the price disciplining effect that it once had. As a result, airfares soared after 2008 (GAO, 2014).

Figures 2.5 and 2.6 display airlines' passenger revenue per available seat mile (PRASM) and the passenger yield, respectively. PRASM is calculated by dividing passenger revenue by available seat miles. PRASM is a measure of passenger "unit revenue" that gives an indication of how much revenue the airline is making for each unit of output produced. This measure is equivalent to the product of load factor and passenger yield (MIT Global Airline Industry program, n.d.). In other words, it is a measure of average airfare per seat mile.

Passenger yield is calculated by dividing passenger revenue by revenue passenger miles (RPMs). Thus, it is a measure of average airfare paid per mile per passenger. It is an indicator for assessing changes in airfares over time. Since passenger yield varies by stage length and does not account for load factor, yield comparisons across airline or markets are less useful. Nevertheless, both PRASM and passenger yield are two important metrics for output price performance in the airline industry (MIT Global Airline Industry program, n.d.).

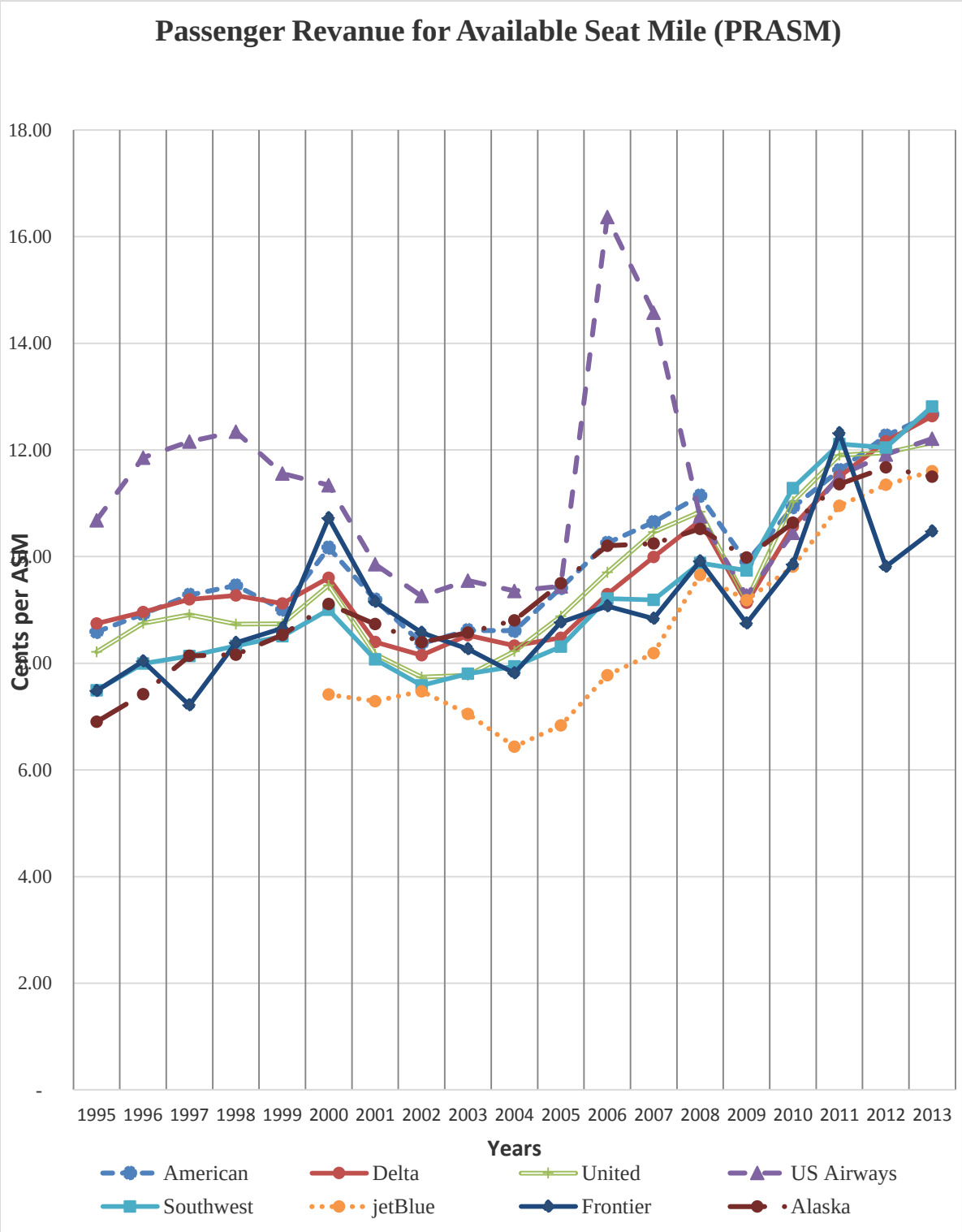

Figure 2.5. Passenger Revenue per Available Seat Mile

Source: MIT Global Airline Industry Program

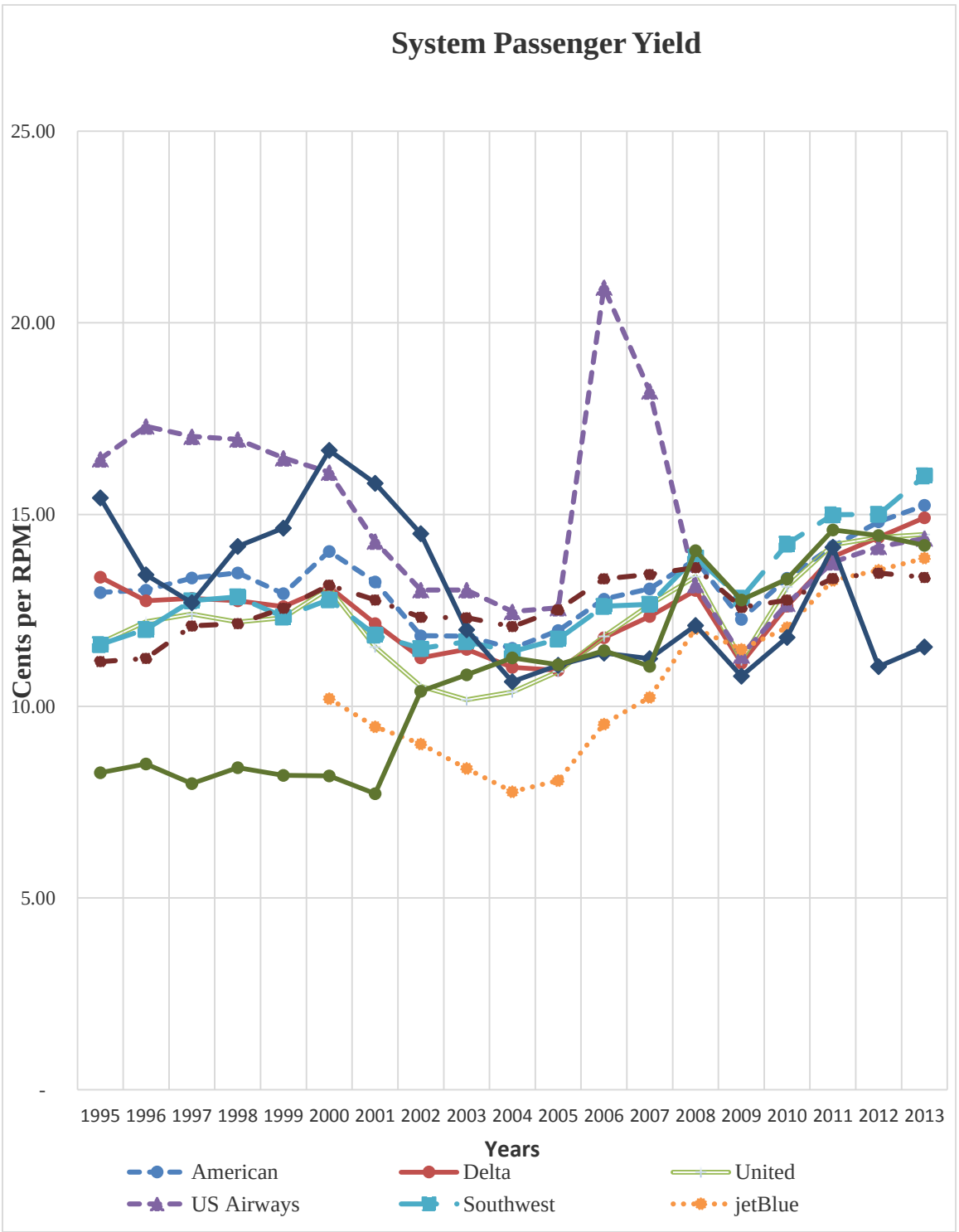

Figure 2.6. System Passenger Yield in the Airline Industry

Source: MIT Global Airline Industry Program

According to Figure 2.5, the average PRASM in the airline industry varies between 8 and 12 cents per available seat mile. Airlines including Southwest, American and Delta display above average PRASM figures by the end of 2013, while Frontier displayed the lowest figures. When I consider the bankruptcy filings for the major airlines in comparison with Figure 2.5, American Airlines' PRASM continued to rise after its bankruptcy filing in 2011. US Airways had its lowest PRASM figures at the time of both of its bankruptcies in 2002 and 2004. But soon after emerging from bankruptcy in 2005 it was able to increase the PRASM figures considerably. United Airlines too showed its lowest PRASM figures during the bankruptcy in 2002, but it managed to increase its PRASM gradually throughout the years when it was under bankruptcy protection. After filing for Chapter 11 in 2005, Delta Air Lines seems to have increased its PRASM figures at an accelerating rate when compared to the non-bankrupt years. However Frontier Airline remains the only company which lowered its PRASM just after filing for bankruptcy protection.

Figure 2.6 shows that the average passenger yield in the U.S. airline industry varied between 10 and 15 cents per RPM from the mid-1990s to 2013. By the end of 2013, only Southwest Airlines and American Airlines were able to increase their passenger yields above 15 cents per RPM, whereas Frontier Airlines displayed the lowest passenger yield of approximately 11 cents per RPM among the major U.S. airlines in Figure 2.6. American Airlines maintains its increasing passenger yield before and after the bankruptcy filing. Delta and United, which show a decreasing trend of passenger yield prior to the bankruptcy filing, managed to gradually increase their passenger yield throughout the bankruptcy protection period. US Airways shows no significant difference in its passenger yield in its two bankruptcy filings even though it experienced a drastic increase and drop in its passenger yield figures in years 2006-2007.

I am able to see from Figures 2.5 and 2.6 that in 2008, almost all the airlines have lower PRASM and passenger yield. This was the time period when the U.S. was facing an economic recession. The airline industry was severely affected by the recession however, by the end of 2013 I can see that the industry's performance matrices improved substantially.

2.3. Bankruptcies in the Airline Industry

The greatest fear expressed by critics of airline deregulation was that bankruptcies and mergers would lead to rapid industry concentration, which in turn would lead to higher air fares (Anderson et al., 2005).

Many airlines declared bankruptcy after the deregulation in 1978. Some airlines have either ceased operations completely (Chapter 7) or opted for major restructuring under the bankruptcy protection of Chapter 11. The time under bankruptcy may vary from firm to firm depending on how much financial or economic distress the firm might be facing. Generally, if a firm under the bankruptcy protection tries to prolong its stay, legal fees may accumulate, and also in the worst scenario, creditors might be given permission to take control of the airline either to operate or to liquidate (Barla and Koo, 1999).

National Florida and Evergreen International Airlines ceased their operations completely by filing Chapter 7 bankruptcy in the years 1990 and 2013, respectively. On the other hand, many major U.S. airlines including US Airways, Delta, Frontier, American, and United have filed for Chapter 11 bankruptcy protection in the past two decades, suggesting that the industry's financial performance is unstable.

Table 2.3. Major Chapter 11 Bankruptcy Filings in U.S. Airline Industry

	Airline	Chapter	Date Filed for bankruptcy	Date Emerging from bankruptcy	Date Refiling for bankruptcy
1)	Air Florida System Inc.	11	7/3/1984	9/15/1984	5/25/1988
2)	America West Airlines Inc.	11	6/27/1991	8/10/1994	
3)	**AMR Corporation**	**11**	**11/29/2011**	**12/08/2013**	
4)	ATA Holdings Corp.	11	10/26/2004	1/31/2006	4/2/2008
5)	Atlas Air Worldwide Holdings Inc.	11	1/30/2004	7/14/2004	
6)	Braniff Inc. (1989)	11	9/28/1989		
7)	Braniff International Corp. (1982)	11	5/13/1982	9/1/1983	
8)	Continental Airlines Corp. (1983)	11	9/24/1983	9/2/1986	12/3/1990
9)	Continental Airlines, Inc. (1990)	11	12/3/1990	4/16/1993	
10)	**Delta Air Lines, Inc.**	**11**	**9/14/2005**	**4/25/2007**	
11)	Eastern Airlines Inc.	11	3/9/1989	12/22/1994	
12)	Fine Air Services Corp.	11	9/27/2000	5/8/2002	1/28/2004
13)	FLYi, Inc.	11	11/7/2005		
14)	**Frontier Airlines Holdings, Inc.**	11	**4/10/2008**	**10/01/2009**	
15)	Frontier Holdings Inc. (1986)	11	8/28/1986		
16)	Global Aviation Holdings Inc. (2012)	11	2/5/2012	12/10/2012	11/12/2013
17)	Global Aviation Holdings Inc. (2013)	11	11/12/2013		
18)	**Hawaiian Airlines Inc.**	11	**3/21/2003**	**5/18/2005**	
19)	Kitty Hawk, Inc.	11	5/1/2000	8/5/2002	10/15/2007
20)	Mesa Air Group, Inc.	11	1/5/2010	1/20/2011	
21)	Midway Airlines Corp (2001)	11	8/13/2001		
22)	Midway Airlines Inc. (1991)	11	3/25/1991		
23)	**Northwest Airlines Corporation**	11	**9/14/2005**	**5/18/2007**	

Table 2.3. Major Chapter 11 Bankruptcy Filings in U.S. Airline Industry (continued)

	Airline	Chapter	Date Filed for bankruptcy	Date Emerging from bankruptcy	Date Refiling for bankruptcy
24)	Pan Am Corp.	11	1/8/1991		
25)	Pinnacle Airlines Corp.	11	4/1/2012	4/17/2013	
26)	Tower Air, Inc.	11	2/29/2000		
27)	Trans World Airlines, Inc. (1992)	11	1/31/1992	8/11/1993	6/30/1995
28)	Trans World Airlines, Inc. (1995)	11	6/30/1995	8/4/1995	1/10/2001
29)	Trans World Airlines, Inc. (2001)	11	1/10/2001		
30)	**UAL Corporation (United)**	11	**12/9/2002**	**1/20/2006**	
31)	**US Airways Group, Inc. (2002)**	11	**8/11/2002**	**3/18/2003**	9/12/2004
32)	**US Airways Group, Inc. (2004)**	11	**9/12/2004**	**09/27/2005**	

Source: UCLA-LoPucki Bankruptcy Research Database

Table 2.3 provides a list of Chapter 11 bankruptcy filings by U.S. airlines. The table shows how common bankruptcies have been in the airline industry, as some of the major airlines have been filing for Chapter 11 protection more than once. With the entry barriers been taken off in 1978, price competition increased drastically, and the established legacy airlines failed to handle it especially with increased labor and unstable fuel costs. This led most of the major airlines to financial distress, and they were directed towards bankruptcy protection. Most airlines had no other alternative other than filing for Chapter 11 for restructuring (Hofer et al., 2009).

There have been arguments that firms in financial distress have nothing to lose and would slash prices to generate cash. According to Borenstein and Rose (1995), there were many ways bankruptcy or financial distress might influence the pricing strategies of airlines.

(1) Filing for Chapter 11 bankruptcy directly lowered the companies' marginal costs due to re-negotiability and cost cutting. Additionally Chapter 11 filing adversely changed consumers' perception of the company, because customers tended to perceive bankrupt airlines' services as low quality and therefore expected to get lower airfares.

(2) Airlines' may discount more on future revenues as a result of bankruptcy. The higher the discount rate, the lower the present value of the future cash flows. In some instances they may reduce prices when increases in discount rates may lead to deviations from cooperative pricing behavior.

(3) Bankrupt airlines may even alter their strategic position with the intention of becoming more aggressive in competition, whereas some bankrupt airlines might be risk averse and would be less aggressive in competition.

(4) Predatory behavior from rivals was noticed during an airline's bankruptcy. Some rivals made drastic price reductions to put the bankrupt airline completely out of business.

The major finding in Borenstein and Rose (1995) was that airlines filing for Chapter 11 bankruptcy had comparatively small fare reductions (5-6%) compared to fares prior to bankruptcy filing, but they did not further reduce airfares during the bankruptcy phase.

Additionally, they found that airlines under bankruptcy protection experienced significant reductions in their route's market shares, whereas their rivals were not affected by the actions of the bankruptcy protected firms and were able to maintain or even increase their airfares (Borenstein and Rose, 1995).

Barla and Koo (1999) attempted to examine the effect of bankruptcy protection on an airline and rival's pricing strategies, as well as the impact of bankruptcy on a firm's average

operating costs. Their results contradicted those in Borenstein and Rose (1995); they found that a bankrupt airline is able to lower its operating costs through renegotiations and restructuring, whereby these low costs are used to lower the airfares after filing for bankruptcy. Besides Barla and Koo (1998), the results in Hofer et al. (2009) also contradicted those found by Borenstein and Rose (1995). Hofer et al. (2009) showed that financially distressed airlines tend to charge lower airfares.

2.3.1. Recent Major Airline Bankruptcies

On 29th November 2011, American Airlines filed for bankruptcy protection with $25.1 billion in assets, making it the second largest airline bankruptcy since 1980 (bankruptcydata.com, 2013). In the 2012 Form 10-K of American Airlines, the company mentions the following as reasons for bankruptcy filing: "We must compete with air carriers that have reorganized under the protection of Chapter 11 of the Bankruptcy Code in recent years, including United, Delta and US Airways. It is possible that other significant competitors may seek to reorganize, or reorganize again, in or out of Chapter 11" (AMR Corporation, 2012, page 1). The firm states that over the past several years, it "has been unable to offset its substantial cost disadvantage through increases in passenger traffic, changes in the mix of traffic that improve yields and/or cost reductions" (AMR Corporation, 2012, page 4).

Delta Air Lines which accounted for 16.8% of the market share in the U.S domestic airline market in 2005 (U.S.D.O.T., 2006), filed for bankruptcy on 14th September 2005. Delta's financial trouble was deepened further by skyrocketing costs of jet fuel that resulted from the aftermath of Hurricanes Katrina and Rita in 2005. Delta spent $1.35 billion more on fuel in 2005 than it did in 2004; the increased fuel expenditure drained the company's cash flow. Other major events and risk factors that struck the company included the terrorist attacks of 11th September

2001, cash-draining pension payments, low priced ticket fares, and intense competition from low-cost rivals such as AirTran and JetBlue (Delta Air Lines, 2005).

Frontier Airlines, based in Denver, filed for bankruptcy protection after its main credit card processor held back substantial proceeds from Frontier's ticket sales. In general, credit-card processors typically turn over revenues of ticket sales to airlines in a few business days. However, for financially weak airlines the processors can sign prior agreements to hold back a percentage of the revenue from the time a ticket is purchased until the passenger takes the flight. First Data Corporation was the credit card processor for Frontier Airlines; it withheld 100 % of the airline's credit card transactions. This is a 55% increase from the previously withheld value. The withholding of funds led the company to seek bankruptcy protection (Frontier Airlines, 2008).

Changes in consumer behavior, especially the reduction in business travelers and changes in their travel patterns, contributed significantly in the reduction of United Airline revenues, which in turn severely impacted the company's financial performance and its ability to meet its maturing debt obligations. United Airlines filed for bankruptcy on 9th December 2002, citing that Chapter 11 "offered the best available means to facilitate the implementation of necessary changes to the debtors' business to bring costs and operations in line with the current business environment" (United Airlines Inc, 2003, page 7). Furthermore, the firm stated that external events such as increased fuel prices, terrorist threats and increasing labor demands cause adverse economic impacts to the firm's financial sustainability.

US Airways had been hit twice by bankruptcy within a very short time frame. It first filed for bankruptcy protection on 8th November 2002. High operating costs comparing to LCCs, large number of lenders and financiers, inability of trustees to modify payment terms of public

equipment financings without the unanimous consent of holders of widely-held trust certificates and the company's inability to reject surplus aircraft leases, return excess aircraft and extinguish applicable obligations without the bankruptcy protection under Chapter 11, were some of the important factors which contributed greatly towards the company filing for bankruptcy protection according to their annual report (US Airways Group, Inc., 2003).

When US Airways emerged from bankruptcy in 2003, industry observers believed that it exited bankruptcy status in a rush. Nevertheless, according to the company's 2004 annual report, the company claimed to have performed a thorough review of its operations to reduce costs significantly. It had also reduced its mainline capacity, realigned its network to maximize yield, initiated new business plans to utilize more regional jets, and expanded its strategic alliances with other carriers. These alterations, however, appeared to be unsuccessful, and the firm continued to incur substantial losses in its operations primarily due to the reduction in domestic revenue and significant increases in fuel prices. The firm attributed the drop in domestic market revenue as a result of the rapid growth of LCCs and the increased transparency of fares through internet sources. When the firm started to experience recurring losses, declining available cash and increased risk of defaults, it had to seek bankruptcy protection once again on 12th September 2004 (US Airways Group, Inc., 2005).

2.3.2. Predicting Airline Bankruptcy

Bankruptcy has reshaped the airline industry dramatically in the past decades. The risk of bankruptcy can be predicted using the Z-score model developed in 1968 by Edward I. Altman to measure several aspects of a company's financial health to forecast the probability of the risk of going bankrupt.

Gritta (1982) called Edward Altman of NYU the true "father of financial bankruptcy forecasting," because his Z-score model has been successful in predicting air carrier failures in early 1980s when it correctly presaged the bankruptcy filings of Braniff and Continental Airlines. Furthermore, the success rate of this model was over 70% (Gritta, 1982).

The Z-score is composed of a few common business ratios, weighted by coefficients, which were obtained from previous bankruptcy filings. The Altman Z-score (Altman, 1968) is calculated as follows:

Z-Score = $0.012X_1 + 0.014X_2 + 0.033\ X_3 + 0.006X_4 + 0.999X_5$,

where,

X_1=Working Capital/Total Assets,

X_2= Retained Earnings/Total Assets,

X_3= Earnings before Interest & Tax/Total Assets,

X_4= Market Value of Equity/Total Liabilities,

X_5= Sales/Total Asset, and

Z = Overall Index.

Table 2.4 on the next page provides the definition of each variable.

Table 2.4. Variables of the Z-score (Altman, 1968)

Variable	Definition
X_1-Working Capital/Total Assets	*This ratio measures the net liquid assets of the firm relative to the total capitalization. Working capital is defined as the difference between current assets and current liabilities(Page 594)*
X_2- Retained Earnings/Total Assets	*Retained earnings reports the total amount of reinvested earnings and/or losses of a firm over its entire life-Earned surplus (Page 595).*
X_3- Earnings before Interest & Tax/Total Assets	*This ratio is a measure of the true productivity of the firm's assets, independent of any tax or leverage factors (Page 595).*
X_4- Market Value of Equity/Total Liabilities	*Equity is measured by the combined market value of all shares of stock, preferred and common, while liabilities include both current and long term. The measure shows how much the firm's assets can decline in value before the liabilities exceed the assets and the firm becomes insolvent. This ratio adds a market value dimension which most other failure studies did not consider (Page 595).*
X_5- Sales/Total Asset,	*The capital-turnover ratio is a standard financial ratio illustrating the sales generating ability of the firm's assets. It is one measure of management's capacity in dealing with competitive conditions (Page 595)*

Source: Altman (1968)

The Z-scores yield key information on firm's financial health. The Z-score ranges below are indications of whether a firm is in the "safe", "grey" or "distress" zones.

Z-score > 2.99 "Safe" Zones. The company is considered safe based on the financial figures only.

1.8 < Z < 2.99 "Grey" Zones. The chance of the company filing for bankruptcy within the next 2 years is high.

Z below 1.80 "Distress" Zones. The score indicates a high probability of distress within this time period.

Over the years many individuals have found that a more convenient specification of the model is of the form: $Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$. Using this formula, one uses the more commonly written percentages as coefficients in the model (Gritta, 1982).

Table 2.5. Altman's Z-scores in the U.S. Domestic Airline Industry

Airline	Years (2005-2014)									
	Dec 2005	Dec 2006	Dec 2007	Dec 2008	Dec 2009	Dec 2010	Dec 2011	Dec 2012	Dec 2013	Dec 2014
Alaska Airlines	1.34	1.3	1.24	0.91	1.24	1.63	1.78	1.97	2.58	2.59
American Airlines	0.6	0.89	0.92	0.46	0.37	0.57	0.3	0.15	0.26	0.91
Delta Air Lines	0.36	-1.18	0.91	-0.32	0.35	0.59	0.62	0.66	1.21	1.36
Jetblue Airways	1.04	1.06	0.85	0.85	0.93	1.07	1.05	1.07	1.2	1.59
Republic/Frontier	1.13	1.08	1.06	1.07	0.97	0.7	0.87	0.72	0.77	0.85
Southwest Airlines	2.2	2.36	1.74	1.77	1.93	2.17	1.72	1.86	2.19	2.95
United Continental	-4.8	3.89	1.04	0.27	0.38	0.58	1.04	0.82	1.1	1.235
US Airways	1.36	0.33	0.73	2.27	1.97	0.3	0.94	1.64	1.44	1.81

Source: Gurufocus.com (http://www.gurufocus.com/tutorials.php#&id=zscore)

Table 2.5 shows the Z-scores for the major air carriers in U.S. for the years 2005 to 2014.All airlines in the table are U.S. passenger carriers classified as major carriers (or Class 1 Carriers) under the U.S.D.O.T. classification ($1.0 billion of annual revenues).

It is noteworthy that all the 8 major airlines have Z-scores in the danger zone, which means that the probability of them filing for bankruptcy is very high. American, Delta, United, and US Airways had filed for bankruptcy protection, and US Airways filed more than once. There was only one instance when an airline (Delta) was in the safe zone for just one year.

Southwest Airlines and Alaska Airlines were able to stand out from the others by maintaining and improving their Z-score values in the "grey zone" between 2005 and 2014. By the end of year 2014, both these airlines were at the margin of getting into the "safe zone".

The year 2014 can be considered a successful year for the airline industry because the major carriers were able to improve their Z-scores. This may be due to the huge drop in jet fuel prices in the world market, coupled with increased demand for air travel (IATA, 2014).

2.4. Collective Agreements

Collective bargaining agreements in the airline industry is a process of negotiations between airlines and employees or unions aimed at establishing agreements to regulate working conditions. Contract negotiations in the airline industry are governed by the Railway Labor Act (RLA), and these labor contracts never expire, but only have an amendable date which gives the opportunity for the firm and the labor unions to amend contracts if necessary (Nordenflycht and Kochan, 2003).

Labor unions are a crucial player in the airline industry, where about 49.3% of workers are unionized, and 51.6% of the labor was under collective bargaining agreements in the airline industry by 2006 (Hirsch, 2007).

According to the GAO (2003), since the industry was deregulated in 1978, the average length of labor negotiations has increased, strikes have reduced, and non-strike work actions

have developed. The average length of time required to reach agreements on contracts between labor and airline management increased from 9 to 15 months after the 1990s.

The employees in the airline industry had negative impacts due to airline strikes which include loss of income and laid off workers. Also disrupted flight scheduling and travel plans, loss of consumer loyalty, and increased expenses affected airlines who were in financial distress (IATA, 2014).

2.5. Strategic Bankruptcy

Barla and Koo (1999) discussed that bankruptcy protection is built to protect firms that are financially distressed to restructure and rebuild. The implications of bankruptcy protection are complicated. As a strategic move, financially stable firms may be tempted to gain subsequent advantages against the rivals by filing for Chapter 11. Bankruptcy may protect unfit firms to survive in a highly competitive environment.

According to Barla and Koo (1999) Chapter 11 filing gives firms the opportunity to reduce costs, postpone repayments of capital and interests, and reject any contracts including the collective bargaining agreements. As airlines under Chapter 11 bankruptcy are able to reduce costs in ways which non-bankrupt airlines are unable to, bankruptcy filing may allow carriers to slash airfares to increase the number of passengers, and the non-bankrupt rivals will have to reduce airfares to match the bankrupt carriers' airfares (Barla and Koo, 1999).

Delaney (1989) gives an anecdotal example of Continental Airlines which abrogated its labor contracts after filing for bankruptcy in 1983. Delaney (1989) calls this a "strategic bankruptcy" and argues that bankruptcy protection was used in this case to avoid the payment of liability awards, punitive damages or high labor costs. The opportunity for contracts re-

negotiation can be considered as a major reason for filing for bankruptcy. Continental Airlines was able to successfully renegotiate its payments schedule on leased aircraft in 1990.

In 1991, America West renegotiated leases with all of its hardware and software vendors; the renegotiation leases helped reduce the airline's costs by 25 to 50%. Trans World Airlines was able to cut $660 million in wages as a result of renegotiations in 1995 (Barla and Koo, 1999).

Ciliberto and Schenone (2012) further explain that an airline will unilaterally modify the labor agreements if the negotiations are unsuccessful and do not satisfy their needs. This gives more bargaining power to the airlines compared to the other parties involved. Another aspect is that the threat that an airline can be forced into liquidation, leaving employees jobless, becomes a reason for employees and labor unions to interact more willingly in the renegotiation process (Ciliberto and Schenone, 2012). Ciliberto and Schenone (2012) note that most bankrupt airlines use bankruptcy as a cost cutting strategy, which is otherwise illegal outside of court protection, especially to handle labor union contracts which are considered to be a heavy burden to the airline industry.

However, Perotti and Spier (1993) conclude that an airline may also be in a good bargaining position to obtain concessions from suppliers or labor, even if it is not under Chapter 11 protection.

3. DATA

This study uses data on domestic, direct, coach-class airfares over the period 2001:Q1-2012:Q4. The sample contains eleven major U.S. domestic airlines, which are classified as network carriers, LCCs and regional carriers. Delta Air Lines, American Airlines, United Airlines, US Airways, America West Airlines, and Continental Airlines are network carriers (GAO, 2014); Hawaiian Airlines and Northwest Airlines are regional carriers (U.S.D.O.T, 2014); Frontier Airlines, Jet Blue Airlines and Southwest Airlines are LCCs (GAO, 2014) in the U.S. domestic airline industry. Table 3.1 displays the amount of tickets issued by each airline in the sample.

Table 3.1. Sampled Tickets Issued by Operating Carriers

Operating Carrier	Freq.	Percent	Cum.
American Airlines	2,391,345	10.24	12.87
Jet Blue Airlines	520,756	2.23	14.90
Continental Airlines	2,255,718	9.65	23.70
Delta Air Lines	6,122,388	26.20	49.64
Frontier Airlines	293,655	1.25	50.78
Hawaiian Airlines	63,313	0.27	51.03
America West Airlines	451,657	1.93	52.79
Northwest Airlines	2,787,085	11.93	64.49
United Airlines	1,607,464	6.88	71.77
US Airways	1,521,028	6.51	78.51
Southwest Airlines	5,349,495	22.89	99.38
Total Observations	23,363,904		

The data was obtained from DB1B and T-100 databases available from the Bureau of Transportation Statistics (BTS). The Airline Origin and Destination Survey (DB1B) is a 10% sample of airline tickets from reporting carriers collected by the Office of Airline Information of the BTS. Quarterly information on ticket prices, data related to origin and destination airports, passenger quantities and distance were obtained from this database. The Air Carrier Statistics database, also known as the T-100 data bank, which contains domestic and international airline

market and segment data, was used in calculating the market shares and Herfindahl-Hirschman Index (HHI) of sampled airlines at origin airports. A major difference between the DB1B and T-100 data is their passenger counts. DB1B data only includes passengers who originate and end their flights at the respective origin and destination airports, while the T-100 data includes passengers from connecting flights at the respective origin and destination airports. I used the total number of passengers in a specific origin airport, which includes the connecting passengers in calculating the market share and the HHI.

Information on airline bankruptcy dates and status was taken from the UCLA-LoPucki Bankruptcy Research Database. The ratio of accommodation earnings to total non-farm earnings for the origin and destination airports were calculated using metropolitan level data from the Bureau of Economic Analysis (BEA). Data from the MIT Global Airline Industry Program was used in selecting a suitable instrumental variable which will be discussed later. Table 3.2 gives a description of the variables used in my study.

Table 3.2. Variable Descriptions

Variable	Description	Source
Ln_airfare	Calculated by dividing the ticket price by the market miles flown (e.g.: if a customer pays $98.00 for the 500-mile segment above, the yield would be 19.6 cents per mile).	DB1B Database
Bankruptcy	Dummy variable. Bankruptcy = 1 if an airline is under Chapter 11 bankruptcy protection, and Bankruptcy =0 otherwise.	UCLA-LoPucki Bankruptcy Research Database
Labor productivity	Log of total average seat miles produced per dollar of employee compensation.	MIT Global Airline Industry Program
Ln_passengers	Log of number of passengers.	DB1B Database

Table 3.2. Variable Descriptions (continued)

Variable	Description	Source
Ln_mktdistance	Log of nonstop distance in miles between endpoint airports of route *j*.	DB1B Database
Ln_mktdissq	Square of Ln_mktdistance.	DB1B Database
Ln_mktshare	Share of total passengers originating from route *j* operated by carrier *i* in for each quarter of the year.	T-100
Ln_HHI	Log sum of squares of each firm's market share based on the origin airport.	T-100
Hub	Dummy variable indicating whether either the origin or destination of route *j* is a hub airport of carrier *i*.	U.S.D.O.T Air Traffic Hubs 2012
Touristdest	The ratio of total accommodation earnings to total non-farm earnings in the metropolitan area of the destination airports.	BEA
Touristori	The ratio of total accommodation earnings to total non-farm earnings in the metropolitan area of the origin airports.	BEA

In Borenstein and Rose (1995), only legacy airlines were used to identify the relationship between bankruptcy and pricing behavior. I included all the major carriers such as network carriers, LCCs and regional carriers in my sample to avoid bias and to make it easier to draw generalizations to the industry as a whole. Table 3.3 presents the summary statistics which describe the basic features of the data in the study.

Table 3.3. Summary Statistics (n = 23,363,904)

Variable	(i) Mean	(ii) Std. Dev.	(iii) Min	(iv) Max
Ln_airfare	-1.987	-1.032	-9.202	4.255
Bankruptcy	0.081	0.273	0	1
Ln_passengers	0.345	0.734	0	8.314
Ln_mktdistance	7.008	0.642	2.398	9.215
Ln_mktdissq	49.524	8.779	5.750	84.909
Ln_mktshare	-1.329	1.292	-12.353	0.000
Ln_HHI	7.331	2.313	-6.782	10.479
Hub	0.517	0.500	0	1
Touristori	0.012	0.028	0.001	0.266
Touristdest	0.012	0.027	0.001	0.266
American Airlines	0.129	0.335	0	1
Jet Blue Airlines	0.020	0.141	0	1
Continental Airlines	0.088	0.283	0	1
Delta Air Lines	0.259	0.438	0	1
Frontier Airlines	0.011	0.106	0	1
Hawaiian Airlines	0.002	0.050	0	1
America West Airlines	0.018	0.132	0	1
Northwest Airlines	0.117	0.321	0	1
United Airlines	0.073	0.260	0	1
US Airways	0.067	0.251	0	1
Southwest Airlines	0.209	0.406	0	1
Labor productivity	3.283	0.182	2.878	3.936

A total of more than 24 million observations was used in our research. Individual level airfare data obtained from DB1B were matched with the data from T-100, the BEA and the MIT Global Airline Industry Program in order to create the final sample data for my research.

Figures 3.1-3.6 display the annual average airfares of each bankrupt airlines from 2001 to 2012. These airfares were obtained from the MIT Global Airline Industry Program. In Figure 3.1, one can clearly see that the average airfare of US Airways was lower at the time of the

airline's Chapter 11 bankruptcies. When the firm emerged from its bankruptcy protection in 2005, a drastic increase of airfare was observed.

In Figures 3.2 and 3.3, Hawaiian and United Airlines also appeared to have lowered average airfares when the firms were in bankruptcy; their airfares rose gradually as they emerged from bankruptcy protection. The average airfares of American, Northwest and Delta Air Lines seemed to be rise very slowly during and post-bankruptcy. It has become difficult to predict how airlines would control their airfares when facing bankruptcy without properly controlling for other market factors.

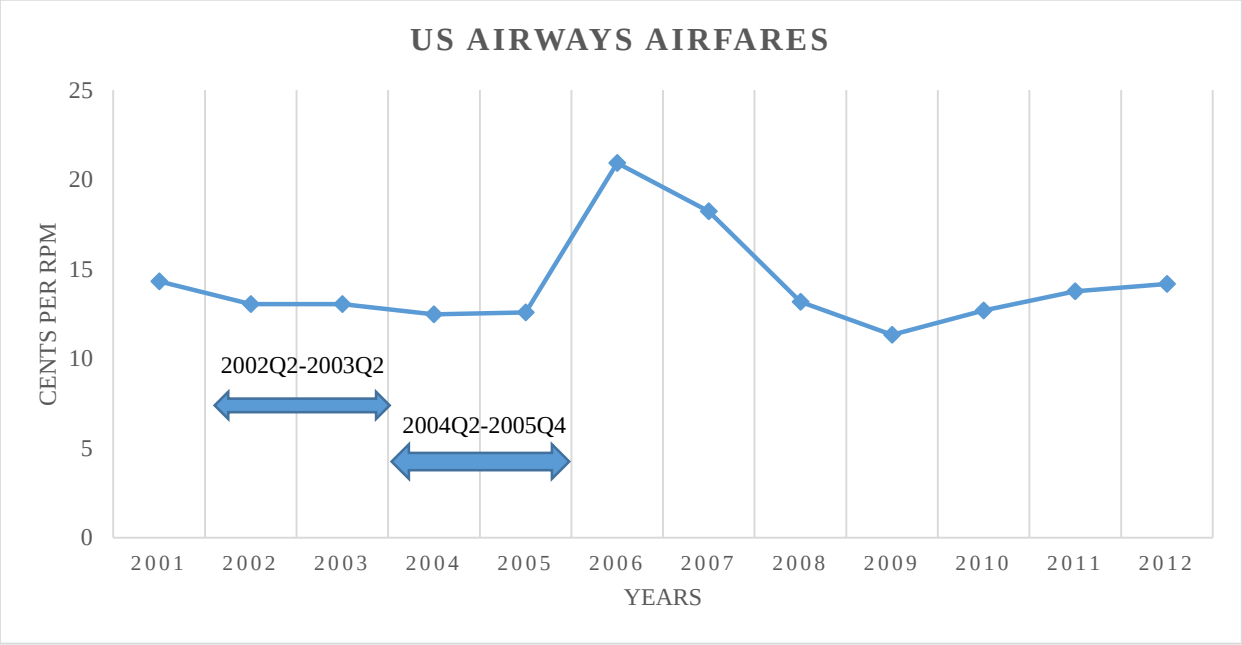

Figure 3.1. US Airways Airfares

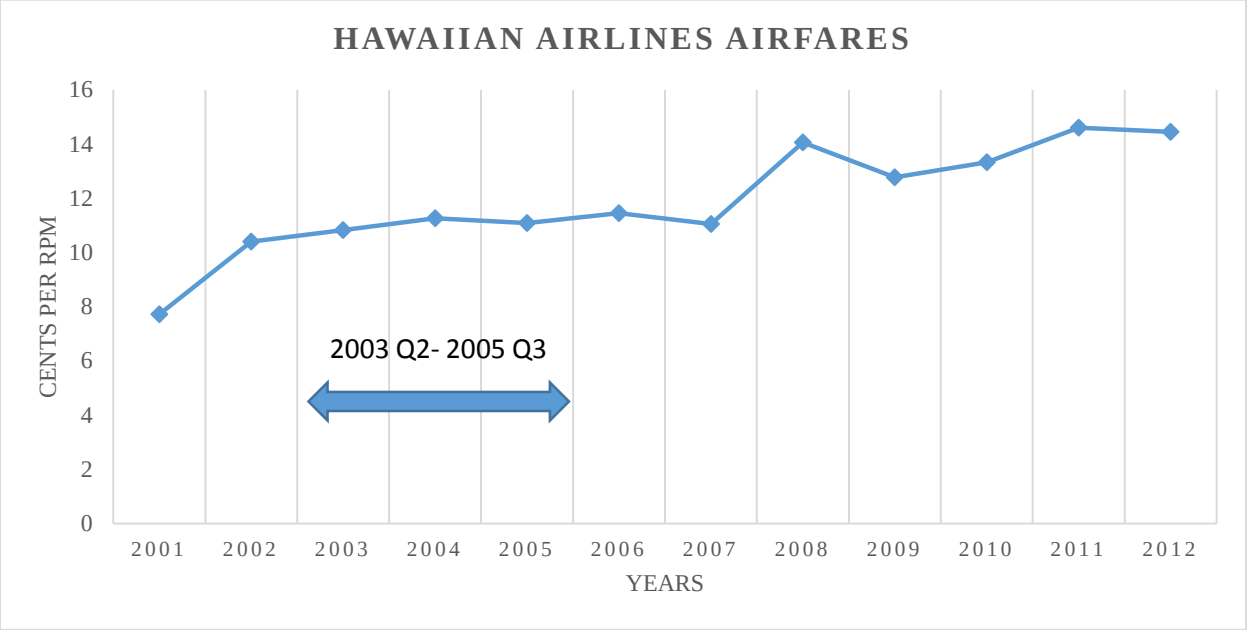

Figure 3.2. Hawaiian Airlines Airfares

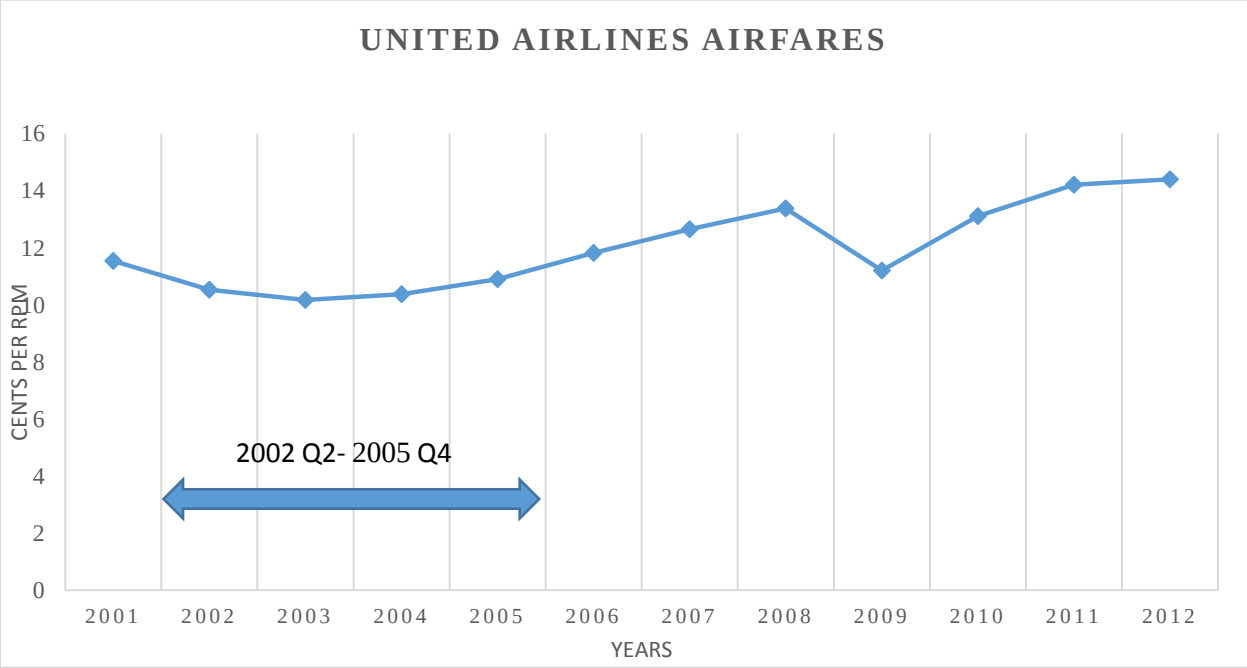

Figure 3.3. United Airlines Airfares

Figure 3.4. Northwest Airlines Airfares

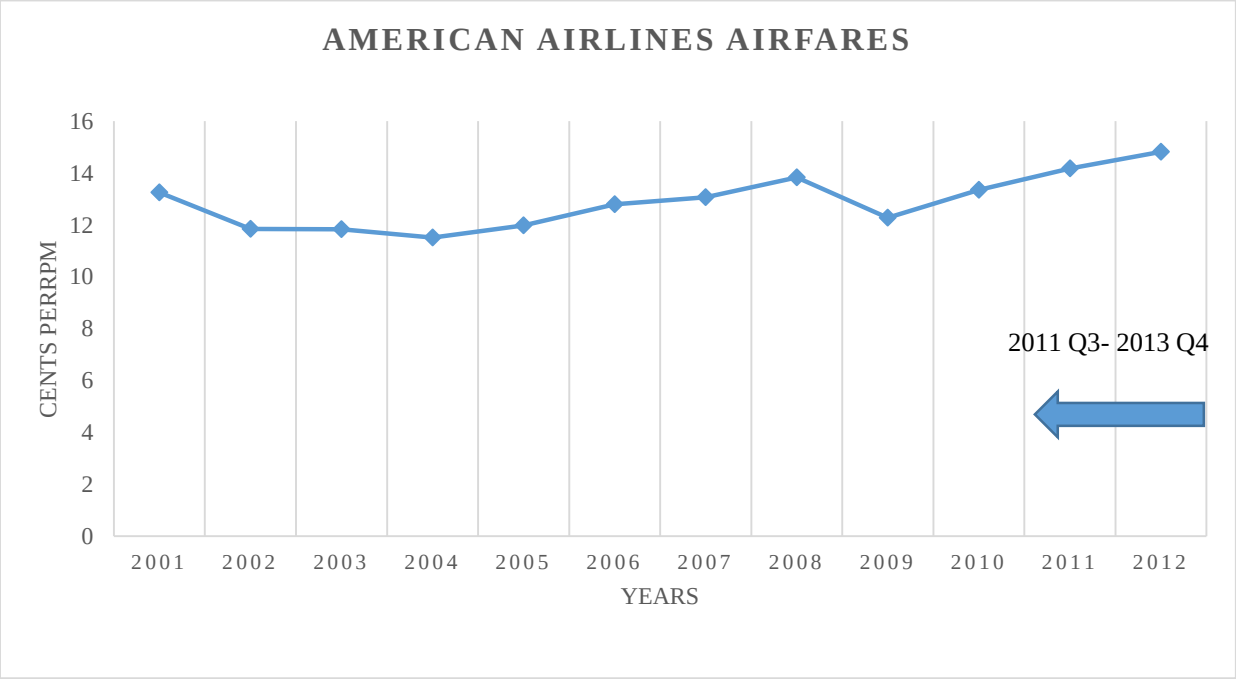

Figure 3.5. American Airlines Airfares

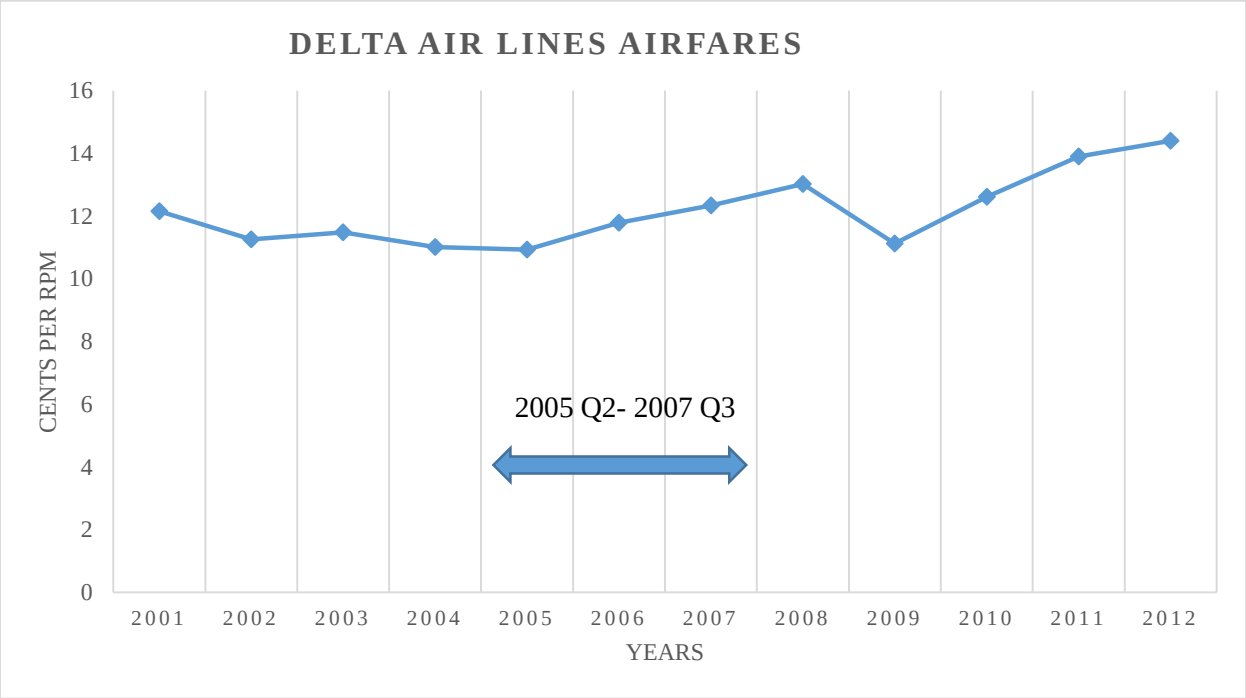

Figure 3.6. Delta Air Lines Airfares

4. EMPIRICAL MODEL SPECIFICATION

The objective of my study is to determine the effect of bankruptcy on airfares in the U.S. domestic airline industry. Eleven major airlines including legacy carriers, network carriers and LCCs have been included in the sample. I considered seven major bankruptcy filings of six U.S. airlines to determine how the airfares changed in times of bankruptcy filings.

Since Chapter 11 bankruptcy reorganization and restructuring allows the bankrupt firms to negotiate contracts and reduce costs, which in turn enables the firms to lower their output prices (Barla and Koo, 1999; Hofer et al, 2005). Assuming cost-minimizing behavior, the cost function of a carrier can be given by $C(w, r, y \mid bankruptcy)$, where p is the output price, y is the output produced, C is cost which is a function of input prices (w and r) and output given by the bankruptcy status of a firm. Thus, for carrier i, $C_i(w, r, y \mid bankruptcy = 1) < C_i(w, r, y \mid bankruptcy = 0)$. If the product market is competitive or has a very large price elasticity of demand, the ability to lower marginal cost of production will give firms a competitive edge over their rivals.

I developed a hedonic price model to identify the determinants of airfares. The hedonic price model enables me to describe the equilibrium relationships between airfares and characteristics of airlines and services (Nesheim, 2008). A hedonic pricing model is a useful tool for exploring product differentiation and price discrimination in the deregulated U.S. airline industry (Schwieterman, 1995). In light of the potential effect of bankruptcy on airfares,
The hedonic price model is given below:

$$\text{Ln\_}(airfare) = \beta_0 + \beta_1 Bankruptcy_i + \sum_k \beta_k X_{ij,k} + \sum_i \delta_i\, Carrier_i + \sum_{q=2}^{4} \theta_q\, Qtr_q + \tau\, Year + \varepsilon. \quad (1)$$

In equation (1), Ln_($airfare$) is a function of airline *i*'s bankruptcy status, a vector of route and market characteristics ($X_{ij,k}$), an annual trend as well as quarterly dummies. The route and market characteristic variables include the number of passengers, market distance between two endpoints, the square of market distance, market share of each individual airline at the origin airport, HHI of each origin airport, origin or destination airport being a hub for an airline, and the ratio of total accommodation earnings to total non-farm earnings in the metropolitan area of the origin and destination airports. The model in (1) also controls for carrier-specific effects.

The dependent variable in model (1) is Ln_($airfare$) which is the logarithm of market fare divided by the market miles flown. It covers coach-class tickets offered by carriers in the U.S. domestic markets, but does not include passengers flying on free tickets (such as employees or frequent flier program awards).

An airline *i*'s bankruptcy status is the major component I considered in this research. Out of the eleven airlines in the selected sample, there were seven Chapter 11 bankruptcies filed by six airlines between the years 2001 and 2012. These include:

Table 4.1. Major Airline Bankruptcies, 2001-2012

Bankrupt Airlines	Year and quarter of Bankruptcy	Year and quarter emerged from Bankruptcy
US Airways	2002 Q2	2003 Q2
US Airways	2004 Q2	2005 Q4
United Airlines	2002 Q2	2005 Q4
Hawaiian Airlines	2003 Q2	2005 Q3
Delta Air Lines	2005 Q2	2007Q3
Northwest Airlines	2005 Q2	2007Q3
American Airlines	2011Q3	2013 Q4

Source: UCLA-LoPucki Bankruptcy Research Database

Borenstein (1994) concludes that increasing passenger volumes lead to higher load factors so the per-passenger cost of flight declines, thus lowering airfares. Thus, the number of passengers is expected to have a negative effect on airfares (Zhang et al., 2013).

The average market distance for a flight from its origin to destination airports is expected to have a positive and significant relationship with average airfares. Generally, passengers that fly longer distances pay higher airfares (Wittman and Swelbar, 2013). According to Wittman and Swelbar (2013), this relationship has remained essentially unchanged over the past decade. As distance increases, average fares can be expected to rise since carriers' operating costs including fuel, in-flight service and labor wages will increase (Borenstein, 1990; Dresner et al., 1996). Both market distance and market distance squared were used in my study specifically to allow the effect of distance to vary with the distance travelled. The expected sign for market distance is positive.

Market share and HHI are market characteristics variables in this study. Market share is introduced to see the effect of airline market power on airfares, and HHI controls for the effect of market concentration on airfares. Since Graham et al., (1983) suggest using the number of flights or the number of passengers as a basis for market concentration calculations, DB1B and T-100 data on the number of passengers travelled are used to calculate the market share which gives an airline's market power and HHI. The HHI is calculated by summing the squares of the individual market shares of all the airlines at the origin airports. Borenstein (1990) finds a statistically significant effect of market share on airfare, although Evans and Kessides (1993) conclude that airfares are not correlated with market share.

Borenstein (1990) shows that while hub-and-spoke is an efficient operating system for airlines in terms of the number of different markets the airlines can serve, it becomes detrimental

for consumers because airlines are shielded from competition when they have a monopoly at their hub airports. His research concludes that when an airline has a dominant position in an airport (generally at a hub), that airline will charge higher fares than the rest of its system.

Biegera and Wittmer (2006) suggest that developments in tourism, especially new forms of tourism and new destinations, also affect air transport by influencing demand. To analyze the impact of tourism on airfares, I include tourism at origin and destination airports as possible airfare determinants. Additionally, quarterly dummies are introduced to control for seasonal airfare fluctuations relative to the first quarter. Model (1) also controls for carrier specific effects.

4.1. The Issue of Endogeneity

Equation (1) assumes that an airline's bankruptcy status affects its airfares. While the specification in (1) is straight forward and can be estimated using ordinary least squares (OLS), it suffers from the potential problem of endogeneity given that the causal relationship between airfares and bankruptcy could be reversed, meaning low airfares could also be a causal factor of bankruptcy.

If equation (1) suffers from the endogeneity problem due to the reversed causality effect of bankruptcy and airfares; it violates the zero conditional mean condition for OLS estimator to be valid. When the zero conditional mean condition is violated, the OLS is no longer the best linear unbiased estimator (BLUE). When one or more of the explanatory variables is correlated with the error term ε, have both $E(\varepsilon | x_i) \neq 0$ and $E(x_i \varepsilon) \neq 0$, so the OLS estimator will be biased and inconsistent (Wooldridge, 2009).

To address the potential problem of endogeneity, I instrument for bankruptcy. The selected instrument should satisfy two requirements. The first is the "instrument exogeneity" criterion which requires the selected instrument to have no partial effect on airfares Borenstein

(1994) concludes that increasing passenger volumes lead to higher load factors so the per-passenger cost of flight declines, thus lowering airfares.

The second requirement is "instrument relevance," which means that the instrument must be correlated, either positively or negatively, with the endogenous explanatory variable, bankruptcy (Wooldridge, 2009). Many factors can be considered as potential instruments for bankruptcy which must satisfy both instrument relevance and instrument exogeneity. Bellovary et al. (2007) lay out a list of bankruptcy predicting variables through his study. The variables I select include Z-scores, cash flows and labor productivity.

Finally as a robustness check, I break down the sample by airline and regress the airfares of each bankrupt airline on the market and route characteristics. This allows me to observe the effect of bankruptcy by airline, since such effect may not be constant for all bankrupt airlines.

5. RESULTS AND DISCUSSION

This chapter provides the results from the econometric model in Chapter 4. I estimated the bankruptcy effect on airfares using the sample of air tickets of eleven major airlines and six bankruptcy filings between the years 2001 and 2012. Table 5.1 reports the estimates of the regression model specified in equation (1). The first column reports the coefficients from the OLS estimation, and column two reports the results of the 2SLS estimation.

For the OLS model, I obtained a negative and significant coefficient on bankruptcy which indicates that airfares are approximately 4% lower for airlines under Chapter 11 bankruptcy protection. The negative effect of bankruptcy on airfares could indicate a strategic pricing decision by the bankrupt airlines. Barla and Koo (1999) suggest that a bankrupt airline is able to lower its operating costs and that these cost reductions are partially translated into lower airfares. The result also agrees with the finding by Hofer et al. (2005) which shows that after the declaration of bankruptcy, airfares were lower by 5.3% than fares charged prior to the filing of bankruptcy protection. Nevertheless, the result contradicts Borenstein and Rose's finding (1995) in which they conclude that bankrupt airlines have only lowered their airfares modestly before entering Chapter 11, with an average decline of about 5.5%, but they do not lower airfares in the bankruptcy phase.

The coefficient estimate on the number of passengers travelled is negative as expected. This is consistent with the conclusions of Zhang et al., (2013) which indicate that increasing passenger volumes lead to higher load factors by which the per-passenger cost of the flight declines, thus lowering the airfares (Borenstein and Rose, 1995).

Market distance has a significant coefficient with the expected positive sign suggesting that longer flight distance leads to higher airfares. This may be due to increase in operating costs including fuel, in-flight service and labor wages (Borenstein, 1989; Dresner et al., 1996).

Market share at origin airports shows airport dominance by a carrier (Evans and Kessides, 1993). They find that increase of an airline's market power (market share) has a positive significant effect on its airfares. The result in Table 5.1 agrees with those of Evans and Kessides (1993) and Borenstein (1990). I calculated the market share based on airport level data following Evans and Kessides (1993). Borenstein (1990) finds that route market share are a better predictor of ticket price than airport market share.

Market concentration is expected to positively affect airfares (Borenstein, 1992, Morrison and Winston, 1990). However the coefficient on Ln_HHI in Table 5.1 shows that the lower the market concentration at an origin airport (an increase in carrier's HHI), the lower the airfares will be. This is consistant with an earlier finding by Stavins (2001); she studied the effects of market concentraton and found a similar result.

The hub-and-spoke system became the norm for most major airlines after the U.S. government deregulated the airlines in 1978. It was used to reduce carrier's operating cost and give passengers better routes to destinations (GAO, 2014). Past research shows how hub dominance by one or two carriers leads to higher fares (Borenstein, 1990). The significant positive coefficient predicts that a hub airport tends to have higher airfares (by approximately 5%).

The European Travel Commission (ETC) in its 2005 report recognized airfares as the main drivers of growth in travel and tourism demand for countries and states (ETC, 2005). From the results obtained in my research, both the Touristori and Touristdest variables have negative

significant coefficients which suggest that if an airline is flying into or from a tourist destination, it tends to charge lower airfares. Gerardi and Shapiro (2009) produce similar results confirming that airfares are negatively correlated with tourist destinations.

According to the U.S.D.O.T. (2006), LCCs have been able to offer much lower fares that they have created new markets that network carriers could never capture. Jet Blue Airlines, Frontier Airlines and Southwest Airlines are the LCCs' in my sample. These LCCs' have a negative significant coefficiant in the regression results. Of the three LCC's, Southwest Airlines is considered the largest LCC in the U.S. Its airfares are approximately 32.6% lower than American Airlines', *ceteris paribus*. This result suggests that when compared to legacy carriers, the LCCs have been able to maintain comparatively lower airfares throughout the years of 2001-2012.

Table 5.1. Regression Results (Dependent variable: Ln_(*airfare*))

	(i)	(ii)
	OLS	2SLS
Intercept	-13.159***	-12.913***
	(0.116)	(0.120)
Bankruptcy	-0.040***	-0.042***
	(0.000)	(0.002)
Ln_passengers	-0.103***	-0.103***
	(0.000)	(0.000)
Ln_mktdistance	0.346***	0.348***
	(0.006)	(0.006)
Ln_mktdissq	-0.082***	-0.082***
	(0.000)	(0.000)
Ln_mktshare	0.038***	0.039***
	(0.000)	(0.000)
Ln_HHI	-0.004***	-0.004***
	(0.000)	(0.000)
Hub	0.051***	0.052***
	(0.000)	(0.000)
Touristdest	-0.448***	-0.447***
	(0.007)	(0.007)

Table 5.1. Regression Results (Dependent variable: Ln_(*airfare*)) (continued)

	(i)	(ii)
Touristori	-0.103***	-0.100***
	(0.007)	(0.007)
Jet Blue Airlines	-0.119***	-0.119***
	(0.001)	(0.001)
Continental Airlines	0.180***	0.182***
	(0.001)	(0.001)
Delta Air Lines	-0.164***	-0.163***
	(0.001)	(0.001)
Frontier Airlines	-0.045***	-0.043***
	(0.001)	(0.001)
Hawaiian Airlines	0.402***	0.403***
	(0.003)	(0.003)
America West Airlines	-0.132***	-0.140***
	(0.001)	(0.001)
Northwest Airlines	-0.055***	-0.053***
	(0.001)	(0.001)
United Airlines	-0.031***	-0.030***
	(0.001)	(0.001)
US Airways	-0.122***	-0.120***
	(0.001)	(0.001)
Southwest Airlines	-0.326***	-0.325***
	(0.001)	(0.001)
Year	0.007***	0.006***
	(0.000)	(0.000)
2.quarter	-0.009***	-0.010***
	(0.001)	(0.001)
3.quarter	-0.006***	-0.007***
	(0.001)	(0.001)
4.quarter	-0.029***	-0.029***
	(0.001)	(0.001)
N	23363904	23363904
R-Squared	0.234	0.234
F(23, 23,363,880)	.	
Prob > F	0.0000	
Wald chi2(23)		6.20E+06
Prob > chi2		0.0000

Robust standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

The Breusch-Pagan test was carried out according to Wooldridge (2009) to see if the model had heteroskedasticity. Results suggested that the model did not satisfy the homoskedasticity condition. Since the estimators of the variances are biased without homoskedasticity, the OLS standard errors, which are based directly on these variances, were no longer valid for constructing confidence intervals and t statistics. Robust standard erors were used to address this issue of heteroskedasticity.

There were potential endogeneity concerns associated with the bankruptcy variable in equation (1), since lower airfares might lead to bankruptcy filings of firms. If endogeneity prevailed in the model, the OLS result would be invalid because the error term and the explanatory variables become correlated, resulting OLS estimates being biased and inconsistent. As a solution to the potential endogeneity problem, a number of instrumental variables (IV) were considered.

Following Wooldridge (2009), I tried to identify an instrumental variable (IV) which would satisfy the two conditions of instrument exogeneity and instrument relevance. The instruments first considered included the Z-scores, airline's cash flows, financial ratios and labor productivity measures. Bellovary et al. (2007) review bankruptcy prediction studies in which they suggest that one of the best bankruptcy prediction models was Altmans' Z-score (1968). Although the Z-score showed instrument relavance in my study, it failed the instrument exogeneity criterion.

Another bankruptcy prediction variable according to Bellovary et al. (2007) was cash flows. Data obtained from the MIT Global Airline Industry Program was used for this. Net cash provided by (used in) operating activities, net cash provided by (used in) operating activities, net cash provided by (used in) investing activities, net cash provided by (used in) financing activities

and net increase (decrease) in cash were some of the cash flow variables considered as potential IVs' for bankruptcy. They too failed the instrument exogeneity requirement.

According to Beaver (1966), net income to total debt had the highest predictive ability of bankruptcy. I used financial ratios such as working capital (current assets - current liabilities), external financing index ratio (cash flow from financing/cash flow from operations) and current ratio or liquidity ratio (current assets/current liabilities) as well as net income and pre-tax income as potential IVs. All of these factors are instrument relevant but fail to be instrument exogenous.

Finally, I consider labor productivity as a potential IV. It is measured by total available seat miles (ASMs) produced per dollar of employee compensation. This variable satisfies both instrument exogeneity and instrument relevance and is therefore a valid IV for bankruptcy. Table 5.2 displays the instrument relavance of the IV selected for the bankruptcy variable.

In the table, labor productivity has a significant coefficient when included in the regression for equation (1). Bryan et al. (2013) find that higher productivity leads to lower bankruptcy risk. However, when airlines undergo Chapter 11 bankruptcy reorganization and restructuring, they have the ability to renegotiate labor contracts and reduce employee compensation (Barla and Koo, 1999; Ciliberto and Schenone, 2012). Holloway (2008) observes that output produced by bankrupt carriers does not seem to decrease. He views Chapter 11 bankruptcy protection as an "exit barrier" in the industry that deters new entrants. He finds that in 2005, nearly half of the ASMs in the U.S. domestic markets were produced by carriers in or recently out of Chapter 11 bankruptcy.

Thus, if carriers' ASMs remain stable while employee compensation drops, the labor productivity measure is expected to be larger for bankrupt airlines. As a result, the coefficient on labor productivity could have a positive sign. This means that while higher productivity lowers

the risk of bankruptcy, ASMs per dollar of employee compensation could be positively associated with bankruptcy status because of cost restructuring.

Table 5.2. Instrument Relevance

Stage 1 Regression (Dependent Variable: Bankruptcy)	
	(i)
Intercept	20.081
	(0.023)
Ln_passengers	-0.005***
	(0.000)
Ln_mktdistance	-0.008***
	(0.001)
Ln_mktdissq	0.002***
	(0.000)
Ln_mktshare	0.005***
	(0.000)
Ln_HHI	0.007***
	(0.000)
Hub	-0.014***
	0.000
Touristdest	-0.101***
	(0.002)
Touristori	-0.081***
	(0.002)
Labor productivity	0.701***
	(0.001)
N	23,363,904
R-squared	0.2129
F	134,082.11
Prob > F	0

+Year, quarterly dummies and airline dummy variables considered but not reported here
Robust standard errors in parentheses
* p<0.05, ** p<0.01, *** p<0.001

In Table 5.3, instrument exogeneity is evident by labor productivity variable becoming insignificant when included in equation (1).

Table 5.3. Instrument Exogeneity

Instrument Exogeneity (Dependent Variable: Ln_(airfare))	
	(i) ln_*airfare*
Intercept	-12.952***
	(0.119)
Bankruptcy	-0.040***
	(0.001)
Labor Productivity	-0.001
	(0.002)
Ln_passengers	-0.103***
	(0.000)
Ln_mktdistance	0.348***
	(0.006)
Ln_mktdissq	-0.082***
	(0.000)
Ln_mktshare	0.039***
	(0.000)
Ln_HHI	-0.004***
	(0.000)
Hub	0.052***
	(0.000)
Touristdest	-0.446***
	(0.007)
Touristori	-0.100***
	(0.007)
N	23363904
R-squared	0.234
F(24,23363879)	.
Prob > F	0

+Year, quarterly dummies and airline dummy variables considered but not reported here
Robust standard errors in parentheses

* p<0.05, ** p<0.01, *** p<0.001

According to Wooldridge (2009), when having a valid instrumental variable, I can test whether an explanatory variable is endogenous. The 2SLS estimator is less efficient than OLS when the explanatory variables are exogenous; and the 2SLS estimates can have very large standard errors. Therefore, it is useful to have a test for endogeneity of an explanatory variable (bankruptcy) that shows whether 2SLS is even necessary.

I applied the endogeneity test suggested by Wooldridge (2009). First, I estimated the reduced form equation of bankruptcy by regressing it on all exogenous variables including the IV, labor productivity. The residuals, $\hat{V}$ was obtained. Secondly $\hat{V}$ was included to the structural equation (which also includes bankruptcy) and test for the significance of $\hat{V}$ using an OLS regression with robust standard errors. If the coefficient on $\hat{V}$ is statistically different from zero, I can conclude that bankruptcy is indeed endogenous. The results obtained from the endogeneity test is given by Table 5.4.

Table 5.4. Tests of Endogeneity

Ho: variables are exogenous
Robust score chi2(1) = .644 (p = 0.422)
Robust regression F(1,23363879) = .644 (p = 0.422)

According to Table 5.4, the test fails to reject the null hypothesis that bankruptcy is exogenous at conventional significance levels (p = 0.422). Hence, I conclude that there is insufficient evidence of endogeneity in the model, and the OLS results are valid.

Finally as a robustness check, I estimate the same equation by bankrupt airlines between 2001 and 2012. Out of the six airlines which filed for Chapter 11 bankruptcy protection, only Northwest Airlines seemed to have increased its airfares by approximately 4% after going bankrupt. The rest of the airlines have reduced their airfares at the time of bankruptcy filing. United Airlines and Hawaiian Airlines have reduced their airfares by approximately 16.4 % and 18.9% respectively after filing for Chapter 11. The bankruptcy variable for all airlines, except for Delta Air Lines, are significant at the 1% significance level. Table 5.5 displays the results of the bankrupt airlines regressions.

Table 5.5. OLS Outputs of Bankrupt Airlines

	(i) US Airways	(ii) United Airlines	(iii) Delta Air Lines	(iv) American Airlines	(v) Northwest Airlines	(vi) Hawaiian Airlines
	Ln_*airfare*	Ln_*airfare*	Ln_*airfare*	Ln_*airfare*	Ln_*airfare*	Ln_*airfare*
Intercept	-19.13***	-0.546	6.130***	-6.610***	-15.36***	-10.09**
	(0.452)	(0.573)	(0.232)	(0.114)	(0.535)	(3.398)
Bankruptcy	-0.0696***	-0.164***	0.00120	-0.0413***	0.0426***	-0.189***
	(0.002)	(0.003)	(0.001)	(0.001)	(0.002)	(0.012)
Ln_passengers	-0.101***	-0.118***	-0.0914***	-0.101***	-0.121***	-0.291***
	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.007)
Ln_mktdistance	-1.326***	-0.148***	0.621***	0.190***	-0.721***	0.0840
	(0.022)	(0.020)	(0.011)	(0.006)	(0.018)	(0.471)
Ln_mktdissq	0.0365***	-0.0390***	-0.0995***	-0.0686***	-0.0184***	-0.0495
	(0.002)	(0.001)	(0.001)	(0.000)	(0.001)	(0.035)
Ln_mktshare	0.0086***	0.0419***	0.0218***	0.00997***	0.0435***	0.0373***
	(0.009)	(0.001)	(0.000)	(0.000)	(0.000)	(0.006)
Ln_HHI	0.0122***	0.0455***	-0.00678***	-0.0118***	-0.00587***	0.00448
	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.004)
Hub	0.109***	-0.0171***	0.134***	0.0525***	0.00339**	0.0312***
	(0.001)	(0.002)	(0.001)	(0.000)	(0.001)	(0.007)
Touristdest	-0.968***	-1.227***	-1.312***	-0.494***	-0.570***	0.315*
	(0.036)	(0.027)	(0.017)	(0.007)	(0.024)	(0.134)
Touristori	-0.577***	-0.718***	-0.548***	-0.279***	0.0610*	-0.212
	(0.031)	(0.024)	(0.016)	(0.006)	(0.024)	(0.123)
Year	0.0122***	0.000677*	-0.00374***	0.00340***	0.00974***	0.00517***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)
2.quarter	0.0315***	0.165***	-0.0420***	0.0159***	-0.00234	0.0379***
	(0.312)	(0.003)	(0.001)	(0.001)	(0.002)	(0.0)
3.quarter	0.0382***	0.0855***	-0.0426***	-0.0329***	0.0180***	0.0136
	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.009)
4.quarter	-0.0825***	0.0141***	-0.0765***	0.000463	0.0226***	0.0530***
	(0.082)	(0.002)	(0.001)	(0.001)	(0.002)	(0.010)
N	1,521,028	1,607,464	6,122,388	2,391,345	2,787,085	63,313
R-squared	0.302	0.214	0.217	0.218	0.289	0.090
F	41,105.96	30,783.00	.	.	83,866.62	256.41
Prob > F	0.000	0.000	0.000	0.000	0.000	0.000

Robust standard errors in parentheses & "* p<0.05, ** p<0.01, *** p<0.001"

6. CONCLUSIONS

In this study, a cross sectional analysis was performed to examine the effect of Chapter 11 bankruptcy restructuring on airfares in the U.S. domestic airline industry. Using data on domestic, direct, coach-class airfares from DB1B and T-100 databases, I develop a hedonic pricing model to study the relationship between airfares and bankruptcy. The model was estimated using the OLS and 2SLS methods. Endogeneity test confirmed that the model was exogenous thus making the OLS results valid. Finally as a robustness check, I broke down the sample by airline and regressed the airfare of each bankrupt airline on the market and route characteristics.

The main result of the hedonic price model is that, airfares charged by a bankrupt airline are approximately 4% lower than airfares of other airlines that are not in bankruptcy, *ceteris paribus,* although larger fare reductions were observed when examining individual bankrupt airlines. For example, my results show that US Airways and Hawaiian Airlines reduced their airfares by approximately 16 percent and 19 percent respectively during bankruptcy. However Northwest Airline is the only exception with an increased airfare at the time of bankruptcy. The strong negative correlation of bankruptcy and airfares suggests the possibility that airlines might have taken advantage of Chapter 11 bankruptcy protection as a strategy to slash airfares or to undercut rivals' prices.

Furthermore, the results indicate that the LCCs included in our sample have lower airfares when compared to the legacy airlines. For example Southwest Airlines, which is considered as a major LCC in the U.S., had approximately 33% lower airfares when compared to the legacy carrier, American Airlines. This suggests a high degree of price competition in the industry.

Also, it is evident that airlines will charge higher airfares at their hub airports compared to their non-hub airports. Airlines flying to a tourist destination tend to have approximately 44% lower airfares while airlines flying from a tourist destination will have approximately 10% lower airfares.

Borenstein and Rose (1995) used only four legacy airlines for their study. Using more data, I have included 11 airlines representing legacy carriers, network carriers and LCCs. When compared to Barla and Koo (1999) who only used data for the second quarter of each year to analyze the effect of bankruptcy on pricing strategies, I have extended this by including all the four quarters of the year.

A major shortcoming in this study is that I was not able to find a suitable IV at the individual airline level that satisfies both instrument relevance and instrument exogeneity. Airfares prior to the filing of bankruptcy and airfare fluctuations post carrier's bankruptcy were not considered in this research. Also, rival's pricing strategies in response to an airline's bankruptcy were not considered in this study.

REFERENCES

ACI. 2013. “Airports Council International Annual Report.” http://Downloads/ACI%20Annual%20Report_2013_final_low_res.pdf

Altman, Edward I., Robert Haldeman, and P. Narayanan. 1977. "Zeta Analysis: A New Model to Identify Bankruptcy Risk of Corporations." *Journal of Banking and Finance* 1 (1): 29-54.

Altman, Edward I. 1968. "Financial Ratios, Discriminant Analysis and the Prediction of Corporate." *Journal of Finance* 23(4): 589-609.

AMR Corporation. 2012. "FORM 10-K for the fiscal year ended December 31, 2011." http://www.sec.gov/Archives/edgar/data/6201/000119312512063516/d259681d10k.htm. (accessed January, 12 2015)

Anderson, William P., Gang Gong, and T. R. Lakshmanan. 2005. "Competition in a Deregulated Market for Air Travel." *Research in Transportation Economics* 13(1): 3-25.

Bailey, Elizabeth E., and John C. Panzar. 1981. "The Contestability of Airline Markets during the Transition to Deregulation." *Law and Contemporary Problems* 44(1): 125-145.

Bamber, Greg J., Jody Hoffer Gittell, Thomas A. Kochan, and Andrew von Nordenflycht. 2009. *Up in the Air: How Airlines Can Improve Performance by Engaging Their Employees.* Cornell: ILR Cornell University Press.

BankruptcyData.Com. 2014. http://www.bankruptcydata.com/default.asp. (accessed January, 15 2015)

Barla, Philippe, and Bonchun Koo. 1999. "Bankruptcy Protection and Pricing strategies in the US airline industry." *Transportation Research Part E* 35(2): 101-120.

Baumol, William J. 1982. "Contestable Markets: An Uprising in the Theory of Industry Structure." *American Economic Review* 72(1): 1-15.

Beaver, W. 1966. "Financial ratios as predictors of failure." *Journal of Accounting Research* 5: 71-111.

Bellovary, Jodi, Don Giacomino, and Michael Akers. 2007. "A Review of Bankruptcy Prediction Studies: 1930-Present." *Journal of Financial Education* 33(1). 1-42.

Belobaba, Peter P., Amedeo Odoni, and Cynthia Barnhart. 2009. *Fundamentals of Pricing Revenue Management.* New York: John Wiley & Sons.

Biegera, Thomas, and Andreas Wittmer. 2006. "Air Transport and Tourism: Perspectives and Challenges for Destinations, Airlines and Governments." *Journal of Air Transport Management* 12(1): 40-46.

Bilotkach, Volodymyr, Xavier Fageda, and Ricardo Flores-Fillol. 2013. "Airline Consolidation and the Distribution of Traffic between Primary and Secondary Hubs." *Regional Science and Urban Economics* 43(6): 951-963.

Borenstein, Severin. 1985. "Price Discrimination in Free-Entry Markets." *Rand Journal of Economics* 16(3): 380-397.

Borenstein, Severin. 1990. "Airline Mergers, Airport Dominance, and Market Power." *The American Economic Review* 80(2): 400-404.

Borenstein, Severin. 1992. "The Evolution of U.S. Airline Competition." *Journal of Economic Perspectives* 6(2): 45-73.

Borenstein, Severin. 2011. "Why Can't US Airlines Make Money?" *American Economic Review* 101(3): 233-237.

Borenstein, Severin, and Nancy L. Rose. 1994. "Competition and Price Dispersion in the U.S. Airline Industry." *Journal of Political Economy* 102(4): 653-683.

Borenstein, Severin, and Nancy L. Rose. 1995. "Bankruptcy and Pricing Behavior in U.S Airline Markets." *American Economic Review* 85(2): 397-402.

Brock, James W. 2009. *The Structure of American Industry.* Miami: Waveland press.

Bureau of Transportation Statistics. 2014. http://www.rita.dot.gov/bts/airfares. (accessed February, 20 2015)

Carlton, Dennis W., and Jeffrey M. Perloff. 2005. *Modern International Organization.* 4. Pearson-Addison: Wesley.

Chang, Yu-Hern, and Chung-Hsing Yeh. 2002. "A Survey Analysis of Service Quality for Domestic Airlines." *Europian Journal of Operational Research* 139(1): 166-177.

Chiuling, Lu, Ann Shawing Yang, and Jui-Feng Huang. 2014. "Bankruptcy Predictions for U.S. Air Carrier Operations: A Study of Financial Data." *Journal of Economics and Finance* 39: 574-589.

Ciliberto, Federico, and Carola Schenone. 2012. "Bankruptcy and Product-Market Competition:Evidence from the Airline Industry." *International Journal of Industrial Organization* 30(6): 564-577.

Cook, Gerald N., and Jeremy Goodwin. 2008. "Airline Networks: A Comparison of Hub-and-Spoke and Point-to-Point SystemsAirline Networks: A Comparison of Hub-and-Spoke and Point-to-Point Systems." *Journal of Aviation* 17(2): 51-60.

Daniel Bryan, Guy Dinesh Fernando, Arindam Tripathy, (2013) "Bankruptcy risk, productivity and firm strategy", *Review of Accounting and Finance*, 12(4): 309 – 326.

Delaney, Kevin J. 1989. "Power, Incorporate Networks, and 'Strategic Bankruptcy'." *Law and Society Review* 23(4): 643-666.

Delta Air Lines. 2006. "Form 10-K for the fiscal year ended December 31, 2005." http://www.annualreportowl.com/Delta%20Airlines/2005/Annual%20Report. (accessed February, 15 2015)

Dresner, Martin, Jiun-Sheng Chris Lin and Robert Windle. 1996. "The Impact of Low-Cost Carriers on Airport and Route Competition." *Journal of Transport Economics and Policy* 3(18): 309-328.

ETC. 2005. "European Tourism 2005: Trends and Prospects." European Travel Commission. http://www.etccorporate.org/page=report&report_id=18&subject=trends_watch&theme=reports (accessed August, 10 2015)

Evans, William N., and Ioannis Kessides. 1993. "Structure, Conduct and Performance in the Deregulated Airline Industry." *Southern Economic Journal* 59(3): 450-467.

Evans, William. N., and Ioannis N. Kessides. 1993. "Localized Market Power in the U.S. Airline Industry." *The Review of Economics and Statistics* 75(1): 66-75.

Fan, Terence, Laurence Vigeant-Langlois, Christine Geissler, Bjorn Bosler, and Jan Wilmking. 2001. "Evolution of Global Airline Strategic Alliance and Consolidation in the Twenty-First Century." *Journal of Air Transport Management* 7(6): 349-360.

Frontier Airlines. 2009. "FORM 10-K for the fiscal year ended December 31, 2008." http://www.annualreportowl.com/Frontier%20Airlines/2008/Annual%20Report. (accessed March, 5 2015)

GAO. 2003. "Airline Labor Relations: Information on Trends and Impact of Labor Actions." Report to the Chairman, Committee on Commerce, Science, and Transportation, U.S.

Senate, Washington, D.C: United States General Accounting Office." http://www.gao.gov/new.items/d03652.pdf. (accessed March, 5 2015)

GAO. 2004. "Commercial Aviation: Legacy Airlines Must Further Reduce Costs to Restore Profitability." United States Government Accountability Office. http://www.gao.gov/assets/250/243742.html. (accessed March, 5 2015)

GAO. 2006. "Airline Deregulation:Reregulating the Airline Industry Would Likely Reverse Consumer Benefits and Not Save Airline Pensions." Report to Congressional Committees, United States Government Accountability Office. http://www.gao.gov/products/GAO-06-630. (accessed March, 6 2015)

GAO. 2008. "Airline Industry- Potential Mergers and Acquisitions Driven by Financial and Competitive Pressures." United States Government Accountability Office. http://www.gao.gov/products/GAO-08-845. (accessed March, 6 2015)

GAO. 2013. "Airline Mergers." United States Government Accountability Office. http://www.gao.gov/products/GAO-13-403T. (accessed March, 7 2015)

GAO. 2014. "Airline Competition." Report to Congressional Requesters, Washington, DC: United States Government Accountability Office. http://www.gao.gov/products/GAO-14-515. (accessed March, 5 2015)

Gaynor, Martin, and John M. Trapani. 1994. "Quantity, Quality and the Welfare Effects of US Airline Deregulation." *Applied Economics* 26(5): 543-550.

Gerardi, Kristopher and Adam Shapiro. 2009. "Does Competition Reduce Price Dispersion? New Evidence from the Airline Industry." *Journal of Political Economy* 117(1): 1-37

Goetz, Andrew R. 2002. "Deregulation, Competition and Antitrust Implications in the US Airline Industry." *Journal of Transport Geography* 10(1): 1-19.

Goetz, Andrew R., and Christopher J. Sutton. 1997. "The Geography of Deregulation in the U.S. Airline Industry." *Annals of the Association of American Geographers* 87(2): 238.

Goetz, Andrew R., and Paul S. Dempsey. 1989. "Airline Deregulation Ten Years after: Something Foul in the Air." *Journal of Air Law and Commerce* 54(4): 926-963.

Goetz, Andrew R., and Timothy M. Vowles. 2009. "The Good, the Bad, and the Ugly: 30 years of US Airline Deregulation." *Journal of Transport Geography* 17(4): 251-263.

Graham, David R., Daniel P. Kaplan, and David S. Sibley. 1983. "Efficiency and Competition in the Airline Industry." *Bell Journal of Economics* 14(1): 118-138.

Gritta, Richard D. 1982. "Bankruptcy Risks Facing the Major U.S. Airlines." *Journal of Air Law & Commerce* 48(Fall): 89-107.

Gustafson, Matthew, Ivan T. Ivanov, and John Ritter. 2014. "Financial Condition and Product Market Corporation." http://www.federalreserve.gov/pubs/feds/2014/201463/201463pap.pdf. (accessed June, 23 2015)

Harteveldt, Henry H. 2012. "The Future Of Airline Distribution: A Look Ahead To 2017." A Special Report Commissioned by IATA, IATA.

Hirsch, Barry T., and David A. Macpherson. 2000. "Earnings, Rents, and Competition in the Airline Labor Market." *Journal of Labor Economics* 18(1): 125-155.

Hirsch, Barry. 2007. "Unions and Wages in the US Airline Industry." Texas: IATA Economics. http://www.iata.org/whatwedo/documents/economics/hirsch_unions_wages.pdf. (accessed February, 9 2015)

Hofer, Christian, Martin Dresner, and Robert Windle. 2005. "Financial Distress and US Airline Fares." *Journal of Transport Economics and Policy* 39(3): 323-340.

Hofer, Christian, Martin E. Dresner, and Robert Windle. 2009. "The Impact of Airline Financial Distress on US Air Fares." *Transportation Research Part E* 45(1): 238-249.

Holloway, Stephen. 2008. Straight and Level: Practical Airline Economics. 3rd edition. Aldershot: England.

Hüschelrath, Kai, and Kathrin Müller. 2011. "Low Cost Carriers and the Evolution of the US Airline Industry." *ZEW Discussion Paper No.11-51*.

IATA. 2014. "Economic Performance of the airline industry." 2014 End-Year Report. www.iata.org/economics. (accessed April 15, 2015)

Jenkins, James Joseph. September 2011. *The Evolution of Passenger Accessibility in the US Airline Industry, 1980-2010.* Master Thesis. Massachusetts Institute of Technology.

Kahn, Alfred E. 1988. "Surprises of Deregulation." *American Economic Review* 78(2): 316-322.

Kim, E. Han, and Vijay Singal. 1993. "Mergers and Market Power: Evidence from the Airline Industry." *The American Economic Review* 83(3): 549-569.

Kole, Stacey R., and Kenneth M. Lehn. 1999. "Deregulation and the Adptation of Governance Structure: the Case of the U.S. Airline Industry." *Journal of Financial Economics* 52(1): 79-117.

Liu, Zinan, and E.L. Lynk. 1999. "Evidence on Market Structure of the Deregulated US Airline Industry." *Applied Economics* 31(9): 1083-1092.

LoPucki, Lynn M. 2014. "UCLA-LoPucki Bankruptcy Research Database."

MIT Global Airline Industry Program. n.d. “Airline Data Project.” Cambridge: Massachusetts Institute of Technology. http://web.mit.edu/airlinedata/www/default.html. (accessed April, 23 2015)

Morrison, Steven A., and Clifford Winston. 1990. "The Dynamics of Airline Pricing and Competition." *American Economic Review* 80(2): 389-393.

Nesheim, Lars. "Hedonic Prices." The New Palgrave Dictionary of Economics. Second Edition. Eds. Steven N. Durlauf and Lawrence E. Blume. Palgrave Macmillan, 2008. The New Palgrave Dictionary of Economics Online. Palgrave Macmillan. http://www.dictionaryofeconomics.com/article?id=pde2008_H000169doi:10.1057/9780230226203.0720. (accessed September, 27 2015)

Nordenflycht, Andrew von, and Thomas A. Kochan. 2003. "Labor Contract Negotiations in the Airline Industry." Monthly Labor Review, U.S. Bureau of Labor Statistics. http://www.bls.gov/mlr/2003/07/art3full.pdf. (accessed April, 12 2015)

O'Kelly, Morton E. 1998. "A Geographer's Analysis of Hub-and-Spoke Networks." *Journal of Transport Geography* 6(3): 171-186.

Perotti, Enrico C., and Kathryn E. Spier. 1993. "Capital Structure as a Bargaining Tool: The Role of Leverge in Contract Renegotiation." *American Economic Review* 83(5): 1131-41.

Pigou, Arthur C. 1920. *The Economics of Welfare.* London: Macmillan.

Rubin, Eran, and Benny Mantin. 2012. "Tabulated Decision Aids and Airfare Pricing." *Electronic Commerce Research and Applications* 11(2): 159-170.

Schwieterman, J. 1995. "A hedonic price assessment of airline service quality in the US." *Transport Reviews* 15(3): 291-302.

Shaw, Shih-Lung, and Russell L Ivy. 1994. "Airline Mergers and Their Effect on Network Structure." *Journal of Transport Geography* 2(4): 234-246.

Smith, Mark, and Brian Pearce. 2008. “Air Travel Demand.” Switzerland: IATA. http://www.iata.org/whatwedo/documents/economics/air_travel_demand.pdf. (accessed October, 31 2015)

Smyth, Mark, and Brian Pearce. 2006. “Airline Cost Performance.” IATA Economics Briefing.

Stavins, Joanna. 2001. Price “Discrimination in the Airline Market: The Effect of Market Concentration.” *The Review of Economics and Statistics* 83(1): 200-202.

Steen, Frode, and Lars Sørgard. 2002/1. "Price Discrimination in the Airline Industry." Report Submitted to the Nordic Competition Authorities, Norwegian School of Economics and Business Administration (NHH), Bergen. http://fagbokforlaget.no/filarkiv/price-discrimination.pdf. (accessed October, 31 2015)

Steven, Adams B., Yan Dong, and Martin Dresner. 2011. "Linkages Between Customer Service, Customer Satisfaction and Performance in the Airline Industry: Investigation of Non-Linearities and Moderating Effects." *Transportation Research Part E* 48(2012): 743-754.

Szwarc, P. 2005. *Researching Customer Satisfaction and Loyalty: How to Find out What People Really Think.* London: Kogan Page.

Thornicroft, Kenneth W. 1989. "Airline Deregulation and the Airline Labour Market." *Journal of Labor Research* 10(2): 163-181.

Trapani, John M., and Martin Gaynor. 1994. "Quantity, Quality and the Welfare Effects of US Airline Deregulation." *Applied Economics* 26(5): 543-550.

Tsikriktsis, N. 2007. "The Effect of Operational Performance and Focus on Profitability." *Journal of Operational Management* 9(4): 506-517.

U.S.D.O.J. 2014. “United States Department of Justice.” http://www.justice.gov/publications/resources. (accessed June, 10 2015)

U.S.D.O.T. 2006. “United States Department of Transportation.” http://www.transtats.bts.gov/. (accessed February, 18 2015)

U.S.D.O.T. 2014. “United States Department of Transportation.” http://www.transtats.bts.gov/. (accessed April, 26 2015)

U.S.D.O.T 2014. “United States Department of Transportation.” http://www.dot.gov/. (accessed June, 13 2015)

United Airlines, Inc. 2003. "FORM 10-K For the Fiscal Year Ended December 31, 2012." Annual Report. http://www.sec.gov/Archives/edgar/data/100517/000104746908001951/a2182991z10-k.htm. (accessed October, 16 2015)

US Airways Group, Inc. 2003. "FORM 10-K For the Fiscal Year Ended December 31, 2002." Annual Report. http://www.getfilings.com/o0000928385-03-000865.html. (accessed October, 16 2015)

US Airways Group, Inc. 2005. "FORM 10-K For the Fiscal Year Ended December 31, 2004." Annual Report. http://www.getfilings.com/o0001193125-05-038926.html. (accessed October, 17 2015)

Vasigh, Bijan, Ken Fleming, and Thomas Tacker. 2008. *Introduction to Air Transport Economics : From Theory to Applications.* England: Ashgate Publishing Limited.

Waguespack, Blaise P., and Dawna L. Rhoades. 2014. "Twenty Five Years of Measuring Airline Service Quality or Why is Airline Service Quality Only Good When Times are Bad?" *Research in Transportation Business & Management* 10: 33-39.

Williams, George. 1993. *The Airline Industry and the Impact of Deregulation.* Brookfield, VT: Ashgate.

Winston, Clifford. 2013. "On the Performance of the U.S. Transportation System: Caution Ahead." *Journal of Economic Literature* 51(3): 773-824.

Wittman, Michael D., and William S. Swelbar. 2013. *Evolving Trends of U.S. Domestic Airfares.* Cambridge: MIT International Center for Air Transportation (ICAT).

Wooldridge, Jeffrey M. 2009. *Introductory Econometrics: A Modern Approach.* 5th Edition. Mason: South-Western.

Zhang, Gaiyan. 2010. "Emerging from Chapter 11 Bankruptcy: Is It Good News or Bad News for Industry Competitors?" *Financial Management* 39(4): 1719-1742.

Zhang, Shengrun ,Ben Derudder, and Frank Witlox. 2013. "The Impact of Hub Hierarchy and Market Competition on Airfare Pricing in U.S. Hub-to-Hub Markets." *Journal of Air Transport Management* 32(1): 65-70.